

Pain Management

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INTRODUCTION

- **Pain** is an **unpleasant subjective experience** that is the **net effect** of a complex interaction of the **ascending and descending neurons** involving **biochemical, physiologic, and psychological** processes.
- **Because there are no reliable objective markers for pain, the patient is the only person who can describe the intensity and quality of their pain.**

Patient Encounter, Part 1

HPI: A 68-year-old woman who fell on a banana peel while vacationing at the lake sustained an ankle fracture. She is to undergo repair with pin placement

PMH: Hypertension for 18 years; diabetes type 2 for 13 years

FH: Mother had osteoporosis; father had diabetes

SH: Lives with husband; has two grown children

Meds: Lisinopril 20 mg daily, metformin 500 mg three times daily

Pain Assessment: Patient rates pain as 8 on a scale of 0 to 10

Based on the type of injury, what type of pain is this patient likely to experience?

What type of pain management regimen would you recommend in the postoperative period? Explain your answer.

EPIDEMIOLOGY AND ETIOLOGY

Prevalence of Pain

- Most people experience pain at some time in their lives, and **pain is a symptom of a variety of diseases.**
- **Migraine** affects more than **28 million Americans**, and **78% of Americans experience a tension headache** during their lifetime.
- Pain resulting from **fibromyalgia** (chronic pain of musculoskeletal origin but uncertain cause) affects 10 million Americans.
- Approximately 25% to 50% of all **pain clinic visits** are related to **neuropathic pain.**

PATHOPHYSIOLOGY

Types of Pain:

- Nociceptive pain: is a **transient pain** in response to a **noxious stimulus** at nociceptors.(periphery, spinal cord, brainstem, to the cerebral cortex..
- inflammatory pain: is the pain that follow tissue damage.
- Neuropathic pain: is defined as **spontaneous pain** associated with *damage to* or *pathologic changes in* the peripheral nervous system or in the central nervous system (CNS).
- Functional pain: is pain sensitivity due to an **abnormal processing** or **functioning of the CNS** in response to **normal stimuli**; such as fibromyalgia and IBS.

Clinical Presentation and Diagnosis of Pain

General

Patients may be in acute distress (acute pain) or have no signs or symptoms of suffering (chronic pain).

Symptoms

Pain is described based on the following characteristics: onset, duration, location, quality, severity, and intensity. Other symptoms may include anxiety, depression, fatigue, anger, fear, and insomnia.

Signs

Acute pain may cause hypertension, tachycardia, diaphoresis, mydriasis, and pallor.

Diagnosis

The patient is the only person who can describe the intensity and quality of their pain. There are no laboratory tests that can diagnose pain.

Acute Pain

- Acute pain :is pain that **occurs as a result of injury or surgery** and is usually **self-limited, subsiding when the injury heals**.
- **Untreated acute pain** can produce physiologic symptoms including **tachypnea, tachycardia, and increased sympathetic nervous system activity**, such as pallor, diaphoresis, and pupil dilation.
- **poorly treated pain** can cause **psychological stress** and compromise the immune system due to the release of **endogenous corticosteroids**.
 - Somatic acute pain: arises from injury to skin, bone, joint, muscle, and connective tissue
 - Visceral pain : involves injury to nerves on internal organs (eg, intestines, liver)
- Acute pain should be treated aggressively.

Chronic Pain

- Chronic pain has four main effects include:
 - (a) effects on the **physical function**, impaired activities, sleeping
 - (b) **psychological changes**, depression, anxiety, anger and loss of self-esteem
 - (c) **social consequences**, relationships with friends
 - (d) **societal** consequences

Chronic pain : malignant , non-malignant, neuropathic

Chronic Malignant Pain

Chronic malignant pain : is associated with a progressive disease that is usually life threatening such as cancer, AIDS, progressive neurologic diseases, end-stage organ failure, and dementia.

