Module-Pain Medicine

(Management of Chronic Pain Syndrome)

DEPARTMENT OF MEDICAL HEALTH AND FAMILY WELFARE,
GOVERNMENT OF UTTAR PRADESH

Module-Pain Medicine

(Management of Chronic Pain Syndrome)

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MESSAGE

Shri Brajesh Pathak

Hon'ble Deputy Chief Minister
Hon'ble Minister of
Medical Health and Family Welfare
Department
Government of Uttar Pradesh

Pain is unfortunately something most of our population suffer from and may stem from various conditions in fact more than one-third of the adult population in India suffers from some kind of chronic pain – pain that lasts longer than 3 months. This Pain is one of the most disabling problems with significant health, social, and economic repercussions.

Untreated back and neck pain, shoulder pain, arthritis, neuralgic pain, fibromyalgia, migraine and cancer related pain accounts for majority of pain cases.People have different thresholds for pain and so pain itself can be highly subjective and challenging for the sufferer to gauge, explain or make other people understand. It certainly impacts many people on a daily basis, potentially affecting even the simplest of daily activities. Therefore, it is desirable that state develops tailored made Continuing Medical Education (CME) modules to caret the medical needs specific to its inhabitants.

Considering the above stated facts, CME on chronic pain syndrome and pain medicineis a minimum standard practice to be offered during life time. Through this, Medical Officers in Provincial Health & Medical Services in Uttar Pradesh, will be exposed to much needed training, thus ensuring that pain management is crucial and this could be achieved through staggered approaches.

I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts to continue developing such module on CME for the benefit of Medical Officers in Provincial Health & Medical Services in Uttar Pradesh that ultimately benefit their patients too.

(Brajesh Pathak)


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MESSAGE

Shri Mayankeshwar Sharan Singh

Hon'ble State Minister
Medical Health and Family Welfare
Department
Government of Uttar Pradesh

Unrelieved pain has major negative effects on individual's life and is associated with many physical, psychological and social changes which become a major health problem. Chronic pain can be excruciating and totally incapacitating. Nowadays, chronic pain is now recognized as a disease in itself and not just a symptom.

Pain Medicine is a comprehensive approach for easing the suffering and improving the quality of life of those living with long standing pain. This involves a spectrum of treatment protocols starting from simple medications to varied advanced interventional procedures supported by counselling and rehabilitative measures. Chronic pain syndrome could cause joint pain, back pain, knee pain, neck pain, arthritis, migraine, sport injury and ankle heel pain lead to intellectual impairment, poor growth, degenerative diseases associated with aging and higher morbidity and mortality.

In order to further strengthen the pain management, it helps in establishing a range of curative and preventive health care services, Continuing Medical Education (CME) on chronic pain syndrome and pain medicine, for Medical Officers in Provincial Health & Medical Services in Uttar Pradesh is one of the good interventions in state's growth.

I am happy that the team at State Institute of Health & Family Welfare, Uttar Pradesh along with the experts from the field, have come up with such an intensified and detailed CME for Medical Officers in Provincial Health & Medical Services in Uttar Pradesh.

I wish team at SIHFW success in their endeavors of aiding an improved health service through such CME onchronic pain syndrome and pain medicine.

(Mayankeshwar Sharan Singh)


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MESSAGE

Dr. Deepa Tyagi

Director General (Training)
Medical, Health & Family Welfare
Government of Uttar Pradesh

Pain is a major public health challenge globally. One in every five adults worldwide suffers from pain, and one in every ten adults is diagnosed with chronic pain each year. Pain can broadly be categorized into two types i.e. acute and chronic often distinguished based on duration. The World Health Organization recognized pain as a distinct disease in its 11th revision of the International Classification of Diseases (ICD-11).

Continuing Medical Education (CME) on pain syndromes and pain medicine is an effort in improving the minimum standard of curative and preventive care to all who are need and to alleviate the chronic pain status of population.

Considering the above stated facts, this module on Continuing Medical Education (CME) on chronic pain syndromes and pain medicine, for Medical Officers in Provincial Health & Medical Services in Uttar Pradesh, State Institute of Health & Family Welfare, Uttar Pradesh with the help of Subject Matter Experts has provided a comprehensive, coherent and insightful module for Medical Officers to deal with pain management.

I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

(Dr. Deepa Tyagi)


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FOREWARD

Shri Partha Sarthi Sen Sharma

Principal Secretary
Department of
Medical Health and Family Welfare
Government of Uttar Pradesh

Pain is often ignored, under-reported, and mismanaged. The worldwide prevalence of pain in the adult population is 20%. As per the World Health Organization (WHO), 15%–17% of Indians suffer from arthritis, 30% have chronic pain, and 25%–30% experience backache. Pain is the most common symptom encountered in cancer and palliative care unit.

One-third of patients referred to a tertiary cancer center in India suffer with severe pain. About 70%–80% of cancer patients suffer from moderate to severe pain in their terminal stage. Untreated chronic pain can result in unemployment, disrupted marital status, depression, insomnia, social isolation, financial issues, and loss of self-esteem and have a negative impact on activities of daily living and overall quality of life.

Pain is a silent epidemic affecting both the family as well as caregivers. Therefore, timely referral of chronic resistant pain to a pain specialist is important but is often delayed.

Considering the above stated facts, this module on Continuing Medical Education (CME) on chronic pain syndromes and pain medicine, for Medical Officers in Provincial Health & Medical Services in Uttar Pradesh, State Institute of Health & Family Welfare, Uttar Pradesh with the help of Subject Matter Experts has provided a comprehensive, coherent and insightful module for Medical Officers to deal with pain management.

I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

(Partha Sarthi Sen Sharma)


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MESSAGE

Dr. Brijesh Rathor

Director General
Family Welfare, Uttar Pradesh

Pain relief is a basic human right. It has been termed as the fifth vital sign and should be routinely assessed along with pulse rate, blood pressure, temperature, and respiratory rate. While other vitals can be monitored and managed efficiently by most physicians, the careful assessment, and management of pain require a trained pain specialist.

Dealing with the biopsychosocial problems of pain is a challenging task. Despite the critical role of pain medicine in the well-being of the patient, this specialty is under-utilized and under-appreciated.

Continuing Medical Education (CME) on pain syndromes and pain medicine is an effort in improving the minimum standard of curative and preventive care to all who are need and to alleviate the chronic pain status of population. Continuing Medical Education (CME) on pain syndromes and pain medicine is an effort in improving the minimum standard of curative and preventive care to all who are need and to alleviate the chronic pain status of population.

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I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

(Dr. Brijesh Rathor)


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MESSAGE

Dr. Shailesh Kumar Srivastava

Director General (Training),
Medical and Family Welfare,
Uttar Pradesh

Pain medicine is the specialized branch of healthcare that deals with providing comprehensive management of acute, chronic and cancer pain, using multidisciplinary strategies that include pharmacological, interventional, and psychological approaches. The main goal of this specialty is to improve the overall quality of life and the functional status of the patient with pain.

In developed nations, physicians with a variety of backgrounds can be trained in "pain medicine," but its proper definition and which branch or physician is responsible for it is still unclear in India.

Continuing Medical Education (CME) on chronic pain syndromes and pain medicine is an effort in improving the minimum standard of curative and preventive care to all who are need and to alleviate the chronic pain status of population.

Considering the above stated facts, this module on Continuing Medical Education (CME) on chronic pain syndromes and pain medicine, for Medical Officers in Provincial Health & Medical Services in Uttar Pradesh, State Institute of Health & Family Welfare, Uttar Pradesh with the help of Subject Matter Experts has provided a comprehensive, coherent and insightful module for Medical Officers to deal with pain management.

I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

(Dr. Shailesh Kumar Srivastava)


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ACKNOWLEDGEMENT

Dr. Rajaganapathy R.
Director
State institute of
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Government of Uttar Pradesh

A pain clinic fulfills the unmet needs of patients in the current medical system and helps patients to deal with their chronic and difficult pain that has not responded to the conventional treatments. It provides a holistic approach and deals with all the components of pain-physical, social, psychological, financial, cognitive, and vocational aspects.

Pain clinics should be able to utilize a vast range of applications, ranging from simple outpatient department medical management to interventional modalities. Anatomically, pain may present in any location from head to toe, and can have varying etiologies and present as headache, postherpes zoster, post-stroke pain spasticity, trigeminal neuralgia, neck pain, cancer pain, neuropathic pain, shoulder pain, chronic abdominal pain, back pain, sciatica, herniated disc, and failed back surgery syndrome.

Multidisciplinary integration of the pain clinic requires psychology, anesthesiology, neurology, neurosurgery, rheumatology, orthopedics, interventional radiology, palliative medicine, and oncology. It requires back up support from physiotherapy, nursing, clinical psychology, occupational therapy, behavior science, and physical medical rehabilitation being represented.

Continuing Medical Education (CME) on chronic pain syndromes and pain medicine, for Medical Officers in Provincial Health & Medical Services in Uttar Pradesh is an effort in the right direction where Medical Officers will be equipped with comprehensive, coherent material and insightful intervention.

I acknowledge the efforts by Faculties at State Institute of Health & Family Welfare, Uttar Pradesh and Prof. Anurag Agarwal, RMLIMS,Lucknow and his team in developing an excellent module for Medical Officers to deal with chronic pain.

I wish the team of State Institute of Health & Family Welfare, Uttar Pradesh and subject matter experts for such a commendable job.

(Dr. Rajaganapathy. R)


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Chapter 1 Chronic Pain Syndromes and 'Pain Medicine'

Any pain and anywhere in the body, that lasts for over three months is defined as 'Chronic Pain'. The pain can be there all the time, or it may come and go. Chronic pain can interfere with your daily activities, such as working, having a social life and taking care of yourself or others, also it can lead to depression, anxiety and trouble sleeping.

Prevalence of chronic pain in India and World:

Chronic Pain is a socio-economic health issue affecting the whole world. Some statistics are as follows:

- Prevalence of Chronic Pain is about 19.3% which means that **every fifth Indian is suffering from chronic pain.**

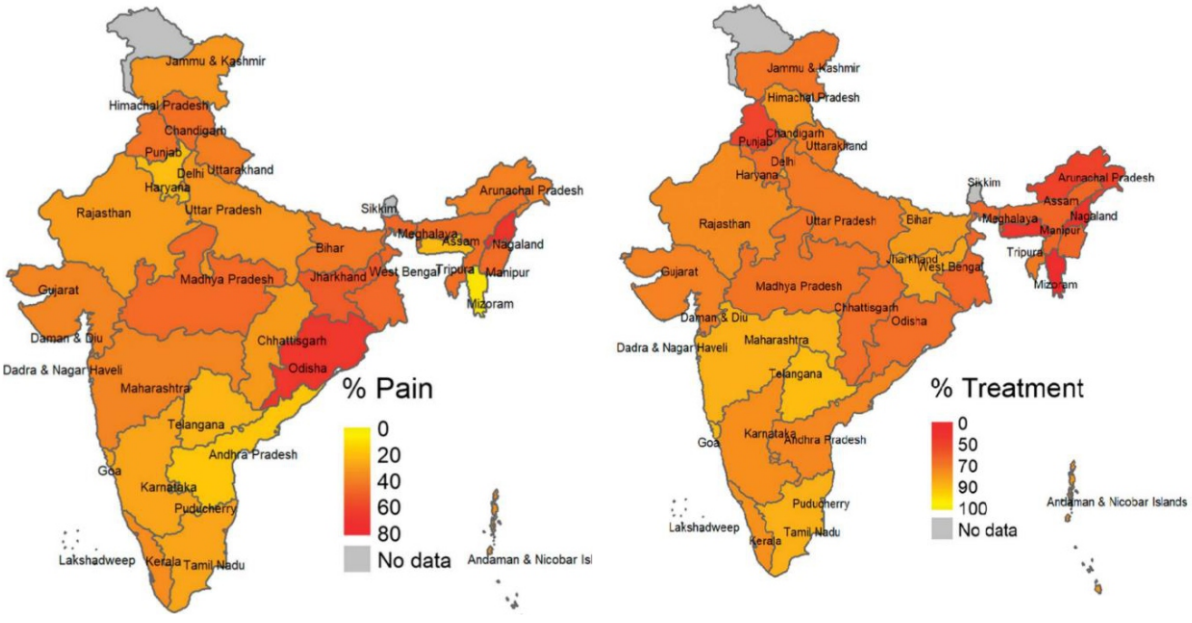


Figure 1-Mohanty SK, Ambade M, Upadhyay AK, Mishra RS, Pedgaonkar SP, Kampfen F, O'Donnell O, Maurer J. Prevalence of pain and its treatment among older adults in India: a nationally representative population-based study. Pain. 2023 Feb 1;164(2):336-348.

- Prevalence is higher in females (25.2%).
- Prevalence increases steeply beyond the age of 65 years. **Up to 30% of adults over 65 years report suffering from chronic pain.**
- Prevalence of chronic **Cancer Pain is 55%** for those in active therapy and up to 70-80% for those with advanced disease.
- There is a significant impact of chronic pain on work and daily functions.
- The Cost of Chronic Pain
    - **Chronic pain costs the US up to $635 billion every year (**direct health care costs and indirect costs due to lower productivity). This is more than the annual cost of cancer, heart disease and diabetes.
    - Lower- and middle-income countries suffer from much higher rates of chronic pain than richer countries.
- **Between 2003 and 2014, the percentage of people committing suicide due to chronic pain rose from 7.4% to 10.2%.**

Why 'Pain Medicine', an emerging super-specialty of Anaesthesiology, is required-

- Conventional treatment of chronic pain is either through major surgeries or long-term intake of drugs including narcotic drugs.
- Surgical treatment comes with high costs, prolonged hospitalization, follow-up care and loss of productivity.
- Narcotics (opioid) drugs, the mainstay of pain treatment, are associated with the very real danger of addiction. In America, thousands of citizens are losing their lives due either to overdoses or abuse of opioid drugs every year.

- Chronic Pain treatment is complex and can cause more harm than good if it is not provided by aphysician with specific training in pain medicine.

- **Pain Medicine as a super-specialty of anesthesiology has the potential to deal with the menace of Chronic Pain in the society, as the Pain Physician (Anesthesiologists) are specifically trained to diagnose and treat various chronic pain conditions.**

- **'Minimally Invasive Pain & Spine Interventions (MIPSI), the niche of Pain Medicine has the potential to decrease the need of drugs required to treat chronic pain and associated side effects** mentioned above and at the same time bringing down the cost of treatment by more than 30%.

Chronic pain is one of the most common reasons why someone seeks medical care across the world. Approximately 22-29% percent adults are suffering from chronic pain in India; likewise, 25% of adults in the United States experience chronic pain. Elderly and women suffer with more chronic pain.

Difference between chronic and acute pain:

Acute pain happens when you get hurt, such as experiencing a simple cut to your skin or a broken bone. It doesn't last long, and it goes away after your body heals from whatever caused the pain; so in sense 'Acute Pain is a Friend to Human Kind, as it suggests that something is wrong', while chronic pain continues long after you recover from an injury or illness. Sometimes it even happens for no obvious reason; so Chronic Pain itself become a disease.

Classification of chronic pain:

Chronic pain patients can have more than one type of pain. For example, a patient with chronic back pain may also have fibromyalgia. A significant percentage of patients suffer from a major depressive and generalized anxiety disorder. Over 67% of patients with chronic pain suffer from a comorbid psychiatric disorder.

Neuropathic, nociceptive, musculoskeletal, inflammatory, psychogenic, and mechanical are the common types of chronic pain syndromes.

Neuropathic Pain- chronic pain due to injury to peripheral or central nervous system

- Peripheral neuropathic pain such as post-herpetic neuralgia or diabetic neuropathy
- Central neuropathic pain - cerebral vascular accident sequels, spinal cord injury and central pain

Nociceptive Pain

- Pain due to actual tissue injuries such as burns, bruises, or sprains

Musculoskeletal Pain

- Back pain, joint pain
- Myofascial pain

Inflammatory Pain

- Autoimmune disorders (rheumatoid arthritis)
- Infection

Psychogenic Pain

- Pain caused by psychologic factors such as headaches or abdominal pain caused by emotional, psychological, or behavioral factors

multiple locations, requiring multimodal treatment or Minimally Invasive Pain & Spine Interventions (MIPSI) to manage chronic pain. Pain may also worsen concurrent depression; thus, the treatment of pain has demonstrated to improve the responses to the treatments for depression. There are multiple pharmacological, adjunct, nonpharmacological, and interventional treatments for chronic, severe, and persistent pain.

Pharmacological options for chronic pain:

- Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), acetaminophen, and aspirin
- Weak opioids such as tramadol and codeine
- Strong Opioids- Morphine and Fentanyl
- Antiepileptic Drugs- Gabapentin and Pregabalin
- Antidepressants- Tricyclic antidepressants like amitriptyline and SNRI's like Duloxetine
- Topical analgesics,
- Muscle relaxers, N-methyl-d-aspartate (NMDA) receptor antagonists, and alpha 2 adrenergic agonists are also possible pharmacological therapies.

Treatment is typically done in a stepwise fashion to reduce the duration and dosage of opioid analgesics.

Chronic musculoskeletal pain is nociceptive pain. First-line therapy would be acetaminophen or NSAIDs. Both are effective for osteoarthritis and chronic back pain. NSAIDs are relatively contraindicated in patients with a history of heart disease or myocardial infarction, renal disease, or patients on anticoagulation or with a history of ulcers. There is limited evidence of which NSAID to use over another. One NSAID pharmacological agent may have a limited effect on a patient's pain while another may provide adequate pain relief.

Opioids are considered a second-line option; however, they may be warranted for pain management for patients with severe persistent pain or cancer pain. Opioid therapy should only start with extreme caution for patients with chronic musculoskeletal pain. Side effects of opioids are significant and frequent and may include opioid-induced hyperalgesia, constipation, dependence, and sedation. For chronic musculoskeletal pain, they are not superior to nonopioid analgesics.

For neuropathic pain, a combination of multiple pharmacological therapies is often necessary. The initial treatment of neuropathic starts with gabapentin or pregabalin. They are indicated for post-herpetic neuralgia, diabetic neuropathy, and mixed neuropathy while carbamazepine is 'Drug of Choice' in the treatment of trigeminal neuralgia and also useful in other types of chronic neuropathic pain.

Antidepressants such as 'serotonin and norepinephrine reuptake inhibitors (SNRI)' or 'tricyclic antidepressants (TCA)' are beneficial in the treatment of neuropathic pain, central pain syndromes, and chronic musculoskeletal pain. The serotonin-norepinephrine reuptake inhibitor (SNRI) duloxetine and venlafaxine are useful in treating chronic pain, osteoarthritis, and the treatment of fibromyalgia.

Less than 50% of patients with neuropathic pain will achieve adequate pain relief with a single agent, so combination is more useful.

Adjunctive topical agents such as topical lidocaine and capsaicin are a useful treatment for neuropathic pain and allodynia as in postherpetic neuralgia. Topical NSAIDs have been shown to improve acute musculoskeletal pain.

The use of cannabis is also an area of interest in pain research. There is some evidence that medical marijuana can be an effective treatment of neuropathic pain, while the evidence is currently limited in treating other types of chronic pain.

Interventional techniques like 'Minimally Invasive Pain & Spine Interventions (MIPSI)' of Pain Medicine speciality are very useful in the treatment of chronic pain.

- Spinal cord stimulation
- Epidural neuroplasty
- Radiofrequency Treatment,
- Botulinum toxin injections,
- Nerve MIPSIs,
- trigger point injections
- Intrathecal pain pumps are some of the procedures and techniques commonly used to combat chronic pain.

Non-pharmacological options:

- Heat and cold therapy,
- Cognitive behavioural therapy and relaxation therapy,
- Biofeedback,
- Group counselling and ultrasound stimulation
- Acupuncture,
- aerobic exercise, chiropractic, physical therapy, osteopathic manipulative medicine, occupational therapy, and TENS units.

For refractory pain, implantable intrathecal delivery systems are an option for patients who have exhausted all other options. Spinal cord stimulators are an option for patients with chronic pain who have failed other conservative approaches.

Spinal cord stimulators are indicated for-

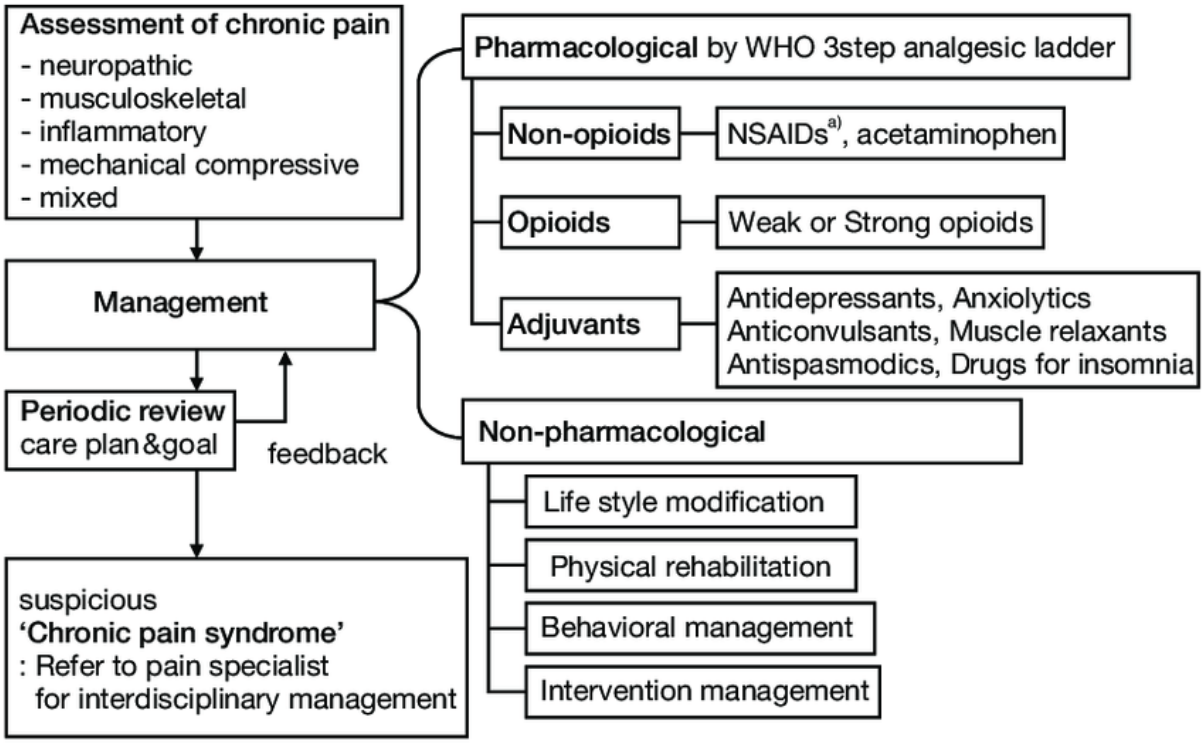
- Failed back surgery

- Complex regional pain syndrome,
- Painful peripheral vascular disease
- Intractable angina,
- Painful diabetic neuropathy
- Visceral abdominal and Perineal pain.

Chronic pain correlates with several severe complications, including severe depression and suicide attempts and ideation. The lifetime prevalence for chronic pain patients attempting suicide attempt was shown to be between 5% and 14%; suicidal ideation was approximately 20%. These complications often require psychiatric intervention and advanced pharmacological or interventional therapies. A team approach is an ideal way to limit the effects of chronic pain and its complications.

- Evaluation of a patient with acute pain by the primary care provider to prevent the progression of chronic pain is the recommended first step.
- Conservative chronic pain management should begin when symptoms are mild or moderate, including physical therapy, cognitive-behavioral therapy, and pharmacological management.
- If symptoms worsen on follow up or if there is a concerning escalation of pharmacological therapy such as with opioids, a referral to a Pain Physician merit consideration.
- If the patient has exhausted various pharmacological and nonpharmacological treatment options, ‘minimally invasive pan & spine interventions’ (MIPSI) should be considered.

- If the patient expresses concern for suicidal ideation or plan at any time, an emergent psychiatric team should evaluate the patient immediately.



[a] NSAIDs; Nonsteroidal Anti-imflammatory Drugs.

Figure 2 Algorithm for Chronic Pain Syndromes

Chapter 2- What is ‘Pain Medicine’ and What does a Pain Physician’ do to manage chronic pain

Pain Medicine, also known as pain management or pain relief medicine, is a medical super- specialty of Anaesthesiology; focused on the diagnosis, treatment, and management of chronic pain. Pain can arise from various sources, such as injury, surgery, medical conditions, or chronic conditions, and it can manifest in different ways, including acute pain (short-term) and chronic pain (long-term).

The primary goal of Pain Medicine and Pain Physicians is to alleviate or reduce pain, improve a patient's quality of life, and restore their ability to function effectively.

It's important to note that Pain Medicine is not only about providing immediate relief but also about addressing the underlying causes of pain and helping patients achieve long-term pain management and improved quality of life. Additionally, due to concerns about the misuse and addiction potential of opioid medications, there is a growing emphasis on multimodal pain management approaches that minimize the use of opioids whenever possible and focus on alternative pain management strategies. Patients with chronic pain are often managed through a personalized, holistic approach tailored to their specific needs.

Pain Medicine plays a significant role in the management of chronic pain, which is characterized by persistent pain that lasts for an extended period, typically longer than three to six months. Chronic pain can result from various underlying conditions, such as injuries, illnesses, nerve damage, or ongoing medical conditions. Managing chronic pain effectively is crucial to improving a patient's quality of life and reducing the impact of pain on their daily activities.

The common causes of pain that pain medicine specialists (Pain Physicians) address:

1. **Injuries:** Chronic pain such as CRPS (complex regional pain syndrome)can result from various types of injuries, such as fractures, sprains, strains, contusions, or dislocations.
2. **Musculoskeletal Conditions:** Conditions like osteoarthritis, rheumatoid arthritis, and fibromyalgia can cause chronic joint and muscle pain.
3. **Neuropathic Pain:** Nerve damage or dysfunction can lead to neuropathic pain, which includes conditions like diabetic neuropathy, post-herpetic neuralgia (shingles), and trigeminal neuralgia.
4. **Back Pain:** This can be caused by issues such as herniated discs, spinal stenosis, degenerative disc disease, or muscle strains.
5. **Headaches and Migraines:** Headaches, including tension-type headaches and migraines, are common causes of head and neck pain.
6. **Cancer:** Cancer itself and cancer treatments, such as chemotherapy and radiation therapy, can cause pain in cancer patients.

7. **Inflammatory Conditions:** Conditions like inflammatory bowel disease (IBD), rheumatoid arthritis, and systemic lupus erythematosus can cause chronic pain due to inflammation.

8. **Neck and Shoulder Pain:** Conditions like rotator cuff injuries, cervical disc herniation, or cervical radiculopathy can lead to pain in the neck and shoulders.

9. **Pelvic Pain:** Conditions like endometriosis, pelvic inflammatory disease (PID), or interstitial cystitis can cause chronic pelvic pain.

10. **Head and Facial Pain:** Conditions such as temporomandibular joint disorder (TMJ), sinusitis, or dental issues can lead to head and facial pain.

11. **Post-Surgical Pain Syndrome:** Some individuals experience chronic pain after surgical procedures, known as post-surgical pain syndrome.

12. **Psychological Factors:** Emotional and psychological factors, including stress, anxiety, and depression, can exacerbate or contribute to chronic pain conditions.

13. **Other Medical Conditions:** Pain can also be a symptom of various other medical conditions, such as kidney stones, gallbladder disease, peptic ulcers, and more.

14. **Autoimmune Disorders:** Conditions like multiple sclerosis or systemic lupus erythematosus can lead to nerve pain and other types of pain.

15. **Traumatic Injuries:** Severe accidents, such as car crashes or falls, can result in significant pain due to fractures, internal injuries, or damage to soft tissues.

16. **Vascular Issues:** Conditions like peripheral artery disease (PAD) or deep vein thrombosis (DVT) can cause pain related to poor blood circulation.

It's essential to identify the underlying cause of pain to determine the most appropriate treatment and management strategies. Pain medicine specialists use a combination of diagnostic tools, physical exams, and patient history to diagnose the cause of pain and develop tailored treatment plans that may include medications, physical therapy, interventions, and other therapies to alleviate pain and improve a patient's quality of life.

