experienced acutely, although tendinitis is no longer thought to be an inflammatory disorder. Bursae may become inflamed for many reasons: chronic friction, trauma, crystal deposition, infection, and systemic diseases (rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis, tuberculosis, and gout). Because tendons frequently cross over bursae, it is not uncommon for bursitis to be secondary to overlying tendinitis (e.g., supraspinatus tendinitis, subacromial bursitis).

TENDONITIS
The signs and symptoms of tendinitis can be quite variable. Pain is the most common complaint of patients with joint problems seen in the ED. Particular attention should be paid to the location of the pain; it can be articular (within the joint capsule), as in septic arthritis, or periarticular (outside the joint capsule), as in septic bursitis or tendinitis (Table 86.1).

BURSITIS
Inflammation of a bursa may be infectious or traumatic, degenerative, or due to underlying systemic disease. Risk factors for the development of bursitis are acute trauma, repetitive injury to the painful area, infections, tuberculosis, gout, pseudogout, uremia, and rheumatoid arthritis. The diagnosis is made clinically based on tenderness at a bursal site, swelling of a superficial bursa, and localized pain with motion and at rest. Regional loss of active motion may occur as a result of swelling; however, range of motion should not be affected in patients with aseptic bursitis (see the Red Flags box on tendinopathy and bursitis).

Key Points
- Emergency department treatment of tendinopathy and aseptic bursitis should be initiated conservatively with rest, immobilization of the involved tendon, compression of superficial bursae, and oral analgesia.
- Nonsteroidal antiinflammatory drugs may be useful in providing pain relief for patients with tendinopathy and bursitis but are no longer preferred over other analgesic regimens.
- Other emergency medical conditions such as septic arthritis, suppurative tenosynovitis, septic bursitis, fractures, and rheumatologic conditions should be excluded in the differential diagnosis.

Perspective
Tendinopathy and bursitis are two of the most common joint complaints affecting adults seen in the emergency department (ED). Tendinopathy refers to pain, swelling, microscopic tearing, or degeneration of a tendon at its bony insertion. Bursitis refers to pain, swelling, or inflammation of the fluid-filled sac covering a joint. Both may be caused by overuse injuries or arthritis or may be symptoms of underlying systemic disease.

Epidemiology
The incidence of tendinitis increases with age as muscles and tendons lose some of their elasticity, and it is highest in the age group 25 to 54 years. Bursitis affects approximately 1 in 31 (3.2%) or 8.7 million people in the United States. According to the Centers for Disease Control and Prevention, in 2001 tendinitis was responsible for a median of 10 days away from work as compared with 6 days for all cases of nonfatal injury and illness. Most cases of tendinitis involved white, non-Hispanic women whose occupations had a highly repetitive component.

Pathophysiology
Most often, tendon injury is caused by chronic overuse resulting in degenerative changes. The classic inflammatory signs of pain, warmth, erythema, and swelling may sometimes be

Red Flags
Tendinopathy and Bursitis
- Any joint effusion with systemic symptoms is septic arthritis until proved otherwise.
- Any injury in a patient with a history of trauma is considered a fracture until proved otherwise.
- Pain with passive motion indicates joint involvement; further investigation for an inflammatory or infectious cause is needed.
- A history of steroid injection into a large tendon greatly increases the risk for rupture.
- Steroid injections or systemic steroids increase the risk for infection.
- Fluoroquinolone use increases the risk for tendinitis and tendon rupture.
PRESENTING SIGNS AND SYMPTOMS

SHOULDER

**Supraspinatus Tendinitis/Impingement Syndrome**

Because of its complex structure and extensive range of motion, the shoulder is a joint predisposed to overuse injuries. The muscles of the rotator cuff (supraspinatus, infraspinatus, teres minor, subscapularis) and the glenohumeral ligaments serve to stabilize the joint. Impingement of these tendons occurs because of their position between the humeral head and acromion, which predisposes to chronic tendinosis (Table 86.2). Impingement syndrome is the number one cause of shoulder pain. It occurs in three progressive stages that worsen over time. Testing and staging of impingement syndrome are reviewed in Table 86.3.

