

# Blue Prints

## in Pain Managements

What every doctor should know in practice



Dr . Mohammad Bushnaq



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*What every doctor should know in practice*

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رقم الإيداع لدى دائرة المكتبة الوطنية (2025/8/4347)

<b>Primary indexing data for the book</b>	
<b>Book Title</b>	Blueprints in Pain Managements
<b>Author</b>	Mohammad Akram M. A. Bushnaq
<b>Publication Data</b>	Amman: Mohammad Akram M. A. Bushnaq, 2025
<b>Physical Description</b>	66 Pages
<b>Classification number</b>	615.783
<b>Descriptors</b>	/Pain Treatment/Medical Treatment/Medical Sciences/
<b>Edition Data</b>	First Edition

يتحمل المؤلف كامل المسؤولية القانونية عن محتوى مصنفه ولا يعبر هذا المصنف عن رأي دائرة المكتبة الوطنية أو أي جهة حكومية أخرى.

ISBN 978-9923-0-1892-7 (ردمك)

## ACKNOWLEDGMENTS

I would like to express my heartfelt gratitude to my esteemed teachers who have profoundly influenced my journey in medicine.

First and foremost, I extend my deepest thanks to Frank Dr. Ferris, whose guidance and expertise in palliative medicine have shaped my understanding of compassionate care. Your dedication to alleviating suffering has inspired me to approach my practice with empathy and integrity.

I am also grateful to John Lyftgoff for introducing me to the intricate world of prolotherapy. Your passion for this field and your commitment to teaching have equipped me with invaluable skills that I will carry throughout my career.

Lastly, I would like to thank Dr. Wiquar Ahmed for your exceptional training in ultrasound-guided pain injection.

Your clear instruction and encouragement have empowered me to develop confidence in my abilities and strive for excellence in patient care.

To all of you, thank you for your unwavering support and for sharing your knowledge. This book is a testament to the lessons I've learned from each of you.

Mohammad Bushnaq

## *PREFACE*

In recent years, advancements in medical research have significantly expanded our understanding of pain mechanisms and treatment options. Despite these advancements, the prevalence of chronic pain and the opioid crisis highlight the ongoing need for effective pain management strategies. This book addresses these critical issues, offering evidence-based approaches that prioritize patient safety and well-being.

We also tried to focus more on the role of the regenerative medicine for treating Musculoskeletal pain. This Science gained increasing attention and interest among doctors specialized in pain management. Not only it is effective and safe tool to treat pain, but also it may heal damaged tissues.

Throughout this book, we will explore a wide range of topics, including assessment techniques, pharmacological

and non-pharmacological treatments, and the latest innovations in pain management.

As we embark on this journey together, let us remember that pain management is not just about treating symptoms. It is about understanding and addressing the unique experiences of each patient. *With* empathy, expertise, and dedication, we can make a profound difference in the lives of those who trust us with their care.



**PAIN** is an unpleasant sensory and emotional experience associated with actual or potential tissue damage.

- It's more than just a physical sensation; it also includes emotional and psychological components.

**PALLIATIVE MEDICINE** is a field of medicine that focuses on improving the quality of life of patients with serious illnesses. It aims to relieve pain and other symptoms of the illness, as well as to provide emotional and spiritual support

to both the patients and their families. Palliative care can be provided at any stage of a serious illness, and it is not just for end-of-life care.

**REGENERATIVE MEDICINE** is a field of medicine focused on developing new treatments to heal tissues and organs. It aims to restore function lost due to aging, disease, damage, or defects.

- It explores approaches to regrow, repair, or replace damaged or diseased cells, tissues, or organs. Is it used in a variety of musculoskeletal pain such as osteoarthritis, tendinitis, and discogenic diseases. In many cases it provides an effective and safe option as an alternative to surgery or long-term pain killers.

**SPIRITUAL THERAPY** is to help individuals find meaning and purpose in their lives, develop a deeper connection to something greater than themselves, and cultivate a sense of peace and well-being. For religious patient praying helps in creating inner peace.

**HOLISTIC PAIN MANAGEMENT** is an approach to pain treatment that considers the whole person; mind, body, and spirit. It goes beyond simply addressing the physical symptoms of pain and aims to improve a person's overall well-being.

**FOR COMPLETE ASSESSMENT** ask about the location and radiation of the pain, character, severity, temporal profile and duration, aggravating and relieving factors, and the pain effect on life style.

**PAIN SCORE** according to pain analogue score, the pain is classified as mild (1-3 over 10), moderate (4-7 over 10), and severe (8-10 over 10).

- The pain is subjective and the only way to measure the pain is what the patient says.

**OVERPROTECTION...** asking the patient to simply tolerate pain is not right. No matter how it is complicated, it is your duty to find effective and safe solutions for the pain medications. Tolerating pain is

riskier than taking pain medication on most cases.

*Placebo is not ethical and illegal.*

**CANCER PAIN MANAGEMENT:** According to WHO ladder, treatment of mild cancer pain is with paracetamol or NSAID's, moderate pain with weak opioids such as Codein or Tramadol, severe pain with strong opioids such as Morphine or Fentanyl.

- Give pain medications around the clock and as needed.
- The best rout of administrators is by mouth, unless another rout is necessary.
- Give adjuvant medication according to the cause and source of pain.

### **ADJUVANT PAIN MEDICATIONS**

Paracetamol for headache. Dexamethasone for pain related to stretching of the capsule, such as liver and spleen pain, as well as increased intracranial pressure, bowel oedema, and bone metastasis. Neuropathic

agents in case of neuropathic pain.

### **HEADACHE TYPES**

- ***Tension headache:*** This is the most common type of headache, and it usually cause mild to moderate pain on both sides of the head. Tension headache is often described as a feeling of tightness or pressure.
- ***Migraine headache:*** Migraine is severe headache that can cause throbbing pain on one side of the head, as well as nausea, vomiting, and sensitivity to light and sound.
- ***Cluster headache:*** are rare but extremely painful headaches that occur in groups or clusters. It causes severe pain on one side of the head, usually around the eye.
- ***Sinus headache:*** Sinus headache is caused by inflammation of the sinuses. It can cause pain and pressure in the forehead, cheeks, and around the eyes.

- ***Rebound headache:*** This headache can be caused by overuse of pain medication.

