

Figure 7-22 Traumatic Shoulder Pain—Algorithm*

*See Figure 7-24 for annotations.

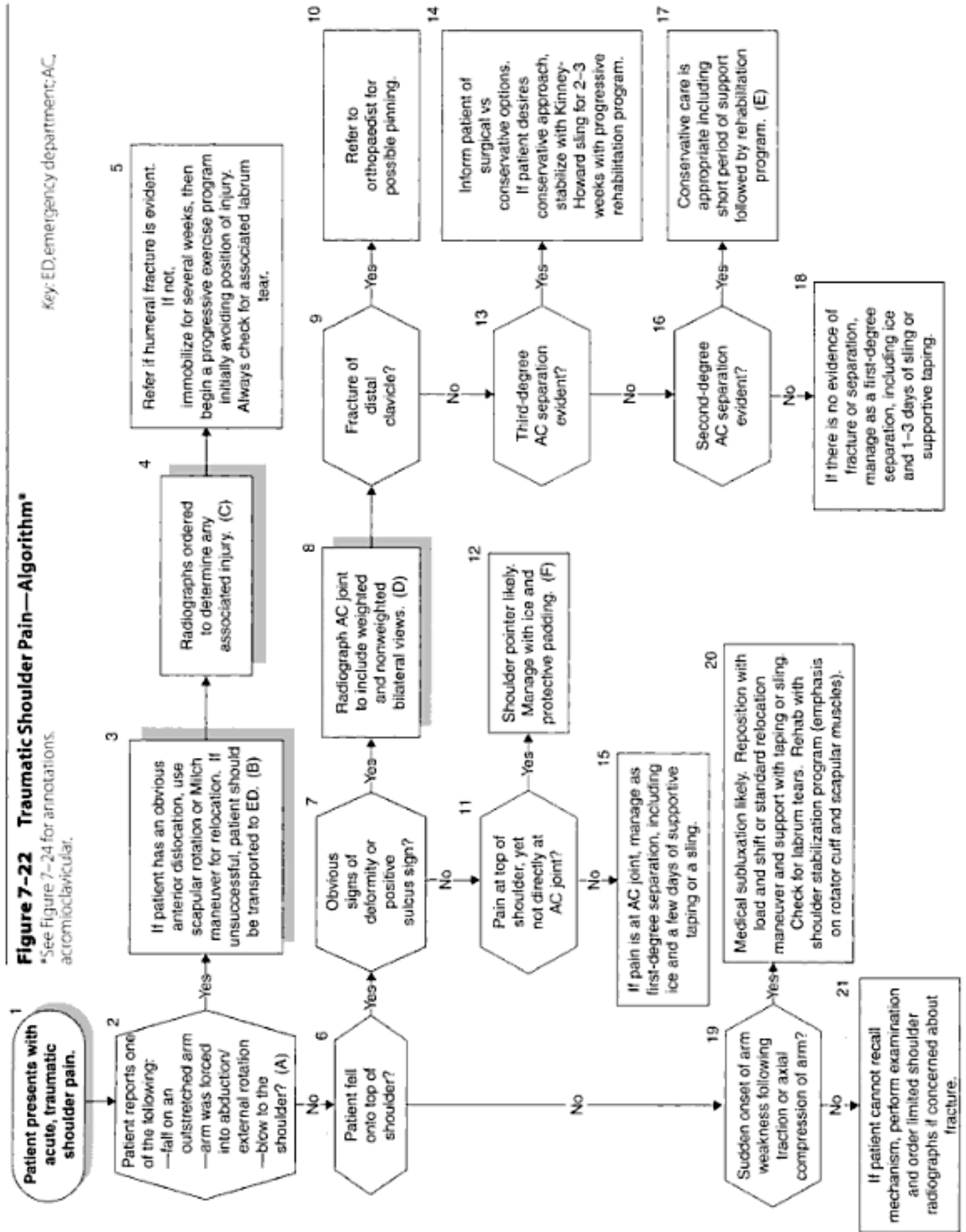


Figure 7-23 Nontraumatic Shoulder Pain—Algorithm*

*See Figure 7-24 for annotations.

Key: AC, acromioclavicular.

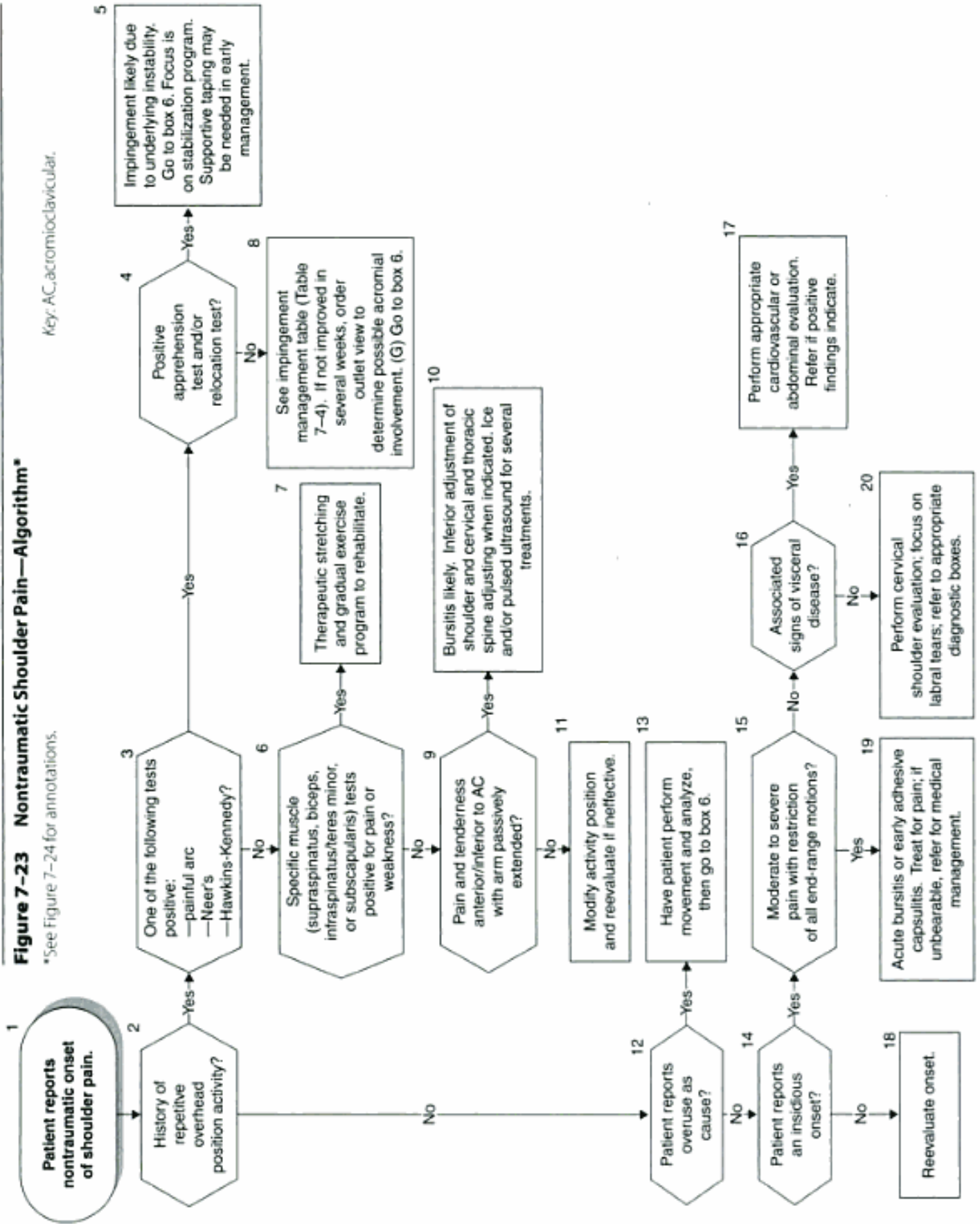


Figure 7-24 Shoulder Complaint (Other than Pain)—Algorithm

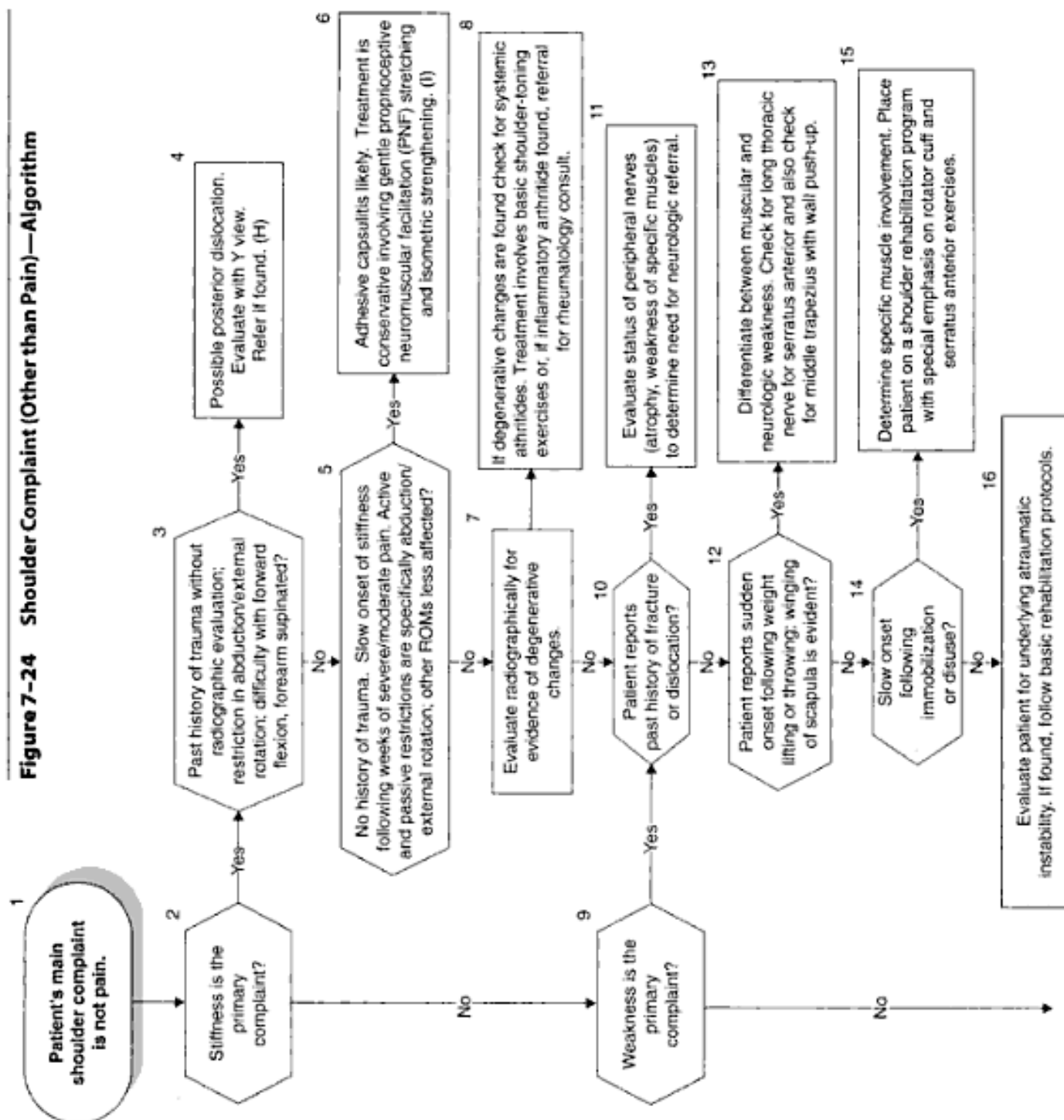
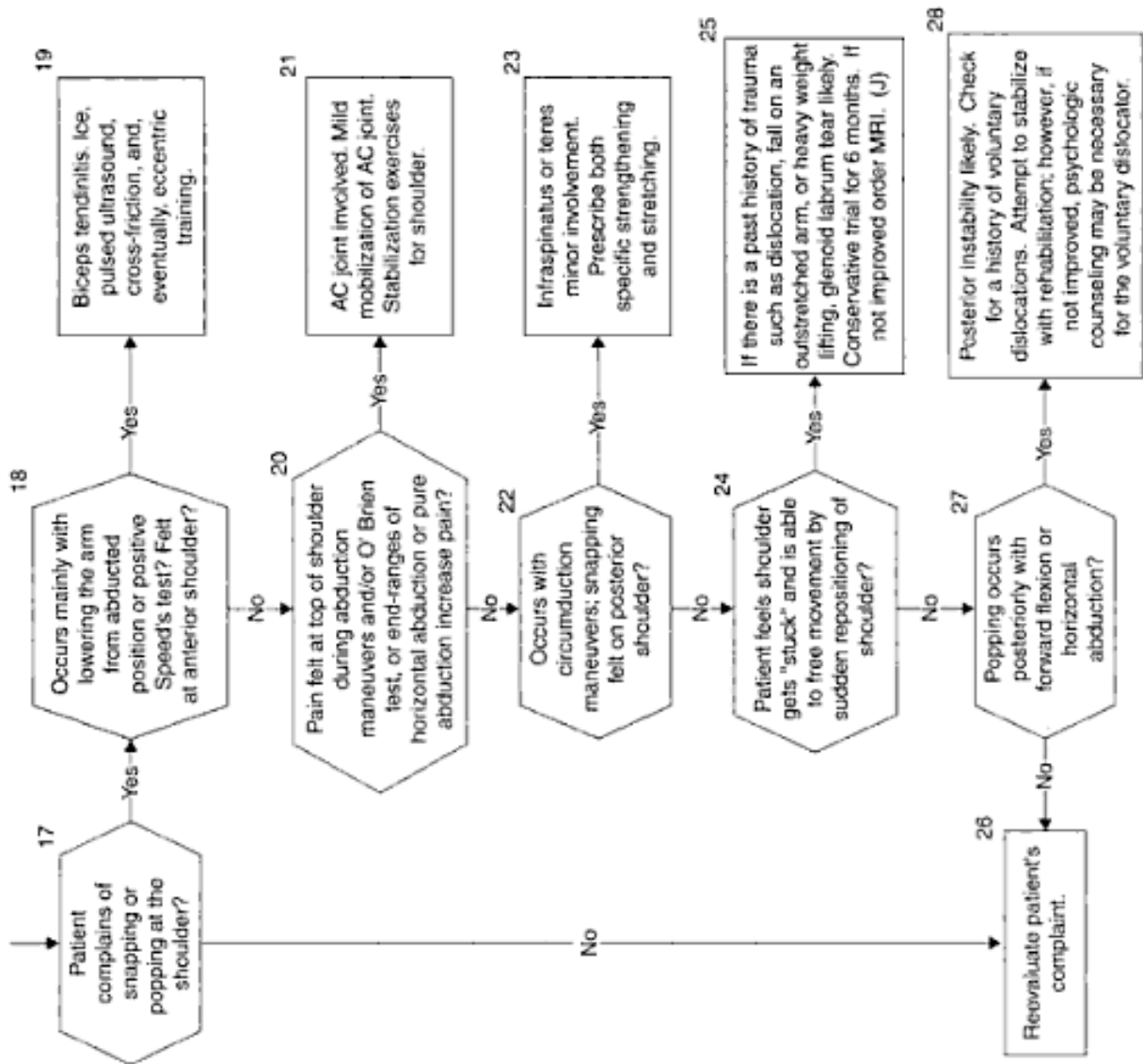


Figure 7-24 (continued)



- Annotations**
- A. Anterior dislocations are usually due to a fall or a blow to the arm when it is in a position of abduction and external rotation.
 - B. The Milch maneuver is an attempt to lift the arm through abduction with the arm externally rotated and at the same time maintaining superior pressure on the humeral head.
 - C. Dislocation is usually readily apparent without films; however, complications including Hill-Sachs lesion and Bankart lesions are visible on apical oblique films or Stryker notch films. Posterior dislocation and Hill-Sachs are visible on the Y view.
 - D. If a deformity is present, a weighted and nonweighted bilateral view should be taken; > 1.3 cm between top of coracoid and clavicle indicates a third-degree separation.
 - E. Second- and third-degree separations are immobilized for 1–2 weeks with a Kinney-Howard sling. Progressive exercises focus on forward flexion and shrugs.
 - F. A shoulder pointer is a contusion to the top of the shoulder usually involving the upper trapezius or deltoid muscle. Ice initially. Protect with doughnut padding if patient is involved in sports.
 - G. The outlet view is a Y view with a 10° to 30° caudal tube tilt.
 - H. The Y view is essentially a lateral scapular view positioning the scapula perpendicular to the bucky; central beam through the glenoid.
 - I. A combination of mild PNF stretching called rhythmic stabilization and ultrasound is the primary treatment. Home stretches and pendulum exercises are also helpful.
 - J. Labrum tests include the crank, O'Brien, slide and pain provocation maneuvers (see text).