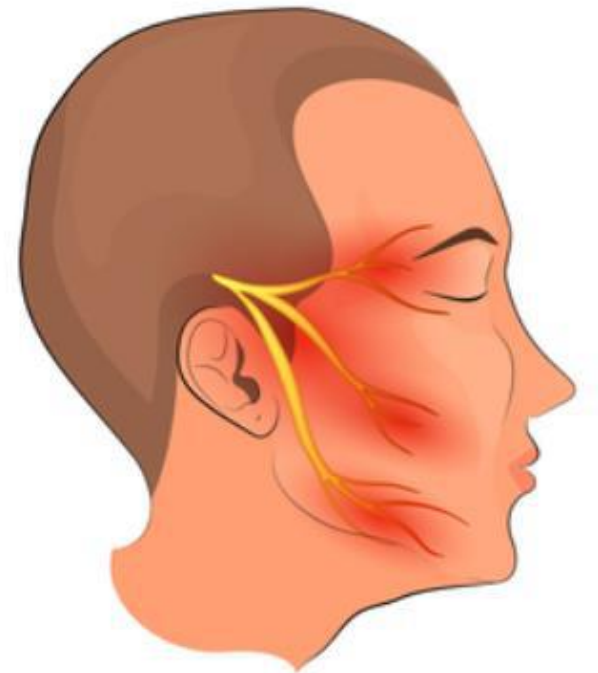
- Tolerance, dependence, and addiction are often not a concern due to the terminal nature of the illness.

Chronic Nonmalignant Pain

- Chronic Nonmalignant Pain: is Pain that is not associated with a life threatening disease and **lasting more than 6 months beyond the healing period.**
- nonmalignant Pain include: pain associated with **low back pain, osteoarthritis, previous bone fractures, peripheral vascular disease, genitourinary infection, RA, and coronary heart disease .**
- treatment is initially conservative but might involve the use of more potent analgesics.

Neuropathic Pain

- Neuropathic pain :is considered to be a type of chronic nonmalignant pain involving disease of the central and peripheral nervous systems.
 - Types of peripheral pain include Diabetic peripheral neuropathy (DPN)
 - Types of central pain include central stroke pain, trigeminal neuralgia.
- The symptoms of neuropathic pain are characterized as tingling, burning, stabbing, electric shock-like quality, or radiating pain.

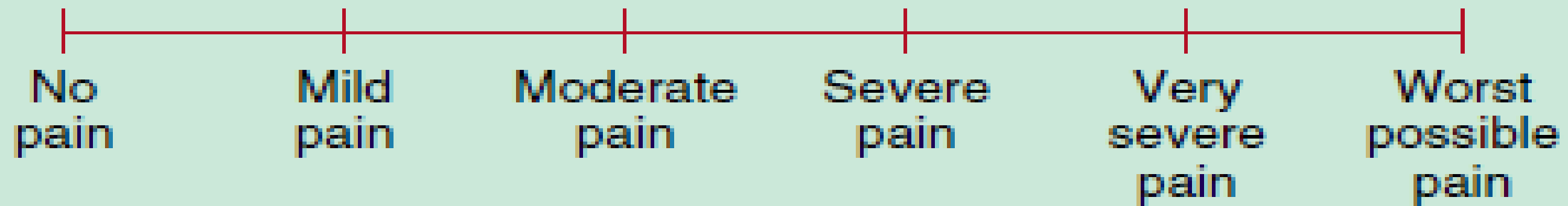


Pain Assessment

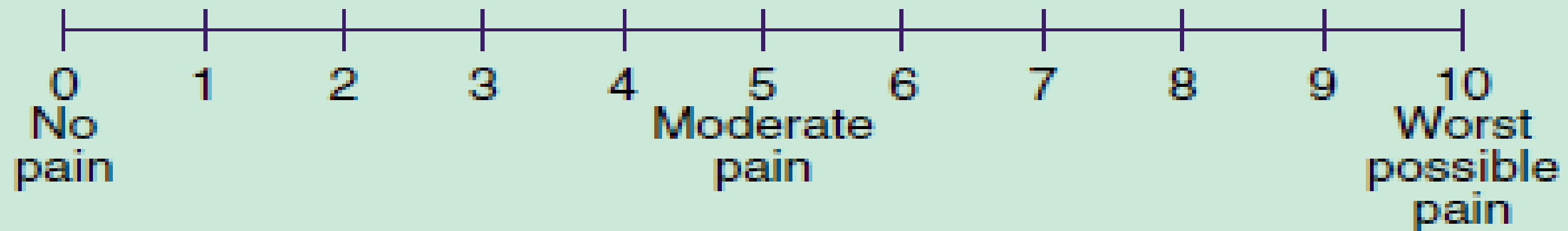
Pain assessment should include questions about (onset, duration, location, quality, severity, and intensity).