In addition to the classic tests for impingement, the examiner should isolate and test individual muscles of the rotator cuff. The empty beer can position tests the supraspinatus by applying downward resistance to an arm in 90 degrees of abduction and 30 degrees of flexion with the thumb pointed downward. Applying resistance to external rotation when the elbow is against the patient’s body and bent at 90 degrees tests the infraspinatus and teres minor. The subscapularis is tested with the arm in the same position and applying resistance to internal rotation.

**Subacromial Bursitis**

The subacromial bursa lies under the acromion and coracoacromial ligament, to which it is attached. This bursa separates the ligament from the supraspinatus muscle and rotator cuff. Subacromial bursitis is thus thought to be an extension of supraspinatus tendinitis and typically follows this disorder’s stages of impingement. Pain and tenderness are localized to the lateral aspect of the shoulder, and signs of impingement are noted on physical examination (see Table 86.3).

ELBOW

**Lateral and Medial Epicondyritis**

The lateral and medial epicondyles are commonly injured as a result of repetitive use (Table 86.4). Pain often begins as a dull ache that increases with the inciting activity. Approximately 50% of tennis players will experience lateral
epicondylitis, although less than 5% of those with the syndrome play tennis. Radiographs may be helpful in atypical or prolonged cases to exclude rare pathologic conditions such as tumors. 

**Olecranon Bursitis**

Because of its superficial location at the posterior tip of the elbow, the olecranon bursa is vulnerable to injury. When traumatized, the resulting bursal hematoma causes pain and swelling mimicking acute bursitis. Infection is frequent and most often occurs locally as a result of puncture wounds or lacera-
tions. If fever is present, septic bursitis must be considered and septic arthritis excluded.

**WRIST AND HAND**

The wrist and hand are composed of several tendons that pass through thick, fibrous retinacular tunnels. Overuse syndromes are thought to result from degenerative changes in the synovial lining between these tendons and the retinaculum (Table 86.5).

The differential diagnosis of wrist and hand tendinopathy also includes osteoarthritis of the carpometacarpal joint, rheumatoid or psoriatic arthritis of the flexor or extensor tendons, gonococcal tendosynovitis, and suppurative tenosynovitis. It is therefore important to review the clinical history for trauma, systemic symptoms, fever, penile or vaginal discharge, or rash (see the Red Flags box on suppurative tenosynovitis).

**HIP**

**Trochanteric Bursitis**

Patients with trochanteric bursitis are generally middle-aged or older women who complain of acute or chronic pain over the bursal area and lateral aspect of the thigh. The pain is increased when lying on the hip or walking down or climbing stairs and is classically worse at night. The pain associated with superficial bursitis can be reproduced by adduction and that of deep trochanteric bursitis by abduction. Approximately 50% of patients have pain with sequential flexion, abduction, external rotation, and extension of the hip while the contralateral knee is held in flexion (Patrick-Fabere test). Internal rotation does not usually provoke symptoms. The hip joint itself appears normal on examination, and no pain is elicited with flexion or extension.

---

### Table 86.3 Impingement Syndrome of the Supraspinatus Tendon

<table>
<thead>
<tr>
<th>GRADE</th>
<th>CHARACTERISTICS</th>
<th>TESTS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: days to weeks</td>
<td>Dull achy, diffuse pain; reversible; no limits of motion</td>
<td>Painful arc: flexion, abduction to 70-130 degrees</td>
<td>Analgesics, activity modification</td>
</tr>
<tr>
<td>Stage 2: weeks to months</td>
<td>Night pain, localizes to lateral acromion and humeral head, active motion limited</td>
<td>Neer test: straight arm forcibly forward-flexed while preventing scapular rotation</td>
<td>As above, orthopedic referral for subacromial steroids (controversial)</td>
</tr>
<tr>
<td>Stage 3: chronic</td>
<td>Rotator cuff tears, muscular atrophy, weakness</td>
<td>Drop arm test: cannot hold arm extended at 90 degrees</td>
<td>Analgesia, orthopedic referral for surgical decompression</td>
</tr>
</tbody>
</table>