Figure 8-7 Elbow/Forearm Pain—Algorithm

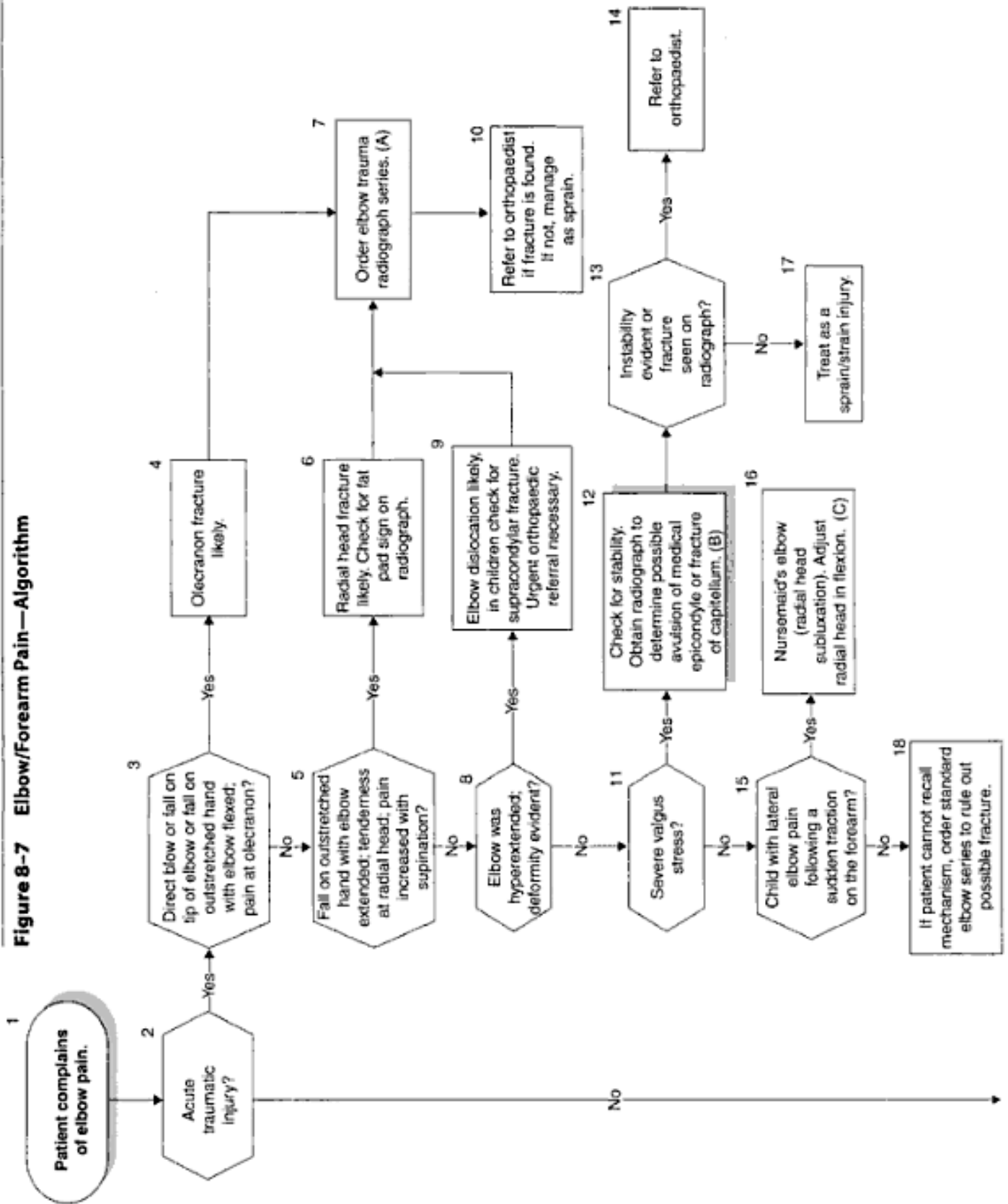
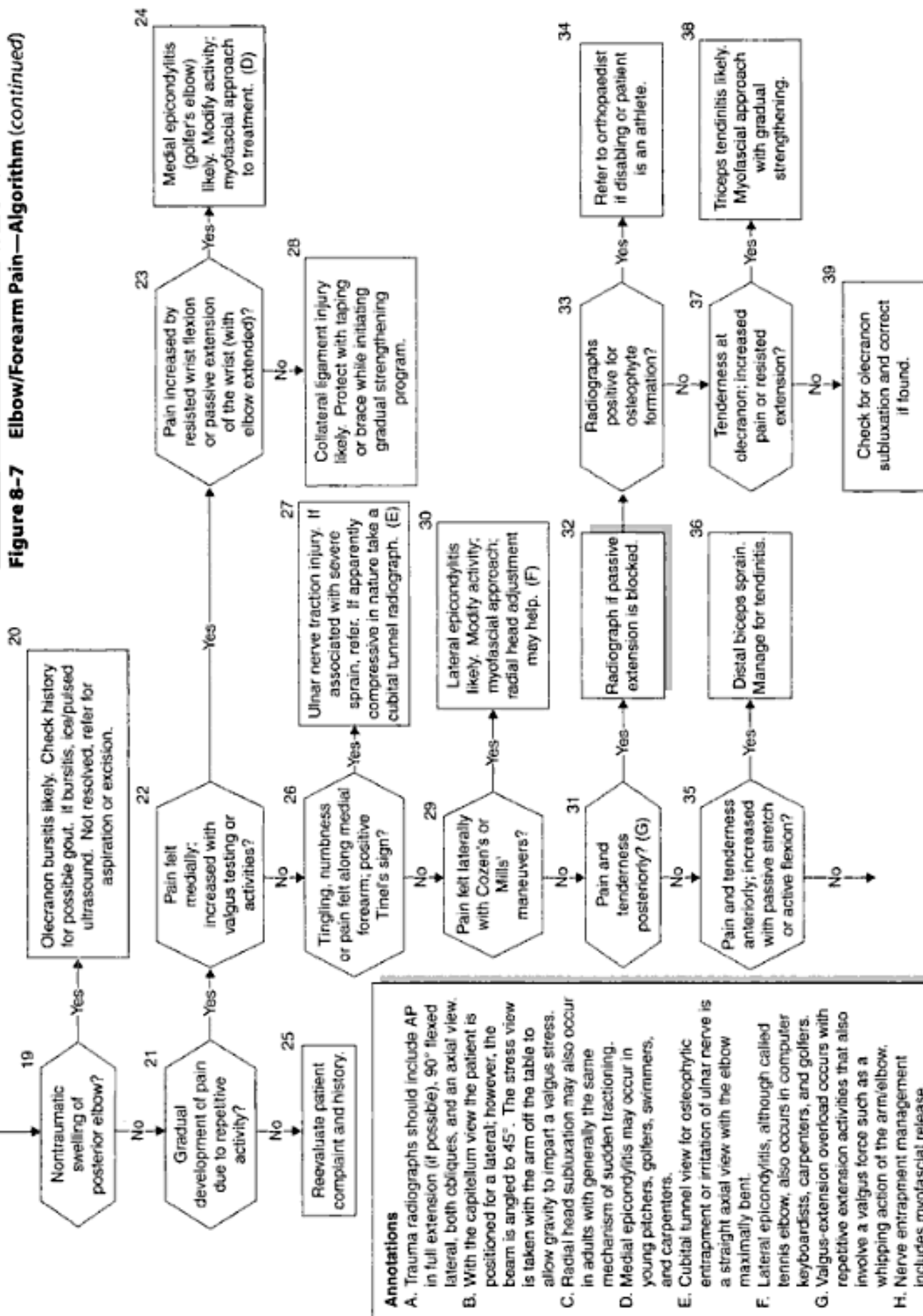


Figure 8-7 Elbow/Forearm Pain—Algorithm (continued)



Annotations

A. Trauma radiographs should include AP in full extension (if possible), 90° flexed lateral, both obliques, and an axial view.

B. With the capitellum view the patient is positioned for a lateral; however, the beam is angled to 45°. The stress view is taken with the arm off the table to allow gravity to impart a valgus stress.

C. Radial head subluxation may also occur in adults with generally the same mechanism of sudden tractioning.

D. Medial epicondylitis may occur in young pitchers, golfers, swimmers, and carpenters.

E. Cubital tunnel view for osteolytic entrapment or irritation of ulnar nerve is a straight axial view with the elbow maximally bent.

F. Lateral epicondylitis, although called tennis elbow, also occurs in computer keyboardists, carpenters, and golfers.

G. Valgus-extension overload occurs with repetitive extension activities that also involve a valgus force such as a whipping action of the arm/elbow.

H. Nerve entrapment management includes myofascial release, modification of inciting activity; if unsuccessful after several months, surgical release is an option.

42 **Figure 8-7** (continued)

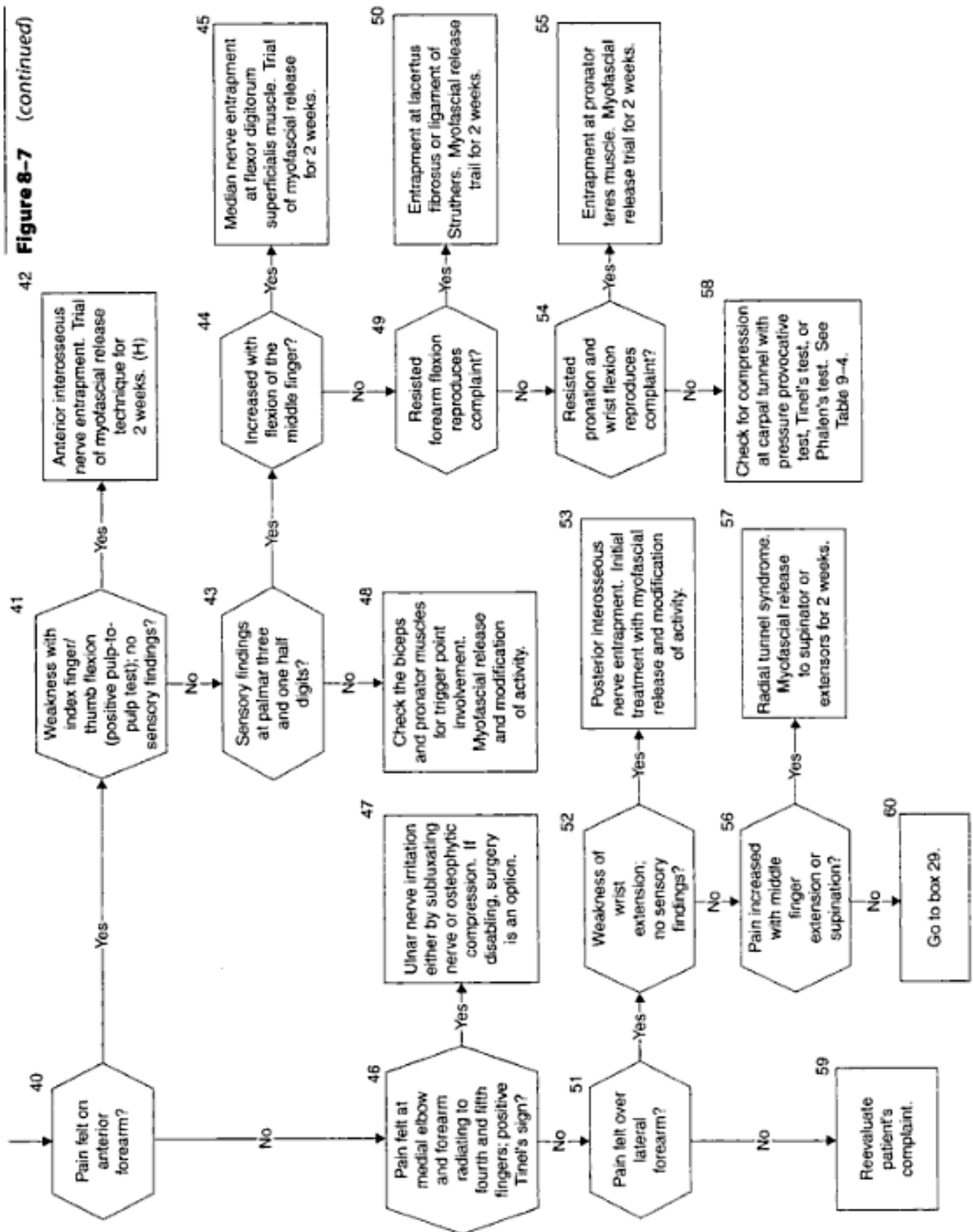
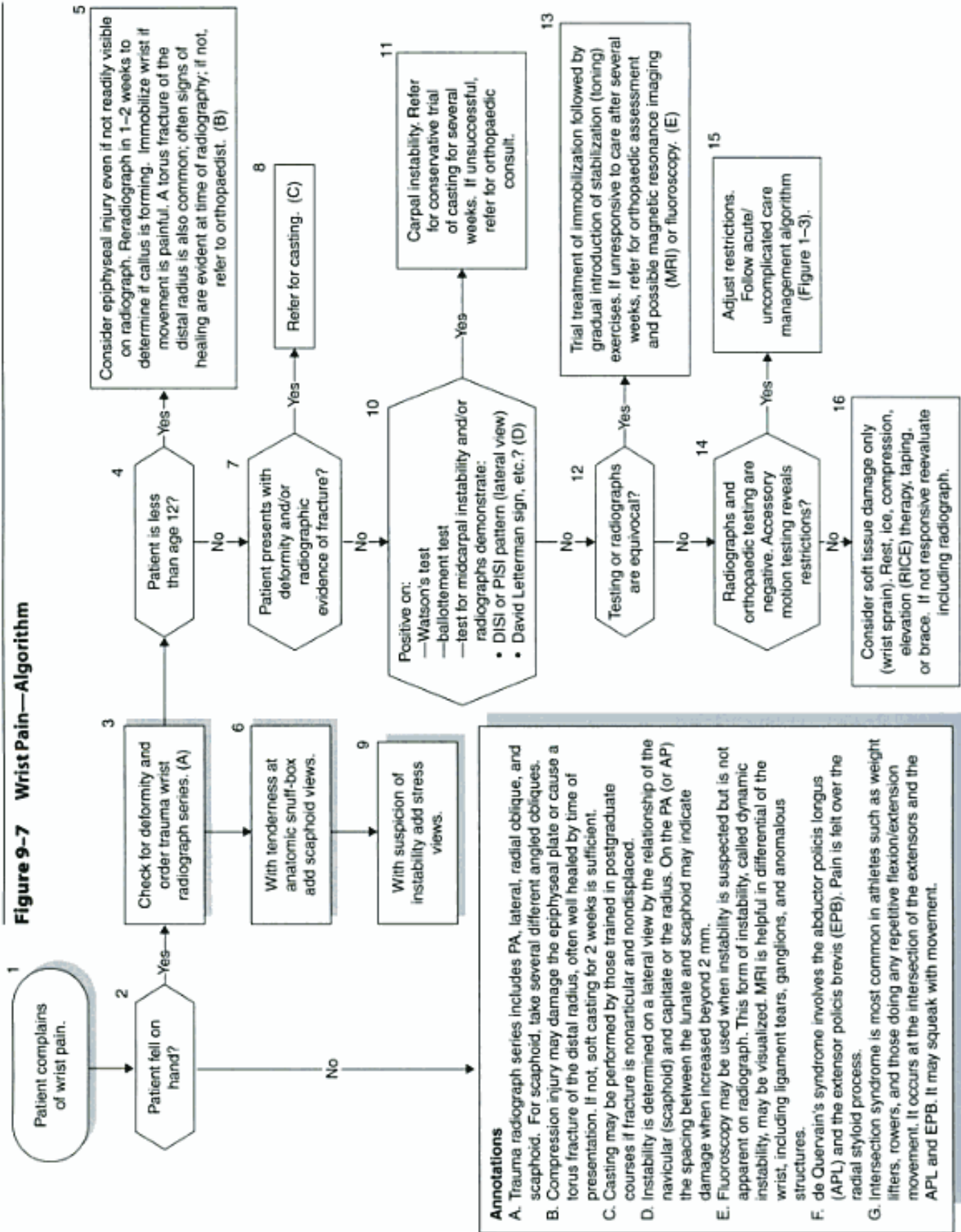