**TREATMENT OF HEADACHE** the best course of treatment for a headache depends on the type of headache. Here's a rundown of treatments for common headache types:

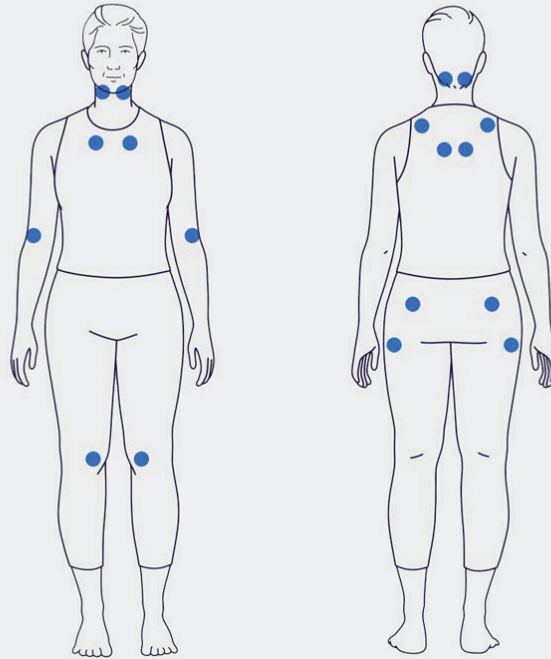
- ***Tension headache:*** This headache usually responds well to over-the-counter pain relievers such as Paracetamol or NSAID's.
- ***Migraine:*** There are a number of medications available to help prevent migraines or treat them once they occur. These include over-the-counter pain relievers, Triptans, and other prescription medications. Resting in a quiet, dark room and applying a cold compress to forehead can also help relieve migraine pain.
- ***Cluster headache:*** Cluster headaches are typically treated with medications such as Triptans, inhaled oxygen, and steroids.

- ***Sinus headache:*** Treatment for sinus headaches usually focuses on relieving the underlying inflammation in the sinuses. This may involve using over-the-counter pain relievers, decongestants, or nasal corticosteroids.
- ***Rebound headaches:*** The best way to treat rebound headaches is to stop taking the pain medication that is causing them. However, this can be difficult because rebound headaches can be just as painful as the original headaches.

**CHRONIC BACK PAIN** is a major health problem that affects millions of people worldwide.

- Chronic back pain is a leading cause of disability and can significantly impact a person's quality of life. It's a significant economic burden, costing billions of dollars in healthcare costs annually.
- It's incredibly common, affecting up to 80% of adults at some point in their lives.

- Main causes are mechanical or inflammatory. Mechanical pain is usually increased with walking and relieved by rest, can be radiated to one limb (sciatica) and often worse at night. Inflammatory pain is usually bilateral, increased by rest and relieved by activity, and it has no radiation. It is worse at morning with associated muscle stiffness.
- Medication includes Paracetamol or muscle relaxants. NSAID's has shown no superiority over paracetamol, except in inflammatory conditions such as sacroiliitis.



**PIRIFORMIS SYNDROME** is a condition characterized by pain in the buttocks and potentially down the leg due to irritation or compression of the sciatic nerve by the piriformis muscle. The piriformis is a small muscle located deep in the buttock, and it plays a role in hip rotation and stabilization.

- Symptoms of piriformis syndrome can include: Pain

in the buttock that may radiate down the legs, numbness or tingling in the leg or foot, discomfort while sitting or standing for prolonged periods, pain that worsens with certain movements, such as climbing stairs or walking.

- Treatment options often include: Analgesics, physiotherapy or prolotherapy injections under ultrasound guidance.

**FIBROMYALGIA** is a chronic condition that causes widespread pain and tenderness throughout the body, along with fatigue, sleep problems, and emotional and mental distress.

- It is most common in middle aged women.
- The pain is usually moderate to severe and is often migrating.
- The exact cause of fibromyalgia is unknown, but it's thought to be related to abnormal pain processing in the brain and spinal cord.

- While there's no cure for fibromyalgia, there are treatments that can help manage the symptoms and improve quality of life. These include medication, exercise, stress management, and cognitive behavioral therapy.
- Assessment involves checking for tenderness in specific areas of the body (trigger points).
- Fibromyalgia is a diagnosis of exclusion. certain blood tests or imaging scans are needed to rule out other conditions and causes, such as CBC, iron profile, Mg, TSH, vitamin D and Vitamin B12.
- Treatment of fibromyalgia include pain medications such as Paracetamol and NSAID's. Tramadol can be given in severe cases. The medications for long term control includes Duloxetine, Amitriptyline, pregabalin and gabapentin.

**OSTEOARTHRITIS** symptoms of osteoarthritis include: Joint pain, especially during or after activity, stiffness in

the joints, particularly in the morning or after periods of inactivity, swelling around the joint, and decreased range of motion in the joint.

- Medication, such as paracetamol and anti-inflammatory drugs. NSAID's has shown to superiority over paracetamol. Paracetamol can be given regular with maximum dose 4 gr per day.
- Intraarticular injections: such as Steroid, Hyaluronic acid, and PRP (Platelet rich plasma).
- In advanced cases, total knee replacement can be performed. If the patient refuses or unable to perform surgery, pain can be effectively managed through radiofrequency ablation, precisely delivered under ultrasound guidance for safe and targeted relief.



**NEUROPATHIC PAIN** is a chronic pain condition that arises from damage or dysfunction of the nerves. Often described as: shooting, burning, stabbing, tingling, numbness, pins and needles.

- It can affect any part of the body, but it's most commonly felt in the hands and feet.
- Neuropathic pain can be constant or come and go in flare-ups. It can significantly impact a person's

quality of life, making it difficult to sleep, work, and participate in everyday activities.

- There are many different causes of neuropathic pain, including: diabetes, post-herpetic neuralgia, fibromyalgia, sciatica, trigeminal neuralgia, carpal tunnel syndrome, autoimmune disease, infections, vitamin deficiencies, toxins, trauma, surgery, cancer and its treatment.
- The first line of treatment is Gabapentin, pregabalin, Tricyclic anti-depressants or Duloxetine.
- Titrate the dose according to the response every three or five days as tolerated.
- If there is good improvement increase the dose of the medication as needed and as tolerated.
- If there is no improvement, switch to another agent from the above list.
- If there is moderate improvement, add another agent from the list above (combination).

**USING OPIOIDS ON NEUROPATHIC PAIN** indications include: cancer related neuropathic pain, for refractory or resistant case, and at the beginning as a temporary agent for rapid relieve of pain.

### **MSK - SPORT INJURIES**

There are two main types of sports injuries:

- ***Acute injuries:*** These occur suddenly, as a result of a single incident, such as a fall or a collision. Common acute injuries include sprains, strains, fractures, and dislocations.
- ***Chronic injuries:*** These develop over time from repetitive stress on a particular body part. Common chronic injuries include tendinitis, bursitis, and stress fractures.
- ***Sprains:*** Sprains are injuries to ligaments, the tough tissues that connect bones at a joint. Sprains can cause pain, swelling, bruising, and difficulty moving the joint.