Here are some ways in which Pain Medicine is applied in the context of chronic pain:

1. **Medications:** Pain medications, including over-the-counter (OTC) drugs like acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs), as well as prescription medications like opioids, muscle relaxants, and antidepressants, may be used to manage pain. The choice of medication depends on the type and severity of pain.

2. **MIPSIs (Minimally Invasive Pain & Spine Interventions):** Some patients may benefit from interventional procedures, such as targeting nerves, epiduralneuroplasty, Intra-articular joint MIPSIs, or spinal cord stimulation, to target specific pain generators or provide relief.

3. **Physical Therapy:** to improve patient’s physical function, mobility, and strength through exercises and techniques designed to reduce pain and promote healing.

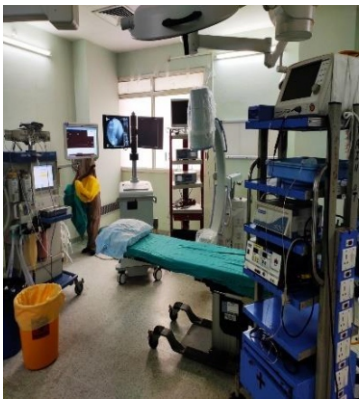
4. **Psychological and Behavioural Approaches:** can help patients manage chronic pain by addressing the psychological and emotional aspects of pain through techniques like cognitive-behavioural therapy (CBT) and relaxation techniques.

5. **Alternative Therapies:** Complementary and alternative therapies like acupuncture, chiropractic care, and massage may be used in conjunction with traditional medical treatments to manage pain.

6. **Lifestyle Modifications:** Lifestyle changes, including diet, exercise, and stress management, can play a crucial role in managing chronic pain and improving overall well-being.

7. **Pain Assessment and Monitoring:** Pain medicine specialists aka Pain Physicians assess the nature and severity of pain and monitor patients' progress to adjust treatment plans as needed.

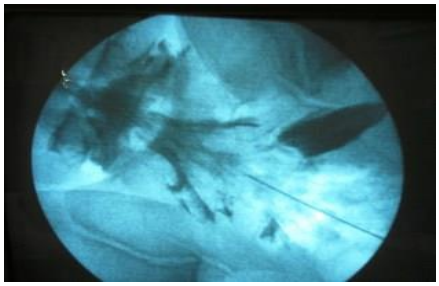
MIPSIs (Minimally Invasive Pain & Spine Interventions) in new super-specialty of 'Pain Medicine' refer to medical procedures or techniques that are used to diagnose, treat, or manage various types of pain. These interventions are typically performed by pain medicine specialists 'Pain Physicians', who are primarilyAnesthesiologists with special dedicated training in Pain Medicine. All these MIPSIs are done with complete asepsis in a dedicated Pain Medicine Operation Theatre.



The choice of intervention depends on the underlying cause of pain and the specific needs of the patient. Here are some common MIPSIs (Minimally Invasive Pain & Spine Interventions) used in pain medicine:

1. **Diagnostic and Prognostic MIPSI:**It involves the delivery of small precise amount of anaesthetic agent or medication directly into or around a nerve or group of nerves that are transmitting pain signals. This can temporarily cease or reduce pain sensation. Examples include epidural steroids, facet joint MIPSI, and sympathetic (Stellate/ Celiac/ superior hypogastric MIPSI).

2. **Epidural MIPSIs:**They are commonly used to provide pain relief for conditions affecting thespine, such as herniated discs or spinal stenosis. Medication is injected into the epidural space surrounding the spinal cord to reduce inflammation and alleviate pain.



3. **Facet Joint Diagnostic MIPSI:** Facet joints are small joints in the spine that can become a source of pain due to arthritis or injury. Diagnostic MIPSI into these joints can provide diagnostic information and pain relief.

4. **Radiofrequency Ablation (RFA):** RFA is a procedure in which heat generated by radiofrequency waves is used to disrupt the function of nerves that transmit

pain signals. It is often used for chronic pain conditions like arthritis or facet joint pain.

5. **Spinal Cord Stimulation (SCS):** SCS involves the implantation of a device that delivers electrical impulses to the spinal cord to interfere with pain signals and provide pain relief. It's commonly used for chronic back and leg pain.

6. **Intrathecal Pump Implantation:** An intrathecal pump is a device surgically implanted under the skin to deliver medication directly into the spinal fluid, providing targeted pain relief for chronic conditions.

7. **Joint Injections:** Injections of PRP (Platelet Rich Plasma) and Stem Cells into specific joints, such as the knee, hip, or shoulder, may be performed to reduce inflammation and alleviate pain associated with conditions like osteoarthritis.

8. **Dry Needling for Trigger Point:** Trigger points are tight, knotted areas within muscles that can cause localized pain. Dry Needling MIPSIcan help alleviate pain in these areas.

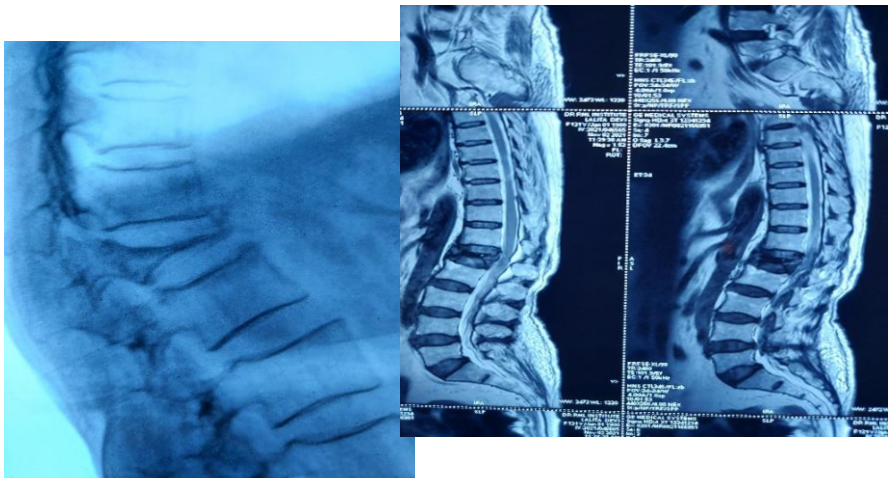
9. **Cryoablation:** Cryoablation involves the use of extreme cold to freeze and destroy nerves responsible for pain. It is used in conditions like chronic knee or hip pain.

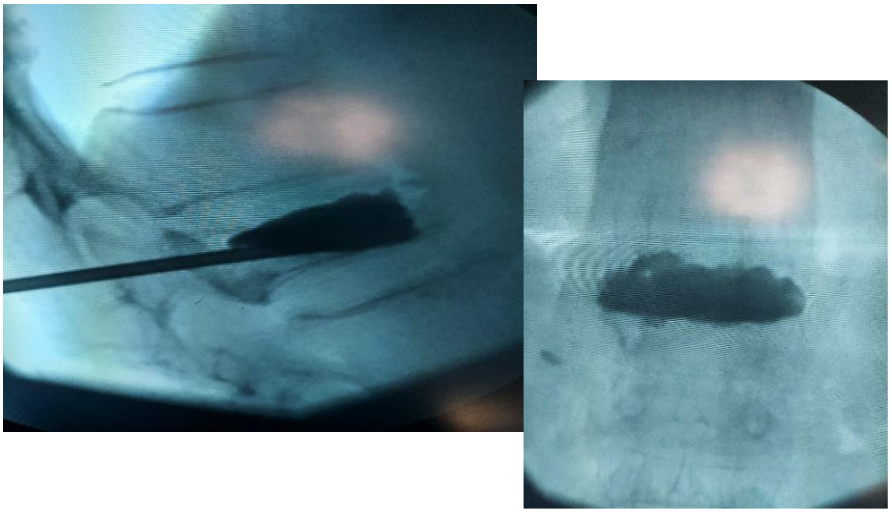
10. **Neurolysis and Rhizolysis:** These MIPSIs are used to permanently disrupt nerve function. For example, a celiac rhizolysis might be used to alleviate pain in advanced gall bladder cancer patients when other treatments have been ineffective.

11. **Percutaneous Disc Decompression:** This minimally invasive procedure involves the removal or ablation of disc material in the spine to relieve pressure on nerves and reduce pain.

12. **Percutaneous Spine Endoscopy-** a percutaneous and minimally invasive method to treat various spine conditions such as prolapsed disc, lumbar canal stenosis.

13. **Percutaneous Balloon Kyphoplasty and Vertebral Stenting System-** a percutaneous and minimally invasive method to treat vertebral compression fractures.





14. **Acupuncture and Dry Needling:** These techniques involve the insertion of thin needles into specific points on the body to relieve pain and improve function. Acupuncture is often used for various pain conditions, while dry needling targets muscle trigger points.

It's important to note that these interventions can have varying levels of effectiveness, and the choice of which one to use depends on the patient's diagnosis, the location and severity of pain, and other individual factors. Before undergoing any interventional procedure, patients should have a thorough evaluation and discuss the potential risks and benefits with their Pain Physicians. Additionally, these interventions are often part of a comprehensive pain management plan that may also include medications, physical therapy, and psychological support.

What are the benefits of MIPSIs (Minimally Invasive Pain & Spine Interventions) in Pain Medicine-

MIPSIs in pain medicine can offer several benefits for individuals suffering from acute or chronic pain. These procedures and techniques are often used to diagnose, treat, or manage pain, and their effectiveness depends on the specific intervention and the underlying cause of the pain. Here are some of the potential benefits of interventions in pain medicine:

1. **Pain Relief:** The primary goal of most interventions is to provide pain relief. These procedures can target the source of pain, interrupt pain signals, or reduce inflammation, leading to a significant reduction in pain intensity.

2. **Improved Functionality:** Pain can significantly limit a person's ability to perform daily activities, work, or engage in recreational pursuits. Successful pain interventions can restore functionality and improve the quality of life by enabling individuals to resume their normal activities.

3. **Reduced Medication Dependency:** In some cases, interventions can reduce the need for long-term medication use, particularly opioids or other pain-relieving drugs that may have undesirable side effects or the potential for addiction.

4. **Diagnosis and Localization:** Certain interventions, such as diagnostic and prognostic MIPSIs, can help pain physicians pinpoint the exact source of pain. This diagnostic benefit can guide further treatment and allow for more targeted approaches.

5. **Minimized Side Effects:** Compared to systemic medications, MIPSIs often have fewer systemic side effects because they deliver medications or treatment directly to the affected area, reducing the risk of side effects affecting the entire body.

6. **Improved Psychological Well-Being:** Chronic pain can take a toll on a person's mental health, leading to conditions like anxiety and depression. Effective pain relief through interventions can help alleviate these psychological symptoms.

7. **Enhanced Mobility:** Pain can restrict movement and mobility. Interventions such as joint injections or physical therapy can improve joint function and flexibility, leading to increased mobility and a better quality of life.

8. **Longer-Lasting Relief:** Some interventions, such as radiofrequency ablation (RFA) or spine endoscopy and vertebral augmentation MIPSIs can provide longer-lasting pain relief compared to the temporary relief provided by medications.

9. **Reduced Inflammation:** Interventions like epidural injections or corticosteroid joint injections can reduce inflammation at the source, which is especially beneficial for conditions like arthritis or spinal stenosis.

10. **Avoidance of BIG Open Surgery:** In some cases, successful pain interventions can help individuals avoid more invasive surgical procedures by effectively managing their pain.

11. **Tailored Treatment:** Pain physicians can customize interventions to the individual patient's needs, ensuring a personalized approach to pain management.

12. **Enhanced Quality of Life:** Ultimately, the reduction or elimination of pain through interventions can lead to a better overall quality of life, allowing individuals to enjoy a higher level of physical and emotional well-being.

It's important to note that the effectiveness of pain interventions can vary from person to person and depends on factors like the underlying condition, the skill of the healthcare provider performing the

procedure, and the patient's overall health. Additionally, not all interventions are appropriate for every type of pain or patient, and the risks and benefits should be carefully considered and discussed with a healthcare provider before undergoing any procedure.

In nutshell, Pain Medicine is a going to be a very important speciality for aging population of the world for taking care of their chronic pains and degenerative conditions.

Chapter 3 Pharmacology of Analgesic Drugs

Introduction

Every person has a right to have relief from pain. The main goal of pain management is to improve the quality of life and maintain a person's physical and mental well-being. Poorly managed pain may affect every system and may cause several deleterious effects.

Table 1: List of deleterious effects of pain

	System	Effect
1	Cardiovascular	increase in cardiac workload, causing tachycardia and hypertension.
2	Respiratory	Increased risk of respiratory infection, respiratory muscle spasm, decrease in Vital capacity, atelectasis, and hypoxia.
3	Gastrointestinal	Postoperative ileus
4	Renal	urinary retention and increased risk of oliguria
5	Coagulation	Increased risk of thromboembolism
6	Immunologic	Impaired immune function
7	Muscular	muscle weakness and fatigue, and limited mobility can increase the risk of thromboembolism
8	Psychological	anxiety, fear, frustration, poor patient satisfaction

Reasons to treat pain:

It is essential to treat pain for various reasons, like:

Increase satisfaction and quality of life

Decrease complications, improve outcome with decrease hospital stay and cost.

Decrease chronic pain possibilities

The deleterious effects of pain are listed in Table 1

1. Pharmacological management: According to the pathophysiology, pain may be classified as (i) Nociceptive, (ii) Neuropathic or (iii) Mixed.

(i) Nociceptive pain is caused by the activation or sensitization of peripheral nociceptive receptors. They respond well to simple analgesics like anti-inflammatory and opioid medication.

(ii) Neuropathic pain, however, is different as the pathology is due to dysfunction of the nervous system, responds better adjuvants like anticonvulsants and antidepressants. Thus, drugs used to manage pain can be classified into the following groups.

a. Analgesics
b. Adjuvants

Analgesics Drugs

Analgesics are of three types

1) Non-Steroidal Anti-inflammatory Drugs(NSAIDs): Nonselective or Selective COX-2 inhibitors.
2) Acetaminophen/Paracetamol
3) Opioids.

Non-Steroidal Anti-inflammatory Drugs(NSAIDs)

NSAIDs are the most widely used analgesics. They are considered to be the first-line treatment for acute and chronic pain. They are also recommended as part of a multimodal approach to postoperative pain therapy. They have demonstrated improved analgesia and opioid-sparing effect, thus, resulting in a reduction in opioid-induced respiratory depression and nausea. However, NSAIDs have a ceiling

effect: "once a maximum dose is achieved, the incidence of side effects increases without getting any additional analgesic effect".

Prostaglandin-mediated hyperalgesia regulates pain perception at sites of tissue damage and in the brain stem and spinal cord. NSAIDs inhibit COX-1 and COX-2 prostaglandin production, decreasing both the inflammatory response and the sensitizing effects of prostaglandins on central and peripheral nociceptors.

(i) COX-1 is expressed in most human tissues, such as platelets, the GI tract, and the kidney. COX-1 synthesized prostaglandins regulate platelet function, gastric mucosa integrity, and renal blood flow.

(ii) COX-2 is found in the kidney and central nervous system and is induced at sites of tissue damage. In addition, COX-2 synthesized prostaglandins are involved in the inflammatory response and increase pain sensation on central and peripheral nociceptors.

Side Effects/Adverse Reactions of NSAIDS:The adverse effects of NSAIDs are due to disruption of prostaglandin-mediated homeostatic function and platelet inhibition. Higher doses and a longer duration of therapy can increase the adverse effects of NSAIDs. Common adverse effects associated with NSAIDs are:

Drug Name	**Oral Dose (mg)/Range(max) in mg/Dosing interval**	**Salient Features**
Ibuprofen	200-800/1200/8–12hourly	Interferes with platelet aggregation and clot formation; avoid use in patients with bleeding diathesis. To be used with caution in patients

		with asthma
Nimesulide	100mg 12hourly	Mainlyinhibit COX-2, Less GI irritation
Ketoprofen	300–600mg 6–8hourly	One high potency drug with fast elimination
Diclofenac sodium	25–75mg/200/ 12hourly	It accumulates in synovial fluid, which is useful in OA RA. Generally not used in children, pregnant and nursing women.
Naproxen	250–500mg/1375mg/8–12hourly	Favourable GI profile plasma half-life is 13h, twice a day dose is enough
Piroxicam	20mg/ 40mg/ 12–24hourly	Long half-life, thus to be used with caution in elderly. It takes as long as one week to achieve a steady concentration.
Etoricoxib	60–120mg/ 180mg/ 24hourly	COX-2 specific inhibitors, In cardiac patients should be used cautiously and also add a low dose of aspirin
Mefenamic acid	500 mg 8–12hourly	The common side effect is diarrhoea, which may also cause severe pancytopenia.

1. Table 2: List of commonly used NSAIDs with their dose

1) **Acetaminophen/Paracetamol**: The exact mechanism of action of acetaminophen/paracetamol is unknown. It acts on COX-3 isoenzyme, which inhibits prostaglandin synthesis. The central serotonergic mechanism partly mediates the anti-

nociceptive action. In the brain and spinal cord, paracetamol, following deacetylation to its primary amine (p-aminophenol), is conjugated with arachidonic acid to form N-arachidonoylphenolamine, a compound known as an endogenous cannabinoid. It has slight anti-inflammatory and no antiplatelet activity. Paracetamol has less potential for gastrointestinal irritation but is known for dose-dependent hepatotoxicity. It is offered as the first-line treatment for mild to moderate pain. The oral dose - 325–1000mg, 6-8hourly (15mg/kg body weight). The maximum dose should not exceed 4g/day.

2) **Opioids:** These form the first-line therapy for certain types of acute pain, particularly for intraoperative and postoperative pain. They are also used in chronic cancer and non-malignant pain. Opioids are used alone or combined with local anaesthetics in neuraxial blocks to provide superior analgesia. Table 3. lists the commonly used opioids, their doses and primary use. Morphine is used for cardioprotective and analgesic properties in acute coronary syndrome

Drug	**Route**	**Dose**	**Use**
Morphine	IM IV	0.05–0.2 mg/kg 0.03–0.15 mg/kg	Postoperative analgesia
Fentanyl	IV IV	2–50 mcg/kg 0.5–1.5 mcg/kg	Intraoperative anesthesia Postoperative analgesia
Sufentanil	IV	0.25–20 mcg/kg	Intraoperative anesthesia

There are four opioid receptors: μ, κ, δ, and nociceptin-orphanin. All receptors mediate analgesia to varying degrees; κ receptors may be involved in dysphoria. At the same time, μ receptors are primarily involved in

analgesia. In contrast, δ receptors mediate analgesia mainly in the spine. μ-opioid receptors cause analgesia, respiratory and cough suppression, sedation, and constipation. μ opioid receptors are found in the dorsal horn of the spinal cord, in the periaqueductal grey matter, limbic system, and the thalamus, and may also be induced by injury or inflammation peripherally.

Sites of action: Systemic opioid analgesics mainly exert their analgesic effect in the periaqueductal grey matter by inhibiting ascending pain signals via the rostral ventral medulla from the dorsal horn. Neuraxial opioids mainly act via μ-opioid receptors found in the substantia gelatinosa in the dorsal horn of the spinal cord.

Table 4: List of system-wise side effects associated with the use of opioids

Central Nervous System	Cardiovascular System	Endocrine System	Renal System	Gastrointestinal System	Obstetrics	Immune System
Respiratory Depression Euphoria Dysphoria Cough Suppression Miosis Sedation	Hypotension Bradycardia (reports of asystole when combined with beta-blockers) High-dose	Decreased LH, FSH, ACTH, norepinephrine, epinephrine Increased ADH and prolactin Slightly	Urinary retention Minimal to no effect on GFR	Decreased LES tone Decreased GI motility Decreased gastric emptying Increased biliary sphincter	It decreased fetal heart rate variability. Fentanyl may be preferable to morphine	Decreased macrophage, NK cell, and T cell activity 30–60 minutes after morphine

Seizures (mainly through meperidine metabolite normeperidine) Hyperalgesia (generally with high doses) Pruritis (μ receptor NOT histamine mediated)	opioid anaesthetics minimize intraoperative hemodynamic variability. Minimal to no effect on myocardial contractility	lowered body temperature		tone Increased GI secretions Increased PONV Patients on preoperative opioids are more likely to have a "full stomach." regardless of their last PO intake.	for egg harvesting since morphine showed decreased rates of IVF in sea urchin eggs (no human data available). Meperidine may increase uterine tone and contractions.	

Opioid-induced hyperalgesia may arise in patients using opioids. It has been reported in the acute setting after intraoperative remifentanil. More commonly, it has been described in the chronic setting, especially with high doses of opioids.

Tramadol:Tramadol is an opioid used to treat moderate to severe pain. Tramadol has dual activity. It is a centrally acting synthetic opioid analgesic and serotonin/ norepinephrine reuptake -inhibitor. It is considered a step 2 option in the WHO pain ladder. Tramadol has proven effective in treating osteoarthritis (OA), fibromyalgia (FM), and neuropathic pain (NP). Seizures have been reported with tramadol use in the form of serotonin syndrome. Therefore, patients with a history of seizures and those taking a tricyclic or SSRI antidepressant, a monoamine oxidase inhibitor, an antipsychotic drug, or other opioids may be at an increased risk for seizures. Daily doses of tramadol should not exceed 400 mg.

b. Adjuvant analgesics: Adjuvant analgesics (or co-analgesics) are drugs with a primary indication other than pain but possess analgesic properties. These are not primarily identified as analgesics but are used as adjuvants with other analgesic drugs. (Table.5). The most common drugs in this group are antidepressants, anticonvulsants, corticosteroids, neuroleptics, bisphosphonates, multivitamins and muscle relaxants. Adjuvant drugs can enhance the effects of pain medications, treat concurrent symptoms, and provide analgesia for other types of pain. Adjuvant analgesics are particularly useful when evidence of decreased opioid responsiveness is present. Adjuvants commonly used to enhance the effects of pain medications include:

Class of drug	Drug name	Dose	Route	Indications
Antidepressants	Amitriptyline	10 to 25-150 mg /day	oral	Neuropathic pain
	Nortriptyline	25 mg/day		
	Desipramine	10 to 25-150 mg /day		
	Venlafaxine	37.5-150 mg/day		
	Duloxetine	30-120 mg/day		
Anticonvulsants	Pregabalin	150-600 mg/day	oral	Neuropathic pain
	Gabapentin	1200-3600 mg/day		
Bisphosphonate	Zoledronic acid	4 mg every 3-4 weeks	i.v.	Osteolytic bone pain
	Pamidronate	60-90 mg every 2-4 weeks		
	Ibandronate	6 mg x 3 days then every 3-4 weeks		
Corticosteroids	Dexamethasone	4-24 mg/day	Oral/i.v.	Neuropathic, visceral, bone pain, brain oedema, spinal cord compression
Lidocaine	Patches	5% day	Topical	Neuropathic pain
	Bolus	1-2 mg/kg in 15-30 min. if effective, 2mg/kg/h	i.v.	
NMDA antagonists	Ketamine	0.04-0.3 mg/kg/h	i.v./oral/s.c./ tropical/s.l.	Neuropathic pain Opioid tolerance
	Amantadine		oral	
	Magnesium	1 gm/day	i.v.	

Table 5: Commonly used adjuvant drugs

1. Anticonvulsants
2. Antidepressants
3. Corticosteroids
4. Muscle relaxants
5. Botulinum toxins
6. Local anaesthetics
7. NMDA receptor antagonists
8. Bisphosphonates
9. Others are α_2 agonists, vitamins and nutrient supplements, etc

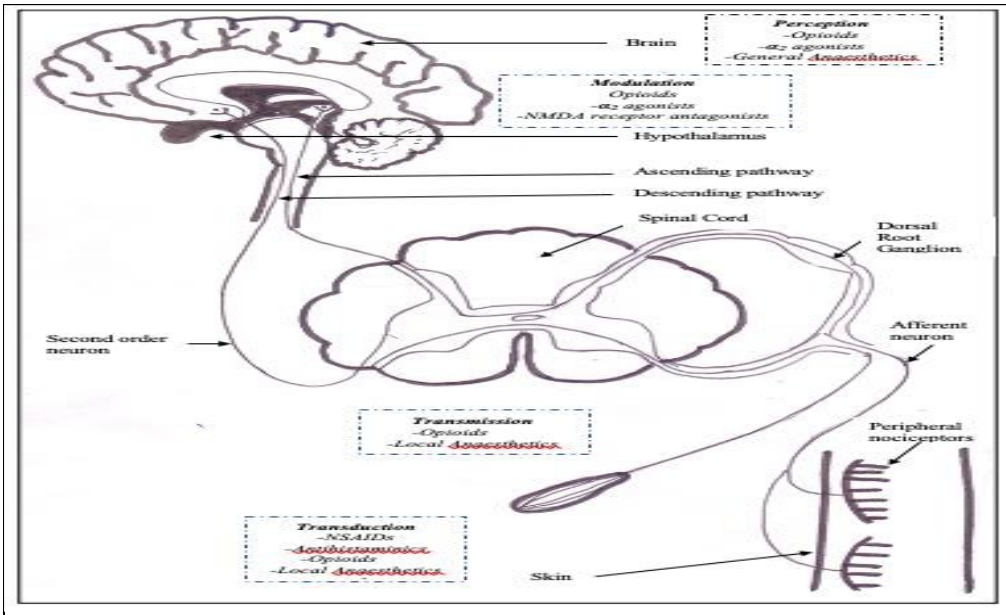


Fig 3Mechanism and site of action of various analgesics and co-analgesics

Chapter- 4 Cervicalgia (Neck Pain) and Cervico-brachalgia

Most patients with neck pain have “non-specific (simple) neck pain,” without radiation to arms and hands, commonly known as “cervical spondylosis”.

The cause is usually multifactorial and also depend on age group-

In Younger age group,

- poor posture (most common),
- anxiety,
- depression,
- neck strain
- sporting or occupational activities.
- whiplash injury
- Prolapsed Cervical Disc

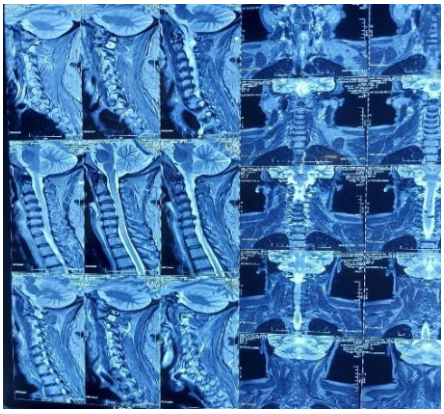


Figure 1-Prolapsed Cervical Disc at C4-5 level in MRI

In Elderly age group

- Osteoarthritis of Cervical Facet Joints (Facet Joint Syndrome)
- Osteoporosis
- Cervical spine degenerative disease

Figure 2-Degeneration (Arthritis) of Cervical Spine on Xray

Classification of cervicalgia-

- Acute Cervicalgia- less than a week duration
- Sub-acute cervicalgia- 1 week to 3 months duration

- Chronic cervicalgia- more than three months duration

Symptoms & Signs of Cervicalgia (neck pain)

Symptoms Cervicalgia (neck pain)

Figure 3- Neck Pain Pattern

i. Neck (Cervical) pain aggravated by movement
ii. Referred pain (occiput, between the shoulder blades, upper limbs)
iii. Retro-orbital or temporal pain (from C1 to C2)
iv. Cervical stiffness—reversible or irreversible
v. Vague numbness, tingling, or weakness in upper limbs
vi. Dizziness or vertigo
vii. Poor balance
viii. Rarely, syncope, triggers migraine, "pseudo-angina"

Symptoms Cervico-brachalgia (neck pain radiating to upper arm up to hands)

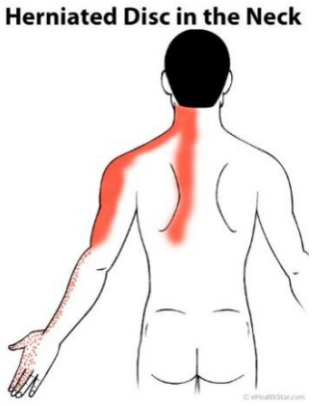


Figure 4- Pain pattern of cervical PIVD

i. Neck (Cervical) pain radiating to one or bilateral upper arms
ii. aggravated by movement
iii. associated with neuropathic features like tingling, burning, pins & needle sensation, numbness in dermatomal presentation and motor weakness

iv. pain increased by weight bearing positions such as sitting and standing and reduce by lying down posture

v. pain increased by cough and sneeze (Valsalva manuvere)

Signs

vi. Poorly localised tenderness

vii. Limited range of movement (forward flexion, backward extension, lateral flexion, and rotation to both sides)

viii. Minor neurological changes like inverted supinator jerks (unless complicated by myelopathy or radiculopathy)

ix. Positive Spurling's Test for cervico-brachalgia

Red Flags

Malignancy or infection-

- fever, night sweats
- Unexpected weight loss
- History of inflammatory arthritis (Rheumatoid Arthritis), malignancy, infection, tuberculosis
- Excruciating pain
- Intractable night pain
- Cervical lymphadenopathy
- Exquisite tenderness over a vertebral body

Myelopathy

- Gait disturbance or clumsy hands, or both

- Objective neurological deficit—upper motor neurone signs in the legs and lower motor neurone signs in the arms
- Sudden onset in a young patient suggests disc prolapse

Other

- History of severe osteoporosis
- History of neck surgery
- Drop attacks, especially when moving the neck, suggest vascular disease
- Intractable or increasing pain

Common DD

- acute neck strain, postural neck ache, or whiplash
- Fibromyalgia and psychogenic neck pain
- Mechanical lesions—disc prolapse or diffuse idiopathic skeletal hyperostosis
- Inflammatory disease—rheumatoid arthritis, ankylosing spondylitis, or polymyalgia rheumatica
- Metabolic diseases—Paget's disease, osteoporosis, gout, or pseudo-gout
- Infections—osteomyelitis or tuberculosis
- Malignancy—primary tumours, secondary deposits, or myeloma

Management at Primary Level-

- **Use good posture.** When standing and sitting, shoulders are in a straight line over the hips and your ears are directly over your shoulders. When using cell phones, tablets and other small screens, keep your head up and hold the device straight out rather than bending your neck to look down at the device.