Figure 9-7 Wrist Pain—Algorithm



Annotations

- A. Trauma radiograph series includes PA, lateral, radial oblique, and scaphoid. For scaphoid, take several different angled obliques.
- B. Compression injury may damage the epiphyseal plate or cause a torus fracture of the distal radius, often well healed by time of presentation. If not, soft casting for 2 weeks is sufficient.
- C. Casting may be performed by those trained in postgraduate courses if fracture is nonarticular and nondisplaced.
- D. Instability is determined on a lateral view by the relationship of the navicular (scaphoid) and capitate or the radius. On the PA (or AP) the spacing between the lunate and scaphoid may indicate damage when increased beyond 2 mm.
- E. Fluoroscopy may be used when instability is suspected but is not apparent on radiograph. This form of instability, called dynamic instability, may be visualized. MRI is helpful in differential of the wrist, including ligament tears, ganglions, and anomalous structures.
- F. de Quervain's syndrome involves the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB). Pain is felt over the radial styloid process.
- G. Intersection syndrome is most common in athletes such as weight lifters, rowers, and those doing any repetitive flexion/extension movement. It occurs at the intersection of the extensors and the APL and EPB. It may squeak with movement.

Figure 9-7 (continued)

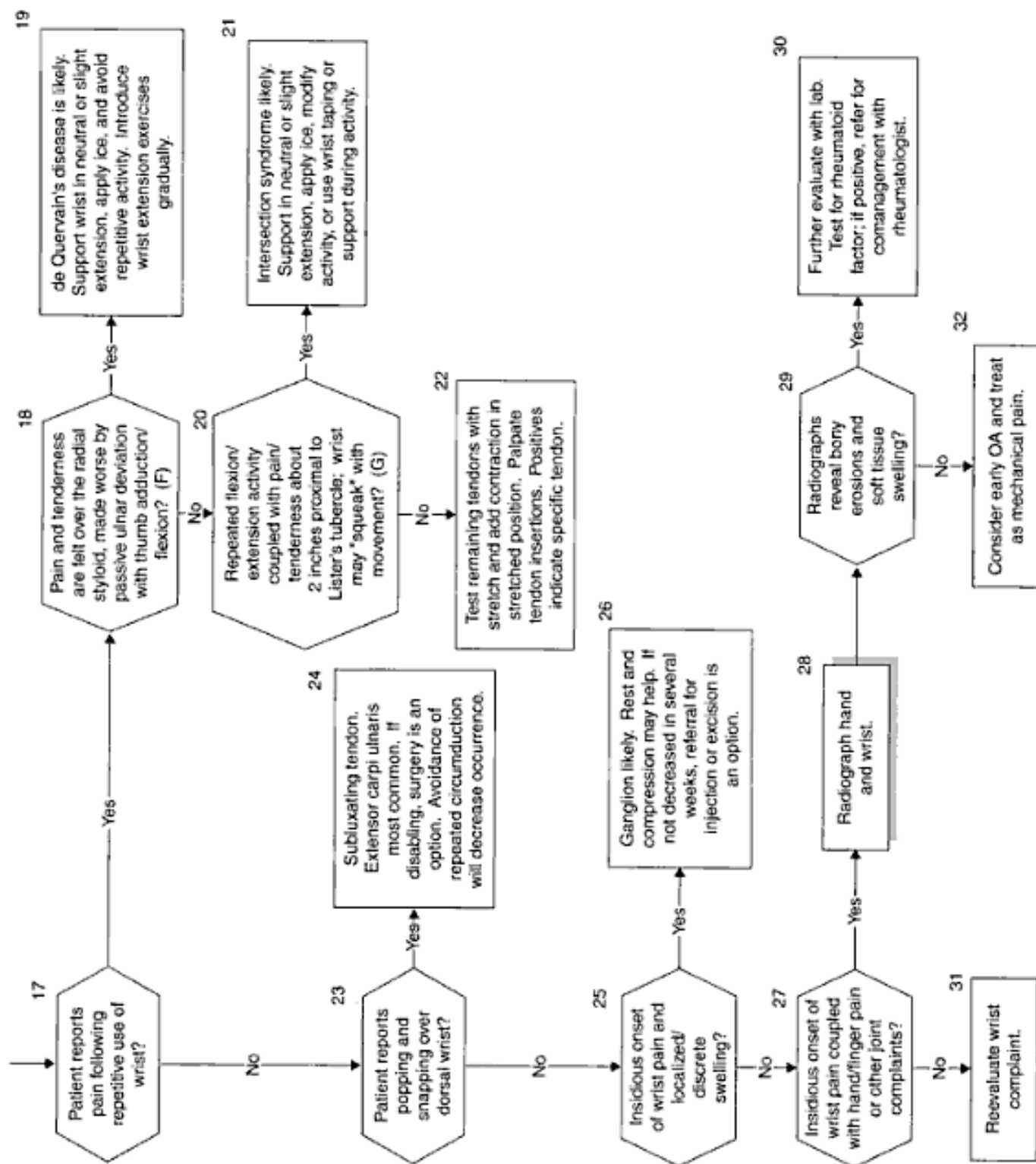


Figure 10-4 Thumb Pain—Algorithm

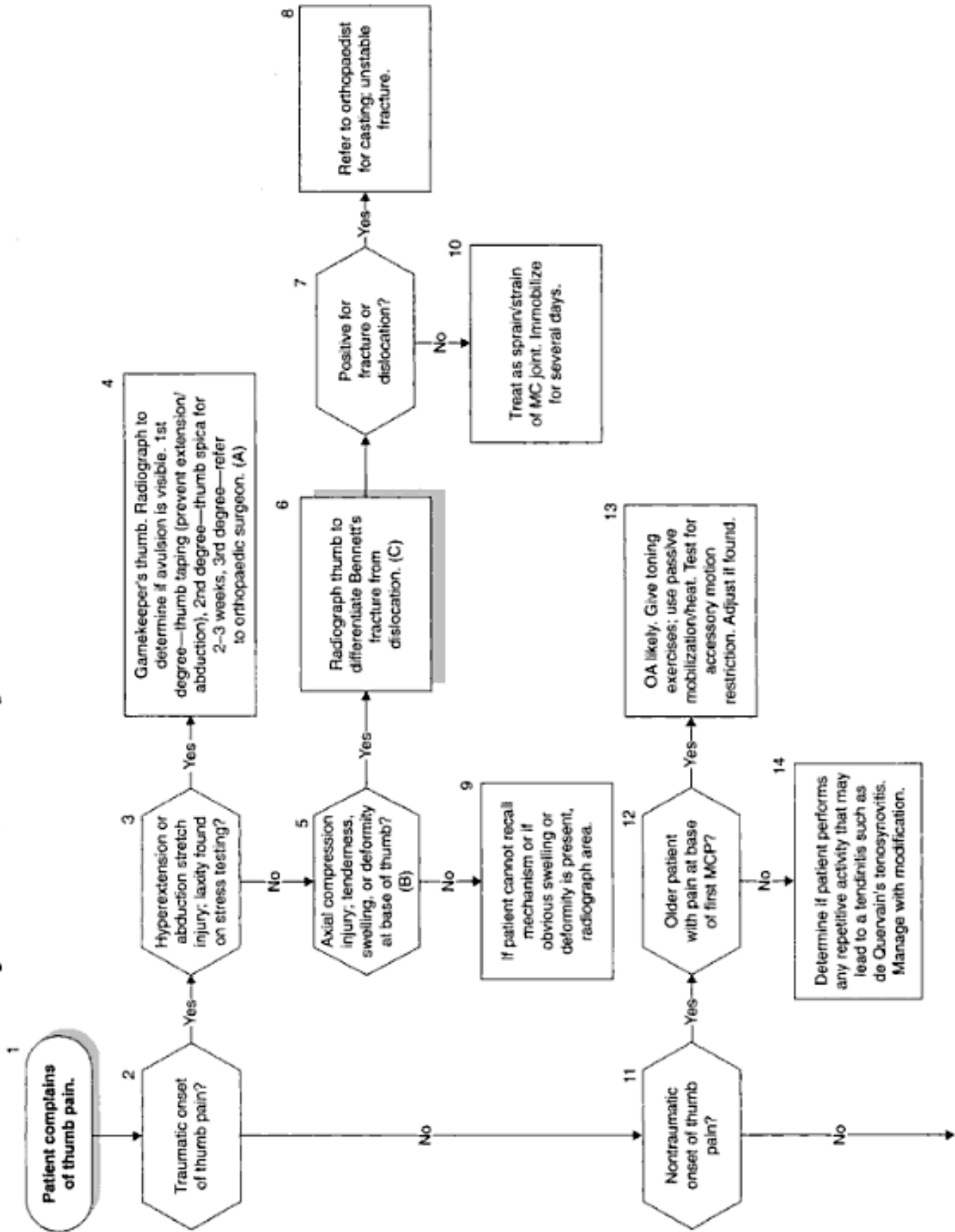
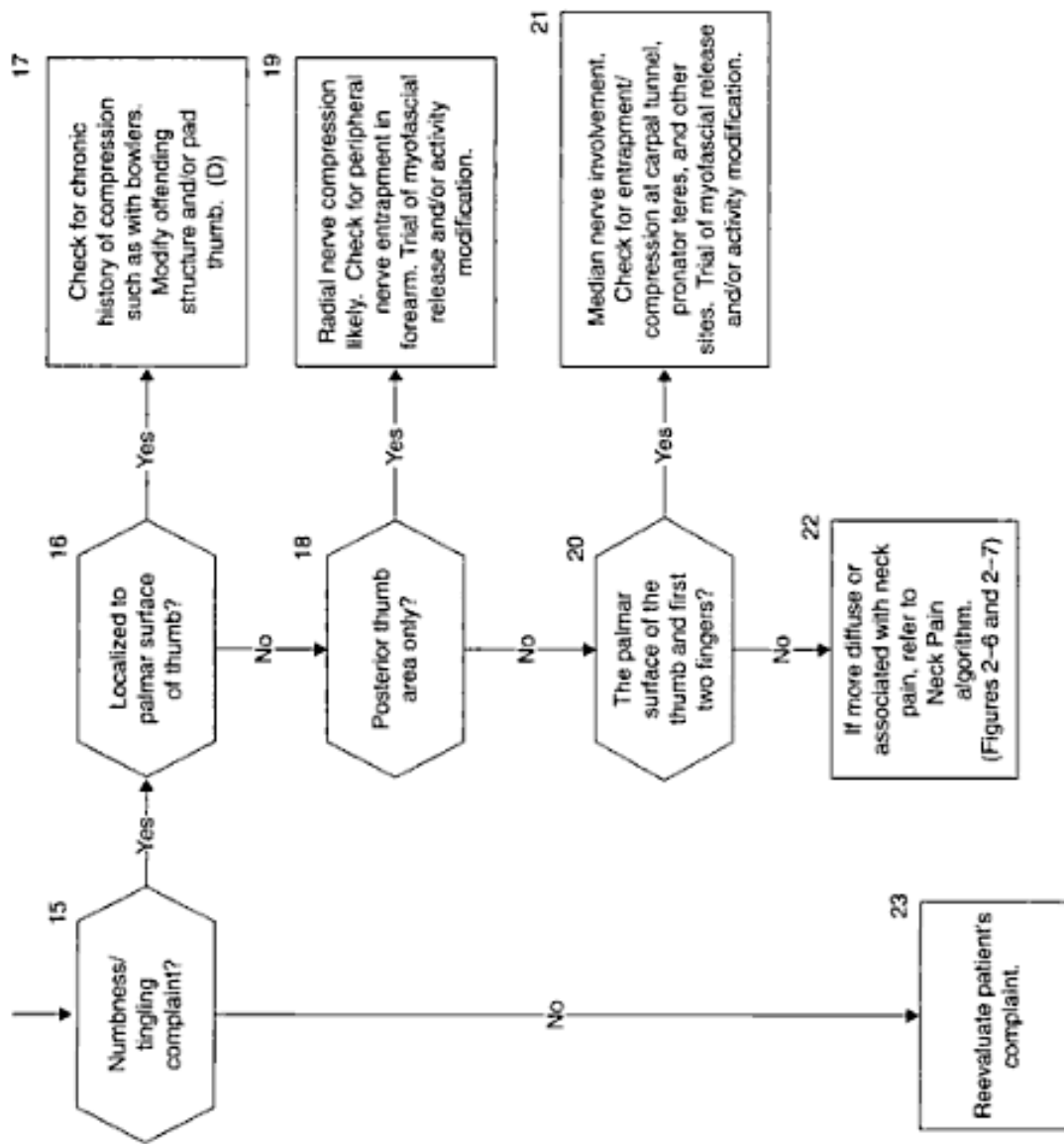