- ***Strains:*** Strains are injuries to muscles or tendons, the tissues that connect muscles to bones. Strains can also cause pain, swelling, bruising, and difficulty moving the affected area.
- ***Fractures:*** Fractures are broken bones. They can range from hairline cracks to complete breaks. Symptoms of a fracture can include pain, swelling, bruising, deformity, and difficulty moving the affected area.
- ***Tendinitis:*** Tendinitis is inflammation of a tendon. It is a common overuse injury that can cause pain, swelling, and tenderness at the site of the inflammation.
- ***Bursitis:*** Bursitis is inflammation of a bursa, a fluid-filled sac that cushions the bones, tendons, and muscles near a joint. It can cause pain, swelling, and tenderness at the affected joint.

- ***Stress fractures:*** Stress fractures are small cracks in a bone that develop from repetitive stress. They are common in athletes who participate in activities that involve a lot of running or jumping. Symptoms of a stress fracture can include pain, especially during activity, and tenderness at the site of the fracture.

### **TENDON AND LIGAMENT INJURIES COMPLICATIONS**

- If you notice, muscles are red, while tendons and ligaments are white. This means rich blood supply to the muscles with rapid recovery from injury. And poor blood supply with slow recovery for the tendons and ligaments. Injuries to ligaments and tendons can take weeks to months to heal.
- A typical ligament or tendon injury takes four to six weeks to heal, with the most healing occurring in the first two weeks after an injury. Unfortunately, after the typical four to six-week healing cycle is over, the body's stimulus to heal has significantly diminished.

- In other words, if healing does not occur within the first month or so after an injury, it is not likely to occur later on its own. In fact, it has been estimated that the usual best result of a connective tissue repair cycle may be as little as 50-60% of pre-injury strength.
- When injury or trauma occurs to a ligament that holds a joint together, the result can be overstretching or micro-tearing of that ligament. The joint becomes loose, which leads to instability, weakness, and pain.
- Similarly, any tendon throughout the body can become chronically relaxed and thus a source of pain. Whether tendon or ligament, if proper healing does not occur, joint instability and pain result. This can make even worse and may lead to osteoarthritis.
- Additionally, an athlete may not report or even notice smaller injuries and so may continue to play on an

injured or weakened joint. Repetitive strain is also a factor.

- A basketball player who jumps over and over again, with a back that eventually begins to hurt or on an ankle that is repeatedly sprained, can accumulate small injuries until one final injury becomes the “straw that breaks the camel’s back,” resulting in pain that doesn’t go away.
- Even disc herniations have been linked to ligament weakness. As early as 1952, it was observed that weakness of the ligaments around the spine came before disc herniations, sometimes years before the actual disc herniations occurred.
- Dr. P.H. Newman, a British surgeon in the 1950s with years of experience performing disc operations, concluded that torn or inefficient spinal ligaments resulted in unstable vertebrae and preceded disc herniations. He believed the most common cause of chronic low back pain was a strain on a segment

of the spine that occurred after the ligaments had already been injured.



**PROLOTHERAPY** stimulates the body to heal, strengthen, and rebuild weakened ligaments, tendons, and joints, even years after the initial injury-thereby greatly reducing or eliminating pain.

- Prolotherapy is injecting glucose water, may be mixed with other materials such as ozone, vitamins or collagen.

- Prolotherapy creates an effective stimulus by creating a directed, local irritation and temporary inflammation at the site of the injury.
- This, then, stimulates the body to send blood and repair cells as well as to increase the activity of growth factors to make new collagen and repair the weak and painful areas.
- That is why prolotherapy can help years after the injury, pain, or weakness first occurred. Most chronic musculoskeletal pain is caused by injured ligaments and tendons that have not completely healed.
- Lloyd Saberski, M.D, former Medical Director of Yale University School of Medicine Center for Pain Management, writes: *“Prolotherapy is the only methodology I have ever utilized with both limited risk yet potential for significant benefit...I routinely utilize Prolotherapy for management of mechanical low back pain and various sports-related injuries”*.

- In fact, research confirms that Prolotherapy stimulates the production of growth factors that help to repair sites of injury. Studies show that ligaments and tendons treated with Prolotherapy increase in strength, stability, and texture, even above normal.
- A 2004 Canadian study of 177 patients treated with Prolotherapy followed their progress for up to two years. The doctors concluded that 91% of patients receiving Prolotherapy had reduced pain, 84% had improvement in their ability to work, and 85% could perform self-care more easily. Also of note: Of patients undergoing treatments, there were no reported complications,
- Long-term results for Prolotherapy have been informally reported. Dr. George S. Hackett, one of the procedure's pioneers in the 1950s, reported that 82% had long term relieve of pain at 12 years after Prolotherapy treatments.

- In 1974, Dr. Gustav Hemwall presented his findings to the Prolotherapy Association, reporting that out of 1,871 patients who completed Prolotherapy treatments, 75.5% reported complete recovery and cure, 24.3% reported general improvement, 0.2% showed no improvement. The net result of Dr. Hemwall's study was that 99% of surveyed patients who completed treatment found some relief from their chronic pain at long term.

**PRP, OR PLATELET-RICH PLASMA** is a regenerative medicine treatment that uses a patient's own platelets to promote healing and reduce pain. Platelets are components of blood that contain growth factors, which are proteins that help cells grow and repair themselves.

- In PRP therapy, a blood sample is drawn from the patient and spun in a centrifuge to concentrate the platelets. The PRP is then injected into the injured area, such as a tendon, ligament, or joint. The growth

factors in the PRP are believed to stimulate healing and reduce inflammation, which can help to improve pain and function.

- PRP therapy is used in the following cases: Osteoarthritis, Tendinitis, Ligament sprains, Muscle injuries.

**OZONE THERAPY** is a treatment that involves introducing ozone gas into the body to manage pain and inflammation. Proponents of ozone therapy believe it can be effective for various conditions, including: arthritis, back pain, muscle pain, disc herniations, sports injuries.

- The theory behind ozone therapy is that it can increase tissue oxygen levels, reduce inflammation, and stimulate the body's healing processes, and it works as antioxidant.

**STEM CELL THERAPY** is an promising area of research for chronic pain management. Stem cells have the potential

to repair damaged tissues and treat chronic pain.