- **Take frequent breaks.** While traveling long distances or working long hours at computer, get up, move around, and stretch your neck and shoulders.
- **Adjust desk, chair and computer** so that the monitor is at eye level. Use your chair's armrests.
- **Quit smoking.** Smoking can increase the risk of developing neck pain.
- **Avoid carrying heavy bags with straps over your shoulder.**
- **Sleep in a healthy position.** Your head and neck should be aligned with your body. Use a small pillow under your neck. Try sleeping on your back with your thighs elevated on pillows, which will flatten your spinal muscles.
- **Stay active.** If you don't move much, increase your activity level.
- Patients should be advised to use only one pillow at night.
- Pharmacological Treatment-
    - NSAIDs with or without Muscle relaxants
    - Low dose tricyclic antidepressants, like amitriptyline 10-30 mg per night
    - Topical NSAIDs/ Lignocaine patch
    - Hot and cold fomentation
    - TENS

MIPSIs for Cervicalgia (Neck Pain) and Cervico-brachalgia

As most common cause of chronic cervicalgia in younger patients is Myo-fascial pain syndrome, in chronic patients, most useful MIPSI is- Dry Needling MIPSI for trigger points.

Facet Joint Syndrome is the most common cause of chronic pain in elderly people, the most useful MIPSI for diagnosis this correctly is-Diagnostic Facet Joint MIPSI, a percutaneous minimally invasive interventions where little amount of local anaesthetic agent like injection lignocaine is spilled over the 'cervical medial branches' which supply the cervical facet joints; if patients get relief from the neck pain for the duration of local anaesthetic used, the diagnosis of 'Cervical Facet Syndrome' is deemed confirmed.

The long-term treatment of cervical facet joint pain is 'Radiofrequency of Medial Branches for Facet Joint Arthropathy'; again, a minimally invasive intervention, where specialized Radio-frequency cannulas are used by a Pain Physician to ablate the medial branches whichsupplythe facet joints.

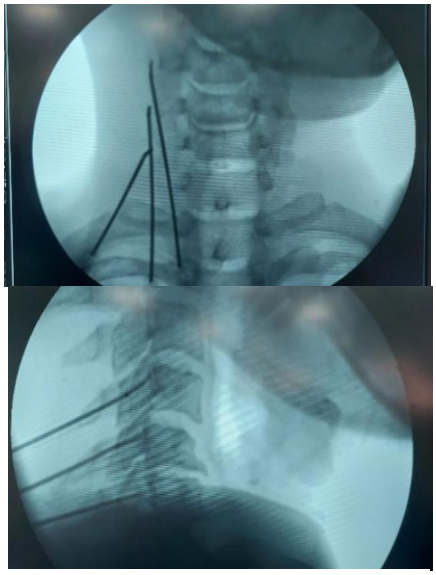


Figure 5-Radio-frequency Treatment of Cervical Facet Syndrome

In cases of cervico-brachalgia (neck pain radiating to upper arm) due to nerve compression in cervical spine, the commonest effective MIPSI is 'Cervical Epidural MIPSI', where under c-arm fluoroscope, little amount of long-acting steroids are delivered at the site of nerve compression to decrease the nerve oedema and pain.

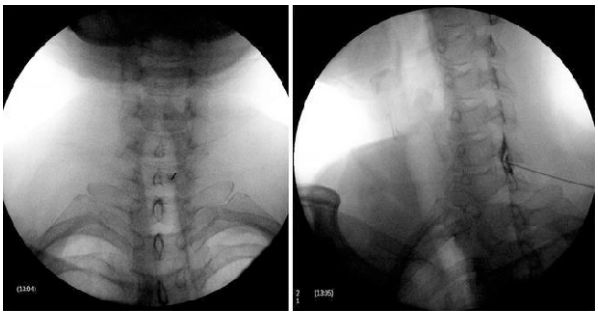


Figure 6-'Cervical Epidural MIPSI' for PIVD

When to Refer to a Pain Physician-

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment
- New or worsening neurological features

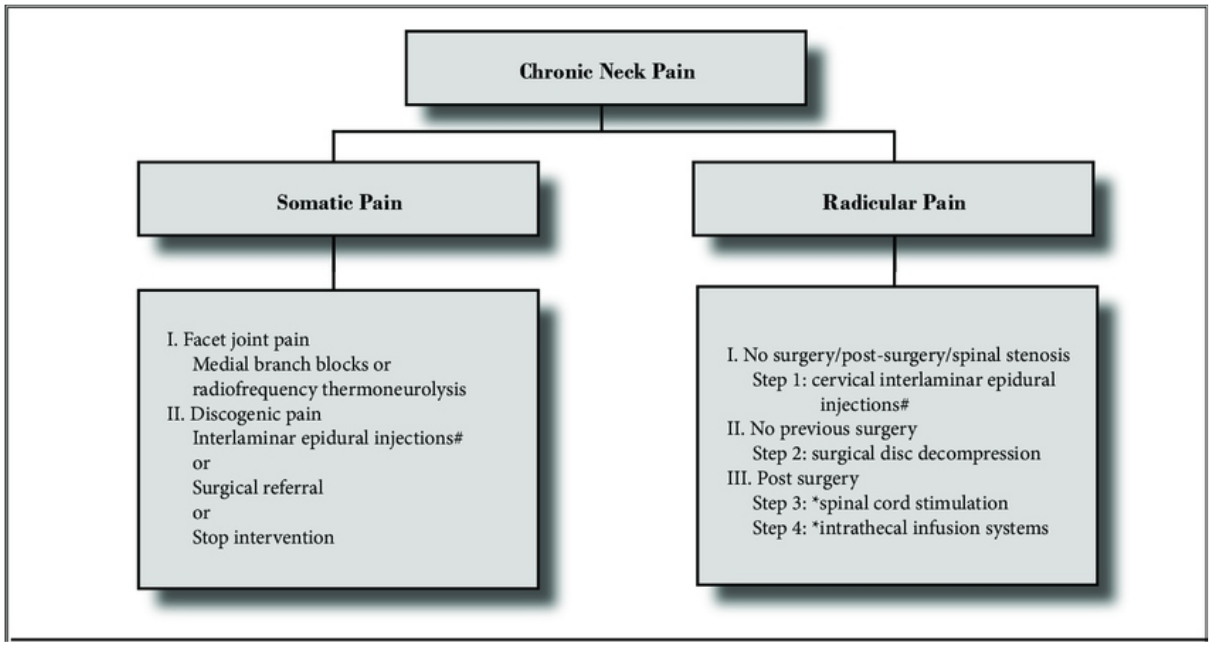


Figure 7- Algorithm for Chronic Neck Pain

Chapter -5 Shoulder Pain

The shoulder has a wide and versatile range of motion, which may cause damage to various structure in the shoulder joint. It may be due to direct injury or by weight transduction across joint and involvement of joint in systemic disease like inflammatory arthropathy, diabetic mellitus etc. There may be referred pain from different area as cervical region, diaphragm and myocardial ischemia. Several factors and conditions can contribute to shoulder pain.

Causes of Shoulder Pain:

- In younger than 40 years: instability, rotator cuff tendinopathy is most common cause
- In older than 40 years: rotator cuff tears, adhesive capsulitis, glenohumeral osteoarthritis

Depending on aetiology, common causes of shoulder pain may be:

1) <u>Intrinsic causes</u>:
    - Glenohumeral-

- Glenohumeral arthritis, instability
- Rotator cuff tear or tendinopathy
- Subacromianburstis
- Labral tear

- Extra Glenohumeral-
  - Acromio-clavicular joint arthritis
  - Bicipital tendinopathy
  - Subscapular bursitis

2) Extrinsic causes:

- Cervical spinal canal stenosis
- Cervical disc pathology
- Long thoracic and suprascapular neuralgia
- Post-herpetic neuralgia involving C4, 5 nerve root
- CRPS involving upper arm and shoulder
- Referred pain: Myofascial pain syndrome (commonly trapezius), Diaphragm, irritation, Myocardial ischemia, Intrathoracic tumours

2) Traumatic
   a. Fracture clavicle, upper end of humerus
   b. Gleno-humeral dislocation
   c. Acromio-clavicular ligament sprain

Common signs and symptoms of shoulder pain:

- Warmth or redness in shoulder
- Neck pain, arm pain, or back pain
- A clicking, popping, or grinding sensation on movement
- Muscle stiffness and weakness
- Limited range of motion

The underlying causes of the shoulder complaints can be categorized in the following three groups:

- Shoulder complaints with limited range of passive motion
- Shoulder complaints without limited range of passive motion but with pain on shoulder abduction or retro-abduction
- Shoulder complaints without limited range of passive motion and no painful abduction trajectory

Red flags

- These conditions should be identified as early as possible and should be referred to speciality centres for further management

- History of cancer; symptoms and signs of cancer; unexplained deformity, mass, or swelling:? tumour
- Red skin, fever, systemically unwell? infection
- Trauma, epileptic fit, electric shock; loss of rotation and normal shape? unreduced dislocation
- Trauma, acute disabling pain and significant weakness, positive drop arm test? acute rotator cuff tear
- Unexplained significant sensory or motor deficit? neurological lesion

D/D of shoulder pain:

- Rotator Cuff Disorders.
- Adhesive Capsulitis or Frozen Shoulder.
- Shoulder Instability or Recurrent Dislocation
- Shoulder Arthritis

Management

Conservative management

- Non steroidal anti-inflammatory drugs
- Physical therapy.
- Local application of heat and cold

Interventional management: Non responders to conservative management can undergo Interventional management

A local injection with an anaesthetic and corticosteroid is given to treat subacromial bursitis, diseases of the acromioclavicular joint, adhesive capsulitis (frozen shoulder) and a rotator cuff disease.

• With impingement syndrome or subacromial bursitis, local injection of depot corticosteroids with a local anaesthetic are administered. Active abduction should be pain free immediately after the injection when carried out properly. There is limited evidence for its efficacy in the short term.

• In case of acromio-clavicular joint diseases, an 'Triple MIPSI' is indicated for persistent pain. Passive abduction should be pain-free and

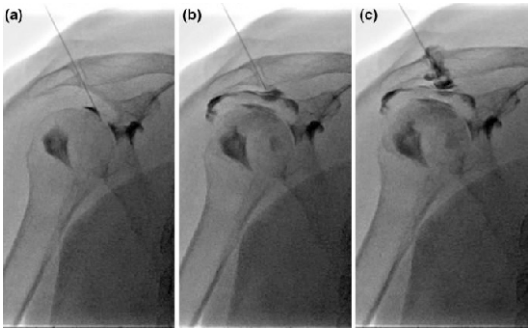


Figure 1- Triple MIPSI for Shoulder Arthritis

normalized in terms of limited range of motion immediately after the injection if it is carried out properly.

- In case of frozen shoulder i.e. glenohumeral joint diseases, a MIPSI i.e. 'Radio-frequency of Supra-scapular nerve' is very useful for almost immediate relief.

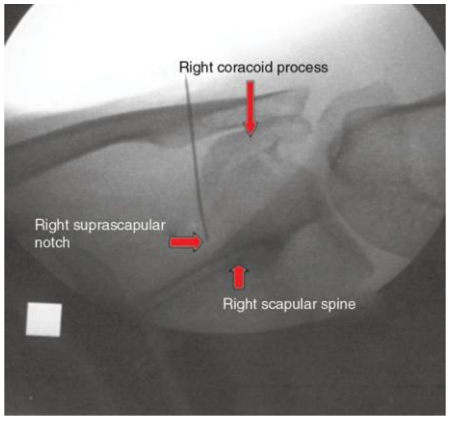


Figure 2-Supra-scapular nerve Radiofrequency MIPSI

When to Refer to a 'Pain Physician'-

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment
- New or worsening neurological features

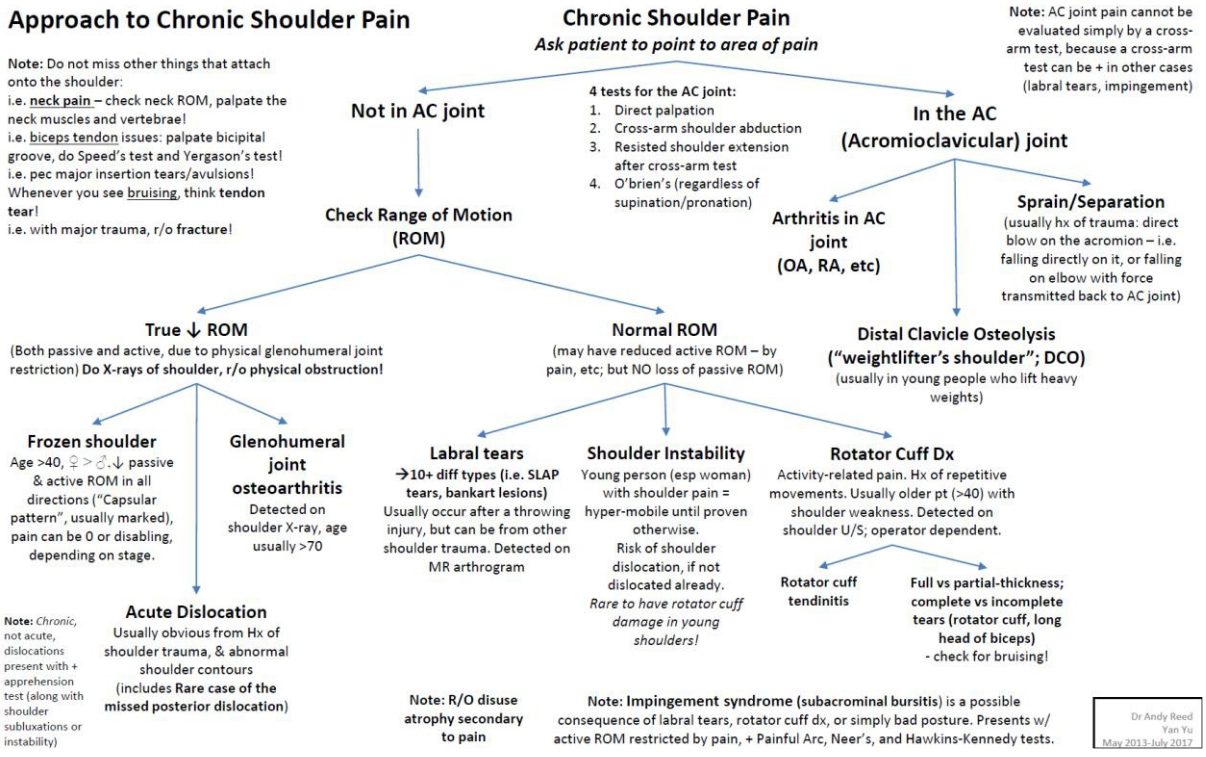


Figure 8- Algorithm for Chronic Shoulder Pain with Differential Diagnosis

Chapter 6: Thoracic or Upper Back pain

Thoracic back pain is very common and estimated to affect 15% to 35% of the general adult population each year. Pain in your middle or upper back can have many possible causes.

Common Causes:

In Younger age group,

- poor posture (most common),
- chair height at school
- weight of back pack

In elderly it may be due to

- Intercostal neuralgia
- Neuralgia of the abdominal wall
- Pain radiating from the spinal cord
- Osteoporosis
  - Vertebral collapse
  - Vertebral metastases
- Scar pain
  - Post-thoracotomy

• Postmastectomy

• Post-thoracoscopy

• Rib pathology

• Fracture/pseudarthrosis • Rib resection

Symptoms of thoracic back pain, depend on the underlying cause:

- sharp pain
- a dull ache at rest
- pain during certain movements
- stiffness
- swelling
- muscle spasms
- cramping
- sudden pain with sneezing, coughing, or laughing
- numbness around your rib cage and chest
- loss of bowel and bladder control
- numbness, tingling, or loss of movement in your legs

Investigation-

X-ray of Dorso-Lumer Spinal in AP and Lateral views to rule out a collapsed vertebra, with a clinical history of a trauma, with or without a history of osteoporosis, the diagnostics can be completed.

A magnetic resonance imaging (MRI) could be necessary to rule out malignant causes of the pain and epidural metastases and tuberculosis

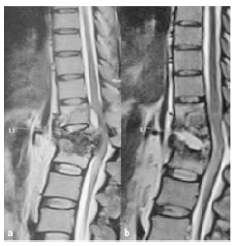


Figure 1- MRI showing 'Pott's spine

(Pott's Spine)

A thoracic X-ray can be useful in the event of thoracic wall pathology.

Red flags:

- Recent violent trauma
- Minor trauma, or even just strenuous lifting, in people with osteoporosis
- Age at onset less than 20 or over 50 years (new back pain). History of cancer, drug abuse, or HIV, immunosuppression or prolonged use of corticosteriod
- Constitutional symptoms - eg, fever, chills, unexplained weight loss.
- Recent bacterial infection.
- Pain that is: Constant, severe and progressive; Non-mechanical without relief from bed rest or postural modification; Unchanged despite treatment for 2-4 weeks; Accompanied by severe morning stiffness in Arthritis
- Structural deformity.
- Severe or progressive neurological deficit in the lower extremities.
- Spontaneous spleen rupture
- Pulmonary embolism
- Neuroblastoma (mimicking as thoracic back pain)

Management:

1. Rest and Activity Modification:

2. Physical Therapy:

3. Analgesic Drugs:

    - Over-the-counter nonsteroidal anti-inflammatory drugs (NSAIDs)

    - Opioids drugs like Tramadol or muscle relaxants, may be necessary in some cases.

4. Bracing and Support:

    - 'Taylor's Brace' or 'TLSO' support devices can help stabilize the vertebral collapse or impending collapse in cases of Pott's spine.

5. Lifestyle Modifications:

    - Posture Correction

6. Minimally Invasive Pain & Spine Treatment (MIPSI):

    - Radio-frequency of Thoracic Facet Joints is very useful in thoracic pain in elderly age-group

Figure 2- Diagram of Radiofrequency MIPSI of Facet Joint

    - Vertebral augmentation MIPSIs like 'Percutaneous Vertebroplasty and Balloon Kyphoplasty' work very well in 'Vertebral collapse and Vertebral Metastasis'.

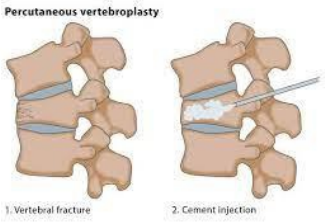


Figure 9- Vertebroplasty of 'Collapsed' vertebra

    - Intercostal nerve minimally invasive intervention, for 'Intercostal Neuralgia'.

    - T2 and T3 sympathectomy RFA for 'Post-herpetic Neuralgia'.

7. Surgery:

- Surgical intervention may be necessary for impending ‘cauda-equina syndrome’ in Pott’s spine cases.

8. Physical Modalities:
    - Heat or cold therapy, ultrasound, or electrical stimulation may be used as adjunct therapies to relieve pain and promote healing.
9. Complementary Therapies:
    - Complementary approaches like acupuncture, chiropractic care, or massage therapy may offer relief for some individuals.

When to Refer to a Pain Physician-

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment
- New or worsening neurological features

Chapter 7 Low back Pain (without Sciatica)

- As per World Health Organization (WHO) in 2020, low back pain (LBP) affected 619 million people globally and it is estimated that the number of cases will increase to 843 million cases by 2050, driven largely by population expansion and ageing (1).
- LBP is the single leading cause of disability worldwide.
- CLBP can be experienced at any age, and most people experience LBP at least once in their life.
- Prevalence increases with age up to 80 years, while the highest number of CLBP cases occurs at the age of 50–55 years.

- CLBP is more prevalent in women (2).
- Axial (Non-specific) LBP is the most common presentation of LBP (about 90% of cases).

Signs & Symptoms-

- Axial (Mechanical) back pain is most common cause of lower back pain, it is primarily from the muscles, ligaments, joints (facet joints, sacroiliac joints), or bones in and around the spine.
- Pain tends to be localized to the lower back, buttocks, and sometimes the top of the legs.
- It usually increased by loading the spine and may feel different based on motion (forward/backward/twisting), activity, standing, sitting, or resting.
- Increasing pain with lifting and bending.
- Worsening pain when resting, sitting, or standing.
- Stiffness in the morning when awakening and lessened back pain with activity.

Red Flags-

If back pain does not improve after a few weeks or if any of the following symptoms happen with back pain:

- Numbness and tingling.
- Severe back pain that does not improve with medication
- Back pain after a fall or injury.
- Back pain along with:
    - Trouble urinating.

- Weakness, pain, or numbness in legs.
- Fever.
- Rapid Weight loss.

Examination-

- The physical exam should include inspection, palpation, the range of motion, strength testing, provocative manoeuvres, and neurologic (limb strength, sensation, and deep tendon reflex) assessments.
- A straight leg raise (SLR) can be completed by raising the patient's leg to 30 to 70 degrees [15]. Ipsilateral leg pain at less than 60 degrees is a positive test for lumbar disk herniation.
- If the pain reproduction occurs contralaterally, it is a positive test for a lumbar disk herniation
- One leg hyperextension test/stork test: Have the patient stand on one leg and (while being supported by the provider) have them hyper-extend their back. Repeat this manoeuvre on both sides. Pain with hyperextension is positive for a pars interarticularis defect.
- Tests for Facet Joint Syndrome-
    - Extension and twisting of lumbar spine
    - Presence of para-spinal tenderness
- Tests for Sacro-iliac Joint Syndrome
    - Patric's/ FABER's test

- Yeoman's Test
- Sacral and Femoral Thrust Tests

b. Management at Primary Level:

   i. Rest and Activity Modification:

   ii. Physical Therapy:

   iii. Analgesic Drugs: nonsteroidal anti-inflammatory drugs (NSAIDs), Opioids drugs like Tramadol and Muscle Relaxants, may be necessary in some cases.

c. MIPSIs for Low back Pain (without Sciatica) Pain

Some common causes of CLBP and their management

Facet joint syndrome

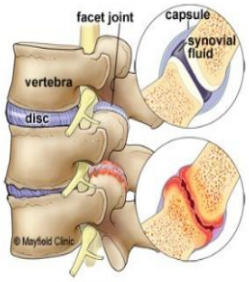


Figure 10-Diagram of Facet Joint Arthritis

Facet joint syndrome, also known as facet joint pain or facet syndrome, is a condition that occurs when the facet joints in the spine become inflamed or irritated, leading to pain and discomfort. Facet joints are small, paired joints located between the vertebrae of the spine. They provide stability to the spine and allow for various movements, such as bending and twisting. When these joints are affected, it can result in facet joint syndrome.

Here are some key points about facet joint syndrome:

1. **Incidence and Prevalence-** facet joints are considered to be the cause of CLBP in 30-45% patients of advanced age group.

2. **Causes**:

    - **Degeneration**: Facet joint syndrome is often associated with degenerative changes in the spine, such as osteoarthritis. Over time, the cartilage in the facet joints can wear down, leading to pain and inflammation.

    - **Injury or Trauma**: An injury or trauma to the spine, such as a whiplash injury or a fall, can damage the facet joints and trigger facet joint syndrome.

    - **Repetitive Stress**: Repetitive movements or activities that place stress on the facet joints, such as heavy lifting or excessive twisting of the spine, can contribute to facet joint pain.

    - **Age**: Facet joint syndrome is more common in older adults due to the natural wear and tear of the joints.

3. **Symptoms**:

    - **Localized Pain**: The most common symptom is localized pain in the affected area of the spine. The pain is often described as a dull ache and can be felt in the lower back, neck, or upper back, depending on the location of the affected facet joints.

    - **Pain with Movement**: Pain is typically exacerbated by movements that put pressure on the facet joints, such as bending backward or to the side.

    - **Stiffness**: Stiffness in the spine, especially in the morning, is a common complaint.

- **Referred Pain**: In some cases, facet joint pain can radiate to nearby areas, causing referred pain.

4. **Diagnosis**:

    - Diagnosis of facet joint syndrome often involves a thorough physical examination and a review of the patient's medical history.
    - Diagnostic tests such as X-rays, MRI scans, or CT scans may be used to visualize the facet joints and rule out other potential causes of back pain.
    - Diagnostic MIPS of Facet joint, where a local anesthetic is injected into the affected joint to see if it provides pain relief, is the 'Only Validated way' of confirming the diagnosis of Facet Joint Syndrome.

5. **Treatment**:

    - Conservative treatments are often the first line of management for facet joint syndrome and may include:
        - **Physical Therapy**: Exercises to improve flexibility and strengthen the muscles that support the spine.
        - **Medications**: Nonsteroidal anti-inflammatory drugs (NSAIDs) and pain relievers can help reduce pain and inflammation.
        - **Heat or Ice**: Application of heat or ice packs to the affected area can provide relief.
    - If conservative treatments are not effective, more invasive interventions may be considered, including:

- **Facet Joint MIPSIs**: These injections can provide temporary pain relief by delivering medication directly to the affected joint.
- **Radiofrequency Ablation of Medial Branches**: This procedure uses heat to ablate the medial branches of dorsal root which transmit pain signals from the facet joints.
- **Surgery**: In rare cases, surgery may be considered if conservative treatments and other interventions do not provide relief. Surgical options may include facet joint denervation or fusion.

Facet Joint Diagnostic & Prognostic MIPSI technique

Figure 11- Facet Joint MIPSI

Facet joint Diagnostic & Prognostic MIPSI are a medical procedure used to diagnose and treat pain originating from the facet joints in the spine. These injections deliver medication directly into the facet joint space to provide pain relief and reduce inflammation. Here's an overview of the technique involved in facet joint injections:

Preparation:

1. **Patient Evaluation**: Before the procedure, the patient undergoes a thorough evaluation, including a medical history review and physical examination. Imaging tests such as X-rays, CT scans, or MRI scans may be used to identify the exact location of the affected facet joints.
2. **Informed Consent**: The healthcare provider discusses the procedure, its risks, benefits, and alternatives with the patient. Informed consent is obtained.

Procedure: 3. **Patient Positioning**: The patient is typically positioned face down (Prone) on an examination table. The exact positioning may vary depending on the targeted facet joint(s) in the spine. A cushion or pillow may be provided to increase comfort.

4. **Skin Preparation**: The skin over the injection site is cleaned and sterilized to reduce the risk of infection.

5. **Local Anesthesia**: A local anesthetic is injected into the skin and tissues overlying the facet joint(s). This numbs the skin and deeper tissues, reducing discomfort during the procedure.

