

## MUSCULOSKELETAL DISORDERS

### SHOULDER PAIN: DIFFERENTIAL DIAGNOSIS AND TREATMENT

#### Rotator Cuff Tendinitis, Subacromial Bursitis, or Rotator Tendon Impingement on Clavicle

Dull ache radiating to upper arm. Painful arc (on abduction 60–120 degrees and external rotation) is characteristic. Also can be distinguished by applying resistance against active range of motion while immobilizing the neck with hand.

**Treatment:** Identify and eliminate provocative, repetitive injury (eg, avoid overhead reaching). A brief period of rest and immobilization with a sling may be helpful. Pain control with APAP or NSAIDs (Table 48), home exercises or PT (especially assisted range of motion and wall walking), and corticosteroid injections may be useful.

#### Rotator Cuff Tears

Mild to complete; characterized by diminished shoulder movement. If severe, patients do not have full range of active or passive motion. The “drop arm” sign (the inability to maintain the arm in an abducted 90-degree position) indicates supraspinatus and infraspinatus tear. Weakness of external rotation (elbows flexed, thumbs up with examiner’s hands outside patient’s elbows; patient is asked to resist inward pressure) is common. MRI establishes diagnosis.

**Treatment:** If due to injury, a brief period of rest and immobilization with a sling may be helpful. Pain control with APAP or NSAIDs (Table 48), home exercises or PT (especially assisted range of motion and wall walking) may be useful. If no improvement after 6–8 wk of conservative measures, consider surgical repair.

#### Bicipital Tendinitis

Pain felt on anterior lateral aspect of shoulder, tenderness in the groove between greater and lesser tuberosities of the humerus. Pain is produced on resisted flexion of shoulder, flexion of the elbow, or supination (external rotation) of the hand and wrist with the elbow flexed at the side.

**Treatment:** Identify and eliminate provocative, repetitive activities (eg, avoid overhead reaching). A period of rest (at least 7 d with no lifting) and corticosteroid injections are major components of therapy. After rest period, PT should focus on stretching biceps tendon (eg, putting arm on doorframe and hyperextending shoulder, with some external rotation).

#### Frozen Shoulder (Adhesive Capsulitis)

Loss of passive external (lateral) rotation, abduction, and internal rotation of the shoulder to less than 90 degrees. Usually follows three phases: painful (freezing) phase lasting wks to a few mo; adhesive (stiffening) phase lasting 4–12 mo; resolution phase lasting 6–24 mo.

**Treatment:** Avoid rest and begin PT and home exercises for stretching the arm in flexion, horizontal adduction, and internal and external rotation. Corticosteroid injections may reduce pain and permit more aggressive PT. Consider surgical manipulation under anesthesia or arthroscopic dilation of capsule.

## BACK PAIN: DIFFERENTIAL DIAGNOSIS AND TREATMENT

### Acute Lumbar Strain (Low Back Pain Syndrome)

Acute pain frequently precipitated by heavy lifting or exercise. Pain may be central or more prominent on one side and may radiate to sacroiliac region and buttocks. Pain is aggravated by motion, standing, and prolonged sitting, and relieved by rest. Sciatic pain may be present even when neurologic examination is normal.

**Treatment:** Most can continue normal activities. If a patient obtains symptomatic relief from bed rest, generally 1–2 d lying in a semi-Fowler position or on side with the hips and knees flexed with pillow between legs will suffice. Treat muscle spasm with the application of ice, preferably in a massage over the muscles in spasm. APAP or NSAIDs (Table 48) can be used to control pain. As pain diminishes, encourage patient to begin isometric abdominal and lower-extremity exercises. Symptoms often recur. Education on back posture, lifting precautions, and abdominal muscle strengthening may help prevent recurrences.

### Acute Disk Herniation

Over 90% of cases occur at L4–L5 or L5–S1 levels, resulting in unilateral impairment of ankle reflex, toe and ankle dorsiflexion, and pain (commonly sciatic) on straight leg raising (can be tested from sitting position by leg extension). Pain is acute in onset and varies considerably with changes in position.