- Studies have shown that stem cell therapy may be effective for pain relief in conditions such as arthritis, osteoarthritis, and lower back pain. However, stem cell therapy is still considered an experimental treatment. More research is needed to determine its long-term effectiveness and safety.
- *Mesenchymal stem cells (MSCs)*: These are adult stem cells found in various tissues throughout the body, including bone marrow, adipose tissue, and umbilical cord blood. MSCs have the ability to differentiate into various cell types, such as bone, cartilage, and muscle cells. They are also known to have immunomodulatory and anti-inflammatory properties, which may help reduce pain.

**NERVE BLOCKS** are injections of medication used to target and numb specific nerves, providing pain relief.

- Different types of nerve blocks target different areas

of the body. The materials used typically include a local anesthetic to numb the area and a steroid to reduce inflammation.

- Nerve blocks are a minimally invasive procedure with a good safety profile.

**EPIDURAL STEROID INJECTION (ESI):** This type of epidural injection is used to reduce inflammation around the spinal nerves. It is commonly used for chronic pain conditions, such as lower back pain and sciatica. Epidural injections are a safe and effective way to manage pain. However, as with any medical procedure, there are some risks involved. These risks include infection, bleeding, and nerve damage.

**RADIOFREQUENCY ABLATION (RFA)** is a minimally invasive procedure that uses heat to target and interrupt pain signals traveling along specific nerves. It's often used to treat chronic pain in the knee, hip and spine that haven't responded well to more conservative measures

like medications or physical therapy. It can also be used for trigeminal neuralgia.

- During RFA, a doctor inserts a thin needle electrode near the targeted nerve under ultrasound or fluoroscopy guidance.. Radiofrequency waves are then delivered through the electrode, heating a small area of the nerve tissue. This disrupts the nerve's ability to transmit pain signals, providing long-term pain relief.
- RFA is a safe and effective procedure with minimal risks and complications. It's typically performed on an outpatient basis, and patients can usually resume normal activities within a day or two.

**ULTRASOUND-GUIDED PAIN MANAGEMENT** is a minimally invasive technique that uses ultrasound imaging to help doctors providers precisely inject medications to targeted areas of the body for pain relief.

- It was found that needle can be inserted on the

wrong location for up to 33% of cases, even with senior physicians. The guidelines strongly encourage physicians to use ultrasound during injections for pain management.

- During ultrasound-guided pain injections, we target specific structures such as peripheral nerves for nerve blocks, joints for intra-articular injections, tendons and ligaments in cases of tendinopathy or instability, bursae to reduce inflammation, fascial planes for hydrodissection or interfascial blocks, and muscles for trigger point or botulinum toxin injections - all with real-time imaging to ensure precision and safety..
- ***Diagnosis:*** such as bursitis, cut tendon and arthritis.
- ***Improved accuracy:*** Ultrasound guidance allows healthcare providers to see real-time images of the target area, ensuring the medication is injected into the correct location.

- ***Reduced risk of complications:*** By visualizing surrounding tissues, ultrasound guidance helps minimize the risk of accidentally damaging nerves, blood vessels, or other structures.
- ***Fewer side effects:*** Because the medication is delivered directly to the source of pain, ultrasound-guided injections can often reduce the need for higher doses of medication, which can help minimize side effects.



**PARACETAMOL** is a safe drug acts to relieve mild to moderate pain. The maximum dose is 4 gr / day.

- It can be used regular for chronic pain such as tension headache, osteoarthritis and chronic low back pain.

**NSAIDS**, or nonsteroidal anti-inflammatory drugs, are a class of medications commonly used to relieve pain, reduce inflammation, and lower fever. Contraindications

includes renal impairment, gastric ulcer, bronchial asthma and allergy to NSAID's.

- Many physicians use it for tendinitis that happens because of minor traumas or sport injuries. It is important to note that, unlike the term tendinitis, the condition does not always involve active inflammation; rather, it often reflects a degenerative process within the tendon structure itself. The inflammation may take place at acute phase, not chronic phase. Regenerative medicine physicians believes that the it is advised to use materials that irritate the tissue to induce inflammation and help in healing these tissues and building collagen for recovery. For this reason, these physicians believe that using NSAID's or steroid for chronic pain will only provide temporary pain relieve and may inhibits this mechanism.

## STEROID INJECTION

- Many physicians use it for different types of pain such as back pain, carpal tunnel syndrome, tendinitis and sacroiliitis.
- It is important to pay attention to the side effects and complications of steroid on long term, such as peptic ulcer, muscle weakness, osteoporosis, psychosis and increased blood sugar.
- Steroid injection may help relieving the acute pain on certain conditions like the cases mentioned above.
- While steroids remain commonly used in managing chronic pain, there is growing concern regarding their long-term impact. As catabolic agents, they suppress the body's natural inflammatory response and may further impair tissue integrity. In contrast, regenerative medicine offers a safer and more effective approach, particularly for degenerative

conditions, by supporting the body's intrinsic healing and restoration processes.

- Prolotherapy involves the injection of a mild irritant solution -commonly dextrose- into damaged or weakened ligaments, tendons, or joints. This controlled irritation triggers a localized inflammatory response, which is the body's natural first step in the healing process. Inflammation increases blood flow and attracts growth factors, platelets, and healing cells to the site of injury. Over time, this response stimulates collagen production, tissue regeneration, and structural strengthening of the treated area. Rather than masking symptoms, prolotherapy aims to restore integrity and function by promoting the body's innate ability to repair itself.
- *The body has the capacity to heal itself!*

**DEXAMETHASONE** is type of steroid with minimal

mineralocorticoid effects, hence minimal risk of fluid retention.

- It is available in tablet and injection forms.
- It is used for different types of pain, in particular for patients with cancer, such as headache associated with increased intracranial pressure, bone metastasis, liver and spleen metastasis, and bowel obstruction.
- It also helps for treatment of cancer related fatigue and poor appetite. Most of the time it is given for short period of time to avoid long term side effects.
- If it is given for a period less than three weeks (usually two weeks), then it can be stopped without tapering.
- It is usually given 4-8 mg once daily after breakfast, and preceded by PPIs before breakfast.

### **CODEIN (REVACOD: PARACETAMOL & CODEIN)**

- Codeine is a medication commonly used to treat mild to moderate pain. It belongs to the group of medicines known as narcotic analgesics, which act on

the central nervous system to relieve pain.

- ***Dosage:*** The usual dose of codeine for treating pain in adults is one or two 30mg tablets, taken every 4 hours, up to a maximum of 8 tablets (240mg) in 24 hours.
- ***Effectiveness:*** In patients with acute and/or chronic pain related to headache or osteoarthritis of the knee or hip, codeine has been found to have a moderate benefit for pain and function compared to placebo or no codeine. It also improves stiffness and sleep outcomes when compared to placebo.