### Table 86.4 Elbow Tendinopathies

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CHARACTERISTICS</th>
<th>TESTS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral epicondylitis (tennis elbow)</td>
<td>Overuse microtrauma of the wrist extensors, supinators</td>
<td>Pain with grasp or resisted wrist dorsiflexion, tender lateral epicondyle</td>
<td>Analgesia, compression banding over the elbow, rest with a splint if severe</td>
</tr>
<tr>
<td>Medial epicondylitis (golfer’s, bowler’s, pitcher's elbow)</td>
<td>Overuse microtrauma of the flexor carpi radialis</td>
<td>Pain with resisted wrist flexion, tender medial epicondyle</td>
<td>Analgesia, circumferential compression banding to the proximal end of the forearm</td>
</tr>
</tbody>
</table>

### RED FLAGS

#### Suppurative Tenosynovitis

Infection of the closed synovial sheaths of the flexors (rarely extensors), often of the fingers and hand

Usually caused by trauma, with the type of bacteria depending on the traumatic exposure (bite wound, puncture, skin flora)

Kanavel signs: tenderness over the flexor sheath, symmetric swelling of the digit, slightly flexed finger at rest, pain with passive extension of the finger

Additional signs: local erythema, edema, lymphangitic streaking, fever, leukocytosis

Treatment with broad-spectrum antibiotics, admission to the hospital, emergency surgical evaluation for incision and drainage

Prophylaxis of all bite wounds recommended to prevent flexor tenosynovitis
Table 86.5  Wrist and Hand Tendinopathies

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CHARACTERISTICS</th>
<th>TESTS</th>
<th>TREATMENT</th>
<th>PEARLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>de Quervain tendinitis</td>
<td>Overuse inflammation (repetitive motion) of the abductor pollicis longus and extensor pollicis brevis synovia causes radial wrist pain</td>
<td>Thumb held in the palm with ulnar deviation of the wrist (Finkelstein test) causes pain</td>
<td>Rest, splinting, NSAIDs, referral to an orthopedist for cortisone injections; refractory cases require orthopedic consultation for tendon release</td>
<td>Carrying heavy objects (grocery bags) over the wrists can cause symptoms; pregnancy precipitates a flare; the differential diagnosis includes SLE, rheumatoid arthritis, CMC joint osteoarthritis, scaphoid fracture or nonunion</td>
</tr>
<tr>
<td>Gonococcal tenosynovitis</td>
<td>Hematogenous seeding of the CMC joint</td>
<td>Fluid culture, sensitivity</td>
<td>Antibiotics, rest, NSAIDs</td>
<td>Fever, penile or vaginal discharge, skin findings, polyarticular arthritis; the differential diagnosis includes Reiter syndrome and de Quervain tendinitis</td>
</tr>
<tr>
<td>Trigger finger</td>
<td>Overuse tenosynovitis or congenital sheath narrowing causes nodules and A-1 palmar pulley stenosis; “catching” sensation with flexion</td>
<td>Symptoms vary from pain to complete locking of the finger in flexion, palpable “pop” during extension</td>
<td>Rest, NSAIDs, splinting; refer to an orthopedist for cortisone injections</td>
<td>The differential diagnosis includes infectious flexor tenosynovitis, trisomy 13, rheumatoid arthritis, diabetes mellitus</td>
</tr>
<tr>
<td>Dupuytren contracture</td>
<td>Proliferative disorder of the subcutaneous palmar fascia; autosomal dominant with variable penetrance</td>
<td>Place the palm down on a flat surface; the digits cannot simultaneously lie flat because of contractures (Hueston tabletop test)</td>
<td>No effective treatment; observation; refer to an orthopedist for fasciotomy</td>
<td>Commonly occurs in older men and patients with alcohol abuse, epilepsy, diabetes, COPD; not symmetric; some patients have Dupuytren diathesis, involvement of the hands and feet (Letterhose disease) or penis (Peyronie disease)</td>
</tr>
</tbody>
</table>

CMC, Carpometacarpal; COPD, chronic obstructive pulmonary disease; NSAIDs, nonsteroidal antiinflammatory drugs; SLE, systemic lupus erythematosus.

**Ischial Bursitis**

Ischial bursitis develops secondary to trauma or sitting on a hard surface (weaver’s bottom). Sometimes the pain radiates down the back of the thigh and mimics sciatic nerve inflammation. The pain can be reproduced by applying pressure over the ischial tuberosity by sitting, standing on tiptoes, or bending forward.