**Treatment:** Initially same as acute lumbar strain (above). If unresponsive, administer epidural injection of a combination of a long-acting corticosteroid with an epidural anesthetic. Consider surgery if recurrence or persistence with neurologic signs beyond 6–8 wk after conservative treatment. The value of epidural injections and surgery for pain without neurologic signs is controversial. (See Table 2 and Table 3.)

### Osteoarthritis and Chronic Disk Degeneration

Characterized by aching pain aggravated by motion and relieved by rest. Occasionally, hypertrophic spurring in a facet joint may cause unilateral radiculopathy with sciatica.

**Treatment:** Identify and eliminate provocative activities. Education on back posture, lifting precautions, and abdominal muscle strengthening. APAP or NSAIDs (Table 48). Corticosteroid injections may be useful. Consider opioids and other pain treatment modalities for chronic refractory pain (see p 116).

### Unstable Lumbar Spine

Severe, sudden, short-lasting, frequently recurrent pain often brought on by sudden, unguarded movements. Pain is reproduced upon moving from the flexed to the erect position. Pain is usually relieved by lying supine or on side. Impingement on nerve roots by spurs from facet joints or herniated disks can cause similar complaints, although symptoms in these conditions usually worsen as time passes. Symptoms can mimic disk herniation or degeneration, or osteoarthritis. Lumbar flexion x-rays can be diagnostic.

### Lumbar Spinal Stenosis

Symptoms increase on spinal extension (eg, with prolonged standing, walking downhill, lying prone) and decrease with spinal flexion (eg, sitting, bending forward while walking, lying in the flexed position). Only symptom may be fatigue or pain in legs when walking (pseudo-claudication). May have immobility of lumbar spine, pain with straight

leg raises, weakness of muscles innervated by L4 through S1 (see **Table 2**). Over 4 yr, 15% improve, 15% deteriorate, and 70% remain stable.

**Treatment:** APAP or NSAIDs (**Table 4B**) and exercises to reduce lumbar lordosis are sometimes beneficial. Corticosteroid injections may be useful. Surgical intervention is more effective than conservative treatment in relieving moderate or severe symptoms; however, recurrence of pain several years after surgery is common.

#### **Vertebral Compression Fracture**

Immediate onset of severe pain; worse with sitting or standing; sometimes relieved by lying down.

**Treatment:** See Osteoporosis (p 112). Bed rest, analgesia, and mobilization as tolerated. Calcitonin may provide symptomatic improvement. May require hospitalization to control symptoms. Percutaneous vertebroplasty or kyphoplasty may be effective for pain relief in refractory cases, but clinical trial data are lacking.

#### **Nonrheumatic Pain (eg, Tumors, Aneurysms)**

Gradual onset, steadily expanding, often unrelated to position and not relieved by lying down. Night pain when lying down is characteristic. Upper motor neuron signs may be present. Involvement is usually in thoracic and upper lumbar spine.

### **HIP PAIN: DIFFERENTIAL DIAGNOSIS AND TREATMENT**

#### **Trochanteric Bursitis**

Pain in lateral aspect of the hip that usually worsens when patient sits on a hard chair, lies on the affected side, or rises from a chair or bed; pain may improve with walking. Local tenderness over greater trochanter is often present, and pain is often reproduced on resisted abduction of the leg or internal rotation of the hip. However, trochanteric bursitis does not produce limited range of motion, pain on range of motion, pain in the groin, or radicular signs.

**Treatment:** Identify and eliminate provocative activities. Check for leg length discrepancy, prescribe orthotics if appropriate. Injection of a combination of a long-acting corticosteroid with an anesthetic is most effective treatment.

#### **Osteoarthritis**

“Boring” quality pain in the hip, often in the groin, and sometimes referred to the back or knee with stiffness after rest. Passive motion is restricted in all directions if disease is fairly advanced. In early disease, pain in the groin on internal rotation of the hip is characteristic.