6. **Needle Placement**: Using c- arm fluoroscopy (real-time X-ray guidance) or ultrasound imaging for precise guidance, the healthcare provider inserts a thin needle through the anesthetized area and advances it to the facet joint(s) being targeted.

7. **Contrast Injection (Optional)**: A contrast dye may be injected through the needle into the facet joint(s). This allows the healthcare provider to confirm the correct placement of the needle by visualizing the spread of the dye on fluoroscopy or ultrasound.

8. **Medication Injection**: Once the needle's placement is confirmed, a mixture of medications is injected into the facet joint(s). The medication typically includes a local anesthetic (e.g., lidocaine or bupivacaine) for immediate pain relief and a corticosteroid (e.g., triamcinolone) to reduce inflammation and provide longer-term relief.

9. **Needle Removal**: After the medication is injected, the needle is carefully withdrawn.

Post-Procedure Care: 10. **Observation**: Patients are monitored for a short period after the procedure to ensure there are no immediate adverse reactions or complications.

11. **Activity Restrictions**: Patients may be advised to avoid strenuous activities for a certain period following the injection to allow the medication to take effect.

Outcome Assessment: 12. **Pain Relief Evaluation**: Over the next several hours or days, patients are typically asked to assess their pain levels and any changes in their symptoms. Pain relief can vary from patient to patient and may last for a variable duration.

Follow-Up: 13. **Follow-Up Appointments**: Follow-up appointments with the Pain Physician may be scheduled to evaluate the effectiveness of the facet joint injection and determine the need for additional treatments or interventions.

Facet joint injections can provide both diagnostic information (confirming that the facet joint is the source of pain) and therapeutic relief (reducing pain and inflammation). It's important for patients to follow their Pain Physician's instructions and communicate any concerns or changes in symptoms following the procedure. As with any medical procedure, facet joint injections carry some risks, and patients should discuss these with their healthcare provider before undergoing the procedure.

Facet joint Radiofrequency Ablation

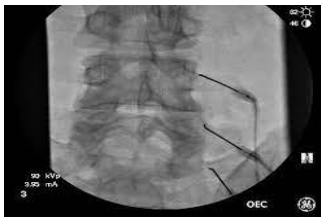


Figure 12- Radiofrequency MIPSI of Facet Joints

Facet joint radiofrequency ablation (RFA), also known as facet rhizotomy, is a minimally invasive procedure used to alleviate chronic back or neck pain that originates from the facet joints in the spine. Facet joints are small, paired joints located between the vertebrae, and they can become a source of pain due to conditions like osteoarthritis or injury. RFA disrupts the nerves that transmit pain signals from these joints, providing long-lasting pain relief. Here's an overview of the facet joint RFA procedure:

Preparation:

1. **Patient Evaluation**: Before the procedure, the patient undergoes a comprehensive evaluation, which includes a medical history review, physical examination, and diagnostic imaging (such as X-rays, CT scans, or MRI scans). These tests help identify the specific facet joints responsible for the pain. Prior to RFA of Facet Joints, a diagnostic Facet Joint MIPSI is a must to confirm the diagnosis.

2. **Informed Consent**: The healthcare provider discusses the procedure, its risks, benefits, and alternatives with the patient. Informed consent is obtained.

Procedure: 3. **Patient Positioning**: The patient is typically positioned face down on an examination table. The exact positioning may vary depending on the targeted facet joints in the spine.

4. **Skin Preparation**: The skin over the area where the procedure will be performed is cleaned and sterilized to reduce the risk of infection.

5. **Local Anaesthesia**: A local anaesthetic is administered to numb the skin and deeper tissues in the area where the RFA will take place. This minimizes discomfort during the procedure.

6. **RF Cannula Placement**: Using fluoroscopy (real-time X-ray guidance) for precision, the Pain Physician inserts a thin, specialized needle (SMK RF cannula) through the anesthetized area and advances it toward the facet joint(s) causing pain.

7. **Radiofrequency Ablation**: Once the needle's placement is confirmed, a radiofrequency electrode is inserted through the needle and positioned near the targeted facet joint nerve. The electrode emits radiofrequency energy, which heats and cauterizes the nerve, disrupting its ability to transmit pain signals.

8. **Confirmation**: The patient may be asked to provide feedback during the procedure to help the healthcare provider verify the correct placement of the electrode.

9. **Needle Removal**: After the RFA is completed, the electrode and needle are carefully withdrawn.

Post-Procedure Care: 11. **Recovery**: Patients are monitored for a short period after the procedure to ensure there are no immediate adverse reactions or complications.

Outcome Assessment: 12. **Pain Relief Evaluation**: Over the next several weeks, patients are typically asked to assess their pain levels and any changes in their symptoms. Pain relief from facet joint RFA can be significant and may last from several months to a year or more.

Follow-Up: 13. **Follow-Up Appointments**: Follow-up appointments with the healthcare provider may be scheduled to evaluate the effectiveness of the facet joint RFA and determine the need for additional treatments or interventions.

Facet joint RFA is considered a safe and effective procedure for many individuals with chronic facet joint pain. However, as with any medical procedure, there are potential risks and benefits to consider, and patients should discuss these with their healthcare provider before undergoing the procedure.

Sacro-ileac Joint Syndrome

Figure 13- Diagram of Sacroiliac Joint Inflammation & Syndrome

The sacroiliac (SI) joint syndrome, also known as sacroiliitis or sacroiliac joint dysfunction, is a condition in which there is inflammation, irritation, or dysfunction of the sacroiliac joint. This condition can indeed be a cause of chronic low back pain in up to 13-25% patients of chronic low back pain. The sacroiliac joint is located at the base of the spine and connects the sacrum (the triangular bone at the lower spine) to the ilium (the large pelvic bone). When the SI joint becomes problematic, it can lead to localized pain in the lower back and buttocks. Here are some key points regarding sacroiliac joint syndrome as a potential cause of chronic low back pain:

1. **Causes of SI Joint Syndrome**:
    - **Inflammation**: Inflammation of the SI joint can occur due to various factors, including trauma, infection, pregnancy-related changes, ankylosing spondylitis, or other inflammatory conditions.
    - **Dysfunction**: Mechanical problems or dysfunction in the SI joint, such as excessive movement (hypermobility) or reduced movement (hypomobility), can lead to pain.
    - **Degeneration**: Similar to other joints, the SI joint can degenerate over time, causing pain.
2. **Symptoms**:
    - **Localized Pain**: Pain is typically felt on one side of the lower back or buttocks and may radiate down the leg. The pain is often described as aching, sharp, or stabbing.

- **Pain Aggravated by Movement**: Activities like standing, walking, climbing stairs, or transitioning from sitting to standing can exacerbate SI joint pain.
- **Stiffness**: Stiffness in the lower back and hips is a common symptom.
- **Pain with Weight Bearing**: Pain may worsen when bearing weight on the affected side, such as when getting out of a car.

3. **Diagnosis**:
    - **Physical Examination**: A healthcare provider will perform a physical examination to assess the SI joint, mobility, and tenderness.
    - **Imaging**: X-rays, MRI scans, or CT scans may be used to visualize the SI joint and assess for structural abnormalities or inflammation.
    - **Diagnostic MIPSI of SI Joint Syndrome**: To confirm the SI joint as the pain source, a diagnostic injection of local anesthetic into the joint may be performed. If it provides significant pain relief, it suggests the SI joint as the cause.
4. **Treatment**:
    - **Conservative Approaches**: Initial treatment often involves conservative measures such as physical therapy, exercises to stabilize the SI joint, and medications (e.g., NSAIDs) to manage pain and inflammation.
    - **SI Joint Diagnostic / Therapeutic MIPSI**: Therapeutic injections of corticosteroids or anaesthetic into the SI joint can provide pain relief and reduce inflammation.

- **Radiofrequency Ablation**: In cases of chronic SI joint pain that does not respond to other treatments, radiofrequency ablation may be considered to disrupt the pain signals from the joint.
- **Percutaneous SI Joint Fixation Devices-** most advanced MIPSIs for chronic SI Joint syndrome patients, who are unresponsive to other conventional treatment.
- **Surgery**: In rare cases where conservative treatments are ineffective, surgical interventions like SI joint fusion may be considered to stabilize the joint.

Sacroiliac joint syndrome can be a challenging condition to diagnose and treat due to its overlapping symptoms with other causes of lower back pain. A comprehensive evaluation by a pain physician is essential to determine the cause of chronic low back pain and develop an appropriate treatment plan tailored to the individual's needs.

SI Joint Diagnostic / Therapeutic MIPSITechnique

A sacroiliac (SI) joint Diagnostic / Therapeutic MIPSI is a medical procedure performed to diagnose and treat pain originating from the sacroiliac joint, which is located at the base of the spine and connects the sacrum to the ilium in the pelvis. This injection involves the administration of medication, typically a combination of a local anaesthetic and a corticosteroid, directly into the SI joint space to alleviate pain and reduce inflammation. Here's an overview of the SI joint injection technique:

Figure 14- Sacroiliac Joint MIPSI

Preparation:

1. **Patient Evaluation**: Before the procedure, the patient undergoes a comprehensive evaluation, which includes a medical history review, physical examination, and diagnostic imaging (such as X-rays, CT scans, or MRI scans). These tests help identify the specific SI joint(s) responsible for the pain.
2. **Informed Consent**: The healthcare provider discusses the procedure, its risks, benefits, and alternatives with the patient. Informed consent is obtained.

Procedure: 3. **Patient Positioning**: The patient is typically positioned lying face down (prone) on an examination table. The exact positioning may vary depending on the targeted SI joint(s) and the preferences of the healthcare provider.

4. **Skin Preparation**: The skin over the area where the injection will be performed is cleaned and sterilized to reduce the risk of infection.
5. **Local Anaesthesia**: A local anaesthetic is administered to numb the skin and deeper tissues in the area where the injection will take place. This helps minimize discomfort during the procedure.
6. **Needle Placement**: Using fluoroscopy (real-time X-ray guidance) for precision, the healthcare provider inserts a thin, specialized needle through the anesthetized area and advances it to the SI joint(s) being targeted.
7. **Contrast Injection**: A contrast dye is injected through the needle into the SI joint(s). This allows the Pain Physician to confirm that the needle is in the correct position by visualizing the spread of the dye on fluoroscopy.
8. **Medication Injection**: Once the needle's placement is confirmed, a mixture of medications is injected into the SI joint. The medication typically includes:
    - **Local Anaesthetic**: Provides immediate pain relief by numbing the joint.

- **Corticosteroid**: Reduces inflammation and provides longer-term relief.

9. **Confirmation**: The patient may be asked to provide feedback during the procedure to help the healthcare provider verify the correct placement of the needle.

10. **Needle Removal**: After the medication is injected, the needle is carefully withdrawn.

Post-Procedure Care: 11. **Recovery**: Patients are monitored for a short period after the procedure to ensure there are no immediate adverse reactions or complications.

Outcome Assessment: 12. **Pain Relief Evaluation**: Over the next several hours or days, patients are typically asked to assess their pain levels and any changes in their symptoms. Pain relief from SI joint injections can vary from person to person and may last for a variable duration.

Follow-Up: 13. **Follow-Up Appointments**: Follow-up appointments with the Pai Physicain may be scheduled to evaluate the effectiveness of the SI joint injection and determine the need for additional treatments or interventions.

SI joint injections are considered a safe and effective diagnostic tool and treatment for many individuals with SI joint pain. However, as with any medical procedure, there are potential risks and benefits to consider, and patients should discuss these with their healthcare provider before undergoing the procedure.

SI Joint Radiofrequency Ablation technique

Sacroiliac joint (SI joint) radiofrequency ablation (RFA) is a minimally invasive procedure performed to alleviate chronic pain originating from the sacroiliac joint, located at the base of the spine where the sacrum meets the ilium in the pelvis. RFA involves the use of thermal energy to disrupt the nerves responsible for transmitting pain signals from the SI joint. This

procedure is often considered when other conservative treatments have not provided sufficient relief. Here is an overview of the SI

joint radiofrequency ablation technique:

Preparation:

1. **Patient Evaluation**: Before the procedure, the patient undergoes a comprehensive evaluation, which includes a medical history review, physical examination, and diagnostic imaging (such as X-rays, CT scans, or MRI scans) to confirm that the SI joint is the source of pain.
2. **Informed Consent**: The healthcare provider discusses the procedure, its risks, benefits, and alternatives with the patient. Informed consent is obtained.

Procedure: 3. **Patient Positioning**: The patient is typically positioned lying face down (prone) on an examination table. Proper positioning is crucial to access the SI joint and maintain patient comfort.

4. **Skin Preparation**: The skin over the area where the procedure will be performed is cleaned and sterilized to reduce the risk of infection.
5. **Local Anaesthesia**: A local aesthetic is administered to numb the skin and deeper tissues in the area where the RFA will take place. This helps minimize discomfort during the procedure.
6. **Needle Placement**: Using fluoroscopy (real-time X-ray guidance) for precision, the healthcare provider inserts a thin, specialized needle through the anesthetized area and advances it to the vicinity of the SI joint and the nerves responsible for transmitting pain signals from the joint.

7. **Diagnostic Nerve MIPSI**: Before the RFA is performed, a diagnostic MIPSI is conducted to confirm the diagnosis. In this step, a local anaesthetic is injected near the targeted nerves to confirm that they are the source of the pain. If the patient experiences temporary pain relief following the nerve block, it indicates that the SI joint nerves are contributing to the pain.

8. **Radiofrequency Ablation**: Once the needle's placement is confirmed, a radiofrequency electrode is inserted through the needle and positioned near the targeted nerves. The electrode emits radiofrequency energy, which heats and cauterizes the nerves, disrupting their ability to transmit pain signals from the SI joint.

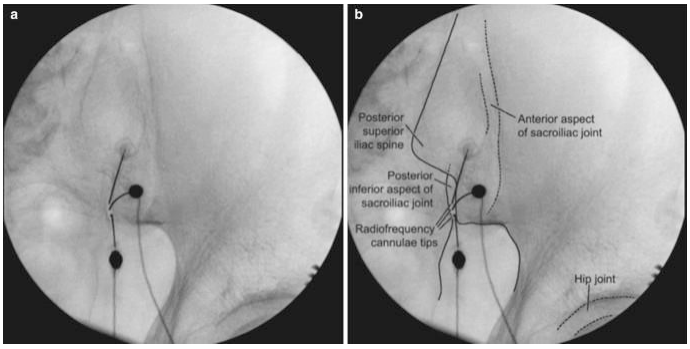


Figure 15- Sacroiliac joint Radiofrequency MIPSI

9. **Confirmation**: During the procedure, the patient may be asked to provide feedback to help the healthcare provider verify the correct placement of the electrode.

10. **Needle Removal**: After the RFA is completed, the electrode and needle are carefully withdrawn.

Post-Procedure Care: 11. **Recovery**: Patients are monitored for a short period after the procedure to ensure there are no immediate adverse reactions or complications.

Outcome Assessment: 12. **Pain Relief Evaluation**: Over the next several weeks, patients are typically asked to assess their pain levels and any changes in their symptoms. Pain relief from SI joint RFA can be significant and may last for a variable duration.

Follow-Up: 13. **Follow-Up Appointments**: Follow-up appointments with the healthcare provider may be scheduled to evaluate the effectiveness of the SI joint RFA and determine the need for additional treatments or interventions.

SI joint radiofrequency ablation is considered a safe and effective procedure for many individuals with chronic SI joint pain. However, as with any medical procedure, there are potential risks and benefits to consider, and patients should discuss these with their healthcare provider before undergoing the procedure.

When to Refer to Pain Physician:

If back pain does not improve after a few weeks or if any of the following symptoms happen with back pain:

- Numbness and tingling.
- Severe back pain that does not improve with medication
- Back pain after a fall or injury.
- Back pain along with:
    - Trouble urinating.
    - Weakness, pain, or numbness in legs.
    - Fever.
    - Rapid Weight loss.

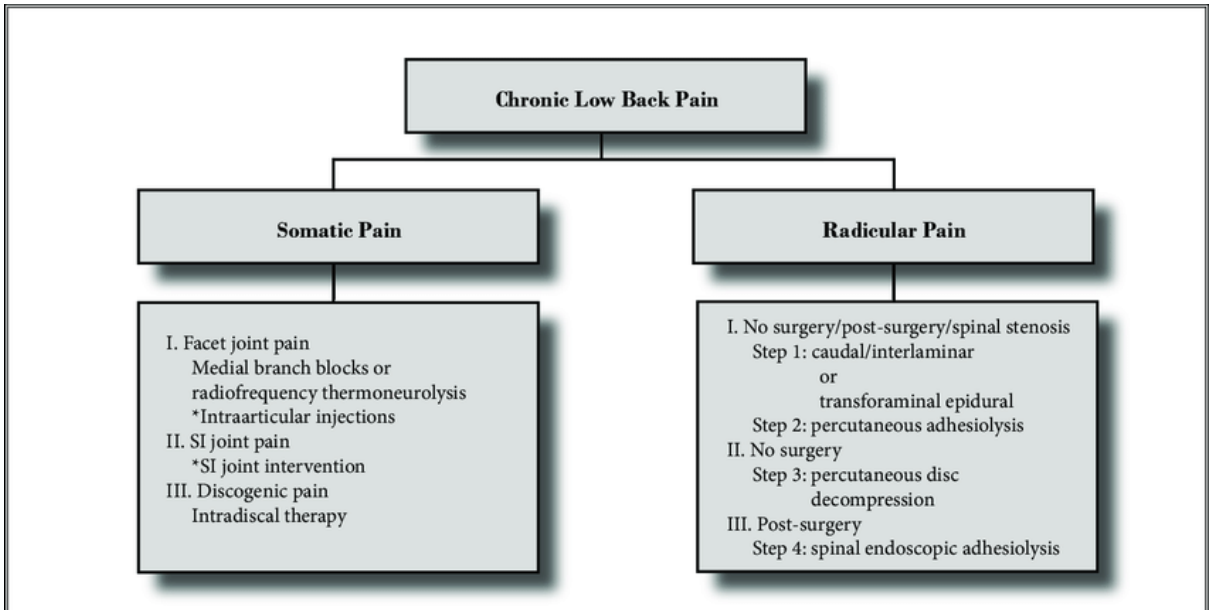


Figure- Algorithm for chronic low back pain

Chapter 8 Low back pain with sciatica

A prolapsed intervertebral disc, often referred to as a herniated disc or slipped disc, is a common cause of low back pain and sciatica. It occurs when the soft inner core (nucleus pulposus) of an intervertebral disc in the spine protrudes through the tough outer ring (annulus fibrosus) and compresses nearby nerves. Here's how a prolapsed intervertebral disc can lead to low back pain and sciatica:

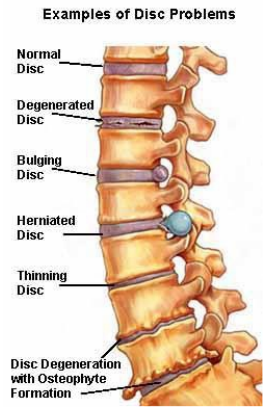


Figure 1- Diagram of various spine diseases

Low Back Pain:

- The protruding disc material can irritate or compress the nerves in the surrounding area, leading to localized low back pain.
- The annular fibers that surround the disc may also be damaged, contributing to pain.
- Inflammation may occur in response to the disc herniation, causing pain and discomfort in the lower back.

Sciatica:

- When the herniated disc material presses on the spinal nerve roots, particularly the sciatic nerve (which is a bundle of nerves that extends down the back of the leg), it can cause a set of symptoms known as sciatica.

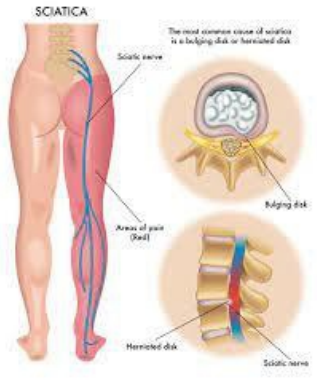


Figure 2- Diagram of Sciatic 'radicular' pain

- Sciatica typically includes pain, tingling, numbness, or weakness that radiates along the path of the affected

nerve. This pain often travels from the lower back down one leg.

- The specific symptoms and their severity can vary depending on the location and size of the disc herniation and which nerve roots are affected.

The characteristic symptoms of sciatica include:

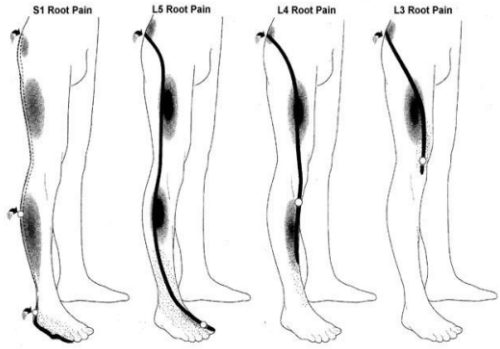


Figure 3- Diagram of 'dermatomal' pain patterns of sciatica

1. **Pain**: Sharp, shooting, or burning pain that may be severe and may extend from the lower back to the buttocks, thigh, calf, and even into the foot in a 'Dermatomal' pattern.
2. **Tingling and Numbness**: A sensation of tingling or numbness in the leg or foot.
3. **Muscle Weakness**: Weakness in the leg or foot, which may result in difficulty walking or maintaining balance.

It's important to note that not all disc herniations cause symptoms. Some people may have herniated discs that are asymptomatic or minimally symptomatic and do not require intervention.

Treatment for a prolapsed intervertebral disc that causes low back pain and sciatica may include:

- **Conservative Measures**: Many cases of herniated discs can be managed with conservative treatments, including rest, physical therapy, exercises to improve spinal flexibility and strength, and pain-relief medications (e.g., NSAIDs).

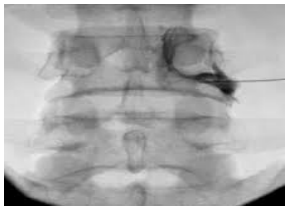


Figure 4-Trans-foraminal Neuroplasty MIPSI

- **Trans-foraminal Neuroplasty MIPSI**: For severe pain, your doctor may recommend epidural steroid injections, where anti-inflammatory medication is injected into the epidural space around the spinal nerve roots to reduce inflammation and relieve pain.

Percutaneous and minimally invasive disc interventions are advanced techniques used to treat PIVD (Prolapsed Intervertebral Disc), commonly known as a herniated disc or slipped disc. These procedures offer the advantage of smaller incisions, reduced tissue damage, quicker recovery times, and shorter hospital stays compared to traditional open surgery. Here are some of the percutaneous and minimally invasive disc interventions for PIVD:

1. **Percutaneous Discectomy**:

   - **Mechanical Discectomy**: In this procedure, a thin tube or needle is inserted through the skin and into the disc space under fluoroscopic guidance. The Pain Physician then uses specialized instruments to remove or break up the herniated disc material, relieving pressure on the nerve. The procedure can be done with or without laser assistance.

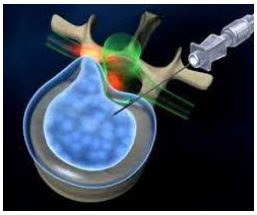


Figure 5- Diagram percutaneous disc decompression

   - **Laser Discectomy**: Laser energy is used to vaporize or shrink the herniated disc material, allowing the Pain Physician to remove or decompress the disc with minimal damage to surrounding tissues.

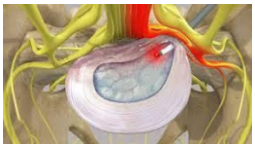


Figure 16-Diagram of Laser disce6ctomy

2. **Endoscopic Discectomy**:

Figure 7- Percutaneous Endoscopic Discectomy (Transforaminal route)

- **Transforaminal Endoscopic Discectomy**:

  In this minimally invasive procedure, an endoscope is inserted through a small incision in the back and guided to the affected disc under fluoroscopic control.

  The Pain Physician uses the endoscope to visualize and remove the herniated disc material, preserving surrounding structures.

3. **Nucleoplasty**:

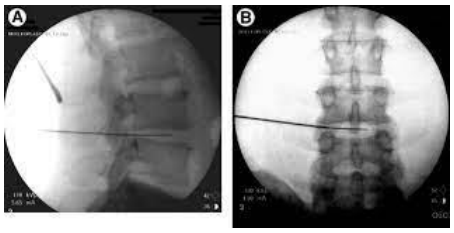


Figure 8- Percutaneous Nucleoplasty

- Nucleoplasty is a minimally invasive procedure that uses radiofrequency energy to treat PIVD. A needle is inserted into the disc, and the nucleoplasty system delivers energy to reduce the volume of the disc and decompress the nerve.

4. **Intradiscal Electrothermal Therapy (IDET)**:

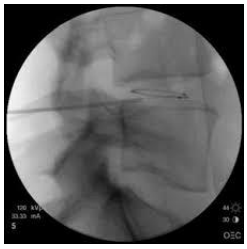


Figure 9- IDET MIPSI for Annular Tear

- IDET involves the use of a catheter inserted into the disc space under fluoroscopic guidance. The catheter delivers controlled heat to the disc, causing collagen

fibers to contract and seal any small disc tears. This procedure is aimed at reducing pain and improving disc stability.

These percutaneous and minimally invasive techniques are typically performed on an outpatient basis or with short hospital stays. They are often preferred when conservative treatments have not provided relief, and the herniated disc is causing significant pain or neurological symptoms. The choice of intervention depends on the specific case, including the location and size of the herniation, the patient's overall health, and the surgeon's expertise.

Percutaneous spine endoscopy for prolapsed intervertebral disc

Percutaneous Spine endoscopy is an ultra modern MIPSI (Minimally Invasive Pain & Spine Intervention) technique used to treat various spinal conditions, including prolapsed intervertebral discs (herniated discs). It offers several advantages over traditional open surgery, such as smaller incisions, less tissue damage, reduced blood loss, shorter hospital stays, and faster recovery. Here's an overview of spine endoscopy for the treatment of a prolapsed intervertebral disc:

Procedure:

Figure 1017- Percutaneous Spine Endoscope

1. **Preparation**: Before the procedure, you will undergo a comprehensive evaluation, including medical history, physical examination, and imaging (such as MRI or CT scans) to confirm the diagnosis and assess the specific details of the herniated disc.
2. **Anaesthesia**: Spine endoscopy is typically performed under local or epidural anaesthesia where patient remains ‘awake & aware’ or, in some cases, general

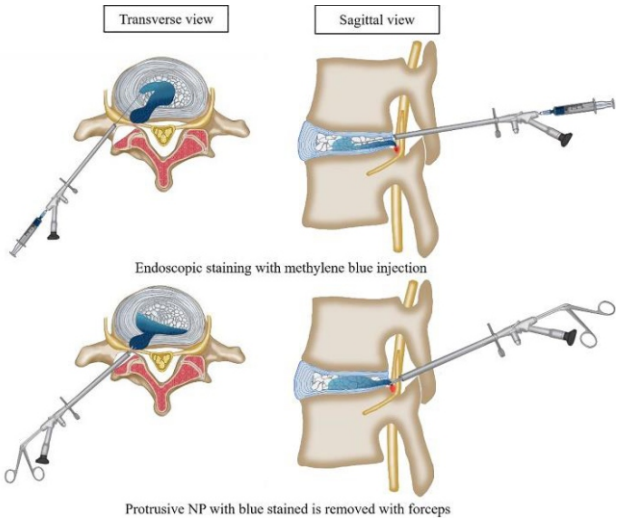
anaesthesia. The choice of anaesthesia depends on the extent and complexity of the procedure.

3. **Incision**: Instead of a large incision, spine endoscopy involves the creation of one or more small incisions (typically less than 1 inch in length) in the skin near the affected disc.

4. **Guidance**: The Pain Physician inserts a thin, flexible endoscope (a tube with a camera and light source) through one of the incisions. The endoscope allows for visualization of the spinal structures, including the herniated disc and surrounding nerves.

Figure 18- Diagram percutaneous spine endoscopy

5. **Nerve Decompression**: Using specialized endoscopic instruments inserted through additional small incisions, the Pain Physician removes or retracts a portion of the herniated disc material that is pressing on the spinal nerve or spinal cord.



6. **Closure**: Once the necessary decompression and disc removal are completed, the incisions are closed with sutures or adhesive strips. In some cases, a small bandage or dressing may be applied.