**TRAMADOL** is a strong pain medication used to treat moderate to severe pain that is not being relieved by other types of pain medicines. It acts in the brain and spine (central nervous system) for pain relief. The extended-release form of tramadol (100mg) is used for around-the-clock treatment of pain and should not be used on an as-needed basis. The Tramadol capsule

(50mg) acts as immediate and short acting form.

- Unlike other opioids, tramadol also has some antidepressant-like effects, reducing pain by keeping pain messages from traveling between brain cells.
- The maximum daily dose of tramadol is 400 mg.
- For chronic pain management, the initial dose for adults is 100 mg orally once a day. It can be titrated in 100 mg increments every 3 days as tolerated.

**MORPHINE** is a strong pain-relieving medication used to treat moderate to severe pain when alternative pain relief medicines are not effective or not tolerated.

- It belongs to a class of medications called opiate (narcotic) analgesics. Morphine works by binding to the mu-opioid receptors within the central nervous system (CNS) and the peripheral nervous system (PNS), changing the way the brain and nervous system respond to pain.

- The only contraindication to morphine is morphine allergy. Extreme caution is necessary for patients who has respiratory, renal or mental problems, as well as elderly patients and hypotension. In these cases, doses will be adjusted according to risk factors.
- There is no maximum does of morphine.
- You may start with morphine 10 mg every 4 hours and titrate the dose according to the response. In case of drowsiness and hallucinations you may reduce the dose.
- Morphine does not cause addiction if used for pain control.
- It may cause dependence or tolerance.
- The *IV* morphine is three times more potent that oral morphine.

**FENTANYL PATCH** one of the narcotic medications that works as dermal patches.

- It is changed every 72 hours. The doses are 25, 50 or 100 micrograms.

- The potency compared to oral morphine is calculated as following: 100 mg of oral morphine is equivalent to 50 micrograms of fentanyl patch.

**TRICYCLIC ANTIDEPRESSANT** can be used for neuropathic pain, fibromyalgia, migraine and irritable bowel syndrome.

- The starting dose is 25 mg at bed time, and can be titrated every 5 days as tolerated for a maximum dose of 150 mg.
- Main side effects are dizziness and drowsiness, anticholinergic symptoms, and arrhythmias.
- It is the most potent agent for neuropathic pain, but be careful for the side effects, in particularly for the elderly people.
- It also works as an antidepressant and sleeping pills.
- Very cheap medicine and it is over the counter!





**GABAPANTIN** for the treatment of neuropathic pain. The starting dose is 300mg (100mg for the elderly).

- Can be titrated every three days as tolerated. The maximum dose 2400mg.
- Main side effects include drowsiness, dizziness, and tremor.

### **PREGABALIN**

- The mechanism of action and side effects are almost similar to Gabapentin.
- It has no more potency than Gabapentin, except for the advantage of rapid titration.
- The starting dose is 75mg at bed time, and the maximum dose is 300mg twice daily.

**DULOXETINE** it is over the counter medication. unlike other agents it is unlikely to cause drowsiness or dizziness.

- It may cause temporary gastric upset or nausea.
- Start with 30mg daily and increase to 60 mg after five days. Maximum daily dose is 90mg.

**VALPROIC ACID** it is the first line treatment for trigeminal neuralgia. Start with 200mg daily and titrate up to 800mg daily.

- Because of the many unwanted side effects and low potency for other neuropathic pain, it is not usually

recommended for other types of pain.

### **COMPLEMENTARY MEDICINE FOR PAIN MANAGEMENT**

- Can be used by experts in this field provided it is safe practice. Examples include acupuncture, meditation and guided imagination, herbal medication, herbal therapy, aromatherapy, hypnosis.

### **ORAL SUPPLEMENTS FOR PAIN MANAGEMENT**

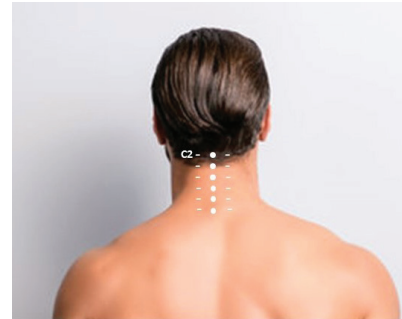
- ***Omega-3 Fatty Acids:*** Found in fish oil, omega-3s have anti-inflammatory properties that may help reduce pain, particularly in conditions like arthritis.
- ***Turmeric (Curcumin):*** Curcumin, the active ingredient in turmeric, has anti-inflammatory and antioxidant effects. It may help manage pain associated with arthritis and other inflammatory conditions.
- ***Glucosamine and Chondroitin:*** These supplements are often used for joint health and may help reduce pain in osteoarthritis patients.
- ***Boswellia Serrata:*** Also known as Indian frankincense,

this herb has anti-inflammatory properties and may help reduce pain and improve joint function.

- ***Magnesium***: This mineral can help relax muscles and may reduce pain associated with muscle tension and cramps.
- ***Vitamin D***: Low levels of vitamin D have been linked to chronic pain. Supplementing may help improve overall health and reduce pain.
- ***Capsaicin***: Derived from chili peppers, capsaicin cream can be applied topically to relieve localized pain, particularly in conditions like arthritis or neuropathy.
- ***Willow Bark***: This herbal remedy has been used for centuries for pain relief and may be effective for back pain and osteoarthritis.
- ***Ginger***: Known for its anti-inflammatory properties, ginger may help reduce pain, especially in conditions like osteoarthritis.

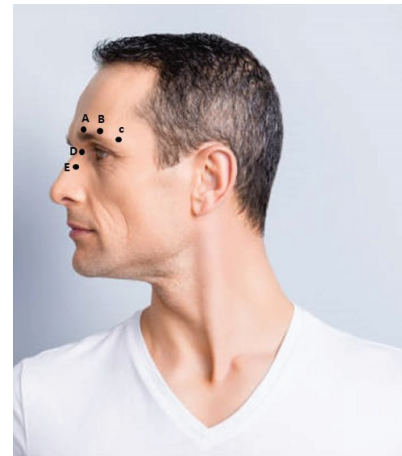
**LOCATIONS OF PROLOTHERAPY ACCORDING TO THE PAIN, AND LOCATIONS OF THE NERVE INVOLVED**