**Treatment:** See Osteoarthritis (p 97). Elective total hip replacement is indicated for patients who have radiographic evidence of joint damage and moderate to severe persistent pain or disability, or both, that is not substantially relieved by an extended course of nonsurgical management.

National Institutes of Health Consensus Development Conference Statement September 12–14, 1994 (reviewed 1998).

#### **Hip Fracture**

Sudden onset, usually after a fall, with inability to walk or bear weight, frequently radiating to groin or knee.

**Treatment:** Treatment is surgical with open reduction and internal fixation, hemiarthroplasty, or total hip replacement, depending on site of fracture and amount of displacement. For patients who were nonambulatory prior to the fracture, conservative management is an option.

#### **Nonrheumatic Pain**

Referred pain from viscera, radicular pain from the lower spine, avascular necrosis, Paget's disease, metastasis.

### **OSTEOARTHRITIS**

#### **Nonpharmacologic Approaches**

- Superficial heat: Hot packs, heating pads, paraffin, or hot water bottles (moist heat is better).
- Deep heat: Microwave, shortwave diathermy, or ultrasound.
- Biofeedback and transcutaneous electrical nerve stimulation.
- Exercise (especially water-based), PT, OT: Strengthening, stretching, range of motion, functional activities.
- Weight loss: Especially for low back, hip, and knee arthritis.
- Splinting: Avoid splinting for long periods of time (eg, > 6 wk) since periarticular muscle weakness and wasting may occur. Bracing (eg, neoprene sleeves over the knee) to correct malalignment is often helpful.
- Assistive devices: Cane should be used in the hand contralateral to the affected knee or hip.
- Surgical intervention (eg, debridement, meniscal repair, prosthetic joint replacement).

**Pharmacologic Intervention** (See also p 116.)

**Topical Analgesics:** Liniment, capsaicin cream.

#### **Intra-articular Injections:**

- Corticosteroids: May be particularly effective if monoarticular symptoms (eg, methylprednisolone acetate, triamcinolone acetonide, and triamcinolone hexacetonide) 20–40 mg for large joints (eg, knee, ankle, shoulder), 10–20 mg for wrists and elbows, and 5–15 mg for small joints of hands and feet; often mixed with lidocaine 1% or its equivalent (in equal volume with corticosteroids) for immediate relief.
- Hyaluronan: Sodium hyaluronate (*Hyalgan*) injections weekly for 5 wk or hylan G-F 20 (*Synvisc*) 3 injections 1 wk apart for knee osteoarthritis.

**Initial Drug Treatment of Choice:** APAP not to exceed 4 g/d (ACR) (see **Table 48**).

**Nutriceuticals:** glucosamine (500 mg 3x/d) or chondroitin (400 mg 3x/d), or both, have been effective for some patients. Combination tablets and timed-release formulations (1500 mg and 1200 mg, respectively) are available. Clinical trials in the United States are in process.

**NSAIDs:** Often provide pain relief but have higher rates of side effects (see **Table 48**). Misoprostol (*Cytotec*) 100–200 mg qid with food [T: 100, 200] or a proton-pump inhibitor (see **Table 29**) may be valuable prophylaxis against NSAID-induced ulcers in high-risk patients. Selective COX-2 inhibitors have lower likelihood of causing gastroduodenal ulcers than nonselective NSAIDs. All may increase INR in patients receiving warfarin.