Advantages of Percutaneous Spine Endoscopy:

- **Minimally Invasive**: Smaller incisions result in less trauma to surrounding tissues.
- **Reduced Blood Loss**: Compared to traditional open surgery, there is typically less blood loss during spine endoscopy.
- **Faster Recovery**: Patients often experience quicker recovery times and shorter hospital stays.
- **Less Scarring**: Small incisions result in minimal scarring.

Candidates for Percutaneous Spine Endoscopy:

Spine endoscopy may be suitable for individuals with a herniated disc if:

- Conservative treatments (such as physical therapy, medications, and epidural injections) have not provided relief.
- There is neurological impairment, such as weakness or numbness in the limbs.
- Imaging studies confirm the location and size of the herniated disc.
- The patient's overall health permits anaesthesia and endoscopy.

It's important to note that while percutaneous spine endoscopy is effective for many patients with herniated discs, not all cases are suitable for this approach. The specific surgical technique and approach used may vary depending on the individual's condition and the Pain Physician's expertise. As with any MIPSI procedure, there are potential risks and benefits to consider, and the decision should be made in consultation with a Pain Physician who can assess the patient's unique situation and recommend the most appropriate treatment option.

Most cases of Chronic Low Back Pain can be very well managed by with MIPSIs (Minimally Invasive Pain & Spine Interventions) of Pain Medicine without big open surgeries, thus obviating the need of big major surgeries and general anaesthesia.

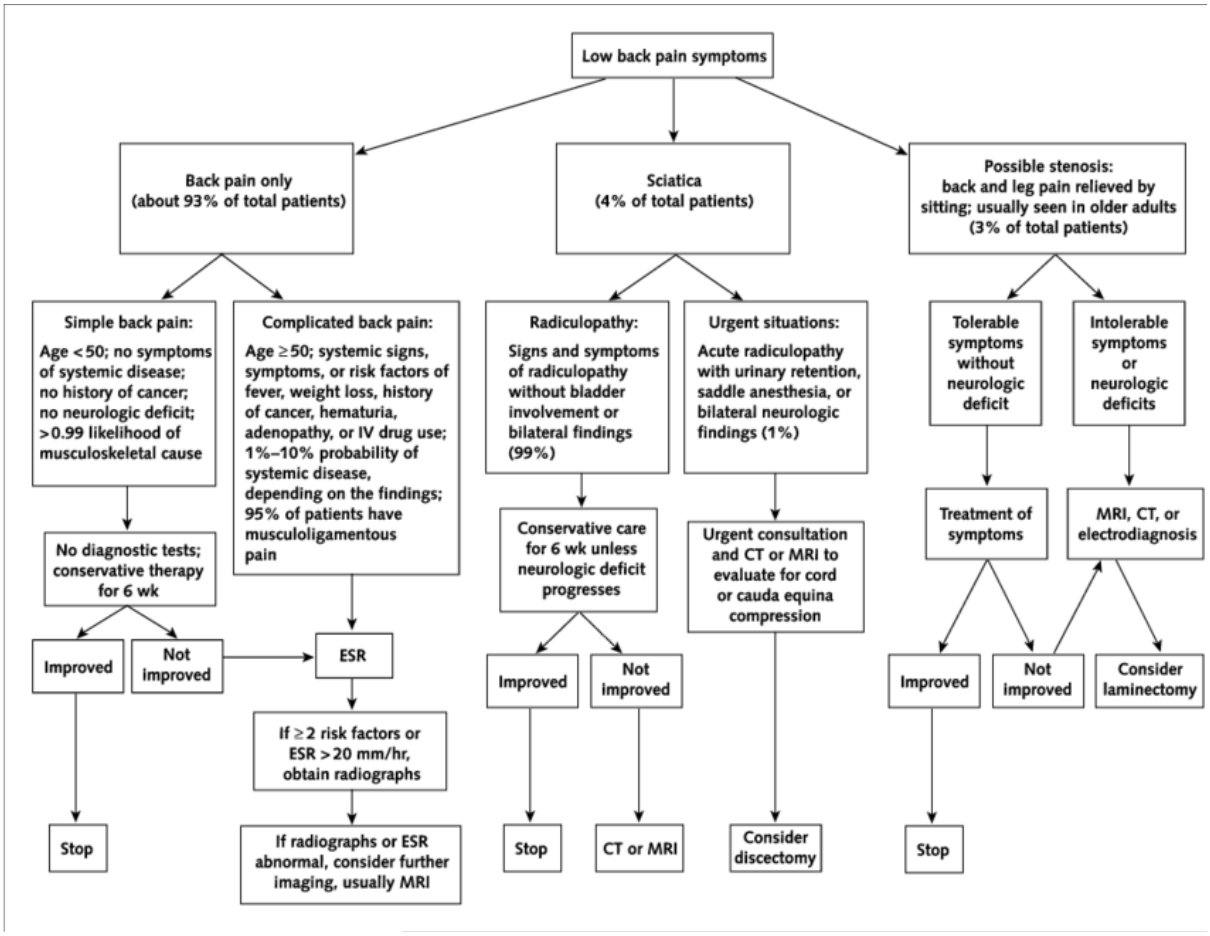


Figure- Algorithm for low back pain with sciatica

Chapter 9 Hip and Buttock Pain

The incidence of hip and buttock pain is estimated that approximately 1-2% of the population per year while the prevalence is estimated to be around 10-25% of the adult population. This means that at any given point in time, up to one in four adults may be experiencing hip or buttock pain.

Risk factors

- Age: Hip and buttock pain is more common in older adults.
- Sex: Females are more likely to experience hip and buttock pain than males.
- Physical activity: People who are active in sports or other activities that put a lot of stress on the hips and buttocks are more likely to experience pain.
- Occupation: People who have jobs that require them to sit or stand for long periods of time are also more likely to experience hip and buttock pain.
- Medical conditions: Certain medical conditions, such as arthritis, obesity, and diabetes, can

Causes of Hip & Buttock Pain

1. Musculoskeletal Causes:
    - Muscle Strain: Overuse or injury to the muscles in the buttock or hip area can lead to pain.
    - Tendinitis: Inflammation of tendons in the hip and buttock region, such as the hip flexor tendons or gluteal tendons, can cause pain.
    - Bursitis: Inflammation of the bursae (fluid-filled sacs that cushion joints) in the hip or buttock can lead to discomfort.

- Hip Labral Tear: Damage to the labrum, a ring of cartilage that surrounds the hip joint socket, can result in pain.

2. Joint Conditions:

    - Osteoarthritis: Degeneration of the hip joint cartilage can lead to hip pain and stiffness.
    - Rheumatoid Arthritis: An autoimmune disease that can affect multiple joints, including the hip.
    - Hip Impingement: A condition where there is abnormal contact between the hip bones, leading to pain and limited range of motion.

3. Nerve-Related Causes:

    - Sciatica: Compression or irritation of the sciatic nerve, which runs from the lower back down through the buttocks and legs, can cause pain in the buttock and radiating down the leg.
    - Piriformis Syndrome: The sciatic nerve can be compressed or irritated by the piriformis muscle in the buttock, causing pain.

4. Traumatic Injuries:

    - Fractures: A hip or pelvic fracture can result from traumatic injury and cause severe pain.
    - Dislocations: A dislocated hip joint can cause acute pain.

5. Inflammatory Conditions:

- Ankylosing Spondylitis: An inflammatory condition that primarily affects the spine but can also involve the hips and buttocks.
- Inflammatory Joint Diseases: Conditions like psoriatic arthritis or an inflammatory bowel disease can lead to hip and buttock pain.

6. Infections: In rare cases, infections in the hip joint or surrounding tissues can lead to pain and discomfort.
7. Other Causes:
    - Tumours: Bone tumours or soft tissue tumours in the hip area can cause pain.
    - Referred Pain: Sometimes, pain originating from another part of the body, such as the lower back or sacroiliac joint, can be felt in the hip and buttock.

Signs and symptoms of hip and buttock pain:

1. Pain: The aching, sharp, dull, or throbbing pain in the hip and buttock area, which may be constant or intermittent.
2. Limited Range of Motion: patients usually present with reduced flexibility and difficulty moving the hip joint. Activities like walking, climbing stairs, or bending over can be painful or restricted.
3. Stiffness: Stiffness in the hip and buttock area, particularly in the morning or after prolonged periods of inactivity, is a common symptom.
4. Radiating Pain: In some cases, the pain may radiate to other areas, such as the lower back, thigh, or down the leg. This can be indicative of nerve compression or referred pain.

5. Swelling: Swelling or inflammation around the hip joint or in the buttock region may occur, especially in conditions like bursitis or joint inflammation.

6. Muscle Weakness: Weakness in the muscles around the hip and buttock.

7. Instability: patients may feel like their hip is giving way or is unstable, which can increase the risk of falls or injuries.

8. Clicking or Popping: Some people may experience clicking, popping, or grinding sensations when moving their hip joint, which can be associated with conditions like labral tears or hip impingement.

9. Numbness and Tingling: In cases of nerve compression, such as sciatica or piriformis syndrome, numbness, tingling, or burning sensations may radiate down the leg.

10. Night Pain: Some conditions, like arthritis, can cause increased pain and discomfort at night, interfering with sleep.

Treatment of hip and buttock pain

10. Rest and Activity Modification:

11. Physical Therapy:

12. Analgesic Drugs:

    - Over-the-counter nonsteroidal anti-inflammatory drugs (NSAIDs)

    - Opioids drugs like Tramadol or muscle relaxants, may be necessary in some cases.

13. Assistive Devices:

- Canes, crutches, or orthotic devices may be recommended to offload pressure on the hip joint or buttock, especially in cases of arthritis.

14. Bracing and Support:

- Braces or support devices can help stabilize the hip joint in cases of instability or after an injury.

15. Lifestyle Modifications:

- Weight management and adopting a healthy lifestyle can reduce stress on the hip joint and alleviate pain, particularly in cases of arthritis.
- Physical activity and exercises to maintain or improve joint flexibility and strength are often recommended.

16. Surgery:

- Surgical intervention may be necessary for some conditions, such as severe hip fractures, advanced arthritis, labral tears, or cases of impingement that do not respond to conservative treatments.
- Hip replacement surgery may be an option for advanced osteoarthritis or other degenerative hip conditions.

17. Minimally Invasive Pain & Spine Treatment (MIPSI):

- PRP MIPSI- Platelet rich Plasma, Pain Biological Therapy is one of most advanced therapy for various arthritic conditions of Hip Joint and

Figure 19- Diagram of PRP Hip Intra-articular MIPSI

often useful for AVN Stage 1& 2 of Hip Joint.

- 'Cooled Radio-frequency of Genicular Nerves of Hip Joints'- most advanced therapy for advanced cases of Hip arthritis and who are not a candidate for Hip Replacement. This therapy is available at Pain Medicine of Dr RMLIMS, Lucknow and few other institutions also in Uttar Pradesh and India.

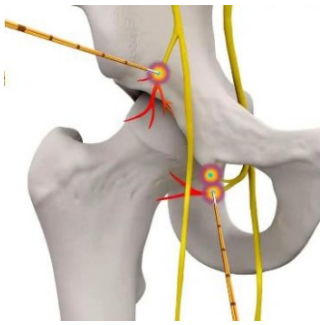


Figure 2- Diagram of Cooled Radiofrequency MIPSI of Hip

- SIJ MIPSI and Radiofrequency Ablation- for Sacro-ileac joint pain syndrome.

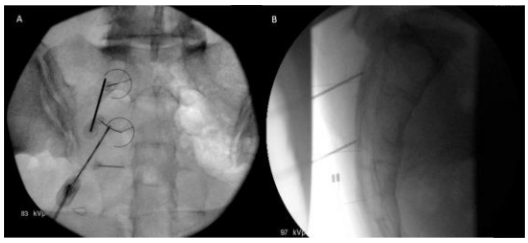


Figure 3- Radiofrequency MIPSI for Sacro-iliac Joint pain

- Piriformis MIPSI is a very effective intervention done under c-arm fluoroscopic guidance by a Pain Physician

Figure 4- Piriformis Syndrome MIPSI

11. Physical Modalities:

- Heat or cold therapy, ultrasound, or electrical stimulation may be used as adjunct therapies to relieve pain and promote healing.

12. Complementary Therapies:

- Complementary approaches like acupuncture, chiropractic care, or massage therapy may offer relief for some individuals.

Treatment plans should be individualized, taking into account the specific diagnosis, the severity of symptoms, the patient's age, overall health, and personal preferences. It's crucial to follow the guidance of a healthcare professional to manage and treat hip and buttock pain effectively. They can help determine the most appropriate treatment options and provide recommendations tailored to your needs.

When to refer to a Pain Physician-

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment
- New or worsening neurological features

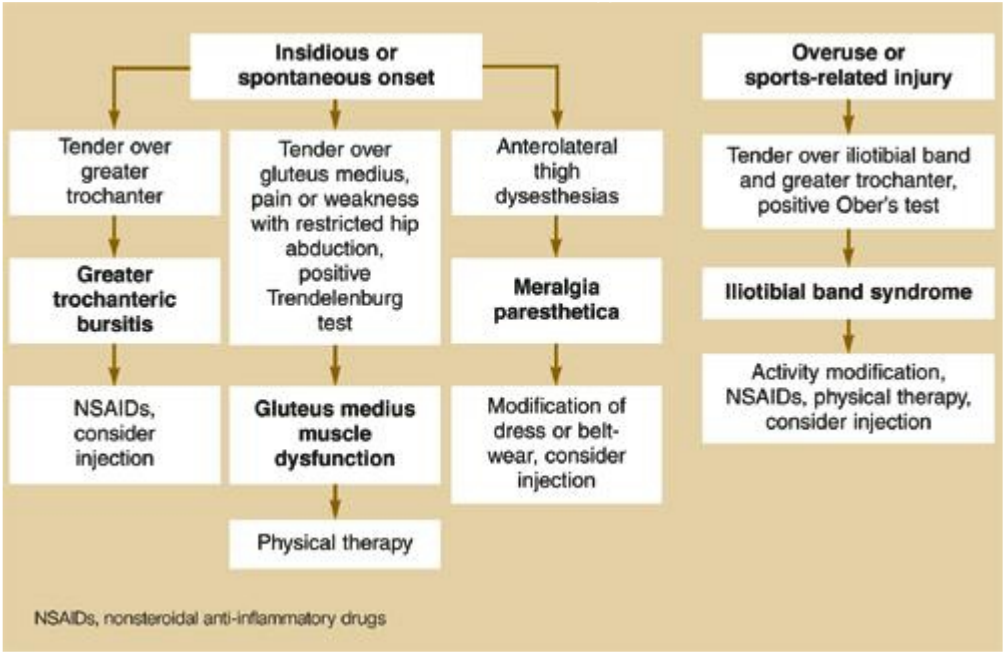


Figure- Algorithm for Hip Pain

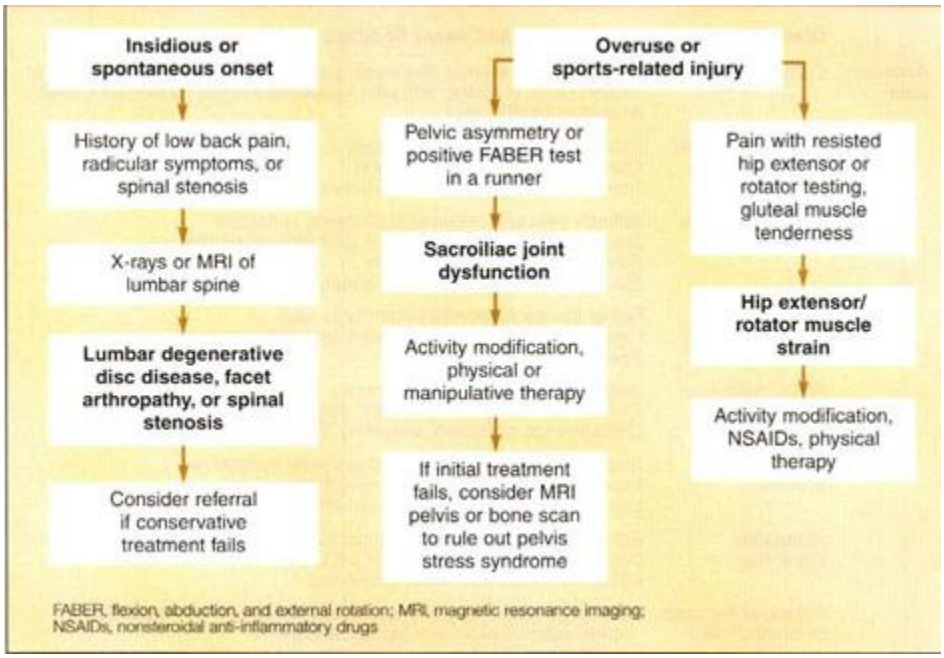


Figure- Algorithm for Buttock Pain

Chapter 10 Knee pain

The knee joint is the largest synovial hinge complex joint because of the fusion of three joints, i.e., medial and lateral femoro-tibial and femoro-patellar joint. It is supported with multiple ligaments bursa and tendons.

Knee pain is one of the most common causes of a patient's visit to a doctor worldwide, due to age related wear and tear injury of the joint.

Causes:

- Osteo-arthritis- most common cause of Knee Pain
- Inflammatory Arthritis -- Including rheumatoid arthritis, lupus, and gout
- Baker cyst -- A fluid-filled swelling behind the knee that may occur with swelling (inflammation) from other causes, such as arthritis
- Osgood-Schlatter disease
- Infection in the bones around the knee
- Infection in the knee joint
- Cancers that either spread to your bones or begin in the bones

Injuries and Overuse

- Bursitis -- Inflammation from repeated pressure on the knee, such as kneeling for a long time, overuse, or injury
- Tendinitis -- Inflammation of the tendon with change in activities, can be related to overuse or deconditioned tissue

- Dislocation of the knee-cap
- Fracture of the knee cap (Fracture patella)
- Iliotibial band syndrome -- Injury to the thick band that runs from your hip to the outside of your knee
- Patellofemoral syndrome -- Pain in the front of your knee around the kneecap
- Torn ligament. -- An anterior cruciate ligament (ACL) injury, or medial collateral ligament (MCL) injury may cause bleeding into your knee, swelling, or an unstable knee
- Torn cartilage (a meniscus tear) -- Pain felt on the inside or outside of the knee joint
- Strain or sprain -- Minor injuries to the ligaments caused by sudden or unnatural twisting

Causes of Referred Knee pain-

- Facet arthropathy
- Lumbar disc disease
- L3/L4 nerve root pain
- Hip pathologies
- Myofascial pain.

Red flags:

- Knee effusion with history of trauma: fracture must be ruled out
- Red, hot knee joint (septic arthritis.)
- Multi- joint involvement in patients with systemic disease.

Sign and Symptom:

- Pain due to local knee pathology or referred pain from nearby structures.
- Swelling
- Or they may present with Mechanical problems as
    - Gelling, Locking, Pseudo-locking, Popping, Buckling, Crepitation.

Osteoarthritis Knee-

In patients over 50 years of age, osteoarthritis (OA) of the knee joint is extremely common condition causing pain in knee. OA may be associated with meniscal tear.

X ray knee standing AP and lateral view is considered to grade OA knee. MRI can help in localised exact compartment and associated meniscal and ligament injury.

Kellgren and Lawrence (K-L)Radiological classificationof OA knee is commonly used for severity of OA Knee..

K-L Grade	0	No radiographic features of osteoarthritis
K-L Grade	1	Possible joint space narrowing and osteophyte formation
K-L Grade	2	Definite osteophyte formation with possible joint space narrowing

K-L Grade	3	Multiple osteophytes, definite joint space narrowing, sclerosis and possible bony deformity
K-L Grade	4	Large osteophytes, marked joint space narrowing, severe sclerosis and definite bony deformity

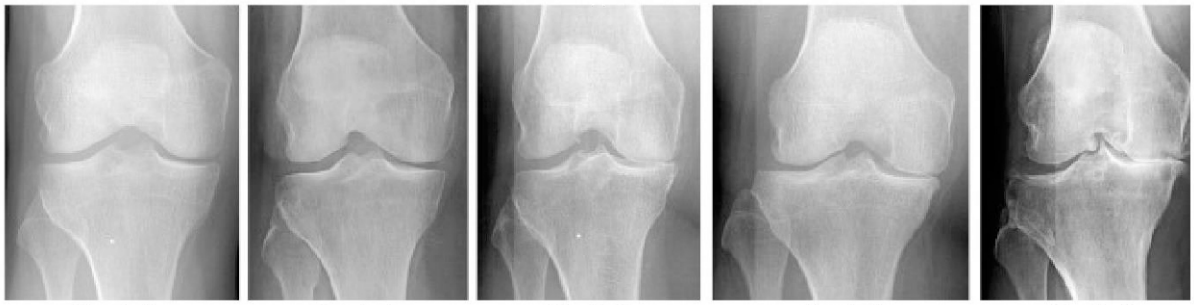


Figure 20- K-L radiological Grading of OA Knee

These patients complain of diffuse knee pain that worsens with weight bearing activities, and they often report some morning stiffness. They present with chronic pain with episodic swelling which is exacerbated by heavy activity causing acute flare ups,

On physical examination, there may occasionally be a visible/palpable effusion. Tenderness over joint line will be more pronounced over medial joint line. Range of movements can be restricted with end bony resistance in passive flexion. Crepitus is a common finding, but does not

Management

Conservative:

Analgesics for oral and Topical application,

- Nutraceuticals like –
  - Type 2 Collagen Supplements
  - Glucosamine
  - Hyaline supplements
- Heat therapy and physical rehabilitation.

Minimally Invasive Pain & Spine Interventions (MIPSIs) for Knee Pain:

- Intra-articular Knee MIPSI-
  - Intra-articular Steroids, especially in conditions of inflammatory arthritis like rheumatoid arthritis; but routine and multiple use is not recommended.
  - Intra-articular PRP (Platelet Rich Plasma) Intervention- most advanced 'regenerative' treatment for degenerative osteo-arthritic conditions. It is usually done by a Pain Physician in a Pain Medicine Operation theatre under Ultrasound Guidance.

Figure 21- USG Guided PRP Knee MIPSI

- High Molecular Weight Hyaluronic Acid supplementation (Synovial Fluid Replacement Therapy); another good treatment for moderate grade 2 & 3 Osteoarthritis knee.
- Genicular Nerve Radio-frequency Treatment- Radio-frequency treatment of genicular nerves supplying the knee joint using most advanced

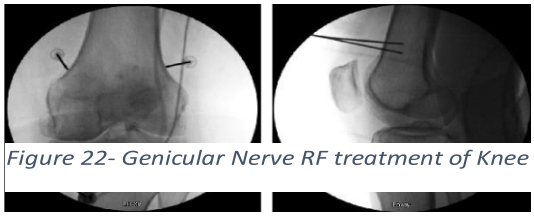


Figure 22- Genicular Nerve RF treatment of Knee

'Cooled radio-frequency Pain Management machine' is a US-FDA approved treatment for all stages of osteo-arthritis knee pain. That is also indicated for Post TKR () and persistent knee pain.

Orthopaedic Treatment:

- Total knee replacement (TKR) and Knee Arthroplasty
- High Tibial Osteotomy

When to Refer to a Pain Physician:

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment.
- Persistent pain after total knee replacement.

Chapter 11 FOOT AND ANKLE PAIN

Foot pain can present with various signs and symptoms, and the differential diagnosis depends on the specific characteristics of the pain.

Common causes of Foot and Ankle Pain-

Extrinsic causes: referred pain from the lumbar spine, hip, knee, or leg.

Intrinsic causes:

- Tendonitis (Achilles tendon, posterior tibial tendon, peroneal tendons).
- Ligament sprains,
- Stress fractures,
- Metatarsalgia,
- Morton's neuroma,
- Plantar fasciitis.
- Tarsal tunnel syndrome,
- Vascular claudication,
- Arthritis of the ankle, hindfoot, mid- foot, or forefoot.

Symptoms of Foot and Ankle Pain:

- Plantar fasciitis:
    - a very common diagnosis.
    - presents as medial heel pain that is worse on first

rising in the morning or after rest.

- flatfoot deformity:
    - An acute or subacute loss of the foot's medial arch
    - Commonly associated with posterior tibial tendon insufficiency.
- Morton's neuroma:
    - Pain during weight bearing in an interspace between the toes, particularly the third interspace.
    - Can be associated symptoms with numbness, burning pain, and cramping in the forefoot or toes.
- Tarsal tunnel syndrome:
    - pain, numbness, and tingling in the plantar aspect of the foot.
    - Pain is usually activity related and reduced by rest.
    - A positive Tinel sign may be present over the tarsal tunnel.
    - Electro- diagnostic testing may be helpful in making the diagnosis as well.
- Foot Arthritis:
    - stiffness and activity related pain.

Management of Foot and Ankle Pain:

- Non-invasive treatments, including rest, icing, and physical therapy
- NSAIDs
- Minimally Invasive Pain & Spine Interventions (MIPSI)
    - Ultrasound-guided corticosteroid injections
    - Platelet-rich plasma (PRP) MIPSI for planter fasciitis, tendon injury, bursitis and arthritis
    - Alcohol sclerosing injections for neuromas

When to refer to a Pain Physician:

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment

Chapter 12 Orofacial pain & Trigeminal Neuralgia

Orofacial Pain: Orofacial pain refers to pain that is localized to the mouth, face, and neck region. It can result from various causes, including dental, musculoskeletal, neurological, and systemic issues.

Signs and Symptoms: The signs and symptoms of orofacial pain can vary, but they may include:

1. Pain in the face, jaw, mouth, or neck.
2. Headaches or migraines.
3. Electric Shock like pain on face
4. Toothache or dental pain.
5. Pain with jaw movement or chewing.
6. Sensitivity to hot or cold temperatures.
7. Clicking or popping sounds in the jaw.
8. Facial muscle tenderness or spasms.
9. Numbness or tingling in the face.
10. Difficulty opening or closing the mouth.
11. Ear pain or ringing in the ears (tinnitus).

Differential Diagnosis:

1. Temporomandibular Joint Disorders (TMD)
2. Dental issues (e.g., cavities, gum disease)
3. Trigeminal neuralgia
4. Myofascial pain syndrome

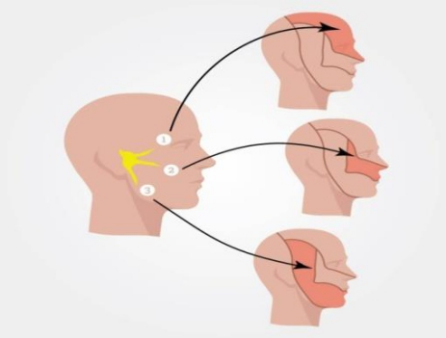


Figure 23 Trigeminal Neuralgia Pain Distribution

5. Headaches (e.g., tension-type, migraines)
6. Sinusitis
7. Neuropathic pain (e.g., post-herpetic neuralgia, glossopharyangeal neuralgia)
8. Burning mouth syndrome
9. Systemic disorders (e.g., fibromyalgia, autoimmune diseases)

Management: Management strategies can be employed based on the specific diagnosis and patient's needs. These may include:

1. **Oral Appliances:** For TMD, custom-made oral splints or mouth-guards can help realign the jaw and alleviate symptoms.
2. **Physical Therapy:** Exercises and manual therapies can be used for TMD and myofascial pain.
3. **Medications**

1. **Anticonvulsant drugs:** anti-epileptic drugs like carbamazepine and oxcarbazepine are often the first-line treatment for trigeminal neuralgia, helping to control pain by stabilizing the nerve's activity.

2. **Muscle relaxants:** Medications that help relax facial muscles, such as baclofen, can be used in combination with anticonvulsants.

3. **Other medications:** Sometimes, tricyclic antidepressants or antispasmodic drugs are prescribed to manage pain.

4. **Botulinum Toxin (Botox):** Injections of botulinum toxin can be used to relax facial muscles and treat conditions like TMD, bruxism, and chronic migraines.

5. **Dental Procedures:** Dental treatments may include fillings, extractions, or root canals for dental-related pain.

6. **Psychotherapy:** Cognitive-behavioural therapy (CBT) can be effective for managing orofacial pain related to psychological factors.

7. **Acupuncture and Acupressure:** These alternative therapies may offer relief for some patients with orofacial pain.