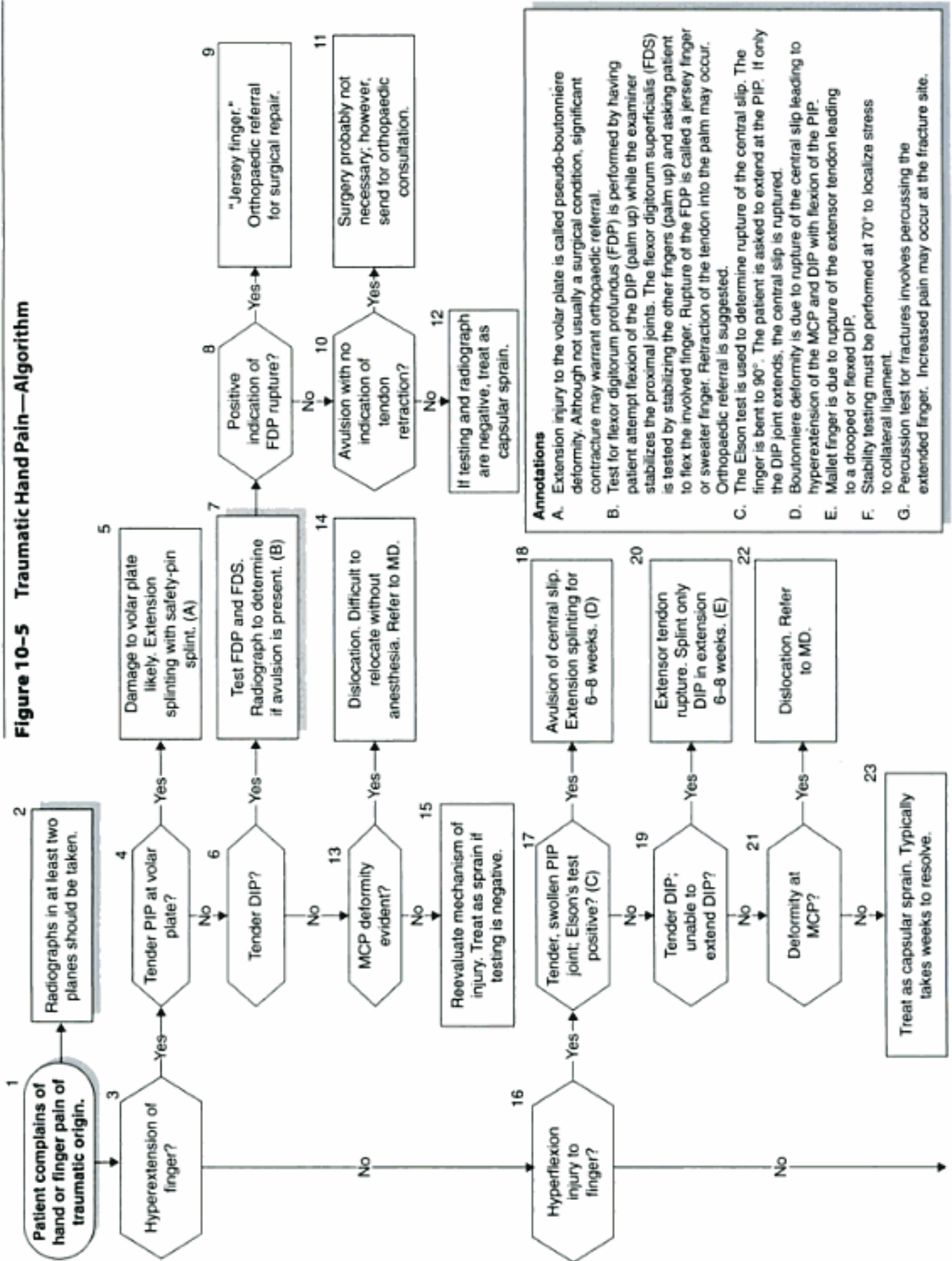
Figure 10-4 (continued)



Annotations

- A. Gamekeeper's thumb is a tear of the ulnar collateral ligament due to hyperabduction. Stability should be tested at 0° and 30° and radiographs should be taken to determine any fracture at the base of the proximal phalanx. Stress radiographs may be used. More than 30% difference between normal and injured MCP angle indicates a complete rupture.
- B. Thumb MCP dislocation may be reduced with adduction and flexion followed by traction. Unsuccessful attempt should be referred to emergency department. Immobilization for 3-4 weeks followed by protective taping for a few weeks is standard management.
- C. Bennett's fracture is a fracture/dislocation of the first metacarpal base. It is a transarticular fracture. Reduction and stability are prevented by pull of the abductor pollicis longus. Orthopaedic referral for casting and possible surgery.
- D. Compression or irritation of the digital nerve of the thumb is referred to as bowler's thumb. Protection with padding and, specifically with bowlers, enlargement of thumb hole on ball are usually sufficient.

Figure 10-5 Traumatic Hand Pain—Algorithm



Annotations

A. Extension injury to the volar plate is called pseudo-boutonniere deformity. Although not usually a surgical condition, significant contracture may warrant orthopaedic referral.

B. Test for flexor digitorum profundus (FDP) is performed by having patient attempt flexion of the DIP (palm up) while the examiner stabilizes the proximal joints. The flexor digitorum superficialis (FDS) is tested by stabilizing the other fingers (palm up) and asking patient to flex the involved finger. Rupture of the FDP is called a jersey finger or sweater finger. Retraction of the tendon into the palm may occur. Orthopaedic referral is suggested.

C. The Elson test is used to determine rupture of the central slip. The finger is bent to 90°. The patient is asked to extend at the PIP. If only the DIP joint extends, the central slip is ruptured.

D. Boutonniere deformity is due to rupture of the central slip leading to hyperextension of the MCP and DIP with flexion of the PIP.

E. Mallet finger is due to rupture of the extensor tendon leading to a drooped or flexed DIP.

F. Stability testing must be performed at 70° to localize stress to collateral ligament.

G. Percussion test for fractures involves percussing the extended finger. Increased pain may occur at the fracture site.

Figure 10-5 (continued)

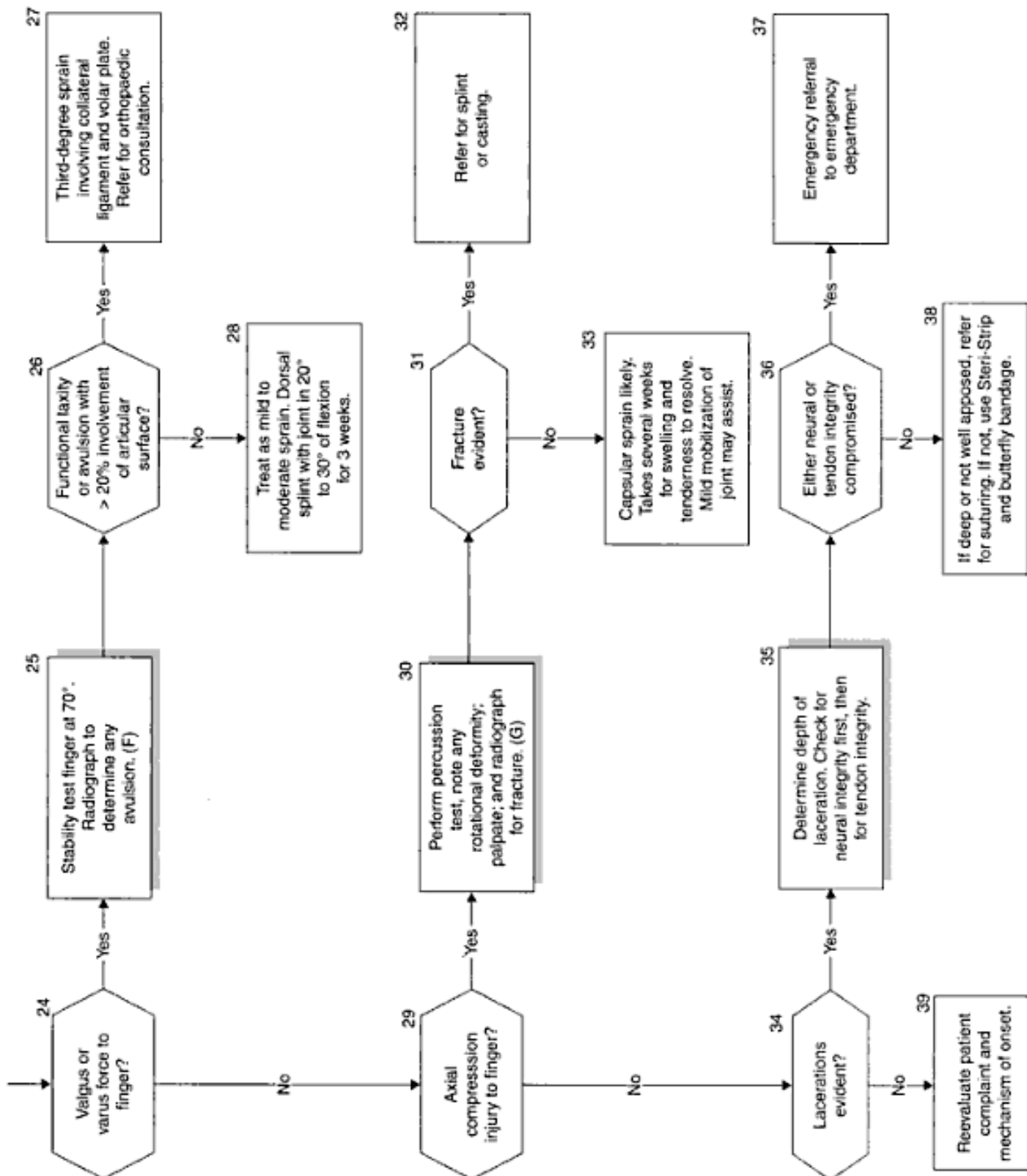
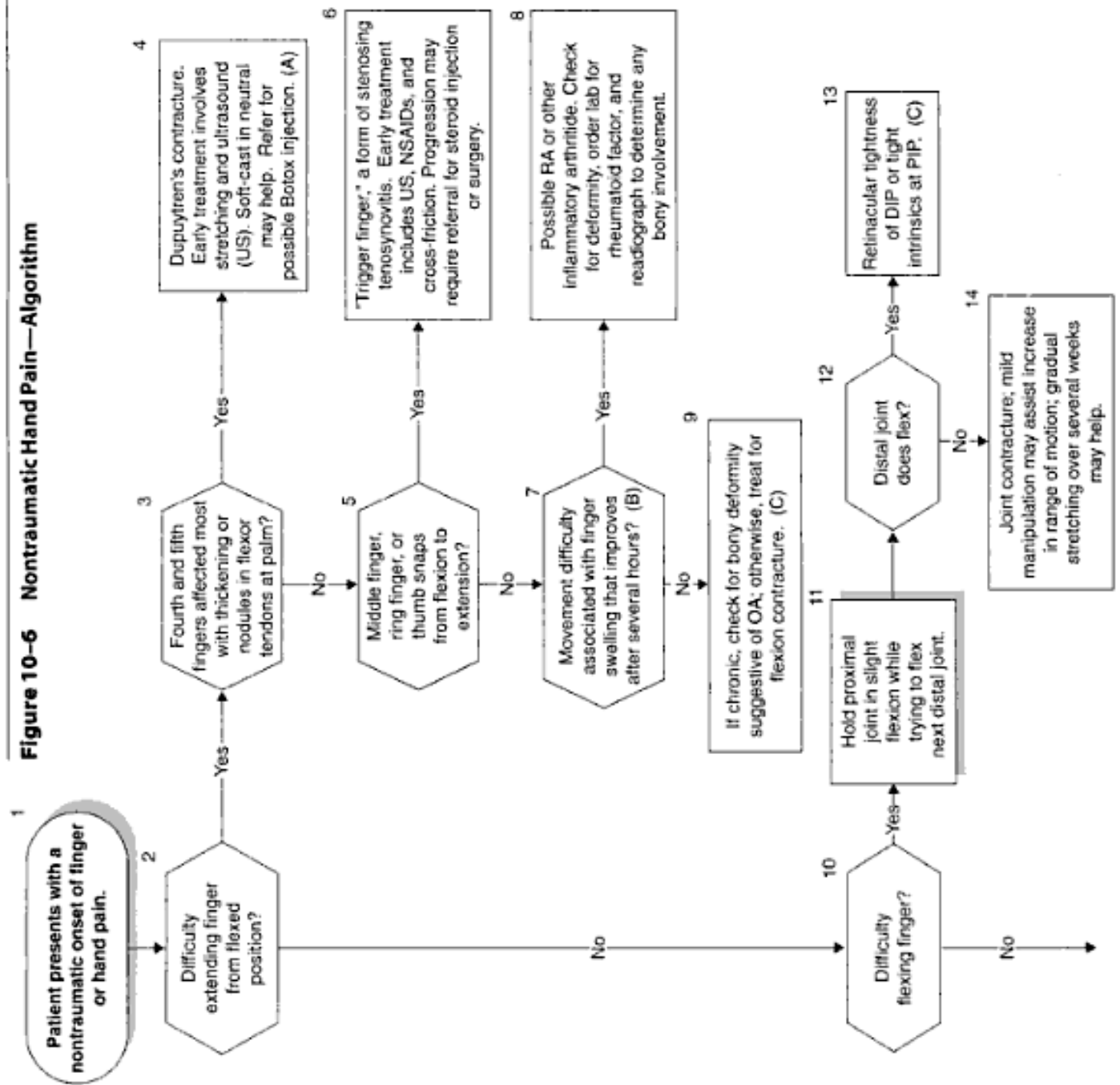


Figure 10-6 Nontraumatic Hand Pain—Algorithm



Annotations

- A. Dupuytren's contracture is more common in alcoholics, epileptics, those with diabetes, and pulmonary tuberculosis.
- B. Finger swelling should be differentiated first between bony deformity and soft tissue involvements. DIP and PIP involvements are suggestive of OA, while PIP & MIP involvements suggest inflammatory arthritide. Soft tissue swelling and stiffness that resolve quickly imply OA, while that taking several hours is more characteristic of inflammatory arthritide.
- C. Joint contracture, intrinsic muscle tightness, or retinacular tightness should be addressed with gentle passive stretching, PNF stretching, and underwater ultrasound.