**Oral Analgesics:** Eg, tramadol, other opioids (see **Table 58**).

Table 48. APAP and NSAIDs			
Class, Drug	Usual Dosage for Arthritis	Formulations	Comments (Metabolism, Excretion)
APAP ( <i>Tylenol</i> )	650 mg q 4–6 h	[T: 80, 325, 500, 650; C: 160, 325, 500; S: elixir 120/5 mL, 160/5 mL, 167/5 mL, 325/5 mL; S: 160/5 mL, 500/15 mL; Sp: 120, 325, 600]	Drug of choice for chronic musculoskeletal conditions; no anti-inflammatory properties; hepatotoxic above 4 g/d; at high doses ( $\geq 2$ g/d) may increase INR in patients receiving warfarin; reduce dose 50%–75% if liver or kidney disease or if harmful or hazardous drinking (L, K)
Extended release ( <i>Tylenol ER</i> )	1300 mg tid	[ER: 650]	
ASA	650 mg q 4–6 h	[T: 81, 325, 500, 650, 975; Sp: 120, 200, 300, 600]	(K)
Extended release ( <i>Ext Release Bayer 8 Hour,* ZORprin</i> )	1300 mg tid or 1600–3200 mg bid	[CR: 650, 800]	
Enteric-coated*	1000 mg qid	[T: 81, 162, 325, 500, 650, 975]	
<b>Nonacetylated Salicylates</b>			Do not inhibit platelet aggregation; fewer GI and renal side effects; no reaction in ASA-sensitive patients
Choline magnesium salicylate ( <i>Tricosal, Trilisate</i> )	3 g/d in 1, 2, or 3 doses	[T: 500, 750, 1000; S: 500 mg/5mL]	(K)
Choline salicylate ( <i>Arthropan</i> )	4.8–7.2 g/d divided	[S: 870 mg/5 mL]	(L, K)
Magnesium salicylate (eg, <i>Backache, Doan's, Mobigesic, Momentum</i> )	650 mg q 4 h, max 3600–4800/d in 3–4 divided doses; 1090 mg tid	[T: 325, 377, 580; C: 467]	Avoid in renal failure
Salsalate (eg, <i>Disalcid, Mono-Gesic, Salflex</i> )	1500 mg to 4 g/d in 2 or 3 doses	[T: 500, 750; C: 500]	(K)
Sodium salicylate* ( <i>Uracef</i> )	325–650 mg q 4 h	[T: 325, 650]	

Table 48. APAP and NSAIDs (cont.)

Class, Drug	Usual Dosage for Arthritis	Formulations	Comments (Metabolism, Excretion)
<b>Nonselective NSAIDs</b>			
Diclofenac ( <i>Cataflam, Voltaren, Voltaren-XR</i> )	50–150 mg/d in 2 or 3 doses	[T: 50, enteric coated 25, 50, 75, ER 100]	(L)
Extended release 50 mg with 200 µg misoprostol ( <i>Arthrotec 50</i> ) 75 mg with 200 µg misoprostol ( <i>Arthrotec 75</i> )	100 mg/d	[T: 100]	(L)
Diflunisal ( <i>Dolobid</i> )	500–1000 mg/d in 2 doses	[T: 250, 500]	(K)
Etodolac ( <i>Lodine</i> )	200–400 mg tid–qid	[T: 400, 500; ER 400, 500, 600; C: 200, 300]	Fewer GI side effects (L)
Fenoprofen ( <i>Nalfon</i> )	200–600 mg tid–qid	[C: 200, 300; T: 600]	Higher risk of GI side effects (L)
Flurbiprofen ( <i>Ansaid</i> )	200–300 mg/d in 2, 3, or 4 doses	[T: 50, 100]	(L)
Ibuprofen (eg, <i>Advil, Motrin, Nuprin</i> )*	1200–3200 mg/d in 3 or 4 doses	[T: 100, 200, 300, 400, 600, 800; ChT: 50, 100; S: 100 mg/5 mL]	Fewer GI side effects (L)
Indomethacin ( <i>Indochron, Indocin</i> )	25–50 mg bid–tid	[C: 25, 50; Sp: 50; S: 25 mg/5 mL; Inj]	High risk of GI side effects; increased risk of CNS side effects (L)
Extended release ( <i>Indacin SR</i> )	75 mg/d or bid	[C: 75]	Increased risk of CNS side effects
Ketoprofen ( <i>Actron, Orudis</i> )	50–75 mg tid	[T: 12.5; C: 25, 50, 75]	(L)
Sustained release ( <i>Actron 200,** Oruvail</i> )	200 mg/d	[C: 100, 150, 200]	(L)
Ketorolac ( <i>Toradol</i> )	10 mg q 4–6 h, 15 mg IM or IV q 6 h	[T: 10; Inj]	Duration of use should be limited to 5 d (K)
Meclofenamate sodium	200–400 mg/d in 3 or 4 doses	[C: 50, 100]	High incidence of diarrhea (L)
Meloxicam ( <i>Mobic</i> )	7.5–15 mg/d	[T: 7.5, 15]	Has some COX-2 selectivity (L)
Nabumetone ( <i>Relafen</i> )	500–1000 mg bid	[T: 500, 750]	Fewer GI side effects (L)
Naproxen ( <i>Aleve,** Naprosyn</i> )	200–500 mg bid–tid	[T: 220, 275, 375, 500; S: 125 mg/5 mL]	(L)
Delayed release ( <i>EC-Naprosyn</i> )	375–500 mg bid	[T: 375, 500]	(L)
Extended release ( <i>Naprelan</i> )	750–1000 mg daily	[T: 375, 500, 750]	(L)