**KNEE**

**Iliotibial Band Syndrome**

Iliotibial band syndrome, or “runner’s knee,” is a common tendinopathy that occurs in long-distance runners. Patients report pain in the lateral portion of the knee as the distal iliotibial tract becomes injured, and they may state that the pain resolves after an initial warm-up phase, may return at the end of running, and is always prominent the next morning on awakening. Examination reveals point tenderness to palpation, and crepitus may be appreciated.

**Biceps Femoris and Popliteal Tendinopathy**

These two disorders are grouped together because of their common anatomic location. The biceps femoris (hamstring) is a large muscle that inserts on the proximal end of the fibula. The popliteal muscle inserts on the lateral aspect of the distal end of the femur. Both tendons cross the knee joint and are subject to acute and overuse injuries, especially in athletes. In acute injuries, radiography should be performed to exclude an avulsion fracture. The diagnosis is made clinically. Patients report that the symptoms occur while running or playing sports. Tenderness to palpation at the insertions of these muscles is noted. Knee tendinopathies are treated conservatively with rest, ice, and referral for physical therapy. Surgery is rarely indicated.

**Prepatellar Bursitis**

Prepatellar bursitis (housemaid’s knee, nun’s knee) causes visual swelling over the lower pole of the patella. Range of motion may increase the pain as the bursa is placed under tension. Findings on examination of the joint are usually normal. Pyogenic prepatellar bursitis is an infection of this bursa and is common in children. This condition requires aspiration, immobilization, and antibiotic coverage. If acute episodes are not resolved within 2 days, incision and drainage should be considered.
**SECTION VIII  Traumatic Disorders**

**Infrapatellar Bursitis**

The infrapatellar bursa is divided into two parts. Between the patellar ligament and the superior anterior surface of the tibia lies the deep part. The superficial aspect lies between the skin and patellar ligament. Deep infrapatellar bursitis is associated with tenderness on both sides of the tendon that increases with extreme flexion. If signs of infection such as loss of full extension of the knee or resistance to full flexion are present, aspiration of the infrapatellar bursa should be performed along with antibiotic therapy. If infection exists, evaluation for surrounding osteomyelitis is advisable.

**Anserine Bursitis**

Anserine bursitis most commonly occurs in obese older women with osteoarthritis and in endurance athletes. Pain characteristically occurs in the medial knee region over the proximal end of the tibia, increases on climbing stairs and with extremes of range of motion, and can radiate to the inner part of the thigh and midcalf region. The area of tenderness is localized to the medial aspect of the knee 2 inches below the joint margin, where the medial hamstrings (sartorius, gracilis, and semitendinosus) attach. The area is usually neither swollen nor warm.

**ANKLE**

**Achilles Tendinitis**

The Achilles tendon can be injured as a result of direct trauma, overuse, and medications such as steroids or fluoroquinolones (Table 86.6; also see the Red Flags box on fluoroquinolones and tendinopathy). It can also become inflamed as part of a systemic disease (ankylosing spondylitis, Reiter syndrome, gout, pseudogout). However, most causes of Achilles tendinitis are thought to be multifactorial. Additionally, the vascular supply creates a watershed area approximately 2 to 6 cm above the calcaneal insertion and is thought to be responsible for the clinical symptoms and pathologic disruption at this site. Tendon rupture must be ruled out. Diagnosis and treatment of Achilles tendon rupture are discussed further in Chapter 85.

**CALCANEAL BURSITIS**

Two bursae are found at the insertion of the Achilles tendon. The superficial bursa lies between the skin and the tendon. It may become inflamed secondary to Achilles tendinitis or from repetitive friction or overuse. The deep bursa lies between the tendon and calcaneus and is rarely affected. Pain with range of motion and tenderness anterior to the Achilles tendon will be noted.

**DIFFERENTIAL DIAGNOSIS**

The differential diagnosis of tendonitis and aseptic bursitis is related to the clinical features accompanying the patient's joint pain (see Table 86.1). Febrile patients need evaluation for septic bursitis and septic joints. Additional differential diagnostic considerations include inflammatory arthritis and gout.