Figure 10-6 (continued)

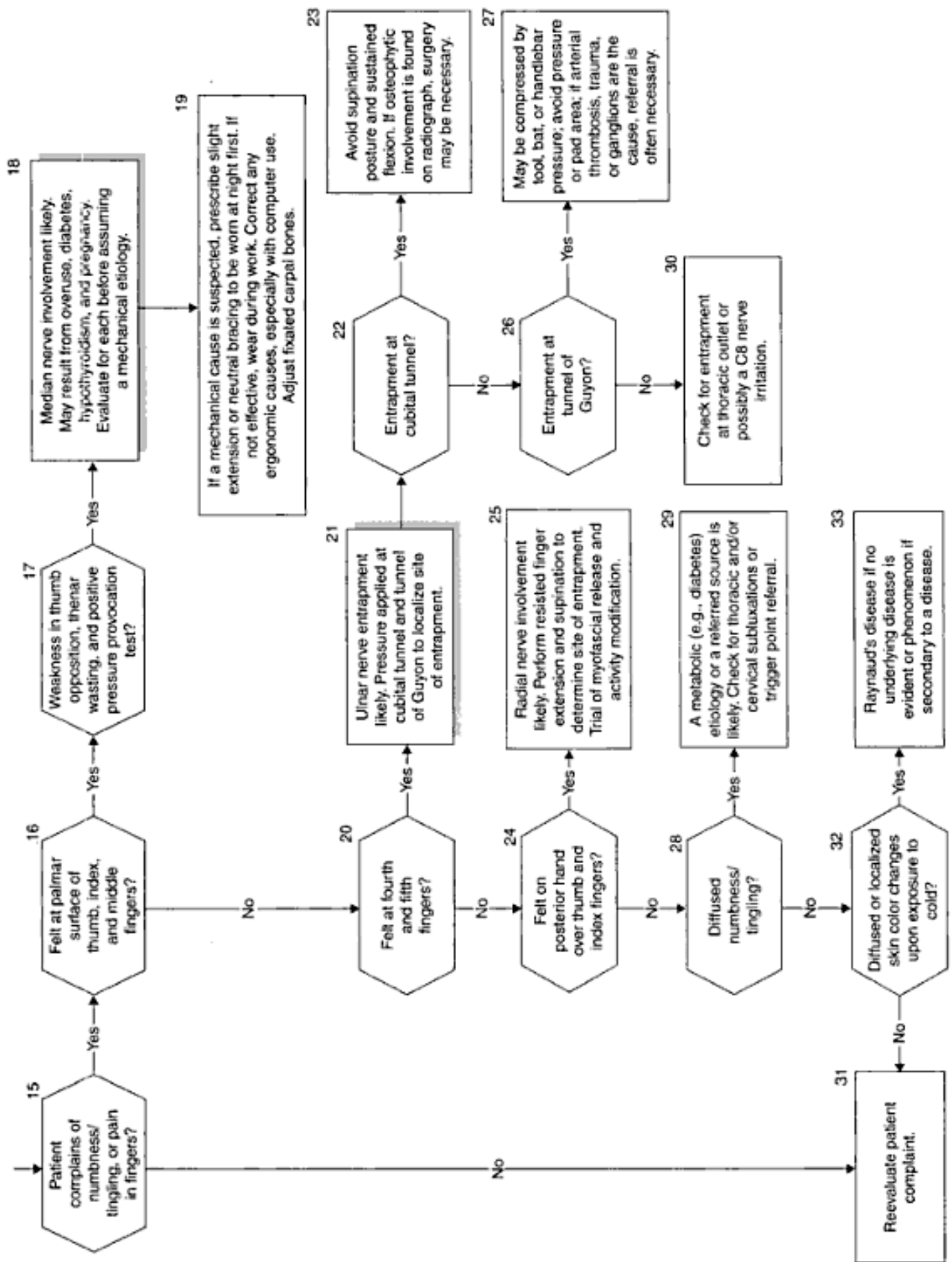
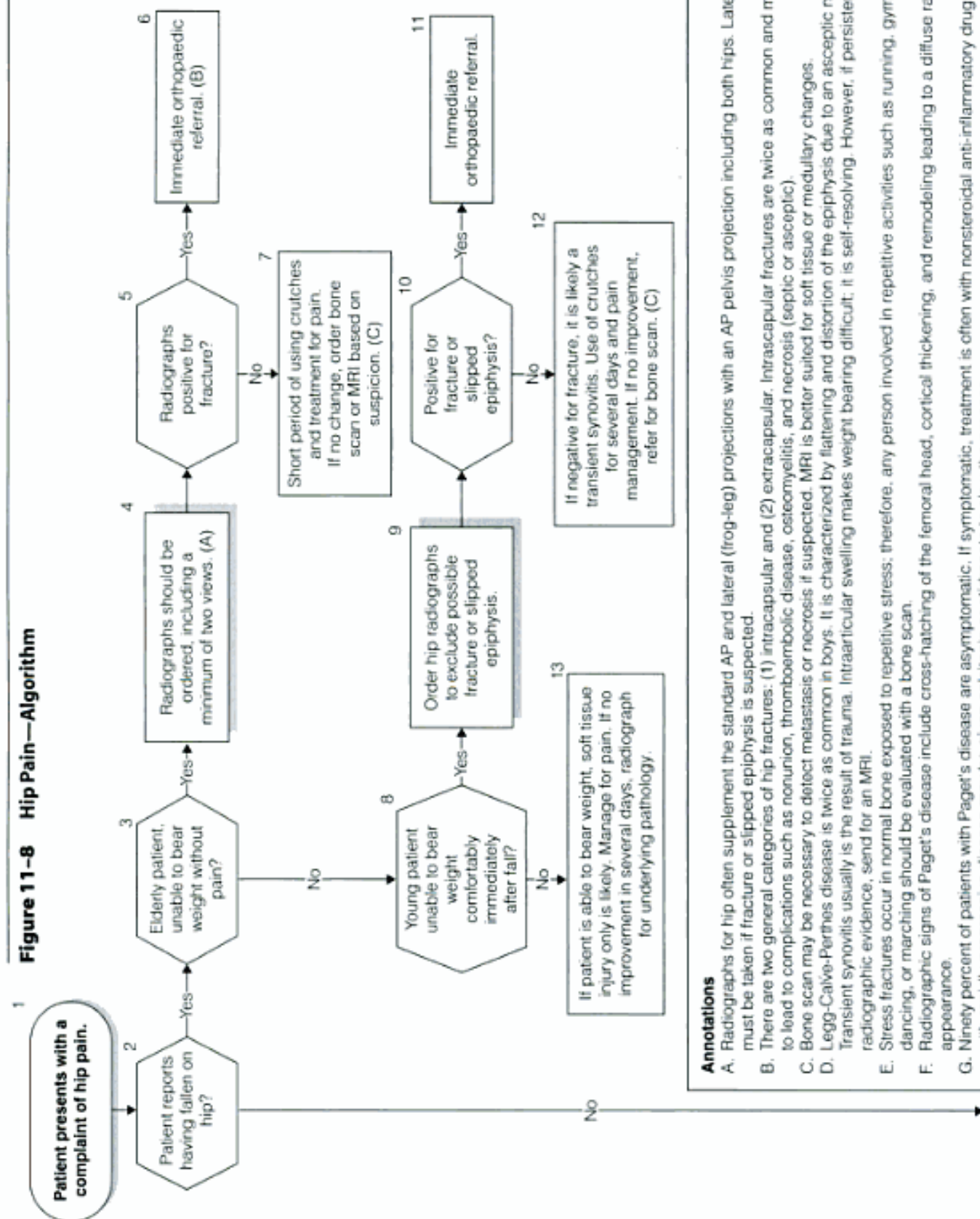


Figure 11-8 Hip Pain—Algorithm

**Annotations**

- A. Radiographs for hip often supplement the standard AP and lateral (frog-leg) projections with an AP pelvis projection including both hips. Lateral views must be taken if fracture or slipped epiphysis is suspected.
- B. There are two general categories of hip fractures: (1) intracapsular and (2) extracapsular. Intracapsular fractures are twice as common and more likely to lead to complications such as nonunion, thromboembolic disease, osteomyelitis, and necrosis (septic or aseptic).
- C. Bone scan may be necessary to detect metastasis or necrosis if suspected. MRI is better suited for soft tissue or medullary changes.
- D. Legg-Calvé-Perthes disease is twice as common in boys. It is characterized by flattening and distortion of the epiphysis due to an aseptic necrosis. Transient synovitis usually is the result of trauma. Intraarticular swelling makes weight bearing difficult; it is self-resolving. However, if persistent and no radiographic evidence, send for an MRI.
- E. Stress fractures occur in normal bone exposed to repetitive stress; therefore, any person involved in repetitive activities such as running, gymnastics, dancing, or marching should be evaluated with a bone scan.
- F. Radiographic signs of Paget's disease include cross-hatching of the femoral head, cortical thickening, and remodeling leading to a diffuse radiopaque appearance.
- G. Ninety percent of patients with Paget's disease are asymptomatic. If symptomatic, treatment is often with nonsteroidal anti-inflammatory drugs. Those with rapidly progressive disease may be given calcitonin or etidronate to slow the process.

Figure 11-8 (continued)

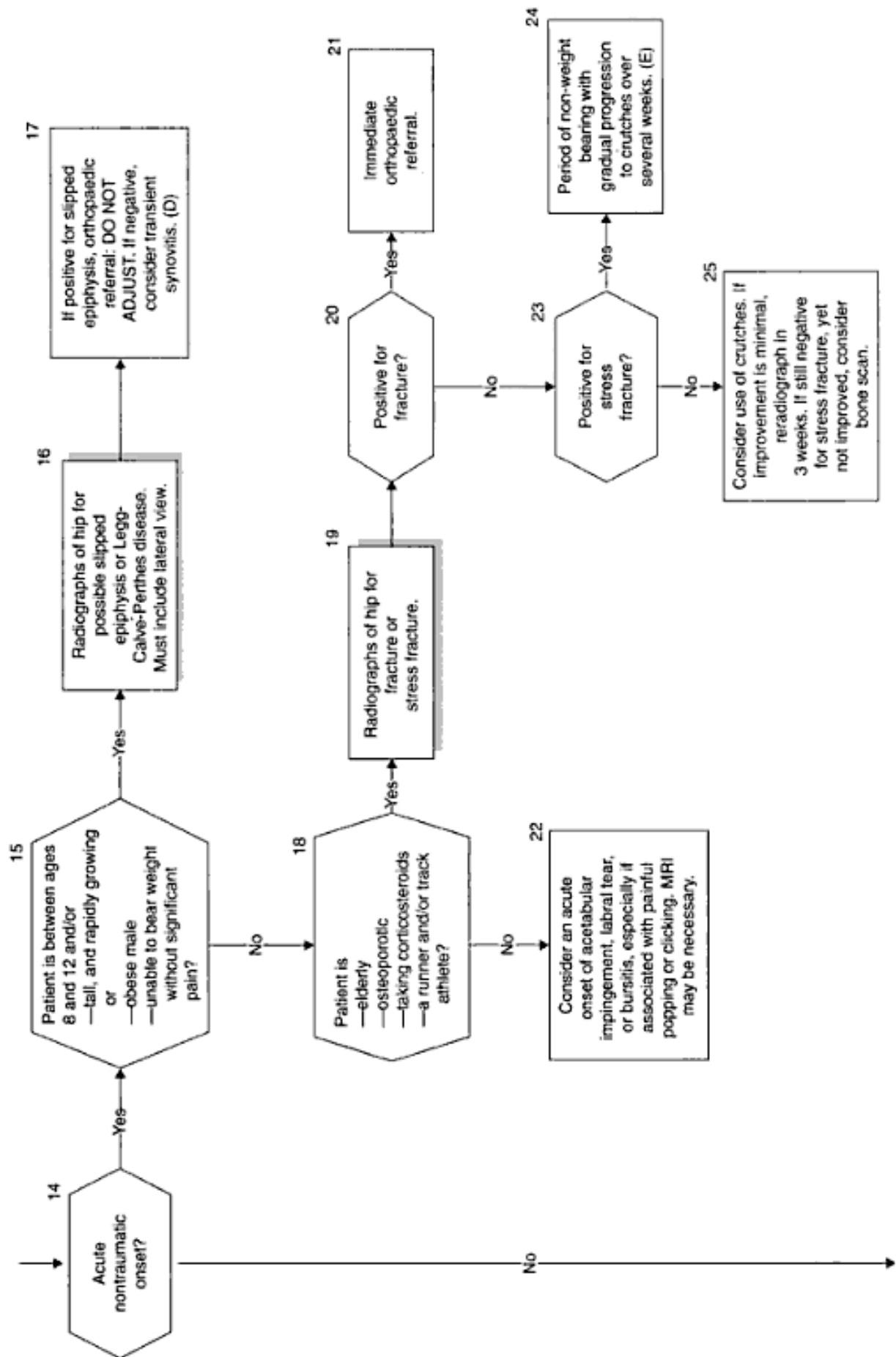


Figure 11-8 Hip Pain—Algorithm (continued)