(continues)

Table 48. APAP and NSAIDs (cont.)			
Class, Drug	Usual Dosage for Arthritis	Formulations	Comments (Metabolism, Excretion)
Naproxen sodium ( <i>Anaprox</i> )	275 mg or 550 mg bid	[T: 275, 550]	
Oxaprozin ( <i>Daypro</i> )	1200 mg/d	[C: 600]	(L)
Piroxicam ( <i>Feldene</i> )	10 mg/d	[T: 10, 20]	(L)
Sulindac ( <i>Clinoril</i> )	150–200 mg bid	[T: 150, 200]	May have higher rate of renal impairment (L)
Tolmetin ( <i>Tolectin</i> )	600–1800 mg/d in 3 or 4 doses	[T: 200, 600; C: 400]	(L)
<b>Selective COX-2 Inhibitors</b>			Less GI ulceration; do not inhibit platelets; may increase INR if taking warfarin; avoid if moderate or severe hepatic insufficiency; may induce renal impairment
Celecoxib ( <i>Celebrex</i> )	100–200 mg bid	[C: 100, 200]	Contraindicated if allergic to sulfonamides
Rofecoxib ( <i>Vioxx</i> )	12.5–25 once daily	[T: 12.5, 25, 50; S: 12.5 mg/5 mL, 25 mg/5 mL]	Contraindicated if allergic to sulfonamides
Valdecoxib ( <i>Bextra</i> )	10 mg once/d	[T: 10, 20]	Contraindicated if allergic to sulfonamides

\*Also available without prescription in a lower tablet strength.

\*\* Available without a prescription.

## GOUT

### Definition

Urate crystal disease that may be expressed as acute gouty arthritis, usually in a single joint of foot, ankle, knee, or olecranon bursa; or chronic arthritis.

### Precipitating Factors

- Alcohol, heavy ingestion
- Allopurinol, stopping or starting
- Binge eating
- Dehydration
- Diuretics
- Fasting
- Infection
- Serum uric acid levels, any change up or down
- Surgery

### Evaluation of Acute Gouty Arthritis

Joint aspiration to remove crystals and microscopic examination to establish diagnosis; serum uric acid (can be normal during flare).