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**Table 86.6 Ankle Tendinopathies**

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CHARACTERISTICS</th>
<th>TESTS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achilles tendinopathy</td>
<td>Pain, morning stiffness</td>
<td>Posterior calf, ankle tenderness</td>
<td>Analgesia, splint in plantar flexion</td>
</tr>
<tr>
<td>Achilles tendon rupture</td>
<td>Pop or snap after forced dorsiflexion, distal calf swelling at the watershed area</td>
<td>Thompson test, weakness of plantar flexion, palpable defect</td>
<td>Analgesia, splint as above, no weight bearing, orthopedic referral for surgery</td>
</tr>
<tr>
<td>Peroneal tendon subluxation</td>
<td>Subluxation of tendons over the lateral malleolus, clicking sensation</td>
<td>Tenderness, ecchymosis, anterior subluxation with forced dorsiflexion</td>
<td>Radiographs for avulsion fractures (50%), analgesia, dorsal splint</td>
</tr>
<tr>
<td>Plantar fasciitis</td>
<td>Tender facia at the plantar calcaneal insertion, heel pain on first morning steps</td>
<td>Pain with passive dorsiflexion of the toes, tenderness in the anteromedial part of the heel</td>
<td>Analgesia, arch supports</td>
</tr>
</tbody>
</table>
If multiple joints are involved and the swelling is symmetric, viral infection, drug-induced reaction, and osteoarthritis should be considered. If the joint swelling is asymmetric, rheumatoid arthritis, lupus, and serum sickness should be considered. If a characteristic rash is present, rheumatologic diseases, Reiter syndrome, Lyme disease, and dermato myositis should be considered. If the pain is migratory, one should consider gonococcal disease and rubella. If the pain occurred after trauma and a joint effusion is present, hemorrhathosis is a possibility. If an audible “pop” is heard, tendon rupture should be considered. If no joint effusion is present, one should look for radiographic evidence of fracture.

**DIAGNOSTIC TESTING**

Patients with bursitis who have local signs of inflammation or any systemic symptoms should be evaluated for septic bursitis (see the Red Flags box on septic bursitis). Some distinguishing characteristics of septic bursitis are rapid onset, marked warmth, erythema, and extremely tense and painful bursae. The most commonly infected bursae are those most superficial: the olecranon and the prepatellar and superficial infrapatellar bursae. Bursae are most often directly inoculated with *Staphylococcus aureus* as a result of subcutaneous trauma.

**Septic Bursitis**

Erythema, edema, pain, or adjacent cellulitis over a bursa is a possible indication of septic bursitis. Patients with septic bursitis may have fever, leukocytosis, an elevated erythrocyte sedimentation rate, or neutrophilic bandemia, although systemic findings are not universal and are more common with deep bursa infection. Joint mobility may be preserved if no direct joint involvement is present. Any swollen bursa with signs of infection should be aspirated and sent for culture and Gram stain. Eighty percent of cases of bacterial septic bursitis are due to *Staphylococcus aureus*; the rest are due mostly to β-hemolytic streptococci. Antibiotic coverage should cover staphylococcal and streptococcal species, preferably guided by Gram stain results. Empiric choices for outpatients include dicloxacillin and clindamycin (with or without trimethoprim-sulfamethoxazole for patients at risk for methicillin-resistant *S. aureus*). Empiric intravenous antibiotic choices include cefazolin or vancomycin. The duration of therapy is between 1 and 4 weeks, depending on culture results and response to treatment. Any patient with severe inflammation, systemic signs, diabetes, or immunosuppression should be admitted for intravenous antibiotics and consultation with orthopedics for incision and drainage.

**IMAGING STUDIES**

A diagnosis of tendinitis or bursitis is generally made on clinical grounds, but radiologic studies are sometimes required to confirm the diagnosis by ruling out other causes of pain. Plain radiographs help distinguish extraarticular from articular sources of pain. In acute injury, radiographs are essential to exclude an avulsion fracture. Ultrasonography is useful in the evaluation of joint effusions and lesions involving tendons, ligaments, and skeletal muscles. It can be very helpful in guiding difficult joint aspirations in the ED and is particularly useful in imaging of the shoulder region. Ultrasound has been shown to be more sensitive than magnetic resonance imaging and is now considered the “gold standard” for evaluating tendon involvement with concomitant trauma or rheumatic diseases.