Dorsal rami



A- Ventral rami

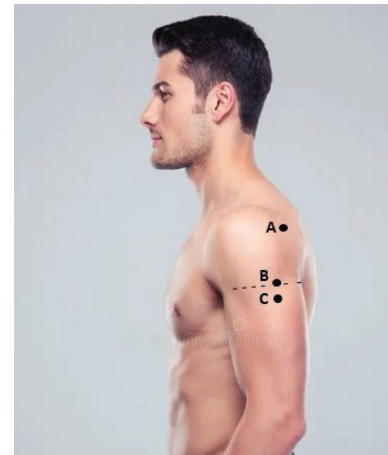
B- Punctum nervosum



A- Suprascapular nerve

B- Axillary nerve

C- Radial nerve

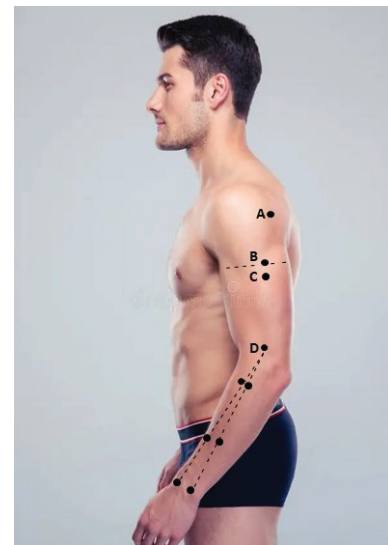


A-Suprascapular nerve

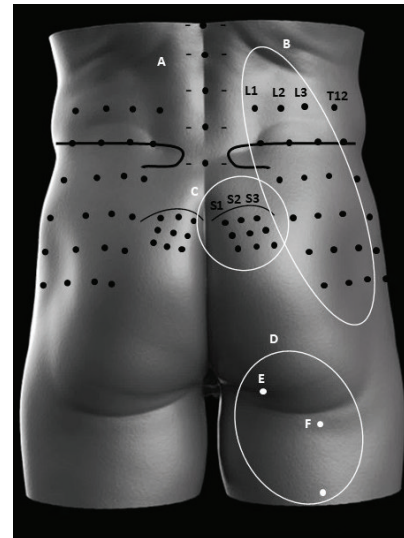
B- Axillary nerve

C- Radial nerve

D- Musculocutaneous nerve

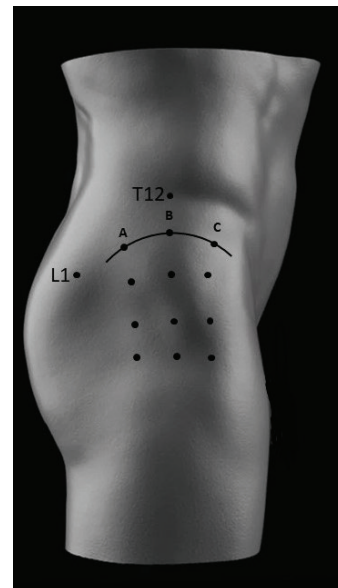


- A- Paraspinal nerves
- B- Superior cluneal nerve
- C- Middle cluneal nerve
- D- Inferior cluneal nerve
- E- Pudendal nerve
- F- Posterior femoral nerve



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- A- Posterior branch of lateral femoral cutaneous nerve
- B- Iliotibia band
- C- Anterior branch of lateral femoral cutaneous nerve



- A- Obturator nerve
- B- Anterior femoral nerve
- C- Lateral femoral nerve
- D- Saphenous nerve



- A- Posterior femoral nerve
- B- Tibial nerve
- C- Sural nerve



A- Saphenous nerve

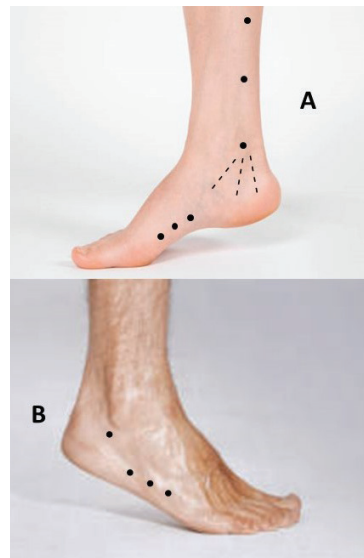
B- Peroneal nerve

C- Plantar nerve



A- Saphenous nerve

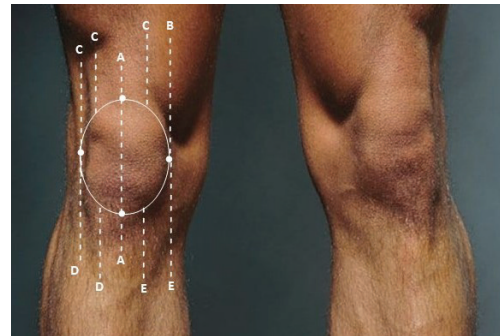
B- Medial calcaneal nerve



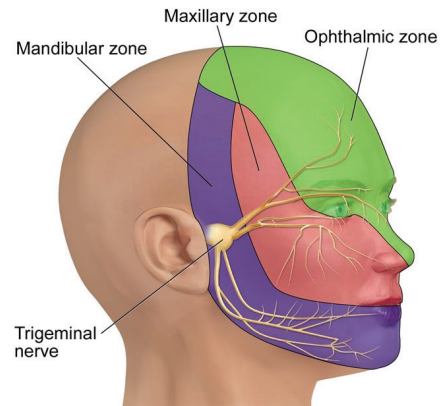
- A- Tibial nerve
- B- Sural nerve
- C- Plantar nerve



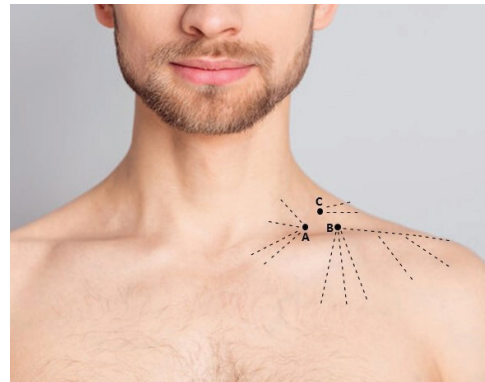
- A- Anterior femoral nerve
- B- Saphenous nerve
- C- Superior genicular nerve
- D- Interior lateral genicular nerve
- E- Inferior medial genicular nerve