- A common mnemonic for pain assessment is PQRST (Palliative/precipitating, Quality, Radiation, Severity, and Time).
- Children:
- Elderly:

Simple Descriptive Pain Intensity Scale^a categorical scale



0–10 Numeric Pain Intensity Scale^a



Visual Analog Scale (VAS)^b



TREATMENT

Desired Outcomes:

- **Prevention, reduction, and/or elimination of pain** are important goals for the treatment of acute pain.
- **General Approach to Treatment:**
- Two common approaches to the **selection of treatment** are based on:
 - severity of pain and
 - the mechanism responsible for the pain (type of pain)

Pain

Acute

Mild/moderate

NSAIDs or
APAP

Opioids

Severe

Opioids

Add
NSAIDs or APAP

Visceral

Opioids for
severe

Add adjuvants
(eg, AED, TCA)

Chronic

Neuropathic

Peripheral

TCA or AED

Lidocaine

SSRI or SNRI

Long-acting
opioid

Central

Inflammatory

APAP or
NSAIDs

Long-acting opioids
(eg, MS contin,
Oxycontin)

Clonidine or
baclofen

Functional

TCA or
tramadol

SSRI/SNRI
pregabalin

Table 34-1

Selection of Analgesics Based on Intensity of Pain

Pain Intensity	Corresponding Numerical Rating	WHO Therapeutic Recommendations	Examples of Initial Therapy	Comments
Mild	1–3/10	Nonopioid analgesic; regular scheduled dosing	Acetaminophen 1000 mg every 6 hours; ibuprofen 600 mg every 6 hours	Consider adding an adjunct or using an alternate regimen if pain is not reduced in 1–2 days
Moderate	4–6/10	Add an opioid to the nonopioid for moderate pain; regular scheduled dosing	Acetaminophen 325 mg + codeine 60 mg every 4 hours; acetaminophen 325 mg + oxycodone 5 mg every 4 hours	Consider step-up therapy if pain is not relieved by two or more different drugs
Severe	7–10/10	Switch to a high-potency opioid; regular scheduled dosing	Morphine 10 mg every 4 hours; or hydromorphone 4 mg every 4 hours	



Pharmacologic Therapy

Nonopioid Analgesics: Acetaminophen (APAP)

selected as initial therapy for mild to moderate pain.

- Considered first line:
 - low back pain
 - and osteoarthritis
- The maximum recommended dose for patients with normal renal and hepatic function is 4000 mg/day.
- the maximum dose should be reduced by 50% to 75% in patients with:
 - renal dysfunction
 - hepatic disease and
 - excessive alcohol use.



- Aspirin and Other Salicylates:
- Aspirin, and other NSAIDs have analgesic, antipyretic, and anti-inflammatory actions.
- Aspirin is effective for mild to moderate pain; however, the risk of gastrointestinal (GI) irritation and bleeding limits its use.

- **Nonsteroidal Anti-inflammatory Drugs:** NSAIDs are the preferred agents for mild to moderate pain which are mediated by prostaglandins (**rheumatoid arthritis, menstrual cramps, postsurgical pain**)
- but they are of minimal use in **neuropathic pain**.
- **S/E(GI irritation, hepatic dysfunction, renal insufficiency, platelet inhibition, sodium retention).**
- Nephrotoxicity is more common :
 - in the elderly,
 - patients with creatinine clearance values less than 50 mL/min, and
 - those with volume depletion or on diuretic therapy

Opioid Analgesics

- Opioids are considered the agents of choice for the treatment of severe acute pain and moderate to severe pain.
- **for moderate pain** (codeine, hydrocodone, tramadol).
- **For severe pain** (morphine and hydromorphone).
- **Tramadol** is associated with an increased risk of **seizures**.
 - **Should be avoided** in patients with a seizure disorder, those at risk for seizures.
- The use of tramadol with other serotonergic drugs (eg, selective serotonin reuptake inhibitors [SSRIs]) might precipitate **serotonin syndrome**.

- **Combination Analgesics:** Combinations of opioids and nonopioids often result in **enhanced analgesia** and **lower dose of each**.
- Combination analgesics are frequently used in moderate pain.