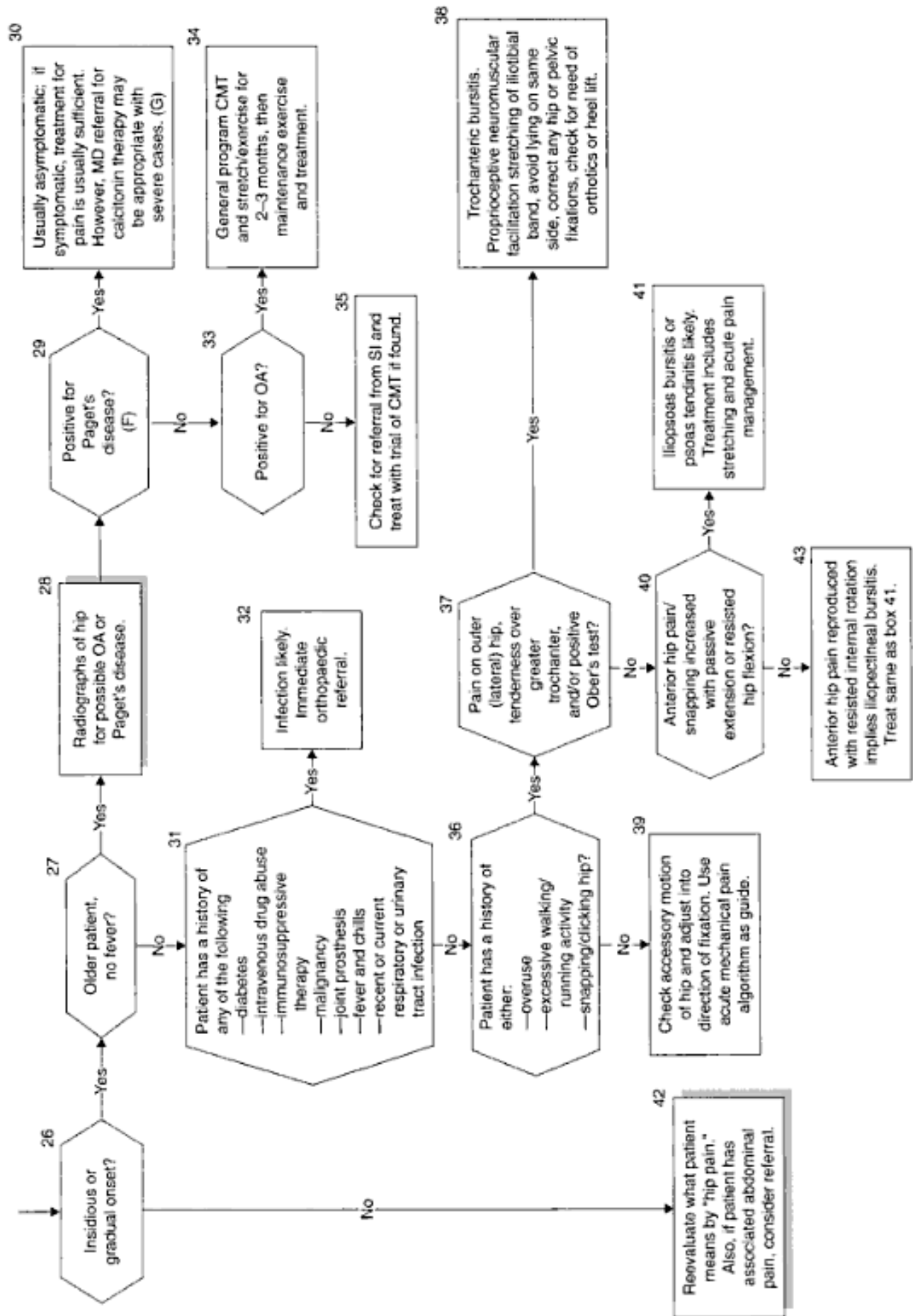
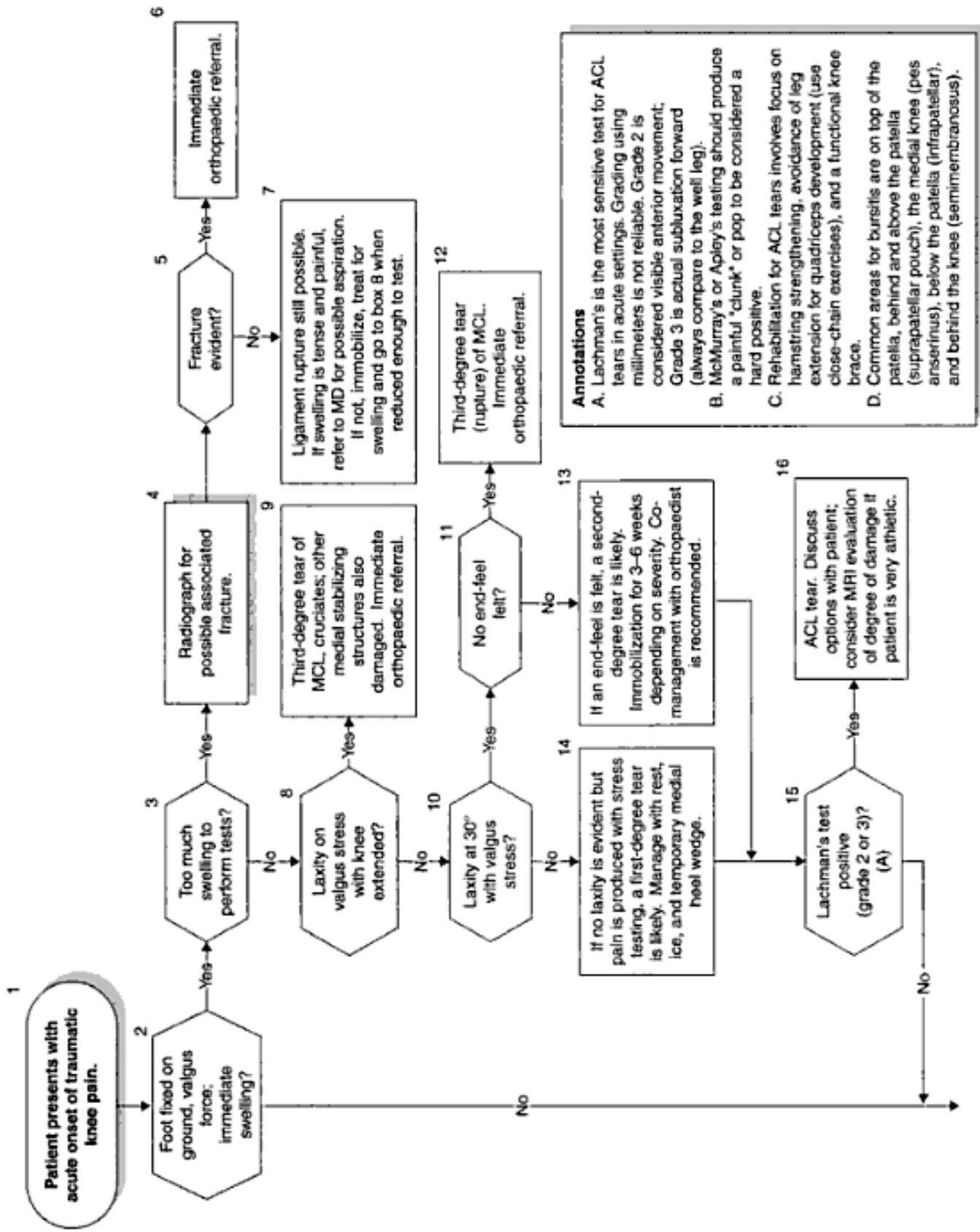


Figure 12-12 Traumatic Knee Pain—Algorithm



Annotations

A. Lachman's is the most sensitive test for ACL tears in acute settings. Grading using millimeters is not reliable. Grade 2 is considered visible anterior movement; Grade 3 is actual subluxation forward (always compare to the well leg).

B. McMurray's or Apley's testing should produce a painful "clunk" or pop to be considered a hard positive.

C. Rehabilitation for ACL tears involves focus on hamstring strengthening, avoidance of leg extension for quadriceps development (use close-chain exercises), and a functional knee brace.

D. Common areas for bursitis are on top of the patella, behind and above the patella (suprapatellar pouch), the medial knee (pes anserinus), below the patella (infrapatellar), and behind the knee (semimembranosus).

Figure 12-12 Traumatic Knee Pain—Algorithm (continued)

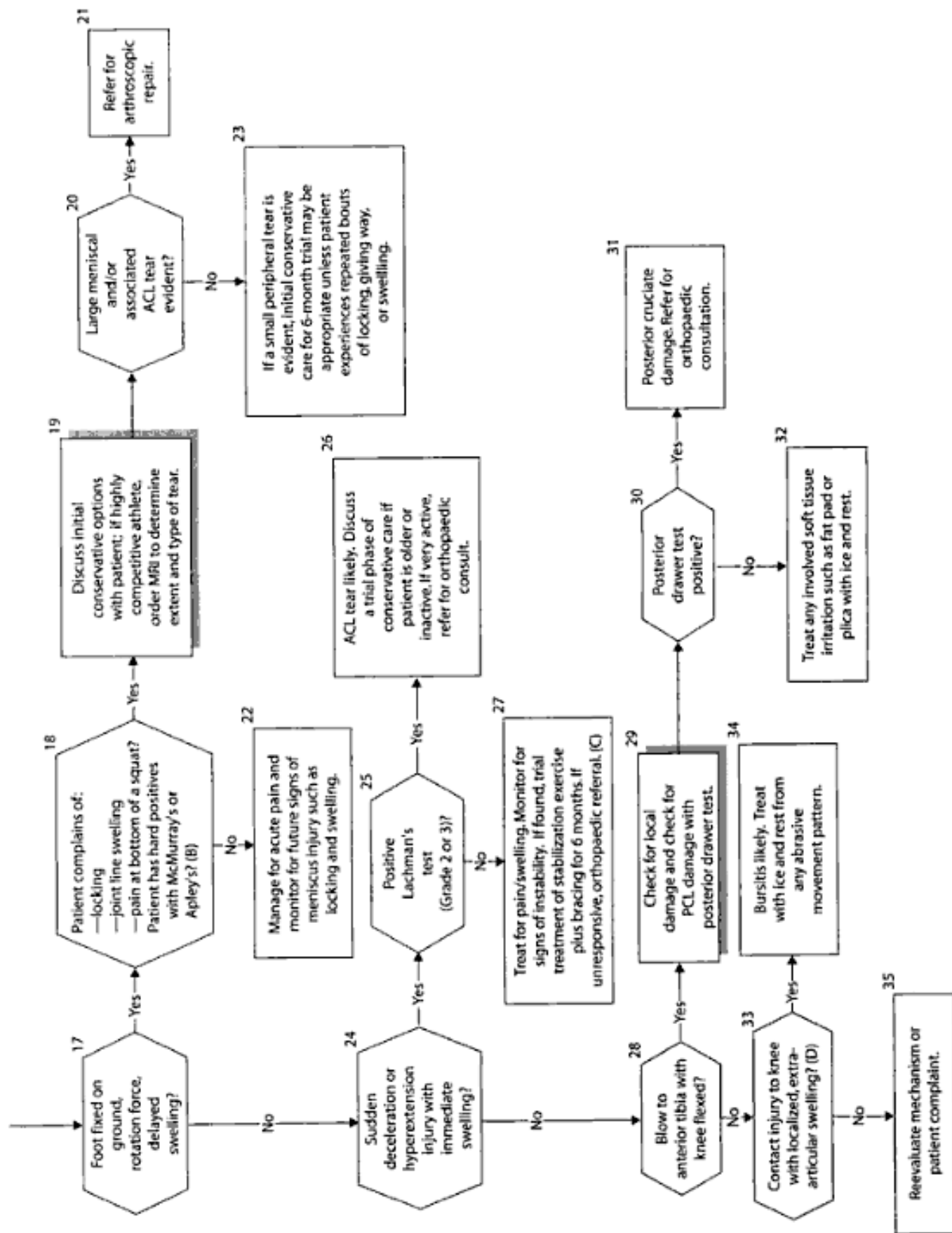


Figure 12-13 Nontraumatic Knee Complaint—Algorithm

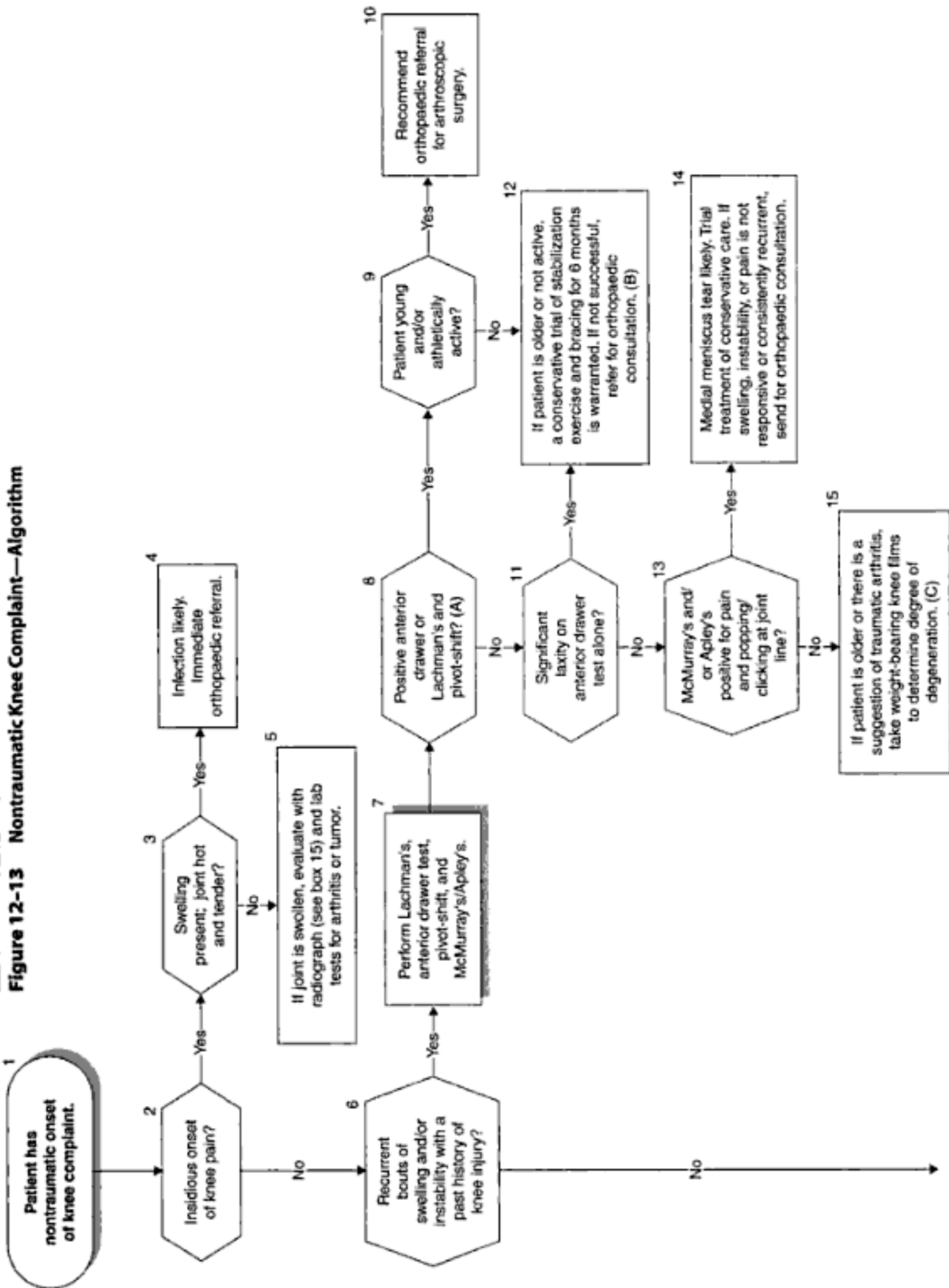


Figure 12-13 Nontraumatic Knee Complaint—Algorithm (continued)