8. **Lifestyle Modifications:** Stress management, dietary changes, and avoiding trigger foods can help reduce symptoms in some cases.

9. **Surgical Options:** In severe cases, surgical interventions may be necessary, but these are generally considered after conservative approaches have been exhausted.

Minimally Invasive Pain & Spine Intervention (MIPSI) for Trigeminal and other orofacial pain

Minimally invasive interventions for trigeminal neuralgia and other orofacial pain conditions aim to provide relief from pain while minimizing the invasiveness and potential side effects associated with more aggressive surgical procedures. Some minimally invasive interventions commonly used for trigeminal neuralgia and other orofacial pain conditions:

1. **Trigeminal nerve minimally invasive interventions:**

   Trigeminal Nerve neurolysis, glycerol rhizotomy, radiofrequency ablation: Local anaesthetic with absolute alcohol, glycerol or phenol can be injected . It is a minimally invasive procedure that can provide relief in pain.

   Percutaneous Radiofrequency of Gasserian Ganglion is a minimally invasive procedure that can provide relief for trigeminal neuralgia.

   Percutaneous Balloon Compression of Gasserian Ganglion- is most advanced MIPSI for treatment of trigeminal neuralgia. A balloon is inserted through the cheek and inflated near the gasserain ganglion. It is minimally invasive compared to open surgery.

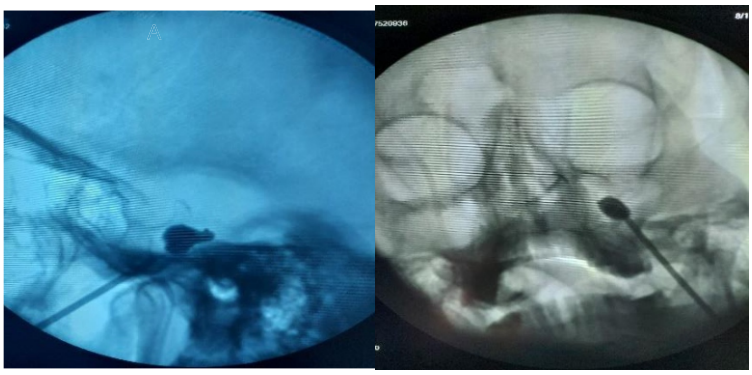


Figure 24 Percutaneous Balloon Compression

   Microvascular Decompression (MVD):

MVD is a neuro-surgical operation for trigeminal neuralgia; where a teflon graft is placed in between the offending blood vessels that may be compressing the trigeminal nerve.

2. Sphenopalatine Ganglion minimally invasive interventions: This procedure targets the sphenopalatine ganglion situated in pterygopalatine fossa and can be performed using various techniques, including intranasal application of local anesthetics or by fluoroscopic guided radiofrequency ablation. It is a useful MIPSI for atypical facial pain.
3. TM joint intervention –PRP MIPSI injection of PRP in the TM joint relive pain and symptoms.

- It's important to note that the choice of intervention will depend on the specific diagnosis and severity of the condition, as well as the patient's preferences and overall health.
- Minimally invasive procedures generally carry fewer risks and have shorter recovery times compared to more invasive surgical options.
- Patients should consult with a Pain Physician to determine the most appropriate treatment plan for their specific orofacial pain condition.

When to Refer to a Pain Physician-

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment
- New or worsening neurological features

Chapter 13 Headache Disorders

Headaches are one of the most common medical conditions in the world. The incidence and prevalence of headaches vary depending on the type of headache, age, gender, and other factors.

One study estimated that the incidence of migraine, the most common type of headache, is about 2.5% per year in adults.

The prevalence of headaches is much higher than the incidence. Global studies have estimated that the prevalence of headaches is about 50% in adults, meaning that half of all adults have had a headache in the past year.

The prevalence of different types of headaches is as follows:

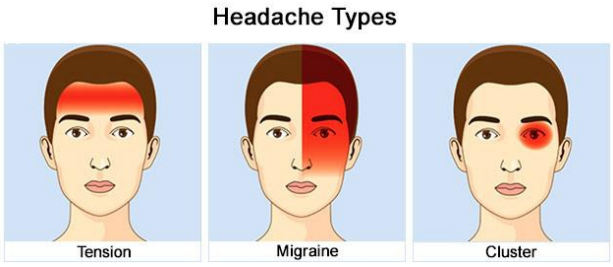
- Migraine: 14%

- Tension-type headache: 26%
- Chronic headache: 4.6%

Other factors that can affect the incidence and prevalence of headaches include:

- Age: Headaches are more common in adolescents and young adults.
- Gender: Headaches are more common in women than in men.
- Genetics: Headaches tend to run in families.
- Stress: Stress is a common trigger for headaches.
- Diet and lifestyle: Certain foods and beverages, such as caffeine and alcohol, can trigger headaches. Lack of sleep and poor posture can also contribute to headaches.

Common Causes:



1. **Tension-Type Headaches:** These are the most common type of headache and are often associated with stress, muscle tension, and poor posture.
2. **Migraines:** Migraines are a type of headache characterized by intense, throbbing pain, often on one side of the head. They are often accompanied by other symptoms like nausea, vomiting, and sensitivity to light and sound.
3. **Cluster Headaches:** Cluster headaches are a rare but extremely painful type of headache that tend to occur in clusters for a period of time, followed by headache-free intervals.

4. **Cervicogenic Headache-** a common cause of headache, which originates at the junctional area of head and neck and referred to the head. It aggravates with neck movement. More prevalent due to arthritic changes in the facet joints of cervical spine.

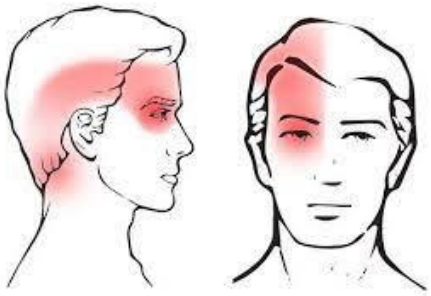


Figure 25- Referral Pattern of Cervicogenic Headache

5. **Sinus Headaches:** These headaches are typically caused by sinus congestion or sinusitis and are often felt in the forehead, cheeks, or nose.

6. **Rebound or Medication-Overuse Headaches:** Overuse of pain relievers or migraine medications can lead to rebound headaches when the medication wears off.

7. **Meningitis:** This is a serious medical condition where the membranes surrounding the brain and spinal cord become inflamed. Severe headaches can be a symptom.

8. **High Blood Pressure (Hypertension):** Elevated blood pressure can lead to headaches, although not everyone with high blood pressure will experience headaches.

9. **Stress and Anxiety:** Emotional stress and anxiety can trigger tension-type headaches or migraines in some people.

10. **Diet and Food Triggers:** Certain foods and drinks, like alcohol, processed foods, and artificial sweeteners, can trigger headaches in sensitive individuals.

11. **Environmental Factors:** Environmental triggers, such as strong odors, smoke, or changes in weather, can lead to headaches in some people.

12. **Neck or Spinal Issues:** Problems with the neck or spine, including poor posture, can cause cervicogenic headaches.

13. **Infections:** Various infections, including the common cold or the flu, can be associated with headaches.

14. **Neurological Conditions:** In some cases, underlying neurological conditions, such as brain tumours or aneurysms, can cause chronic or severe headaches.

Signs and symptoms of headaches

1. **Head Pain:** The most prominent and common symptom of a headache is pain in the head. The location, quality, and intensity of the pain can vary depending on the type of headache.

2. **Location:** The pain may be localized to a specific area of the head (e.g., one side or both sides), or it can be more generalized.

3. **Quality of Pain:** The pain may be described as a dull ache, throbbing, stabbing, squeezing, or a constant pressure.

4. **Duration:** Headaches can be brief and acute or long-lasting and chronic, depending on the underlying cause.

5. **Frequency:** Headaches can occur infrequently or frequently, and some individuals may experience chronic daily headaches.

6. **Associated Symptoms:** Depending on the type of headache, other symptoms may be present, including:

    - Nausea and vomiting

- Sensitivity to light (photophobia)
- Sensitivity to sound (phonophobia)
- Visual disturbances
- Aura (typically seen in migraines)
- Light-headedness or dizziness
- Changes in vision or visual disturbances

7. **Severity:** The severity of the pain can range from mild discomfort to severe, incapacitating pain, such as in the case of migraines.
8. **Triggers:** Some individuals can identify specific triggers that lead to their headaches, such as certain foods, alcohol, stress, or hormonal changes.
9. **Timing:** Headaches can occur at any time of the day or night. Some individuals may experience morning headaches.
10. **Prodrome:** Some types of headaches, like migraines, can be preceded by prodromal symptoms that occur hours or even days before the headache. These symptoms may include changes in mood, food cravings, or other subtle warning signs.
11. **Aura:** Migraines with aura can include temporary neurological symptoms such as visual disturbances, flashing lights, or tingling sensations.
12. **Relief:** The pain may respond to rest, relaxation, or over-the-counter pain relievers in some cases, while others may require prescription medications or other treatments.
13. **Chronic vs. Acute:** Chronic headaches are those that occur on a regular or daily basis for an extended period, while acute headaches are infrequent or sporadic.

Management of headache

The management of headaches depends on the underlying cause, type of headache, and individual factors. Here are some general strategies and treatments that can help alleviate or manage headaches:

1. **Identify and Avoid Triggers:**
    - Keep a headache diary to track potential triggers like specific foods, drinks, stressors, sleep patterns, or environmental factors.
    - Once triggers are identified, try to avoid or minimize exposure to them.
2. **Lifestyle Modifications:**
    - Maintain regular sleep patterns and get adequate rest.
    - Stay well-hydrated by drinking enough water throughout the day.
    - Adopt a healthy and balanced diet.
    - Manage stress through relaxation techniques, mindfulness, or stress reduction strategies.
    - Engage in regular physical activity and maintain good posture.
    - Limit caffeine and alcohol consumption.
3. **Acetaminophen and NSAIDS:**
    - For tension-type headaches or mild migraines, over-the-counter pain relievers like acetaminophen, ibuprofen, or aspirin may help.
4. **Prescription Medications:**

- If over-the-counter medications do not provide relief or if patient has frequent or severe headaches, may require specific headache medications.
- They can be either 'Preventive' or 'Abortive' medications for individuals with chronic or recurrent migraines or tension-type headaches.
- **'Abortive' medications-** Triptans are a class of medications designed to treat/ abort an attack of migraine. They work by narrowing blood vessels and reducing inflammation in the head.
- **Preventive Medications:** beta-blockers, anticonvulsants, or tricyclic antidepressants are commonly used medications for prevention of migraine.

5. **Non-Prescription Medications:**
   - Some individuals may benefit from non-prescription migraine or headache medications containing caffeine, aspirin, and acetaminophen.
6. **Rest and Relaxation:**
   - If your headache is triggered or exacerbated by stress or fatigue, finding a quiet, dark room and resting in a comfortable position can be helpful.
7. **Cool Compress or Warm Compress:**
   - Applying a cool or warm compress to the forehead or neck may provide relief for some people, depending on the type of headache.
8. **Caffeine:**

- In some cases, caffeine may help alleviate a headache, but excessive caffeine intake or withdrawal can also trigger headaches, so it should be used judiciously.

9. **Biofeedback and Relaxation Techniques:**

    - Biofeedback, relaxation, and stress management techniques can help you learn to control physiological responses that may contribute to headaches.

10. **Hydration:**

    - Drinking enough water and staying well-hydrated can help prevent headaches, particularly those triggered by dehydration.

11. **Botox Injections:**

    - Botox injections may be considered for chronic migraines if other treatments are ineffective.

12. **Surgery:**

    - In rare cases, surgery may be recommended for certain types of headaches or underlying structural issues.

Red flags of Headache

"Red flags" in the context of headaches are symptoms or characteristics that suggest the possibility of a more serious underlying condition, and they should prompt to seek immediate medical attention. Red flags associated with headaches may indicate a potentially life-threatening or severe medical issue.

1. **Sudden and Severe Headache:** A sudden and extremely severe headache, often described as the "worst headache of your life," can be a sign of a serious condition, such as a ruptured aneurysm or bleeding within the brain.

2. **New-Onset Headache:** If you are experiencing a headache for the first time in your life and you are over the age of 40, it's important to rule out serious causes.

3. **Change in Headache Pattern:** If you have a history of recurrent headaches (e.g., tension-type or migraines) and notice a significant change in the frequency, intensity, or characteristics of your headaches, it could indicate an underlying problem.

4. **Neurological Symptoms:** Headaches accompanied by neurological symptoms such as weakness, numbness, changes in vision, difficulty speaking, confusion, or loss of consciousness should be taken seriously.

5. **Seizures:** New-onset seizures, especially if they occur in adulthood, can be related to underlying brain conditions.

6. **Fever with Headache:** Headache associated with fever, especially if accompanied by stiff neck, could be a sign of meningitis or another infection.

7. **Headache after Head Injury:** If you experience a headache following a head injury or concussion, it's crucial to seek medical evaluation to rule out a more serious condition like a hematoma.

8. **Worsening Over Time:** If your headache progressively worsens over hours or days, it may be indicative of a growing problem.

9. **Headache in Certain Populations:** In certain populations or specific circumstances, headaches may be of particular concern. For example, if a pregnant woman experiences a severe headache, it may require immediate evaluation.

10. **Recent Infection:** In some cases, a severe headache following a respiratory or sinus infection can be associated with complications like sinusitis or even abscess formation.

MIPSIs (Minimally Invasive Pain & Spine Interventions) for Headache Disorder-

In Pain Medicine, multiple Minimally Invasive Pain & Spine Interventions (MIPSI) have been found useful for chronic headaches.

- Atlanto-Occipital Joint (C0-1 Joint) MIPSI and Atlanto-Axial (C1-2 Joint) Joint MIPSI- very useful in certain set of patients with arthritis and resultant headache located in the 'junction of head and neck'.

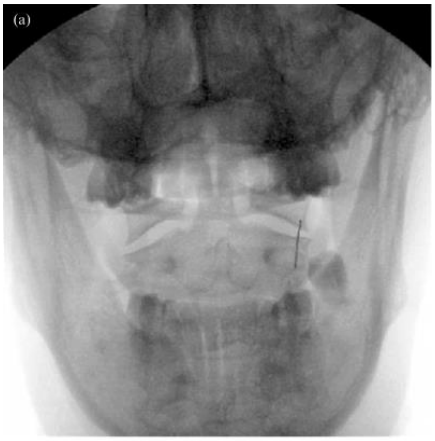
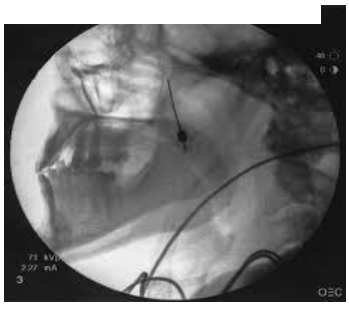


Figure 26- Atlanto-axial Joint MIPSI

- TON MIPSI & Radiofrequency Treatment- Third Occipital Neuralgia is often under-diagnosed but common cause of pain in occipital area, which can be very treated by a Pain Physician.

Figure 27- TON (Third Occipital Nerve) Radiofrequency Treatment)

- Injection of Botulinum Toxin A in a



"PREEMPT Protocol' is found very useful for resistant cases of migraine.

- Spheno-Palatine Ganglion MIPSI and Radiofrequency treatment is very useful in certain cases of Cluster Headache.

Figure 28- Spheno-palatine Radiofrequency MIPSI

When to refer to a Pain Physician-

- Patient not responding to conservative care for a reasonable duration i.e., 2-3 weeks
- Pain continuously increasing in spite of treatment
- New or worsening neurological features

Chapter 14 Common Rheumatologic Diseases

INTRODUCTION

Polyarthralgia is a medical term used to describe a condition characterized by pain and discomfort in multiple joints throughout the body. The prefix "poly" indicates the involvement of several joints, and "arthralgia" refers to joint pain. This condition is often associated with various underlying causes, and understanding its etiology is crucial for effective diagnosis and management.

Polyarthralgia can manifest as a range of symptoms, including joint pain, stiffness, swelling, and reduced range of motion. Patients may experience pain in multiple joints simultaneously or sequentially. It is a common complaint in the field of rheumatology and can affect individuals of all ages, including children and adults.

The most common causes of polyarthralgia include inflammatory conditions such as rheumatoid arthritis, systemic lupus erythematosus, and psoriatic arthritis. These conditions involve an abnormal immune response leading to joint inflammation and pain. Additionally, infectious diseases like Lyme disease and viral arthritis can also result in polyarthralgia, as pathogens infiltrate the joints and cause inflammation.

Other factors contributing to polyarthralgia may encompass osteoarthritis, which is a degenerative joint disease, and crystal-induced arthritis, as seen in gout. Metabolic disorders, such as hyperuricemia and certain endocrine conditions like hypothyroidism, can also induce joint pain in multiple sites.

Diagnosis typically involves a thorough medical history, physical examination, and various diagnostic tests, including blood tests, imaging studies, and joint fluid analysis to identify the underlying cause. Management of polyarthralgia often revolves around addressing the root cause, which may involve medication to reduce inflammation, physical therapy, lifestyle modifications, and pain management strategies.

In summary, polyarthralgia is a medical condition characterized by pain and discomfort in multiple joints. It is a complex condition with various potential causes, making an accurate diagnosis crucial for effective treatment. Understanding the underlying factors contributing to

polyarthralgia is essential for tailoring a patient's management plan and improving their quality of life.

SIGNS AND SYMPTOMS OF RHEUMATOLOGIC DISEASE

Rheumatologic diseases encompass a wide range of conditions that primarily affect the joints, connective tissues, and sometimes other organs in the body. The signs and symptoms of these diseases can vary significantly depending on the specific condition, but common features often include:

1. Joint Pain: Pain and discomfort in one or more joints are a hallmark symptom of rheumatologic diseases. The pain can be acute or chronic and may vary in intensity.
2. Joint Swelling: Inflammation of the synovium, the lining of the joint, can lead to joint swelling. This can result in joint deformities and reduced range of motion.
3. Joint Stiffness: Morning stiffness is a common complaint, with joints feeling stiff and difficult to move, especially after periods of inactivity.
4. Warmth and Redness: Inflamed joints may feel warm to the touch and appear red due to increased blood flow and inflammation.
5. Fatigue: Many rheumatologic diseases are associated with chronic fatigue, which can be debilitating and affect daily life.
6. Weakness: Muscle weakness is often a consequence of joint inflammation and disuse, particularly in conditions like rheumatoid arthritis.
7. Systemic Symptoms: Some rheumatologic diseases, such as systemic lupus erythematosus, can affect multiple organ systems, leading to symptoms like fever, skin rashes, and organ dysfunction.
8. Deformities: Over time, joint damage can result in joint deformities, such as swan-neck deformity in rheumatoid arthritis or ulnar deviation of the fingers.

9. Limited Range of Motion: Inflammation and joint damage can lead to decreased mobility and limited range of motion in affected joints.
10. Skin Changes: Conditions like systemic sclerosis can cause skin thickening and tightening, often accompanied by color changes.
11. Eye Involvement: Some rheumatologic diseases, like rheumatoid arthritis or ankylosing spondylitis, can affect the eyes, causing symptoms such as redness, pain, or vision changes.
12. Raynaud's Phenomenon: Fingers and toes may exhibit color changes (white, blue, and red) in response to temperature changes or stress in conditions like systemic sclerosis.
13. Nodules: Rheumatoid nodules, which are firm lumps, can develop under the skin in individuals with rheumatoid arthritis.
14. Kidney or Lung Involvement: Certain rheumatologic diseases, like systemic lupus erythematosus or systemic sclerosis, can affect the kidneys or lungs, leading to various symptoms.

RED FLAGS

Red flags in rheumatologic diseases are warning signs or symptoms that should prompt immediate medical evaluation and potentially indicate a serious or urgent underlying condition. Identifying these red flags is crucial for timely diagnosis and appropriate management. Some common red flags in rheumatologic diseases include:

1. **Unexplained Joint Pain or Swelling:** Persistent, unexplained joint pain or swelling, especially if it affects multiple joints, should be evaluated promptly.

2. **Morning Stiffness:** Severe and prolonged morning stiffness in the joints, lasting for more than 30 minutes, can be indicative of certain rheumatologic conditions.
3. **Systemic Symptoms:** The presence of systemic symptoms such as unexplained fever, unexplained weight loss, and profound fatigue can suggest an underlying autoimmune or inflammatory disease.
4. **Rash:** Unexplained skin rashes, especially in the context of joint pain or other systemic symptoms, can be a sign of conditions like systemic lupus erythematosus or dermatomyositis.
5. **Neurological Symptoms:** Symptoms like numbness, weakness, or difficulty with coordination may be associated with conditions like multiple sclerosis or neuromyelitis optica, which can mimic rheumatologic diseases.
6. **Eye Problems:** Redness, pain, or vision changes may indicate eye involvement in certain rheumatologic diseases, such as uveitis associated with ankylosing spondylitis or rheumatoid arthritis.
7. **Organ Involvement:** Symptoms suggesting kidney, lung, heart, or gastrointestinal involvement, such as difficulty breathing, chest pain, blood in urine, or abdominal pain, can be red flags for systemic autoimmune diseases like systemic sclerosis or lupus.
8. **Family History:** A strong family history of autoimmune or rheumatologic diseases may increase the risk of developing such conditions and should be considered during evaluation.
9. **Painful or Swollen Tendons:** Conditions like enthesitis (inflammation of tendon or ligament insertions) are common in spondyloarthropathies and may cause significant discomfort.

10. **Persistent Joint Deformities:** The development of joint deformities or limited range of motion in multiple joints is a concerning sign.
11. **Previous Unexplained Infections:** A history of unexplained or recurrent infections may be relevant, especially in cases of reactive arthritis or certain autoimmune conditions.
12. **New or Changing Symptoms:** The sudden onset of new or changing symptoms in a patient with a known rheumatologic condition may suggest a disease flare or complications.
13. **Age and Gender:** Some rheumatologic diseases have specific demographic associations; for example, ankylosing spondylitis is more common in young males.

COMMON DIFFERENTIAL DIAGNOSIS IN A PATIENT WITH POLYARTHRALGIA

1. **Rheumatoid Arthritis (RA):** RA is an autoimmune disease that primarily affects the joints, leading to polyarthralgia, joint swelling, and morning stiffness. It often involves symmetrical joint involvement.
2. **Osteoarthritis (OA):** While more common in older adults, OA can cause polyarthralgia, especially if multiple joints are affected. It results from the gradual wear and tear of joint cartilage.

3. **Systemic Lupus Erythematosus (SLE):** SLE is a systemic autoimmune disease that can cause polyarthralgia, skin rashes, fatigue, and involvement of multiple organ systems.
4. **Spondyloarthritis:** This group of diseases includes ankylosing spondylitis, psoriatic arthritis, and reactive arthritis, all of which can lead to polyarthralgia, particularly in the spine and peripheral joints.
5. **Crystal-Induced Arthritis:** Gout and pseudogout are types of crystal-induced arthritis that can cause sudden onset of polyarthralgia due to the deposition of uric acid or calcium pyrophosphate crystals in joints.
6. **Infectious Arthritis:** Certain infections, like Lyme disease, can lead to polyarthralgia as pathogens infiltrate and inflame multiple joints.
7. **Polymyalgia Rheumatica (PMR):** While "polyarthralgia" primarily refers to joint pain, PMR is a condition characterized by pain and stiffness in the shoulders and hips, which may be associated with peripheral joint pain.
8. **Fibromyalgia:** Fibromyalgia is a chronic pain condition characterized by widespread pain, tender points, and fatigue. It may be associated with polyarthralgia.
9. **Osteoporosis:** In some cases, osteoporotic fractures and bone pain can mimic polyarthralgia, especially in the elderly.
10. **Viral Arthritis:** Certain viral infections, like hepatitis B or C, can cause polyarthralgia as a part of their clinical presentation.
11. **Sjögren's Syndrome:** This autoimmune disease primarily affects the salivary and lacrimal glands but can also lead to joint pain and polyarthralgia.
12. **Hemochromatosis:** Excess iron deposition in joints can lead to polyarthralgia in individuals with this genetic disorder.

13. **Medication Side Effects:** Some medications, like certain antibiotics, can cause joint pain as a side effect.

Diagnosing the specific cause of polyarthralgia requires a thorough medical history, physical examination, and often, various diagnostic tests such as blood tests, imaging, and joint fluid analysis. It's important to consult a healthcare provider, typically a rheumatologist, to determine the underlying condition and develop an appropriate treatment plan. The differential diagnosis may vary based on the patient's clinical presentation and risk factors.

EXAMINATION OF A PATIENT WITH RHEUMATOLOGIC DISEASE

When examining a patient with polyarthralgia (pain in multiple joints), a comprehensive assessment is essential to determine the underlying cause and develop an appropriate treatment plan. Here is a step-by-step guide on how to conduct an examination:

1. **Patient History:**
    - Begin by taking a detailed medical history, including the onset and duration of symptoms, any preceding illnesses or injuries, family history of rheumatic diseases, and any relevant personal or lifestyle factors.
    - Ask the patient to describe the location, quality, and severity of joint pain. Inquire about any exacerbating or alleviating factors.
2. **General Inspection:**
    - Observe the patient's general appearance, noting signs of fatigue or discomfort.
    - Check for signs of inflammation, such as joint swelling, warmth, or redness.
3. **Vital Signs:**

- Measure vital signs, including blood pressure, heart rate, respiratory rate, and temperature.

4. **Musculoskeletal Examination:**
    - Perform a systematic joint examination, including all joints in the body. This may include the fingers, wrists, elbows, shoulders, knees, ankles, and toes.
    - Assess for tenderness, pain on palpation, and signs of inflammation (swelling, warmth, redness).
    - Evaluate joint range of motion. Note any limitations or stiffness, especially morning stiffness lasting more than 30 minutes.
    - Check for joint deformities, such as ulnar deviation in the hands or swan-neck deformities.
    - Examine for the presence of nodules, which are firm lumps often found in conditions like rheumatoid arthritis.
    - Assess muscle strength and tenderness.
    - Evaluate the spine and sacroiliac joints, especially if ankylosing spondylitis is suspected.
5. **Skin and Nail Examination:**
    - Inspect the skin for rashes, psoriasis plaques, or other dermatological manifestations.
    - Examine the nails for pitting or onycholysis, which can be associated with some rheumatologic diseases.
6. **Eye Examination:**
    - Inquire about eye symptoms and perform a basic eye examination, particularly looking for signs of uveitis or other eye involvement.
7. **Lymph Nodes:**

- Palpate lymph nodes, particularly in the neck and axilla, to check for enlargement.

8. **Cardiovascular Examination:**
    - Assess the cardiovascular system, as some rheumatologic diseases, such as systemic lupus erythematosus, can affect the heart and blood vessels.
9. **Respiratory Examination:**
    - Evaluate the respiratory system if necessary, especially in cases of suspected interstitial lung disease, which can be associated with certain rheumatologic diseases.
10. **Neurological Examination:**

- Conduct a brief neurological examination to assess for any signs of neuropathy, muscle weakness, or coordination problems.

MANAGEMENT OF A RHEUMATOLOGIC PATIENT AT PRIMARY LEVEL

Managing a rheumatologic patient at the primary care level involves various aspects of care, including initial assessment, monitoring, education, and referral when necessary. Here is an overview of the key components of managing a rheumatologic patient at the primary care level:

1. **Initial Assessment:**
    - Begin by conducting a thorough medical history and physical examination to identify and characterize the patient's symptoms, including joint pain, stiffness, and any associated systemic symptoms.
2. **Differential Diagnosis:**

- Based on the assessment, consider potential diagnoses, which may include common conditions like osteoarthritis, as well as inflammatory arthropathies like rheumatoid arthritis, psoriatic arthritis, or other autoimmune diseases.