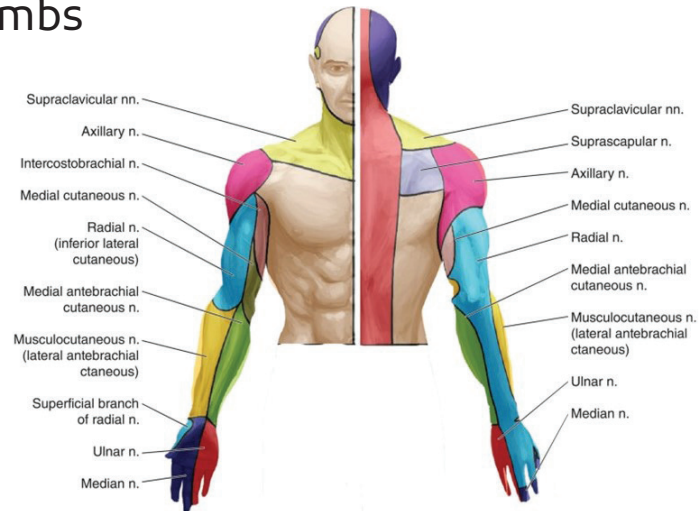
## A- Trigeminal nerve



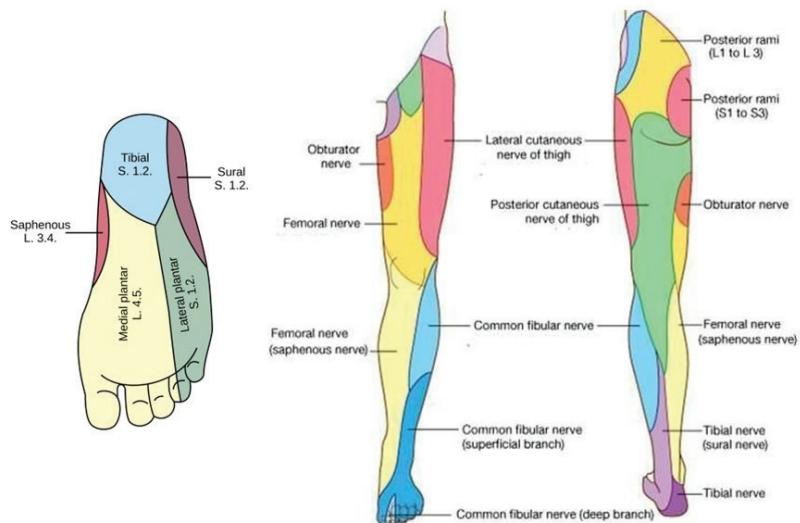
- A- Anterior nerves
- B- Middle nerves
- C- Posterior nerves