Table 34-3		
Equianalgesic Doses of Selected Opioids ^{23,38,41,42}		
Opioid (Brand Name)	Dose Equianalgesic to 10 mg of Parenteral Morphine (mg)	
	Parenteral (mg)	Oral (mg)
Mild to Moderate Pain		
Codeine (generic, various)	120	200
Hydrocodone (Vicodin, Lorcet)	N/A	30
Oxycodone (OxyContin, OxyFAST, Oxy IR)	N/A	20
Meperidine (Demerol)	100	400
Moderate to Severe Pain		
Morphine (Roxanol, MS Contin, Kadian, Avinza)	10	30
Hydromorphone (Dilaudid)	1.5	7.5
Oxymorphone (Opana, Opana SR, Numorphan)	1	N/A
Levorphanol (Levo-Dromoran)	2	4
Fentanyl (Duragesic)	0.1–0.2	N/A ^a
Methadone (Dolophine)	10 ^b	3–5 ^b



Tapering of Opioids:

- Tapering of opioids might be necessary once the painful situation has resolved in patients receiving doses greater than **160 mg/day of oral morphine**.
 - the dose should be reduced by 15% to 20% each day to avoid **withdrawal symptoms**.

Opioid Rotation:

- Opioid rotation is the switch from one opioid to another **to achieve a better balance between analgesia and treatment-limiting adverse effects**. additionally, to prevent the development of **analgesic tolerance**.

Table 34–3

Managing Opioid Side Effects

Adverse Effects	Drug Treatment/Management
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Excessive sedation

Reduce dose by 25% or increase dosing interval

Constipation

Casanthranol-docusate one capsule at bedtime or twice daily; senna one to two tablets at bedtime or twice daily; bisacodyl 5–10 mg daily plus docusate 100 mg twice daily; polyethylene glycol 3350 17 grams daily; methylnaltrexone 0.15 mg/kg SQ every other day; naloxegol 12.5–25 mg daily

Nausea and vomiting

Prevention: Hydroxyzine 25–100 mg (po/IM) every 4–6 hours as needed; diphenhydramine 25–50 mg (po/IM) every 6 hours as needed; ondansetron 4 mg IV or 16 mg po
 Treatment: Prochlorperazine 5–10 mg (po/IM) every 3–4 hours as needed or 25 mg PR twice daily; ondansetron 4–8 mg IV every 8 hours as needed

Gastroparesis

Metoclopramide 10 mg (po/IV) every 6–8 hours

Vertigo

Meclizine 12.5–25 mg po every 6 hours as needed

Urticaria/itching

Hydroxyzine 25–100 mg (po/IM) every 4–6 hours as needed;
 diphenhydramine 25–50 mg (po/IM) every 6 hours as needed

Respiratory depression

Mild: Reduce dose by 25%
 Moderate to severe: Naloxone 0.4–2 mg IV every 2–3 minutes (up to 10 mg) for complete reversal; 0.1–0.2 mg IV every 2–3 minutes until desired reversal for partial reversal; may need to repeat in 1–2 hours depending on narcotic half-life

CNS irritability

Discontinue opioid; treat with benzodiazepine

Adjuvant Agents for Chronic Pain

- adjuvant agents for chronic pain, **particularly neuropathic pain**, is necessary.
- Common adjuvants include **antiepileptic drugs (AEDs), antidepressants, antiarrhythmic drugs, local anesthetics,**
- **first-line therapy for neuropathic pain** include gabapentin or pregabalin, transdermal lidocaine, or tricyclic antidepressants (TCAs).