3. **Laboratory and Imaging Studies:**
    - Order appropriate blood tests (e.g., complete blood count, inflammatory markers, autoimmune antibodies) and imaging studies (e.g., X-rays, ultrasound) to help confirm the diagnosis and assess disease activity.
4. **Pain Management:**
    - Provide pain relief and symptom management with over-the-counter pain relievers (e.g., acetaminophen, NSAIDs) or, in some cases, prescription medications as needed.
5. **Education:**
    - Educate the patient about their condition, including its nature, potential causes, and treatment options. Encourage the patient to ask questions and seek reliable sources of information.
6. **Lifestyle Modification:**
    - Offer guidance on lifestyle modifications, such as weight management, exercise, and joint protection techniques. Emphasize the importance of a healthy diet and smoking cessation.
7. **Physical Therapy and Occupational Therapy:**
    - Refer patients to physical therapists and occupational therapists to help improve joint function and reduce pain.
8. **Monitoring and Follow-Up:**

- Schedule regular follow-up appointments to assess the patient's response to treatment, monitor disease progression, and adjust the management plan as needed.

9. **Medication Management:**
    - Prescribe and manage medications, such as disease-modifying antirheumatic drugs (DMARDs) or biologic agents, when necessary. Monitor for potential side effects and drug interactions.
10. **Referral to Rheumatologist:**
    - If the diagnosis is uncertain, the patient's condition is severe, or there is suspicion of a complex or rare rheumatologic disease, consider referring the patient to a rheumatologist for a more specialized evaluation.
11. **Psychosocial Support:**
    - Recognize the emotional and psychological impact of chronic rheumatic diseases. Offer support and referrals to mental health professionals or support groups when needed.
12. **Patient Engagement:**
    - Encourage active patient engagement in their care. Ensure they understand the importance of adhering to treatment plans, attending follow-up appointments, and reporting any changes in symptoms.
13. **Coordination of Care:**
    - Work in collaboration with other healthcare providers, such as physical therapists, rheumatologists, and specialists in cases of comorbidities, to provide comprehensive care.

Managing rheumatologic patients at the primary care level involves a patient-centered, multidisciplinary approach. While primary care providers can manage many aspects of care,

collaboration with rheumatologists may be necessary for complex or refractory cases. Regular monitoring and ongoing patient education are crucial components of long-term management.

REFERIING A PATIENT

Referring a patient with a rheumatologic disease to a rheumatologist or a specialist in rheumatology is important in several situations, as rheumatologists have expertise in diagnosing and managing these complex conditions. Here are some key circumstances when it is advisable to refer a patient with a rheumatologic disease:

1. **Uncertain Diagnosis:** When the diagnosis is unclear, and the patient's symptoms do not fit a straightforward clinical picture, referral to a rheumatologist is crucial. Rheumatologists have specialized training and experience in differentiating between various rheumatologic conditions.
2. **Severe or Rapidly Progressing Disease:** If a patient's rheumatologic disease is rapidly progressing, causing significant disability, or leading to organ involvement, early referral is important to initiate appropriate treatment and prevent further damage.
3. **Complex or Rare Rheumatologic Diseases:** For patients with complex or rare rheumatologic conditions, including those with overlapping syndromes or unusual clinical features, a rheumatologist's expertise is essential for accurate diagnosis and management.
4. **Disease-Modifying Medications:** When disease-modifying antirheumatic drugs (DMARDs) or biologic agents are considered, a rheumatologist is best suited to make

these treatment decisions, as they have in-depth knowledge of the available therapies and their potential side effects.

5. **Refractory Disease:** If the patient's rheumatologic disease does not respond adequately to initial treatments or there are concerns about medication side effects, a rheumatologist can provide guidance on alternative therapies and treatment options.
6. **Pregnancy or Fertility Issues:** For patients with rheumatologic diseases who are pregnant or planning to become pregnant, it is important to consult a rheumatologist to manage their condition in a way that is safe for both the patient and the baby.
7. **Preoperative Evaluation:** Before elective surgeries, especially for patients with conditions like systemic lupus erythematosus, rheumatoid arthritis, or vasculitis, a rheumatologist can help optimize disease control to reduce perioperative risks.
8. **Multi-organ Involvement:** Rheumatologic diseases can affect multiple organ systems. If a patient's condition involves organs beyond the musculoskeletal system (e.g., kidneys, heart, lungs), a rheumatologist's expertise is valuable in coordinating comprehensive care.
9. **Assistance with Disease Monitoring:** Regular disease monitoring and adjusting treatment as needed are critical for many rheumatologic diseases. A rheumatologist is skilled at assessing disease activity, interpreting lab results, and modifying treatment regimens accordingly.
10. **Medication Management:** When prescribing immunosuppressive medications with potential toxicities, a rheumatologist can closely monitor the patient for side effects and make appropriate adjustments to their treatment plan.
11. **Second Opinion:** In some cases, a patient or primary care provider may seek a second opinion from a rheumatologist to confirm a diagnosis or explore alternative treatment options.

12. **Clinical Trials:** If a patient is interested in participating in clinical trials for new rheumatologic treatments, a rheumatologist can help identify relevant research opportunities.
13. **Educational and Support Needs:** For patients who require extensive education about their condition, symptom management, and self-care strategies, a rheumatologist can provide in-depth guidance and connect them with appropriate resources.

Referring a patient to a rheumatologist at the right time ensures that they receive specialized care tailored to their specific rheumatologic condition, promoting the best possible outcomes and quality of life. Early and appropriate intervention can help manage symptoms, prevent organ damage, and improve long-term prognosis.

Chapter 15- Cancer Pain Management and Role of a Pain Physician

Cancer pain refers to the discomfort or pain experienced by individuals with cancer. It can result from various factors related to cancer itself or its treatment. Cancer pain can vary in intensity, duration, and location and it can significantly impact a person's quality of life. Adequate pain management not only improves the patient's quality of life but also contributes to their overall well-being and ability to tolerate cancer treatments.

Cancer Pain Incidence and Prevalence

- 20 percent to 50 percent of cancer patients experience pain.
- 80 percent of people with advanced cancer endure moderate to severe pain.

Figure 1- WHO data on cancer pain epidemiology

In India

- more than one million new cases of cancer are diagnosed each year.
- It is estimated that the cancer burden in India will almost double during the coming 20 years.
- The incidence of pain in advanced stages of cancer approaches 70%–80%.

If you or someone you know is living with cancer and experiencing pain, it's essential to communicate with Pain Physicians to ensure that pain management is tailored to individual needs and that pain is adequately controlled throughout the cancer journey.

Here are some key aspects to consider:

1. **Types of Cancer Pain:**
    - **Nociceptive Pain:** This type of pain occurs when cancer cells or tumors invade or damage nearby tissues, bones, or organs. It is often described as aching, throbbing, or sharp and can be localized to a specific area.
    - **Neuropathic Pain:** Neuropathic pain is caused by damage to nerves. It may result from tumour compression, surgery, chemotherapy, or radiation therapy. Neuropathic pain is often described as burning, shooting, or tingling.
    - **Mixed Pain:** Some individuals with cancer experience a combination of nociceptive and neuropathic pain.
2. **Causes of Cancer Pain:**
    - **Tumour Growth:** As cancer cells grow and spread, they can put pressure on surrounding tissues, nerves, and organs, causing pain.
    - **Inflammation:** The body's immune response to cancer can lead to inflammation and pain.
    - **Treatment:** Cancer treatments such as surgery, radiation therapy, chemotherapy, and immunotherapy can cause pain as side effects.
    - **Metastasis:** When cancer spreads to other parts of the body, it can cause pain in those areas.
3. **Assessment and Management:**

- Proper assessment and management of cancer pain are crucial to improving a patient's quality of life. Pain should be evaluated regularly and treated appropriately.
- Pain management may involve a combination of medications, such as opioids, non-opioids pain relievers, and adjuvant drugs that target specific types of pain (e.g., neuropathic pain).
- Other approaches include physical therapy, radiation therapy to shrink tumors, nerve blocks, and interventional procedures.
- Palliative care and hospice care teams specialize in managing cancer pain and providing comprehensive support to patients with advanced cancer.

4. **Psychosocial Support:**
    - Cancer pain can have a significant impact on a person's mental and emotional well-being. Psychosocial support, including counselling and support groups, can help individuals cope with pain and its effects on their lives.
5. **Personalized Care:**
    - Each person's experience of cancer pain is unique, and pain management should be tailored to their specific needs and preferences.
    - Open communication with healthcare providers about pain levels, concerns, and treatment goals is essential for effective pain management.

Cancer pain can occur in various organs and parts of the body, depending on the type of cancer, its stage, and its impact on surrounding tissues and nerves. Here are some common examples of cancer pain associated with different organs:

1. **Bone Pain:**
    - Bone pain is a frequent symptom in advanced cancers, such as breast, prostate, lung, and multiple myeloma.
    - Cancer that has metastasized (spread) to the bones can cause severe, deep, and aching pain.
    - It can worsen at night and with movement.
2. **Head and Neck Pain:**
    - Head and neck cancers can cause localized pain in the mouth, throat, or neck.
    - Pain may result from tumour growth, ulceration, or nerve involvement.
    - Painful swallowing (odynophagia) and difficulty speaking may also occur.
3. **Abdominal Pain:**
    - Abdominal pain can be caused by various abdominal cancers, including pancreatic, liver, stomach, and ovarian cancer.
    - Pain may be dull, achy, or cramp-like and is often associated with tumour enlargement and pressure on surrounding organs.
4. **Pelvic Pain:**
    - Gynaecological cancers such as ovarian, cervical, and uterine cancers can cause pelvic pain.

- Pain may result from tumour growth, inflammation, or pressure on nearby structures.
- Pelvic pain may be accompanied by changes in menstrual patterns.

5. **Chest Pain:**
    - Lung cancer can lead to chest pain, especially when the tumour involves the chest wall or pleura (lining around the lungs).
    - Chest pain can vary from a sharp, stabbing sensation to a dull ache.
6. **Nerve Pain (Neuropathic Pain):**
    - Some cancers, like brain tumours or certain lymphomas, can affect nerves directly, causing neuropathic pain.
    - Neuropathic pain is often described as burning, shooting, or tingling and may radiate along specific nerve pathways.
7. **Skin Pain:**
    - Skin cancers, including melanoma and squamous cell carcinoma, can cause pain, itching, and discomfort at the site of the lesion.
    - Pain can be sharp, burning, or throbbing.
8. **Rectal or Anal Pain:**
    - Colorectal cancer can cause rectal or anal pain, often due to tumour obstruction, inflammation, or nerve involvement.
    - Pain may be accompanied by changes in bowel habits.
9. **Breast Pain:**

- Breast cancer can cause breast pain, which may be related to tumour size, location, or the presence of metastases to the bones.
- Breast pain can be sharp, dull, or aching.

Cancer Pain Management

Cancer pain management is a critical component of cancer care aimed at improving a patient's quality of life by effectively controlling and alleviating pain. Pain management strategies are tailored to individual needs, the type and stage of cancer, and the underlying causes of pain. Here are key elements of cancer pain management:

1. **Pain Assessment:**
    - Regular and comprehensive pain assessment is the foundation of pain management. Patients should be asked to describe the location, intensity, quality, and duration of their pain.
    - Pain can be assessed using various tools, including numeric rating scale (0-10), visual analogue scale, and verbal pain scales.
    - Patients should be encouraged to communicate changes in their pain levels or any new pain symptoms.
2. **Multidisciplinary Approach:**
    - Cancer pain management often involves a multidisciplinary team of healthcare professionals, including oncologists, Pain Physicians, nurses, physical therapists, and psychologists.

- Collaboration among team members helps address the physical, emotional, and psychological aspects of pain.

3. **Medication Management:**

    - Medications are a central component of cancer pain management. They can include:

        - **Opioids:** These powerful pain relievers, like morphine or oxycodone, are often used for moderate to severe pain.

        - **Non-opioid Analgesics:** These include drugs like acetaminophen (paracetamol) and non-steroidal anti-inflammatory drugs (NSAIDs).

        - **Adjuvant Medications:** These medications target specific types of pain, such as neuropathic pain. Examples include gabapentin and amitriptyline.

    - Medications are prescribed based on the type and severity of pain and may require adjustment over time.

4. **MIPSI (Minimally Invasive Pain & Spine Interventions) Procedures:**

    - For some patients, interventional pain management techniques may be beneficial. These procedures can include nerve rhizolysis, epidural injections, and spinal cord stimulation.

    - Interventional techniques are often used when pain is localized or when medications alone are insufficient.

5. **Radiation Therapy and Surgery:**

- Radiation therapy can be used to shrink tumours that are causing pain, especially bone pain.
- Surgical interventions may be necessary to remove tumours or reduce tumour-related pressure on nerves or organs.

6. **Palliative Care:**
    - Palliative care focuses on improving the quality of life for individuals with serious illnesses, including cancer.
    - Palliative care teams specialize in symptom management, including pain relief, and provide holistic support to patients and their families.
7. **Psychosocial Support:**
    - Emotional and psychological support is essential in cancer pain management. Patients may experience anxiety, depression, and fear related to pain and the cancer diagnosis.
    - Counselling, support groups, and relaxation techniques can help patients cope with the emotional aspects of pain.
8. **Lifestyle and Complementary Therapies:**
    - Complementary therapies like acupuncture, massage therapy, and physical therapy may provide pain relief and improve overall well-being.
    - Encouraging patients to maintain a healthy lifestyle through nutrition and exercise can also help manage pain.
9. **Regular Follow-Up:**

- Patients receiving cancer pain management should have regular follow-up appointments to assess the effectiveness of treatment and make necessary adjustments.

10. **Patient Education:**

- Educating patients and their caregivers about pain management strategies, potential side effects of medications, and how to use pain medication safely is crucial.

WHO Pain Ladder for medical management of chronic cancer pain-

The WHO Ladder, also known as the World Health Organization (WHO) Pain Ladder, is a guideline for the management of pain, particularly cancer pain. It was originally developed in 1986 by the WHO as a framework for healthcare providers to approach pain management systematically. The WHO Ladder outlines a stepwise approach to pain management, with the goal of achieving effective pain relief while minimizing side effects.

The WHO Ladder consists of three steps, each of which corresponds to a level of pain intensity:

Step 1: Mild Pain

- For patients with mild pain (pain intensity rating of 1 to 3 on a scale of 0 to 10), non-opioid analgesics are recommended as the

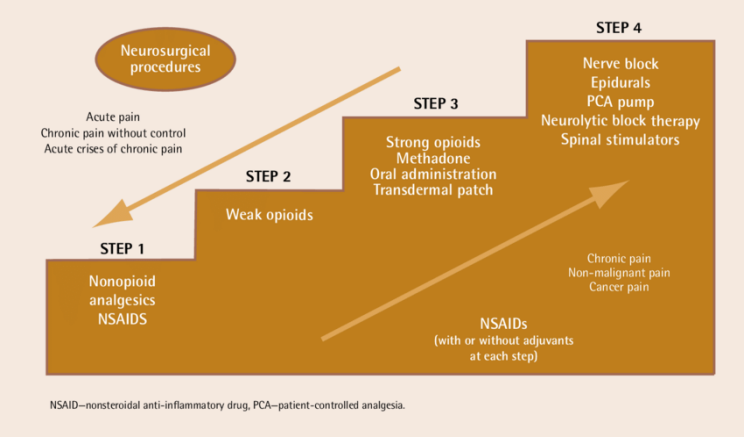


Figure 2- WHO analgesic ladder for cancer pain

initial treatment. These can include medications like acetaminophen (paracetamol) or Non-steroidal Anti-Inflammatory Drugs (NSAIDs) such as ibuprofen.

Step 2: Mild to Moderate Pain

- For patients with mild to moderate pain (pain intensity rating of 4 to 6 on a scale of 0 to 10), stronger medications, such as weak opioids like codeine or tramadol, may be added to the non-opioid analgesics.

Step 3: Moderate to Severe Pain

- For patients with moderate to severe pain (pain intensity rating of 7 to 10 on a scale of 0 to 10), strong opioids like morphine or oxycodone are recommended. These medications are effective for managing more intense pain but may have stronger side effects.

<u>Key points about the WHO Ladder:</u>

- The WHO Ladder is a flexible framework, and Pain Physicians can adjust treatment based on the individual patient's pain and response to medications.
- It emphasizes the importance of starting with milder pain medications and only progressing to stronger opioids when necessary to achieve adequate pain relief.
- Adjuvant medications (such as those for neuropathic pain) and non-pharmacological interventions can be used at any step to enhance pain management.

It's important to note that while the WHO Ladder is a useful guideline, pain management should always be tailored to the specific needs and preferences of the patient. Cancer pain, like all pain, is highly individual, and the approach to pain relief should consider the type and cause of pain, potential side effects of medications, and the patient's overall health and goals of care.

Regular assessment of pain and communication between healthcare providers (Pain Physicians & Oncologists) and patients are critical for ensuring effective pain management while minimizing the risks associated with opioids medications. Advances in pain management and palliative care have expanded the range of options available to address cancer pain, improving the overall quality of life for many individuals with cancer.

Adjuvant drugs

Adjuvant drugs, also known as adjuvant medications or adjuvant therapies, are drugs that are used alongside primary treatments to enhance their effectiveness, manage side effects, or address specific symptoms or conditions. These medications are typically used in combination with the main treatment, which is often surgery, chemotherapy, radiation therapy, or other primary therapies. Adjuvant drugs serve various purposes, depending on the medical condition being treated. Here are some common uses of adjuvant drugs:

1. **Pain Management:** Adjuvant drugs can be used to augment pain relief in individuals with various types of pain, including cancer-related pain or neuropathic pain. Examples include:
    - **Antidepressants:** Certain antidepressants, such as amitriptyline and duloxetine, can help manage chronic pain, particularly neuropathic pain.
    - **Anticonvulsants:** Drugs like gabapentin and pregabalin are effective in treating neuropathic pain.
    - **Muscle Relaxants:** These can be used to relieve muscle spasms and associated pain.

2. **Nausea and Vomiting Control:** Adjuvant drugs are often prescribed alongside chemotherapy to prevent or alleviate chemotherapy-induced nausea and vomiting (CINV). Common examples include:
    - **Antiemetic:** Medications like ondansetron, metoclopramide, and aprepitant help manage CINV.
    - **Corticosteroids:** Dexamethasone is sometimes used to enhance the effectiveness of antiemetics.
3. **Side Effect Management:** Adjuvant drugs may be used to manage side effects of primary treatments, such as chemotherapy or radiation therapy. These can include:
    - **Hematopoietic Growth Factors:** Drugs like filgrastim and pegfilgrastim can stimulate the production of white blood cells, helping to prevent or reduce infection risk during chemotherapy.
    - **Erythropoiesis-Stimulating Agents (ESAs):** ESAs like epoetin alfa are used to stimulate red blood cell production and manage anaemia, which can be a side effect of cancer treatment.
4. **Bone Health:** Adjuvant medications may be prescribed to maintain bone health in individuals at risk of bone loss due to cancer treatments. Bisphosphonates like zoledronic acid can help prevent bone complications.
5. **Psychological Support:** Certain medications may be used alongside psychological therapy to manage conditions such as anxiety and depression, which can be common in individuals undergoing cancer treatment.

6. **Hormone Therapy:** In cases of hormone-dependent cancers like breast or prostate cancer, hormone therapy medications are often used as adjuvant therapy to block hormone receptors and inhibit cancer growth.

7. **Immunotherapy:** Some adjuvant drugs, particularly immunomodulators, may be used alongside cancer immunotherapy treatments to enhance the immune response against cancer cells.

8. **Radiation Therapy Sensitization:** Drugs that sensitize cancer cells to radiation therapy may be used as adjuvant therapy to improve the effectiveness of radiation treatment.

Adjuvant drugs play a crucial role in optimizing the outcomes of primary treatments, managing side effects, and improving the overall quality of life for individuals undergoing medical interventions. The choice of adjuvant drugs depends on the specific medical condition, treatment plan, and individual patient factors. Pain Physicians carefully consider the potential benefits and risks of adjuvant drugs when incorporating them into a patient's treatment regimen.

MIPSI (Minimally Invasive Pain & Spine Interventions) Procedures for Cancer Pain

Cancer pain interventions are medical procedures or treatments aimed at relieving or managing pain in individuals with cancer. These interventions are often used in conjunction with medications and other pain management strategies to improve a patient's quality of life. The choice of intervention depends on the type, location, and severity of the pain, as well as the individual patient's condition. Here are some common cancer pain interventions:

1. **Nerve MIPSIs:**

   - Nerve MIPSIs involve the injection of anaesthetic agents or neurolytic medications near specific nerves or nerve clusters to block pain signals.
   - Examples include celiac plexus rhizolysis (for abdominal pain) and epidural or intrathecal rhizolysis (for spine or lower body pain).

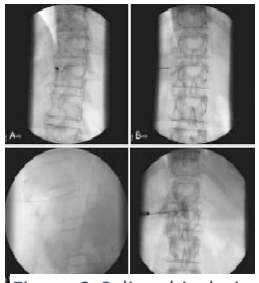


Figure 3-Celiac rhizolysis for Gall Bladder Cancer Pain

   - These interventions can provide significant pain relief, especially in cases of localized pain.

2. **Radiofrequency Ablation (RFA):**

   - RFA is a minimally invasive procedure that uses heat generated by radiofrequency waves to destroy nerve tissue responsible for transmitting pain signals.
   - It is commonly used for bone metastases, where it can relieve pain by targeting the nerves around the affected bone.

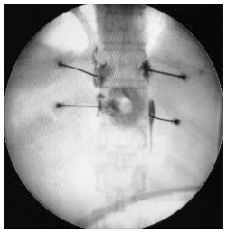


Figure 4-Splanchnic RFA for Pancreas Cancer Pain

3. **Spinal Cord Stimulation (SCS):**

   - SCS involves implanting a small device under the skin that delivers electrical impulses to the spinal cord, interfering with pain signals.
   - This intervention is used for chronic, neuropathic pain that is not responsive to other treatments.

4. **Kyphoplasty or Vertebroplasty:**

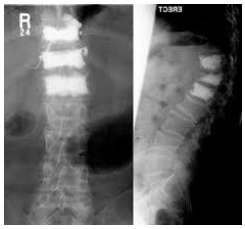


Figure 5- Cementoplasy

- These procedures involve injecting a special cement-like material into fractured or weakened vertebrae to stabilize them and relieve pain.
- They are typically used for pain caused by vertebral compression fractures, often seen in patients with bone metastases.

5. **Intrathecal Drug Delivery:**

Figure 6-Intra-thecal Pump placed in abdominal wall

- An intrathecal drug delivery system involves implanting a pump beneath the skin to deliver pain-relieving medications directly into the cerebrospinal fluid.
- This method can provide highly targeted pain relief with lower doses of medication and fewer side effects.

6. **Neurolytic Procedures:**

- Neurolytic interventions involve injecting substances like alcohol or phenol directly into nerves to damage them and block pain signals.
- These procedures are used when other interventions have not been effective or when pain is not responding to medication.

7. **Palliative Radiation Therapy:**

- Radiation therapy can be used to shrink tumours or target areas of pain, particularly in cases where cancer has spread to bones, causing bone pain.
- It is a non-invasive intervention that can provide long-lasting pain relief.

8. **Surgery:**

- Surgical interventions may be necessary to remove tumours that are causing pain, to address complications, or to relieve pressure on nerves or organs.
- Surgical procedures can be curative or palliative, depending on the goals of treatment.

9. **Physical Therapy and Rehabilitation:**
    - Physical therapists can help cancer patients with exercises and techniques to improve mobility, reduce pain, and enhance overall function.
10. **Psychosocial Support:**
    - Counselling, relaxation techniques, and other psychosocial interventions can help patients cope with the emotional and psychological aspects of pain.

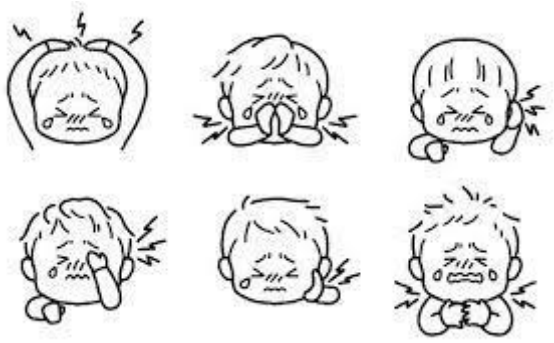
Cancer pain interventions should be carefully selected based on the patient's specific condition and pain characteristics. It's crucial for healthcare providers to assess the risks and benefits of each intervention and involve the patient in the decision-making process. Additionally, a multidisciplinary approach, involving Pain Physicians, oncologists, and palliative care teams, is often essential to provide comprehensive pain management and support for individuals with cancer.

But one thing is for sure, that NO Patient of cancer pain shouldn't be left alone to suffer, especially when the services of Pain Physicians are available at most places of Bharat.

For more information regarding most advanced treatment of cancer pain, readers are advised to subscribe the YouTube channel http://www.youtube.com/@dranurag11

Chapter 16- Chronic Pain in Paediatric Population

Children's' pain has a history of misunderstanding and under-treatment. It is very important to recognize that all age children, neonate to adolescent, experience painful events. Thus, it should be managed to best ability to avoid its consequences. beyond the initial event.



Some key points about chronic pain in children:

- The chronic pain is defined as pain lasting at least 3 months in duration or the pain which outlasts normal healing process.
- The chronic pain does not serve any purpose as opposed to acute pain which serves as a warning sign in the body.
- 40% of children and adolescents complain of pain that occurs at least once weekly, and chronic pain affects at least 15%-20% of children.
- Just as chronic pain is more prevalent in women than men, girls report more pain than boys.
- Of children aged 5-17 years, 20% suffer headaches.
- More than one third of children complain of abdominal pain lasting two weeks or longer.

- Juvenile arthritis, which causes joint inflammation and aches, affects nearly 250,000 people under the age of 16 years.
- If left unaddressed, chronic pain can affect children in ways that will follow them throughout their lives. The chronic pain in children results in psychological turmoil leading to anxiety and depression. If left untreated it can also lead to chronic pain, physical and psychological problems in adulthood and old age.

Signs and symptoms of pain in children

- Favoring one arm or leg over the other.
- A decrease in physical activity.
- Changes in appetite or sleep pattern.
- Avoiding contact with other children.
- Crankiness, irritability, or unruly behavior.
- Nonverbal expressions of pain such as gasping, wincing, or frowning.
- Physical cues like dull eyes, flushed skin, rapid breathing, or sweating
- Headache
- Abdominal pain
- Pain in muscles, bones, and joints
- Constipation
- Poor sleep
- Loss of school attendance
- Poor participation in play or sports

The chronic pain in pediatric patients can be broadly categorized as

- Chronic headache
- Chronic abdominal pain
- Chronic musculoskeletal pain

Common causes of chronic pain in children:

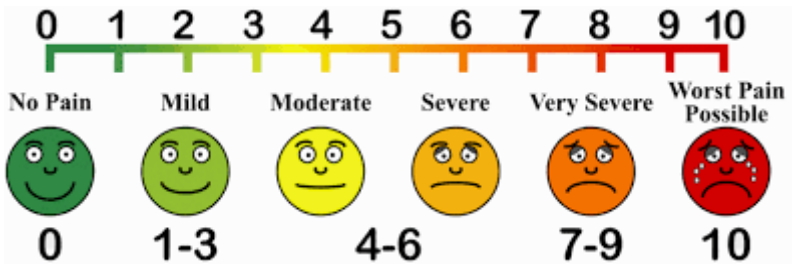
- Sickle cell haemoglobinopathy.
- Rheumatic diseases (e.g. juvenile rheumatoid arthritis).
- Skin conditions (e.g. epidermolysis bullosa).
- Metabolic diseases (e.g. osteogenesis imperfecta).

Pain assessment in Children:

- Pain assessment in children can be a difficult and confusing matter;
- The use of most reliable tools will have been scientifically validated for the patient and setting for which they are designed.

Self-report

- A simple 'visual analogue scale (VAS)' is useful in for adolescents and older children, who are able to understand.
- However, VAS score may not be suitable for young children, or the cognitively impaired.
- Children at the age of 3–4 years are usually able to report the degree of pain experienced. Therefore, some form of self-report like (Wong-Baker Pain Rating Scale; using images of faces showing increasing degrees of pain from which the child can choose the most appropriate) is useful.



Behavioural

- Observation for pain-related behaviour is an option for children

who cannot self-report. It is important that behavioural tools are appropriate for age and setting, as behaviour is highly modified by develop- mental, affective and other factors. Facial expression and cry have been found to be the most reliable behaviours in the very young, followed by body posture and motor restlessness Typically, an observer scores a number of such behaviours (sometimes with particular weightings) to achieve a final numerical assessment of pain.