### Management

**Treatment of Acute Gouty Flare:** Experts differ regarding order of choices:

- Intra-articular injections (see p 97)
- NSAIDs (see Table 48)
- Colchicine (more toxic in older persons; more effective if given within 24 hr of symptom onset)

- Oral 0.5–0.6 mg (1 tablet) q 1–2 h until symptoms abate, GI toxicity occurs, or maximum dose of 6 mg/24-h period has been given.
- IV 1–2 mg in 10–20 mL NS given over 3–5 min
  - may repeat the following day
  - contraindicated in patients who have had recent oral colchicine
  - avoid in patients with renal or hepatic disease
  - potential for severe bone marrow toxicity
- Prednisone 20–40 mg po qd until response, then rapid taper
- ACTH 75 IU SC or cosyntropin (*Cortrosyn*) 75 µg SC; may repeat daily for 3 d

**Treatment of Hyperuricemia Following Acute Flare:** Colchicine 0.5–0.6 mg/d for 2–4 wk prior to initiation of any treatment in **Table 49** and continued until serum uric acid has returned to normal.

Drug	Usual Dosage	Formulations	Comments (Metabolism, Excretion)
Allopurinol ( <i>Zyloprim</i> )	100–200 mg qd	[T: 100, 300]	Do not initiate during flare; reduce dose in renal or hepatic impairment; increase dose by 100 mg every 2–4 wk to normalize serum urate level; monitor CBC; rash is common (K)
✓ Colchicine	0.5–0.6 mg	[T: 0.5, 0.6; Inj]	Follow CBC (L)
Probenecid ( <i>Benemid</i> )	500–1500 mg in 2–3 divided doses	[T: 500]	Adjust dose to normalize serum urate level or increase urine urate excretion; inhibits platelet function; may not be effective if renal impairment (K, L)
✓ Sulfipyrazone ( <i>Anturane</i> )	50 mg po bid to 100 mg qid	[T: 100; C: 200]	Inhibits platelet function (K)

Note: ✓ = preferred for treating older persons.

### PSEUDOGOUT

#### Definition

Crystal-induced arthritis (especially affecting wrists and knees) associated with calcium pyrophosphate.

#### Risk Factors

- Advanced osteoarthritis
- Diabetes mellitus
- Gout
- Hemochromatosis
- Hypercalcemia
- Hyperparathyroidism
- Hypomagnesemia
- Hypophosphatemia
- Hypothyroidism
- Neuropathic joints
- Older age

#### Precipitating Factors

- Acute illness
- Dehydration
- Minor trauma
- Surgery



#### **Evaluation of Acute Arthritis**

Joint aspiration and microscopic examination to establish diagnosis; x-ray indicating chondrocalcinosis (best seen in wrists, knees, shoulder, symphysis pubis).

#### **Management of Acute Flare**

See **Gout** (p 100). Colchicine is less effective in pseudogout.

### **POLYMYALGIA RHEUMATICA, GIANT CELL (TEMPORAL) ARTERITIS**

#### **Definitions**

**Polymyalgia Rheumatica (PMR):** proximal limb and girdle stiffness without tenderness but with constitutional symptoms (eg, fatigue, malaise) and elevated sedimentation rate, often  $\geq 100$ , and C-reactive protein (CRP); consider ultrasound.

**Giant Cell (Temporal) Arteritis (GCA):** medium to large vessel vasculitis that presents with symptoms of PMR, headache, scalp tenderness, jaw or tongue claudication, visual disturbances, TIA or stroke, elevated sedimentation rate, and CRP.

#### **Diagnosis and Management**

- PMR is a clinical diagnosis supported by an increased sedimentation rate. Management is low-dose (eg, 5–20 mg/d) prednisone or its equivalent. Some patients with milder symptoms may respond to NSAIDs alone. Follow symptoms and CRP or sedimentation rate. Maintain therapy for at least 1 yr to prevent relapse. Consider osteoporosis prevention medication (see p 112).
- GCA is confirmed by temporal artery biopsy, but treatment should not wait for pathologic diagnosis. Begin prednisone (1.0–1.5 mg/kg/d) or its equivalent while biopsy and pathology are pending. Consider adding methotrexate 10 mg orally per wk and folate 5 mg/d, which may have a steroid-sparing effect. After 2–4 wk, begin gradual taper to lowest dose that will control symptoms and CRP or sedimentation rate. Maintain therapy for at least 1 yr to prevent relapse. Consider osteoporosis prevention medication (see p 112).