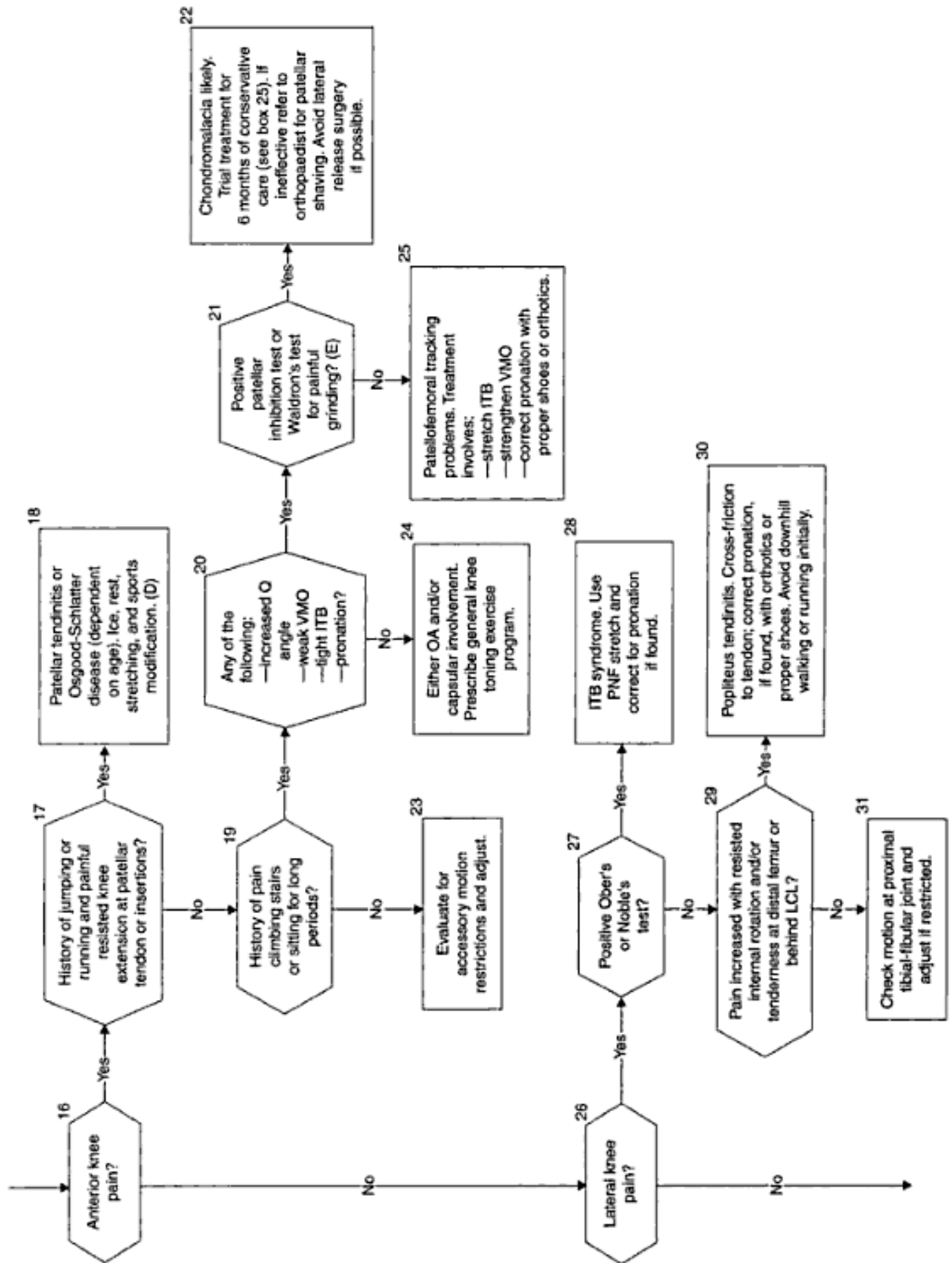


Figure 12-13 (continued)

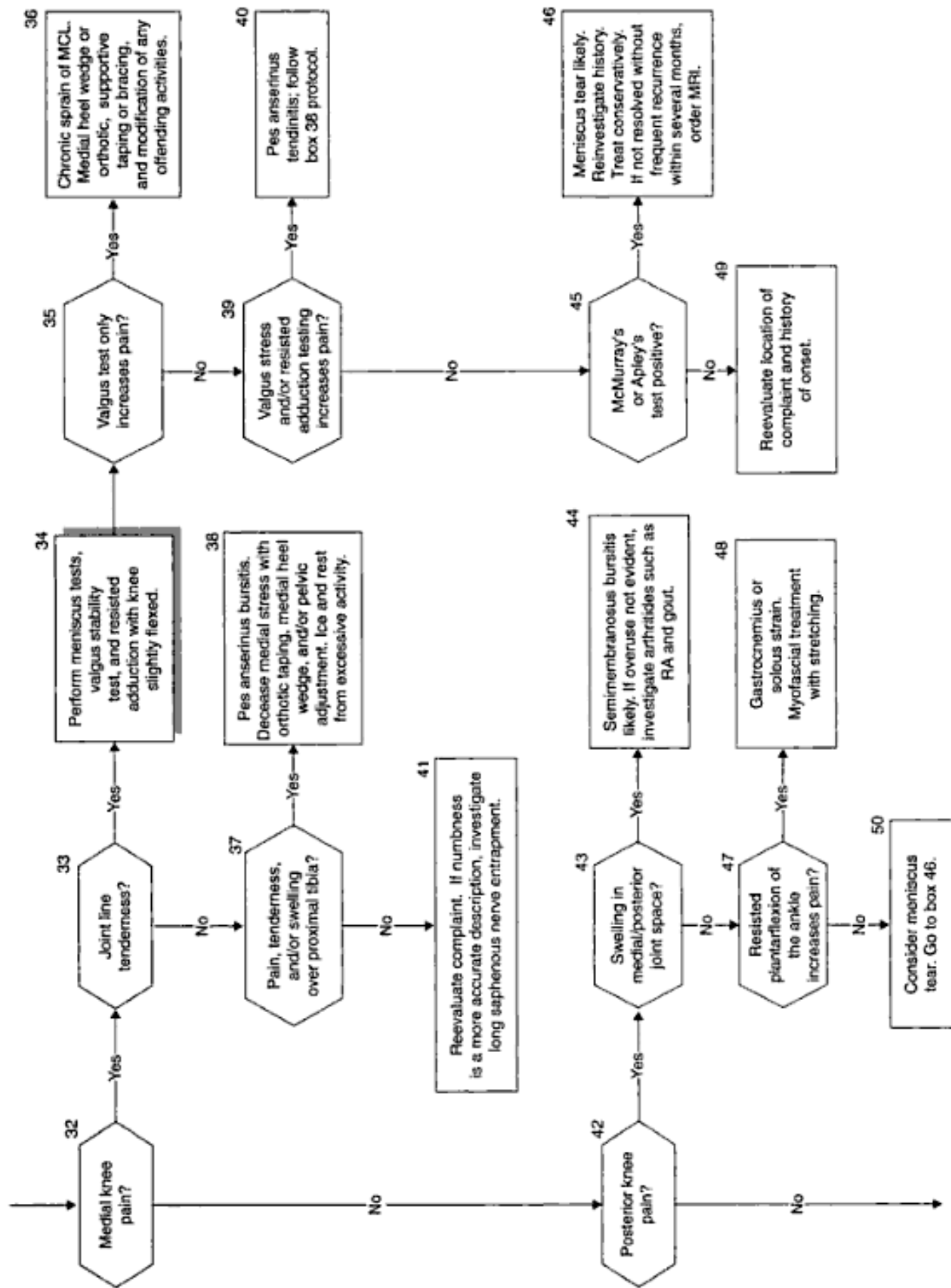
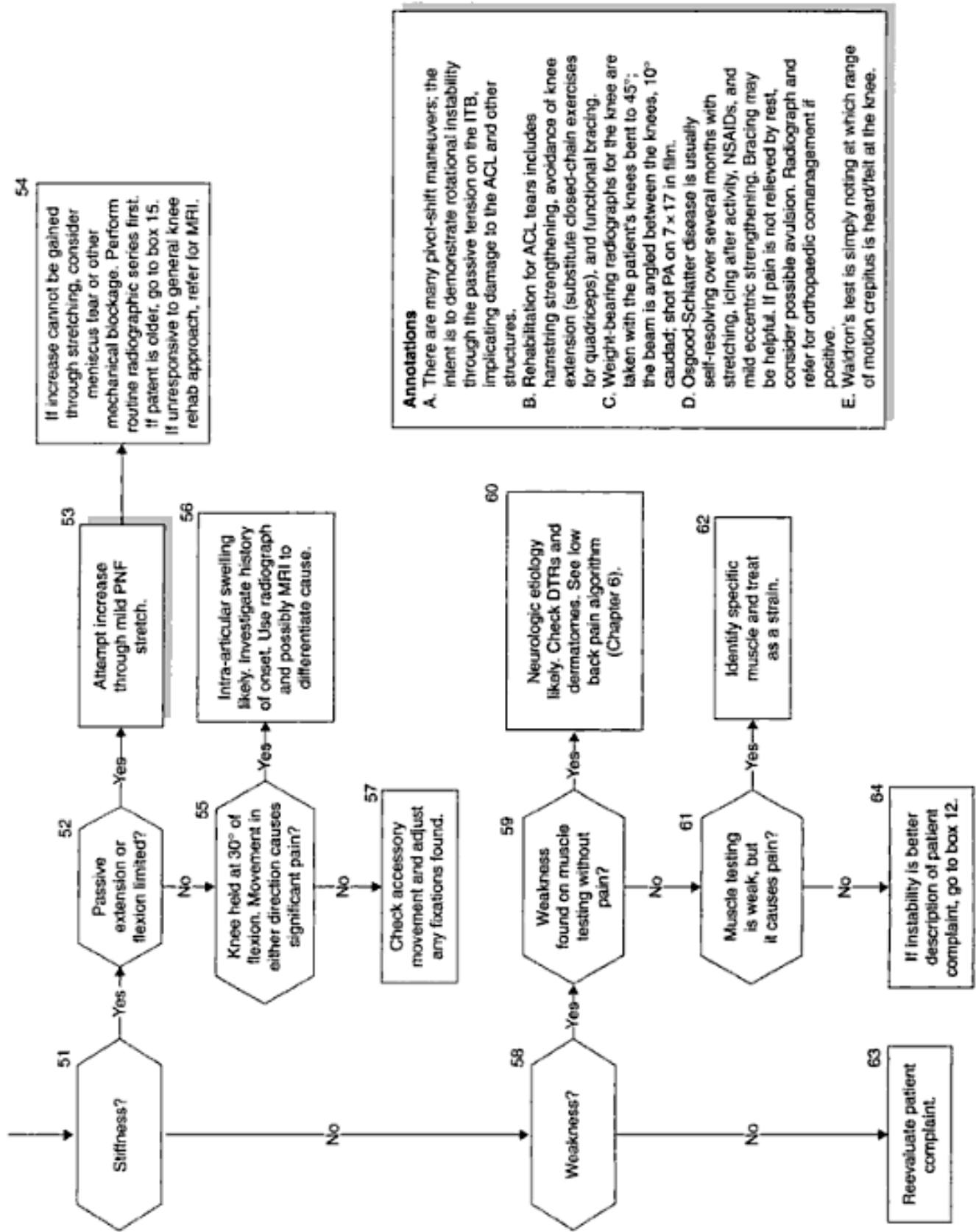


Figure 12-13 Nontraumatic Knee Complaint—Algorithm (continued)



Annotations

A. There are many pivot-shift maneuvers; the intent is to demonstrate rotational instability through the passive tension on the ITB, implicating damage to the ACL and other structures.

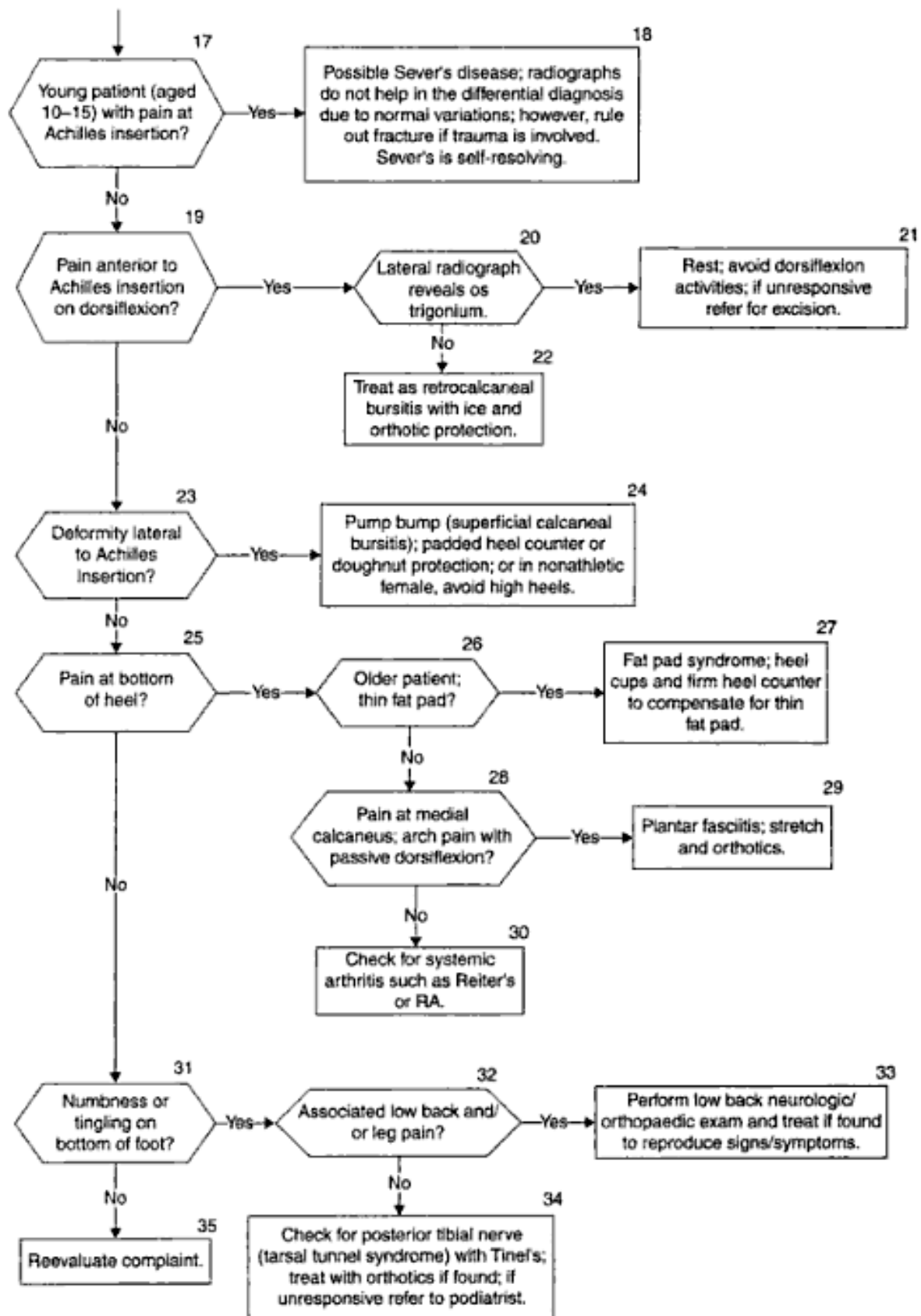
B. Rehabilitation for ACL tears includes hamstring strengthening, avoidance of knee extension (substitute closed-chain exercises for quadriceps), and functional bracing.