**TREATMENT**

Most patients seen in the ED with tendinopathy can be managed conservatively by resting the affected region, administering adequate pain medication, and referral to orthopedics or physical therapy for biomechanical rehabilitation and gradual eccentric load exercises (Box 86.1). Aseptic bursitis can be managed conservatively with joint protection, modification of activity, and pain control. Exceptions are olecranon bursitis and prepatellar bursitis, which have a moderate risk of being infected, most likely with *S. aureus*. These bursae require needle aspiration and treatment with antibiotics until culture results are negative. Documentation should support the clinical suspicion of infection (see the Documentation box).

**BOX 86.1 Treatment of Tendinopathy and Aseptic Bursitis**

- **Rest**: Ice for 24 to 48 hours after trauma
- **Immobilization of the involved tendon**
- **Aspiration of the swollen bursa**
- **Circumferential compression band for the swollen bursa**
- **Oral analgesics tailored to the patient**
Patients should rest the involved joint. Many patients with tendinopathy benefit from splinting followed by graduated range-of-motion exercises. Shoulders should not be immobilized for more than a few days because of the risk for adhesive capsulitis. Patients with superficial bursitis should have a compression dressing with an elastic bandage applied to prevent recurrent swelling after drainage of the bursa.

Nonsteroidal antiinflammatory drugs (NSAIDs) provide pain relief when compared with placebo and are well ingrained in the literature as treatment of both tendinopathy and bursitis. Because tendinopathies are now thought to be due to degenerative changes and abnormal healing responses, NSAIDs may not provide any additional benefit over other oral analgesics such as acetaminophen. NSAIDs have not been found to improve healing in patients with chronic tendinopathy and probably should not be used long-term for the management of recurrent pain. Further research is needed in this area. Oral analgesia should therefore be tailored to the patient. Regardless of the medication chosen, a short (1- to 2-week) course of oral analgesia should be administered as first-line treatment along with rest and modification of activity.

Glucocorticoid injections are often used in treating refractory rotator cuff tendinitis, de Quervain tendinitis, trigger finger, subacromial bursitis, trochanteric bursitis, and olecranon bursitis, although good-quality research to support their use is lacking. Complications of intrabursal injections are infection, local subcutaneous atrophy, bleeding, postinjection flare as a result of the release of microcrystals, and tendon rupture. Steroid injections are best managed by the follow-up physician after conservative measures have failed and culture results have definitively ruled out infection.

Multiple alternative treatments of chronic tendinopathy exist as well, including massage, stretching, cryotherapy, heat, therapeutic ultrasound, laser, orthotics, and various types of tendon injections. Evidence to support the use of these treatments is lacking. Some evidence supports eccentric load rehabilitation exercises for the treatment of chronic tendinopathy.

**ADMISSION AND DISCHARGE**

Most patients can be managed conservatively as outpatients as long as close follow-up is ensured (see the Patient Teaching Tips box). Referral to the primary medical physician, orthopedic surgery, and physical therapy is appropriate. Patients who undergo fluid aspiration of bursitis should follow up within 48 hours for culture results. Otherwise, patients may schedule follow-up within 1 to 2 weeks so that further treatment can be initiated if conservative measures fail. Patients with suppurative tenosynovitis or septic bursitis require admission for intravenous antibiotics and consultation with orthopedic surgery for incision and drainage.

**PATIENT TEACHING TIPS**

Instructions should be given regarding proper rest, analgesia, and immobilization.

- If a joint or bursa is aspirated, prompt follow-up must be obtained for culture results.
- Septic bursitis requires antistaphylococcal antibiotics and immediate orthopedic consultation. Patients with systemic symptoms require admission for intravenous antibiotics and operative washout.
- Patients should call their primary provider or return to the emergency department for the following:
  - Increased pain, swelling, or redness around the area
  - Fever
  - Inability to move a joint because of pain

**SUGGESTED READINGS**


**REFERENCES**

References can be found on Expert Consult @ www.expertconsult.com.
REFERENCES