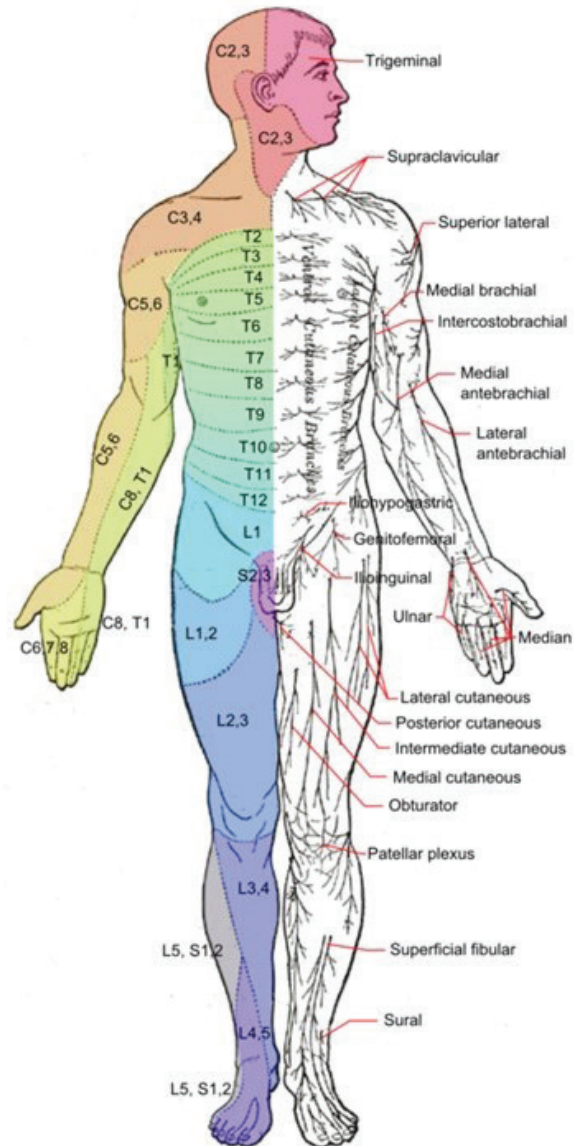
## Shoulder and upper limbs



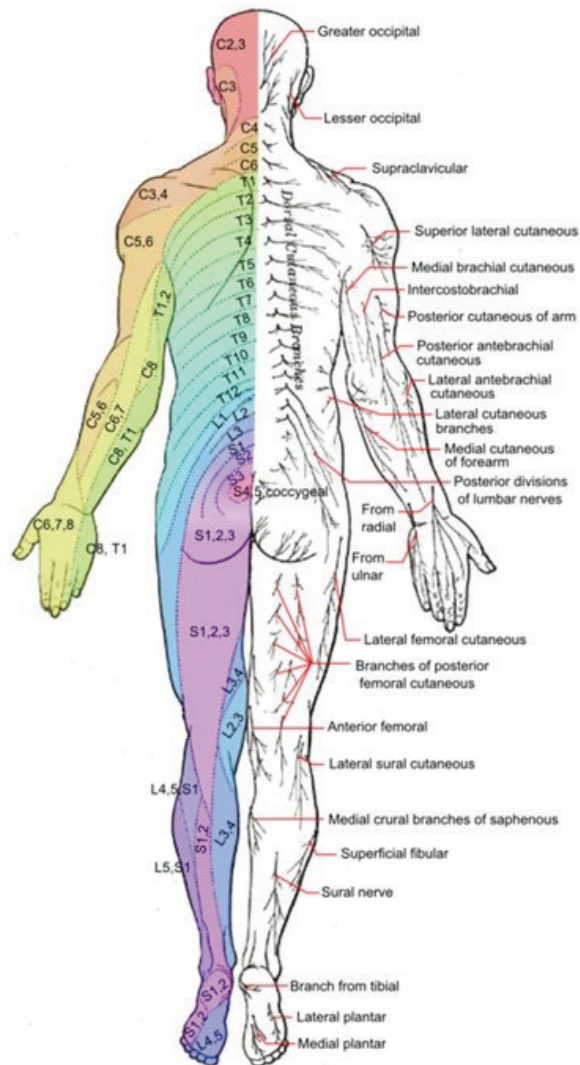
## Lower Limbs



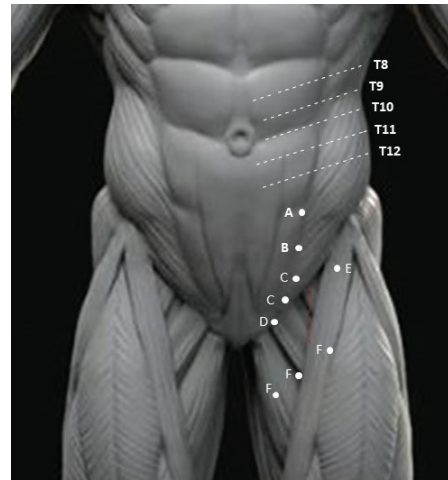
# Trunk



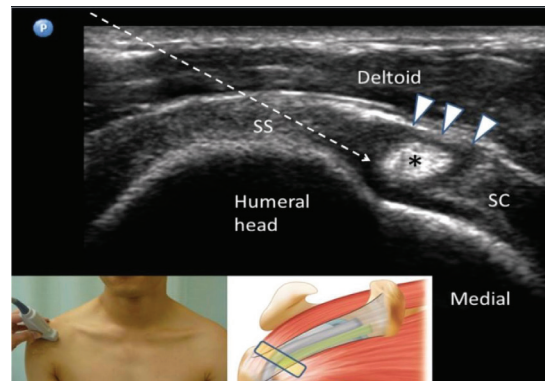
# Back



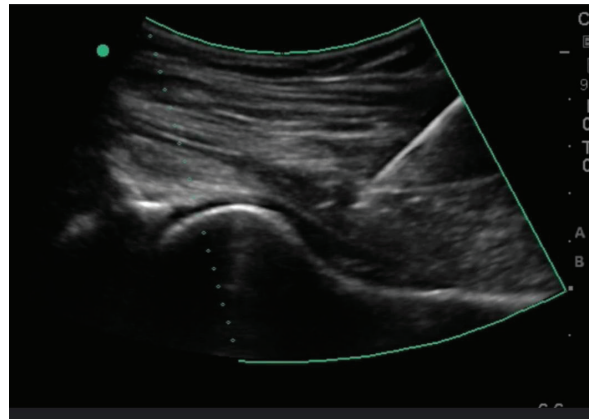
- A- Subcostal nerve
- B- Iliohypogastric nerve
- C- Ilioinguinal nerve
- D- Genito femoral nerve
- E- Femoral nerve
- F- Obturator



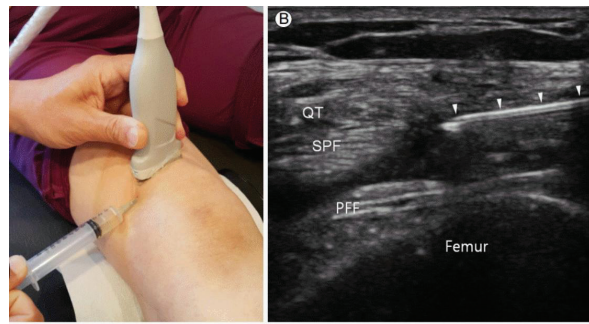
### Supraspinatus tendon ultrasound guided injection



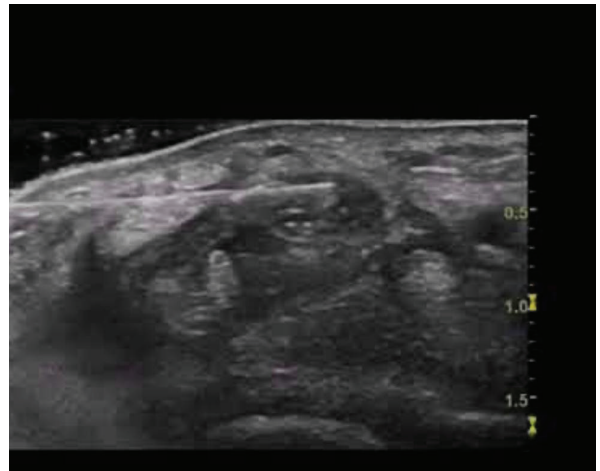
## Hip joint ultrasound guided injection



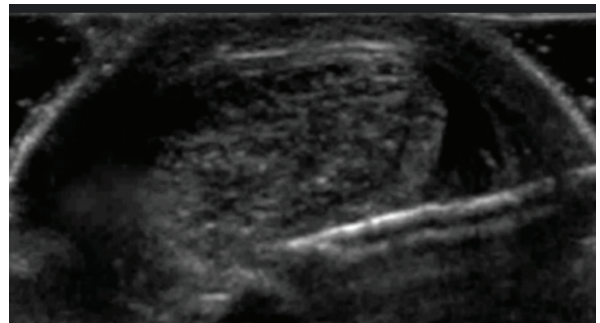
## Knee joint ultrasound guided injection



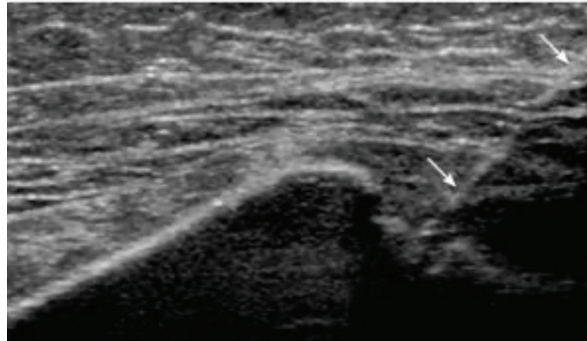
Carpal tunnel syndrome  
ultrasound guided  
injection



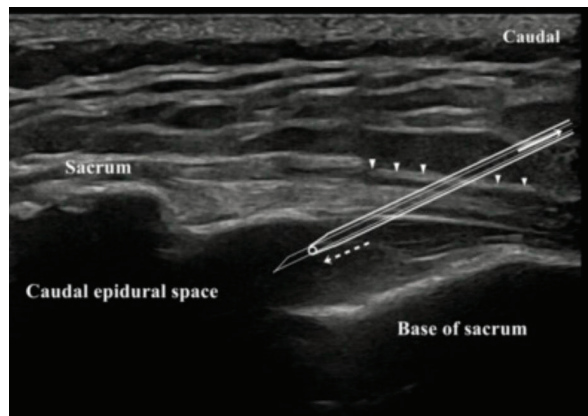
Achilles tendon  
ultrasound guided  
injection



## Sacroiliac joint ultrasound guided injection



## Caudal canal ultrasound guided injection



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***A prolific author and international speaker, Dr. Bushnaq has published eight books and represented Jordan at global conferences. His work over 20 years has positioned him as a leading voice in medical, education and advocacy at national and regional levels.***

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**ISBN 978-9923-0-1892-7 (ردمك)**