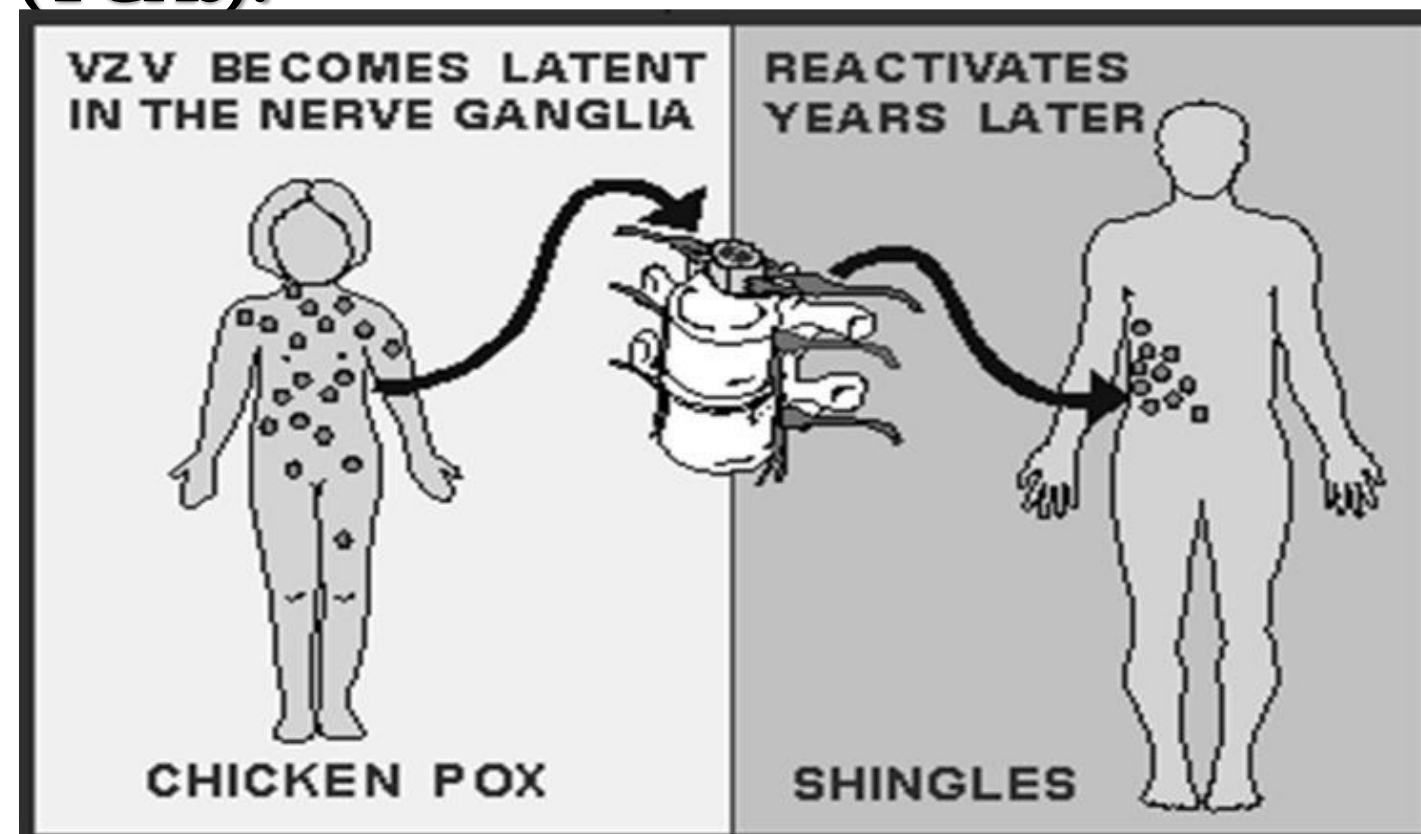


Table 34–5**Selected Adjuvant Analgesics and Suggested Dosing**

Agent	Dosing Guidelines	FDA-Approved Indication
Amitriptyline (Elavil)	10–25 mg at bedtime with weekly increments to a target dose of 25–150 mg of amitriptyline or an equivalent dose of another TCA	
Duloxetine (Cymbalta)	DPN: 60 mg daily Fibromyalgia: 30 mg daily, may be increased to a target dose of 60 mg/day	DPN, fibromyalgia
Gabapentin (Neurontin)	Initially, 300 mg three times a day up to a maximum of 3600 mg daily, in divided doses ^a	PHN

Pregabalin (Lyrica)

DPN: Initially, 50 mg three times a day; may be increased to 100 mg three times a day within 1 week based on efficacy and tolerability^a

PHN: Initially 75 mg twice a day or 50 mg three times a day; may be increased to 100 mg three times a day within 1 week based on efficacy and tolerability^a

Fibromyalgia: Initially 75 mg twice a day, increase after 1 week to 300 mg to 450 mg/day (in divided doses every 12 hours)

Lidocaine 5% (Lidoderm patch)

Up to three patches may be applied directly over the painful site once daily; patches are applied using a regimen of 12 hours on and 12 hours off

DPN, PHN, and fibromyalgia



PHN

Case 1

Mrs. Jones is a 78-year-old woman with a history of diabetes, treated with oral medications. Recently, she has been complaining of pain in her feet that she describes as “numbness and tingling”. What is the most likely pathophysiologic type of pain in this case? And how to treat this patient ?