Physiological

- Many physiological parameters have been used to assess pain, including: heart rate, blood pressure, sweating, plasma cortisol and catecholamines. The hope that a physiological measurement may accurately quantify pain has not been realized. Cardiovascular and humoral responses are characterized by a lack of specificity and sensitivity to pain. Physiological measures are also subject to homoeostatic mechanisms, which tend to reduce their value over time. Therefore, they have generally been used to help assess the pain of brief stimuli rather than the ongoing pain.

Management of Paediatric Pain:

Non -pharmacological measures:

- Close parental involvement.
- A suitable environment.
- Use of cognitive-behavioural and other psychology- based strategies.
- Allowing as much autonomy and sense of control as appropriate in individual settings.

Diagnosis and Treatment

Headache

- All the children with complaints of headache should undergo comprehensive neurological examination including testing of cranial nerves.
- Mostly children presenting with headache have either tension type headache or Migraine which can be treated with Paracetamol (dose 10-15 mg/kg every 6 hrly) or ibuprofen (5-10 mg/kg every 6-8 hrly).
- Tricyclic antidepressants like amitriptyline (0.1-2 mg/kg/day) can be prescribed if not relieved with simple analgesics.
- If not relieved by this or if the child has to take medication for headache more than 3 days/week or 15 days/month, then refer the child to specialists.

Abdominal pain

- The ultrasound of whole abdomen to rule out any organic cause of abdominal pain.
- If no organic cause is found, then it is because of centrally mediated chronic abdominal pain. It is due to high pain sensitivity of the patients.
- A history of chronic constipation should also be sought.
- The child and the parent should be reassured and can be prescribed simple analgesics like paracetamol and ibuprofen.
- These patients generally need psychological interventions like cognitive behavioral therapy, biofeedback and relaxation therapy so should be referred to a specialist.

Chronic musculoskeletal pain

- <u>Joint pain</u>
    - If joint pain is not associated with red flags and then prescribe simple analgesics, massage and heat therapy.
- <u>Bone pain</u>

- Children in the age group of 3-12 years complaint of evening or night pain in lower limbs. These are called growth pain.
- The children usually complain of cramps and stiffness in the legs. The reassurance, hot fomentation, massage and simple non-steroidal anti-inflammatory drugs like ibuprofen are usually sufficient for the treatment.

Red flags

If a child presents with following red flags, then it should be thoroughly investigated and referred to a specialists

- Headache associated with severe nausea and vomiting.
- Headache aggravated with straining.
- New onset severe headache
- Pain that awakens a child from sleep
- Abdominal pain is associated with blood in stools.
- Weight loss
- Fever
- Redness or warmth of a joint
- Rash
- Joint swelling that has persisted for at least several days.
- Joint stiffness or decreased range of motion
- Joint pain or stiffness that is worse in the morning.
- Joint pain or stiffness that is worse after a nap or periods of inactivity.
- Trouble using the joint.
- Swelling over the bones

Chapter 17 Pain management in the Senior Citizen

Pain management in the elderly population is a critical aspect of healthcare, as older adults often experience chronic pain due to various age-related conditions. Effective intervention and treatment strategies are essential to improve their quality of life. Here are some key considerations:

Comprehensive Assessment:

Start with a thorough assessment to identify the type, cause, and intensity of pain.

Consider the patient's medical history, comorbidities, and medications, as these can affect pain perception and management.

Non-Pharmacological Interventions:

Physical therapy: Exercise and stretching can improve mobility and reduce pain, especially in cases of musculoskeletal pain.

Occupational therapy: Helps elderly individuals adapt to daily activities and reduce pain caused by functional limitations.

Heat and cold therapy: These can provide relief for certain types of pain, such as arthritis or muscle strains.

Pharmacological Interventions:

Medications: Depending on the type of pain, analgesics such as acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), or opioids may be prescribed.

Careful consideration is needed to balance pain relief with potential side effects and drug interactions.

Polypharmacy: Be cautious of potential drug interactions, especially in older adults who may be taking multiple medications for various health conditions.

Behavioural and Psychological Interventions:

Cognitive-behavioural therapy (CBT): Helps elderly patients manage pain by addressing the psychological and emotional aspects of pain perception.

Relaxation techniques: Techniques like deep breathing and meditation can help reduce pain-related anxiety and stress. Complementary and Alternative Medicine:

Acupuncture, massage therapy, and herbal remedies may provide relief for some individuals.

Palliative Care:

In cases of advanced or terminal illness, palliative care specialists can provide holistic pain management to improve the patient's overall comfort and quality of life.

Geriatric Pain Management:

Geriatric specialists understand the unique needs of older adults and can provide more tailored pain management strategies.

Considerations should be made for potential cognitive and sensory impairments in the elderly population.

Minimally Invasive Pain & Spine Interventions (MIPSI) in elderly patients-

Epidural Steroid Injections (ESIs):

ESIs are performed under fluoroscopic guidance, where a corticosteroid and sometimes a local anesthetic are injected into the epidural space around the spinal cord. This can provide relief from conditions such as spinal stenosis, herniated discs, or radiculopathy

Facet Joint MIPSIs:

Facet joint injections involve injecting a corticosteroid and a local anesthetic directly into the facet joints in the spine. This can help alleviate pain caused by facet joint arthritis.

Radiofrequency Ablation (RFA):

RFA uses radiofrequency energy to target and disrupt the nerves responsible for transmitting pain signals. It is commonly used for chronic pain conditions, such as facet joint pain, sacroiliac joint pain, genicular nerves of the knee and peripheral nerve pain.

Neurolytic MIPSI:

Neurolytic blocks involve the use of alcohol or phenol to create a chemical neurolysis that selectively destroys nerve fibers responsible for transmitting pain signals. This can be used for managing pain in certain conditions, such as cancer-related pain.

Spinal Cord Stimulation (SCS):

SCS involves the implantation of a device that delivers electrical impulses to the spinal cord, disrupting pain signals and providing relief for chronic pain conditions like neuropathic pain, failed back surgery syndrome, and complex regional pain syndrome.

Kyphoplasty and Vertebroplasty:

These minimally invasive procedures are used to treat vertebral compression fractures, which are common in elderly individuals with osteoporosis. Cement is injected into the fractured vertebrae to stabilize and reduce pain.

Percutaneous Discectomy:

This procedure is used to treat herniated discs. A small incision is made, and a special device is used to remove or shrink the herniated disc material.

Platelet-Rich Plasma (PRP) and Stem Cell Therapy:

These regenerative medicine techniques involve injecting a patient's own platelets or stem cells into an area of pain or injury to promote healing and reduce pain. While not always covered by insurance, they can be considered for certain conditions.

Regular Follow-Up:

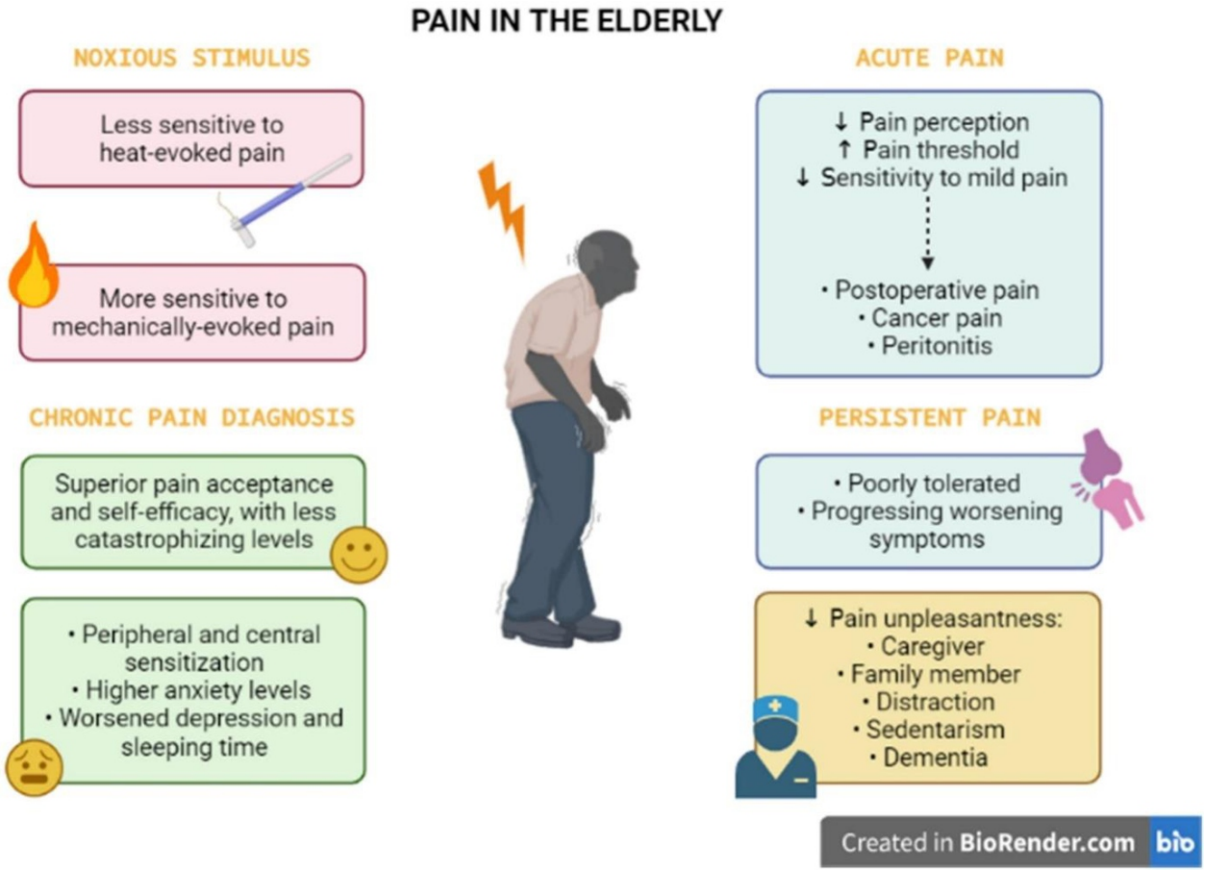
Pain management is an ongoing process. Regular follow-up appointments are crucial to monitor the effectiveness of interventions and adjust the treatment plan as needed.

Caregiver and Family Education:

Educate caregivers and family members about pain management and the importance of medication adherence and therapy to support the elderly patient.

It's important to note that not all minimally invasive interventions are suitable for every individual or type of pain. The choice of intervention should be based on a thorough assessment by a Pain Physician who is formally trained in the field of Pain Medicine after a MD/ DNB Anaesthesiology specialization. Factors such as the cause of the pain, the patient's overall health, and the expected benefits and risks of the procedure should be carefully

considered. Additionally, elderly patients may have unique considerations, such as comorbidities, frailty, and potential interactions with other medications, which should be taken into account when selecting the most appropriate pain management approach.



Chapter 18 Management of ‘Acute on Chronic’ pain syndromes in The Emergency Department (ED)

Pain management in the emergency department (ED) is the process of relieving pain in patients who come to the ED with acute as well as ‘acute on chronic’ pain. Acute pain is pain that is sudden in onset and of short duration. It can be caused by a variety of injuries, illnesses, or medical procedures.

The goal of pain management in the ED is to relieve the patient's pain to a level that is tolerable and allows them to function. This can be achieved through a variety of methods, including:

- Medications, such as opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), and acetaminophen
- Injections, such as nerve blocks or epidurals
- Physical therapy
- Other non-pharmacological methods, such as relaxation techniques, heat or cold therapy, and massage

The specific pain management method that is used will vary depending on the patient's individual pain level, medical condition, and preferences.

Here are some of the most common pain management methods used in the ED:

- Opioids are strong pain relievers that work by binding to opioid receptors in the brain and spinal cord. They are often the first-line treatment for moderate to severe pain. However, opioids can also have side effects, such as nausea, vomiting, constipation, and drowsiness.
- NSAIDs are non-opioid pain relievers that work by reducing inflammation. They are often used for mild to moderate pain. However, NSAIDs can also have side effects, such as stomach upset and ulcers.
- Acetaminophen is a non-opioid pain reliever that works by reducing pain and fever. It is often used for mild pain. However, acetaminophen can also have side effects, such as liver damage.
- Injections can be used to deliver pain medication directly to the affected area. This can be helpful for pain that is localized to a specific area, such as a joint or muscle.
- Physical therapy can help to reduce pain and improve function by strengthening muscles, stretching tissues, and improving range of motion.
- Other non-pharmacological methods can also be helpful for pain management. These methods include relaxation techniques, heat or cold therapy, and massage.

The choice of pain management method will depend on the patient's individual needs and preferences. The healthcare provider will work with the patient to choose the best pain management method to achieve the desired outcome.

If you are experiencing pain, it is important to seek medical attention. The healthcare provider will be able to assess your pain and recommend the best treatment option for you.

Pain Management of specific ‘acute on chronic’ conditions in ED-

Pain management of acute headache in the emergency department (ED)

Pain management of acute headache in the emergency department (ED) is a priority. Acute headache is a type of headache that is sudden in onset and of short duration. It can be caused by a variety of factors, such as stress, dehydration, and medication overuse.

The goal of pain management for acute headache is to relieve the patient's pain to a level that is tolerable and allows them to function. This can be achieved through a variety of methods, including:

- Over-the-counter pain relievers, such as acetaminophen (Tylenol) or ibuprofen (Advil).
- Prescription pain relievers, such as opioids or triptans.
- Injections of pain medication directly into the affected area.
- Other non-pharmacological methods, such as relaxation techniques, heat or cold therapy, and massage.

The choice of pain management method will depend on the patient's individual pain level, medical condition, and preferences. The healthcare provider will work with the patient to choose the best pain management method to achieve the desired outcome.

Here are some additional information about the pain management of acute headache in the ED:

- The pain of an acute headache can be described as a sharp, throbbing, or dull pain.

- The pain may be localized to a specific area of the head, or it may be generalized.
- Other symptoms of an acute headache may include nausea, vomiting, sensitivity to light or sound, and dizziness.
- If you are experiencing any of these symptoms, it is important to seek medical attention immediately.

The healthcare provider will perform a physical examination and order tests to rule out any underlying medical conditions. These tests may include a computed tomography (CT) scan or magnetic resonance imaging (MRI) of the brain.

The treatment for an acute headache depends on the underlying cause. However, pain relief is an important part of the treatment for all cases of acute headache. The healthcare provider will choose the best pain relief medication for you based on your individual needs and preferences.

The healthcare provider will also monitor your condition closely and adjust your treatment plan as needed. You may be discharged home with pain medication or admitted to the hospital for further treatment.

The prognosis for an acute headache is good. Most cases of acute headache are treatable and the patient can make a full recovery.

Here are some tips to help prevent acute headaches:

- Get enough sleep.
- Stay hydrated.

- Avoid caffeine and alcohol.
- Manage stress.
- Exercise regularly.
- Eat regular meals.
- See a doctor if you have frequent headache

Management of acute trigeminal neuralgia pain in emergency department

The pain management of acute trigeminal neuralgia in the emergency department (ED) is a priority. Trigeminal neuralgia is a chronic pain condition that affects the trigeminal nerve, which is responsible for sensation in the face. The pain is usually described as a sharp, stabbing, or electric shock-like pain that occurs in one side of the face.

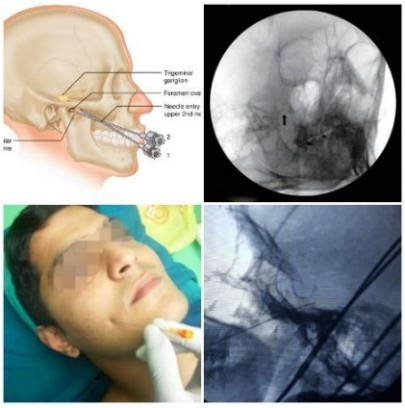
Acute trigeminal neuralgia is a severe and sudden-onset facial pain condition caused by irritation or compression of the trigeminal nerve. Managing the intense pain associated with trigeminal neuralgia in the emergency department (ED) typically involves a combination of medications and other supportive measures. Here's a general guideline for managing acute trigeminal neuralgia in the ED:

- Initial Assessment:

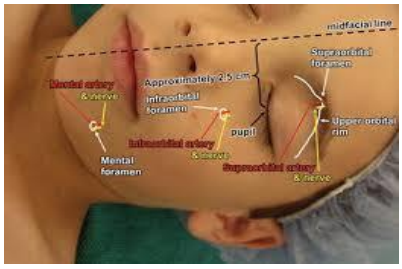
- Perform a thorough clinical assessment, including a detailed history and physical examination, to confirm the diagnosis and rule out other potential causes of facial pain.
- Evaluate the patient's vital signs and assess for any signs of distress or complications.
- Pain Control:
- The primary goal in the ED is to provide rapid and effective pain relief. Medications commonly used for pain management in trigeminal neuralgia include:
- Oral Medications:
- Carbamazepine: This is often the first-line medication for trigeminal neuralgia. It can provide significant pain relief within hours.
- Oxcarbazepine: Similar to carbamazepine and may be used if the patient cannot tolerate the former.
- Gabapentin or pregabalin: These anticonvulsant medications may also be considered.
- Intravenous Medications (for severe pain):
- IV opioids like morphine or fentanyl may be used to provide immediate relief.
- Intravenous lidocaine may be considered in refractory cases.

MIPSIs (Minimally Invasive Pain & Spine Interventions) employed by a trained Pain Physician can be used to block the transmission of pain signals from the trigeminal nerve to the brain. They can be used to relieve the pain of acute trigeminal neuralgia in the emergency department (ED).

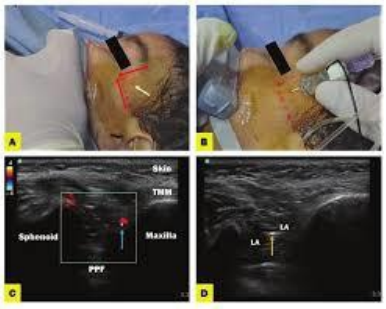
There are several different types of MIPSIs that can be used for acute trigeminal neuralgia, including:



- Gasserian ganglion MIPSIs – Here small amount of local anesthetic agent like Lignocaine 1% is injected into the trigeminal ganglion, which is a cluster of nerves located near the brain stem. This can provide pain relief for the entire trigeminal nerve distribution.



- Ophthalmic nerve block is a nerve block that is injected into the ophthalmic nerve, which is one of the three branches of the trigeminal nerve. This nerve block can provide pain relief for the forehead, eyes, and nose.



- Maxillary nerve block is a nerve block that is injected into the maxillary nerve, which is another branch of the trigeminal nerve. This nerve block can provide pain relief for the cheek, upper lip, and teeth.

- Mandibular nerve block is a nerve block that is injected into the mandibular nerve, which is the third branch of the trigeminal nerve. This nerve block can provide pain relief for the jaw, lower lip, and chin.

MIPSIs are usually performed by a pain physician under c-arm fluoroscope guidance and in operation theatre. The procedure is usually done with the patient lying down. The healthcare provider will clean the skin at the injection site and then inject the local anesthetic. The MIPSIs may cause some pain or discomfort, but this is usually mild and goes away quickly.

MIPSIs can be an effective way to relieve the pain of acute trigeminal neuralgia. However, they are not a permanent solution. The pain relief from an emergency MIPSIs usually lasts for several hours to days.

There are some risks associated with MIPSIs, including:

- Bleeding
- Infection
- Nerve injury

The risks of nerve blocks are usually low. However, it is important to discuss the risks and benefits of nerve blocks with your healthcare provider before the procedure.

- Monitoring:

- Continuously monitor the patient's vital signs and pain level after medication administration.
- Assess for any signs of medication side effects or adverse reactions.
- Consideration for Admittance:
- In some cases, if the pain is not well controlled or if there are complications, admission to the hospital for further evaluation and treatment may be necessary.
- Pain Physician and Pain Medicine Consultation:
- Consult a neurologist or a Pain Physician for further evaluation and long-term management planning.
- Rule Out Secondary Causes:
- It's crucial to rule out any underlying causes of trigeminal neuralgia, such as tumors or vascular abnormalities, through imaging studies like MRI or CT scans.
- Patient Education:
- Provide the patient with information about trigeminal neuralgia, potential triggers, and strategies for pain management.
- Discuss the importance of compliance with prescribed medications and follow-up appointments.
- Referral for Long-Term Management:
- Ensure that the patient is referred to a specialist for ongoing management of their condition. This may involve adjusting medications, considering surgical options like microvascular decompression, or other interventional procedures.
- Follow-Up:

- Schedule a follow-up appointment for the patient to assess their progress and adjust their treatment plan if necessary.
- Remember that trigeminal neuralgia can be an extremely painful condition, and the approach to pain management should prioritize rapid relief while also addressing the underlying cause. Individual patient needs may vary, so treatment should be tailored to the specific circumstances and the patient's response to therapy. Always consult with a healthcare provider for guidance on managing acute trigeminal neuralgia in the ED.

The prognosis for acute trigeminal neuralgia is good. Most cases of acute trigeminal neuralgia are treatable and the patient can make a full recovery.

Here are some tips to help prevent acute trigeminal neuralgia:

- Avoid triggers, such as touching the face, chewing, or talking.
- Take medications as prescribed.
- See a doctor if you have frequent pain.

If you are experiencing acute trigeminal neuralgia, it is important to seek medical attention. The healthcare provider will be able to assess your pain and recommend the best treatment option for you.

pain management acute rib fracture in emergency department

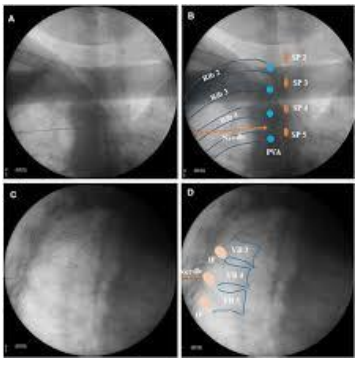
Nerve blocks can be an effective method for managing pain associated with acute rib fractures in the emergency department. Rib fractures can be extremely painful, and providing adequate pain relief is important not only for the patient's comfort but also to facilitate proper

breathing and minimize the risk of complications such as pneumonia. Here's an overview of how nerve blocks can be used for pain management in this context:

1. **Intercostal Nerve Blocks**:

   - Intercostal nerve blocks involve injecting a local anesthetic, such as lidocaine or bupivacaine, into the intercostal spaces, which are the spaces between the ribs.
   - The local anesthetic blocks the pain signals transmitted by the intercostal nerves, effectively reducing pain in the fractured area.
   - This type of nerve block can be performed at multiple levels along the ribcage, depending on the location of the fracture.

2. **Paravertebral Nerve Blocks**:

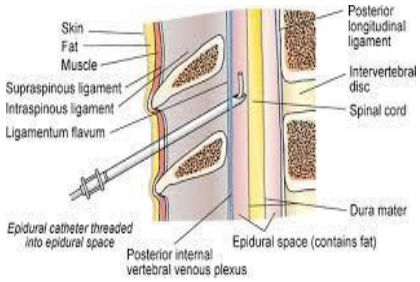


   - Paravertebral nerve blocks involve injecting a local anesthetic alongside the vertebral column, targeting the nerves that supply sensation to the ribs.
   - This type of nerve block can provide more widespread pain relief along a specific segment of the ribcage and is often considered when multiple rib fractures are present.

3. **Thoracic Epidural Block**:

   - A thoracic epidural block involves injecting a local anesthetic into the epidural space in the thoracic region of the spine.

   - This technique can provide comprehensive pain relief for rib fractures on one side of the chest.



   - It's typically used in more severe cases or when other nerve block methods may not be sufficient.

4. **Ultrasound Guidance**:

   - Ultrasound guidance is often used to ensure accurate placement of the needle and precise delivery of the local anesthetic.

   - It helps minimize the risk of complications and increases the effectiveness of the nerve block.

5. **Complications and Considerations**:

   - While nerve blocks can be highly effective for pain relief, they may carry certain risks, such as infection, bleeding, or nerve injury.

   - The choice of nerve block technique and the specific medication used should be based on the patient's individual case, medical history, and any contraindications.

6. **Patient Monitoring**:

    - Patients who receive nerve blocks for rib fractures should be closely monitored for any adverse effects and to assess the adequacy of pain relief.

7. **Multimodal Approach**:

    - Nerve blocks are often part of a multimodal pain management approach that may include oral pain medications, chest wall bracing, and respiratory support as needed.

It's important for healthcare professionals in the emergency department to carefully evaluate each patient with a rib fracture and tailor the pain management strategy to their specific needs. Nerve blocks can be a valuable tool in providing effective and targeted pain relief in such cases.

Chapter 19 Pain Medicine Services in Uttar Pradesh

Pain Medicine, an emerging 'super-specialty' branch of Anesthesiology, focus upon the comprehensive management of various chronic pain syndromes, but the niche of Pain Medicine is its use of various MIPSIs (Minimally Invasive Pain & Spine Interventions) for the percutaneous and minimally invasive treatment of chronic pain conditions.

Since the inception of Pain Medicine in America in late 1960s, Bharat (India) in general and Uttar Pradesh in particular, wasn't far behind. Just after formation of 'International Association for Study of Pain-IASP' in America in 1976; the 'Indian Society for Study of Pain-ISSP' was formed at Banaras Hindu University BHU, Varanasi, Uttar Pradesh in 1986 under the leadership of Prof. Virendra Rastogi, Professor Anesthesiology and Head- Division of Pain Medicine at Department of Anesthesiology, Institute of Medical Sciences, BHU, Varanasi, Uttar Pradesh. Since then, Pain Medicine movement is continuously growing up in Bharat, serving millions of patients of chronic pain syndromes.

Not only in providing the services of Pain Medicine and MIPSIs, Uttar Pradesh has also been a leader in the education of Pain Medicine. The first formal course of Pain Medicine was also started by

Prof. V Rastogi of BHU, Varanasi in 2008 in the form of 'One Year fulltime, in-house Post Doctoral Certificate Course (PDCC) in Pain Medicine. This PDCC courses paved the way for further strengthening of formal educational opportunities in Pain Medicine in the form of two years FNB (Pain Medicine) and tree years DM (Pain Medicine). Currently many institutions

in Uttar Pradesh are imparting formal education in Pain Medicine like Dr RMLIMS, Lucknow; SGPGIMS, Lucknow; KGMU, Lucknow; BHU, Varanasi, AMU, Aligarh.

It is a great thing to declare that the most advanced services of Pain Medicine are available in multiple intuitions of Uttar Pradesh to serve the large population. A list of institutions is given below for the information-

Pain Medicine OPD/ IPD	**Institution**	**Resource Person**	**Training/ Educational Opportunities available**
Yes	Dr Ram Manohar Lohia Institute of Medical Sciences, Gomti Nagar, Lucknow	1. Dr Anurag Agarwal 2. Dr Shivani Rastogi	• PDCC- Pain Medicine • Observership in Pain Medicine
Yes	SGPGIMS, Lucknow	1. Dr Sujeet Gautam 2. Dr Sandeep Khuba 3. Dr Chetna Shamshery	• PDAF- Pain Medicine (2 years)
Yes	KGMU, Lucknow	1. Dr Sarita Singh 2. Dr Manish Singh	• PDCC- Pain Medicine
Yes	BHU, Varanasi	1. Dr Anil Paswan 2. Dr Nimisha	• PDCC- Pain Medicine
Yes	AMU, Aligarh	1. Dr Hammad Usmani	• PDCC- Pain Medicine
Yes	GSVM Medical College, Kanpur	1. Dr Chandra Shekhar Singh	NA
Yes	SN Medical College, Agra	1. Dr Amrita Gupta 2. Dr Yogita Dwivedi	NA
Yes	LLRM Medical College, Meerut	1. Dr Navneet Gupta 2. Dr Yogesh Manik	NA
Yes	Ayodhya Medical	1. Dr J P Tiwari	NA

	College, Kanpur		
Yes	Civil Hospital, Lucknow	1. Dr Vivek Dwivedi	NA

Apart from these government medical institution, there are many formally trained and competent Pain Physicians are serving the needy patients in the private and corporate hospitals.

So, all the needy patients should be referred to a 'Pain Medicine OPD' in a nearby medical institution for a quality and comprehensive care of all chronic pain patients.

Please remember, -

'Effective Pain Relief is a Basic Human Right'!!

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Department of Medical Health and Family Welfare,
Government of Uttar Pradesh