C. Weight-bearing radiographs for the knee are taken with the patient's knees bent to 45°; the beam is angled between the knees, 10° caudad; shot PA on 7 × 17 in film.

D. Osgood-Schlatter disease is usually self-resolving over several months with stretching, icing after activity, NSAIDs, and mild eccentric strengthening. Bracing may be helpful. If pain is not relieved by rest, consider possible avulsion. Radiograph and refer for orthopaedic comanagement if positive.

E. Waldron's test is simply noting at which range of motion crepitus is heard/felt at the knee.

Figure 13-2 Calf/Heel Pain—Algorithm (continued)



Key: PNF, proprioceptive neuromuscular facilitation; RA, rheumatoid arthritis.

Figure 14-8 Traumatic or Sudden Onset of Foot Pain—Algorithm

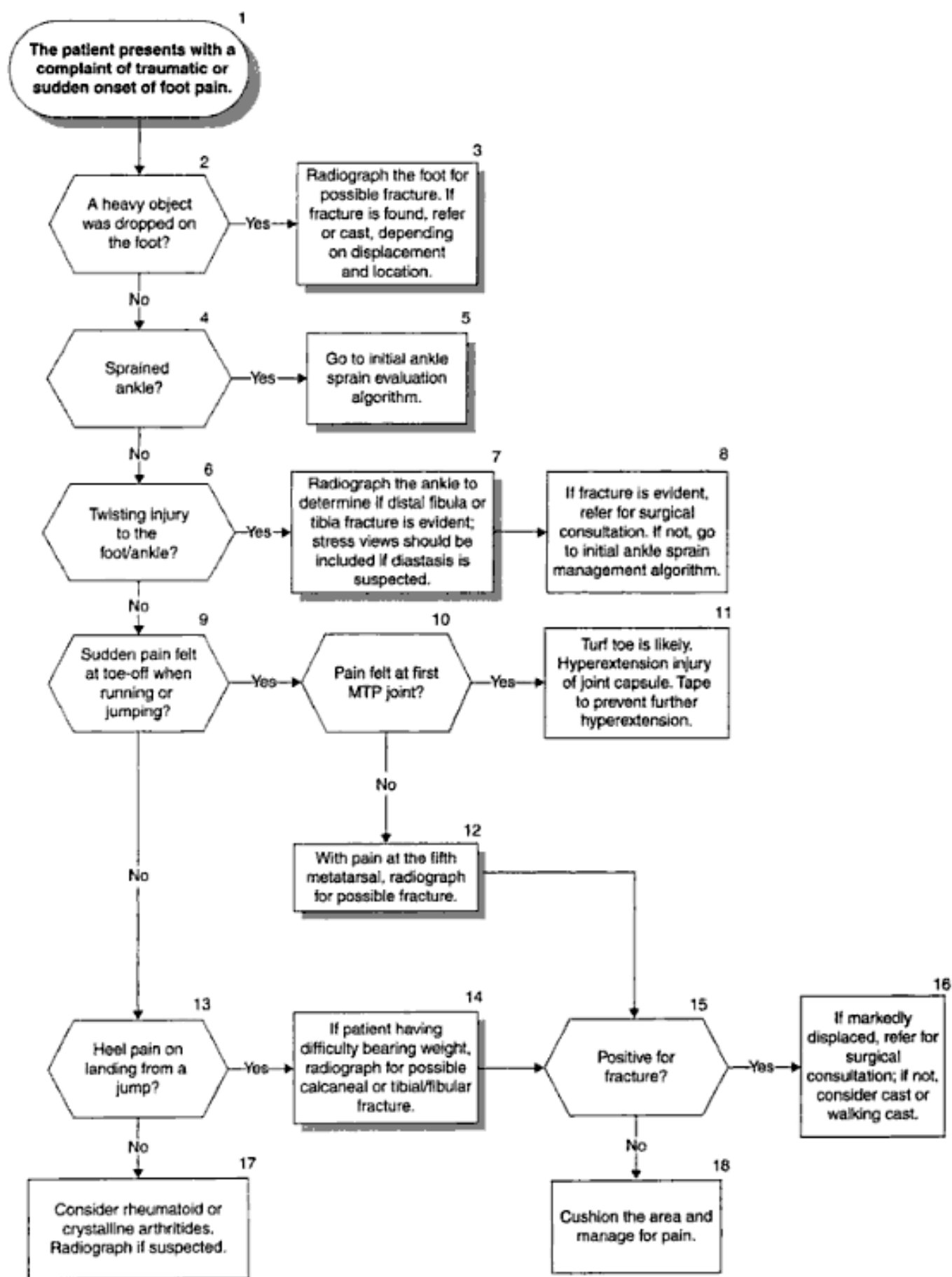
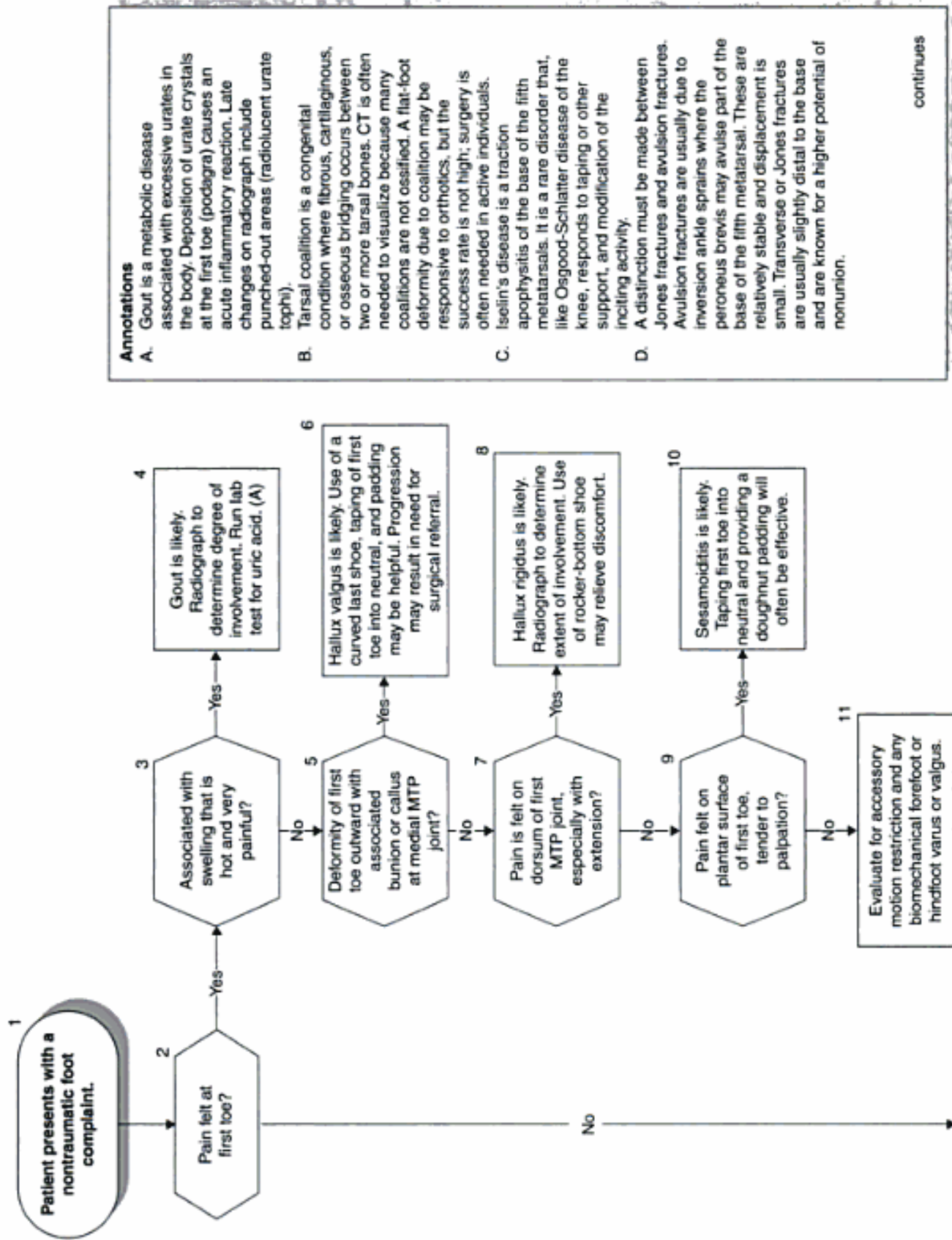


Figure 14-9 Nontraumatic or Insidious Onset of Foot Pain—Algorithm



Annotations

- A. Gout is a metabolic disease associated with excessive urates in the body. Deposition of urate crystals at the first toe (podagra) causes an acute inflammatory reaction. Late changes on radiograph include punched-out areas (radiolucent urate tophi).
- B. Tarsal coalition is a congenital condition where fibrous, cartilaginous, or osseous bridging occurs between two or more tarsal bones. CT is often needed to visualize because many coalitions are not ossified. A flat-foot deformity due to coalition may be responsive to orthotics, but the success rate is not high; surgery is often needed in active individuals.
- C. Iselin's disease is a traction apophysitis of the base of the fifth metatarsals. It is a rare disorder that, like Osgood-Schlatter disease of the knee, responds to taping or other support, and modification of the inciting activity.
- D. A distinction must be made between Jones fractures and avulsion fractures. Avulsion fractures are usually due to inversion ankle sprains where the peroneus brevis may avulse part of the base of the fifth metatarsal. These are relatively stable and displacement is small. Transverse or Jones fractures are usually slightly distal to the base and are known for a higher potential of nonunion.

continues

Figure 14-9 Nontraumatic or Insidious Onset of Foot Pain—Algorithm (continued)

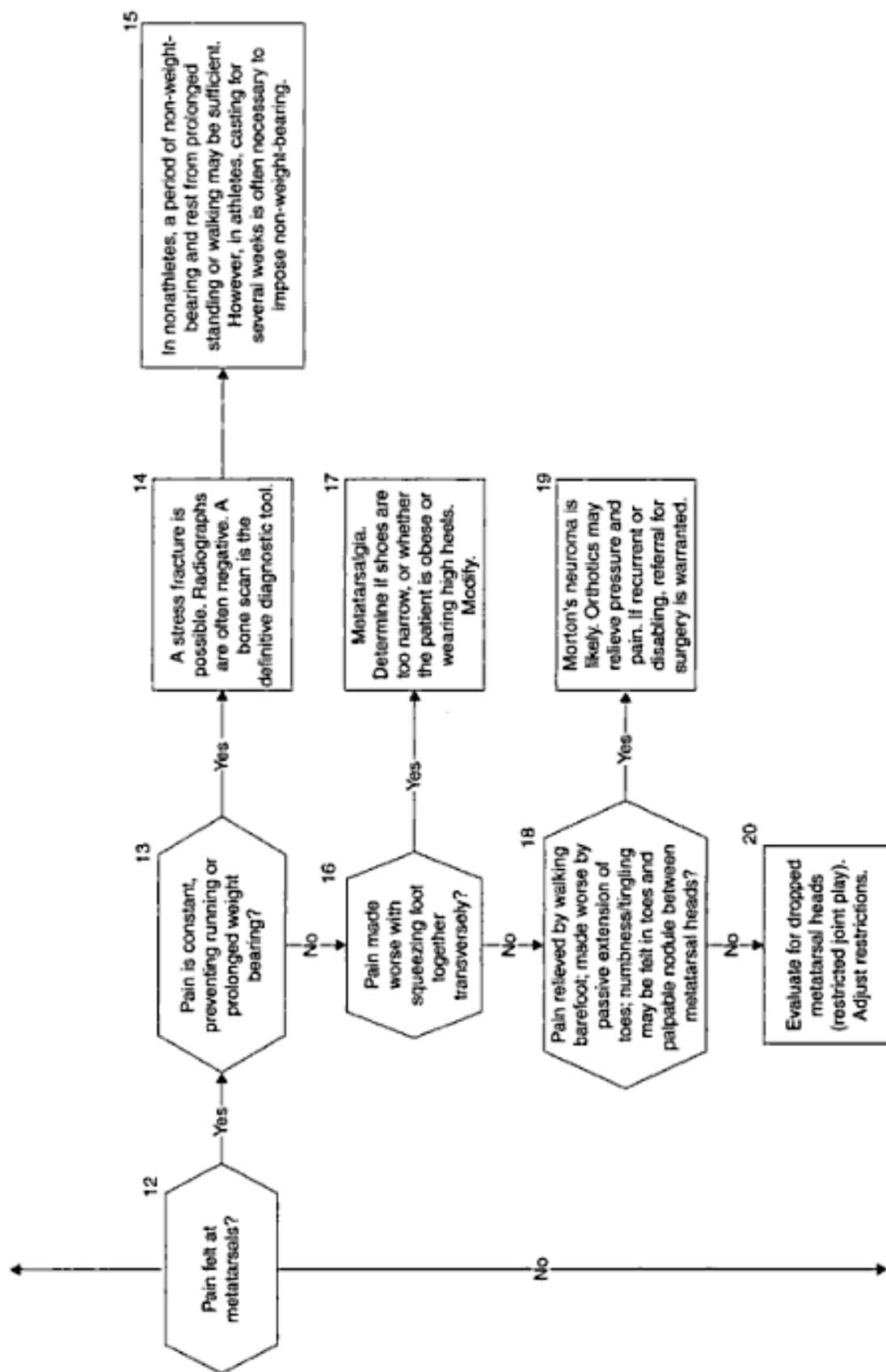


Figure 14-9 (continued)

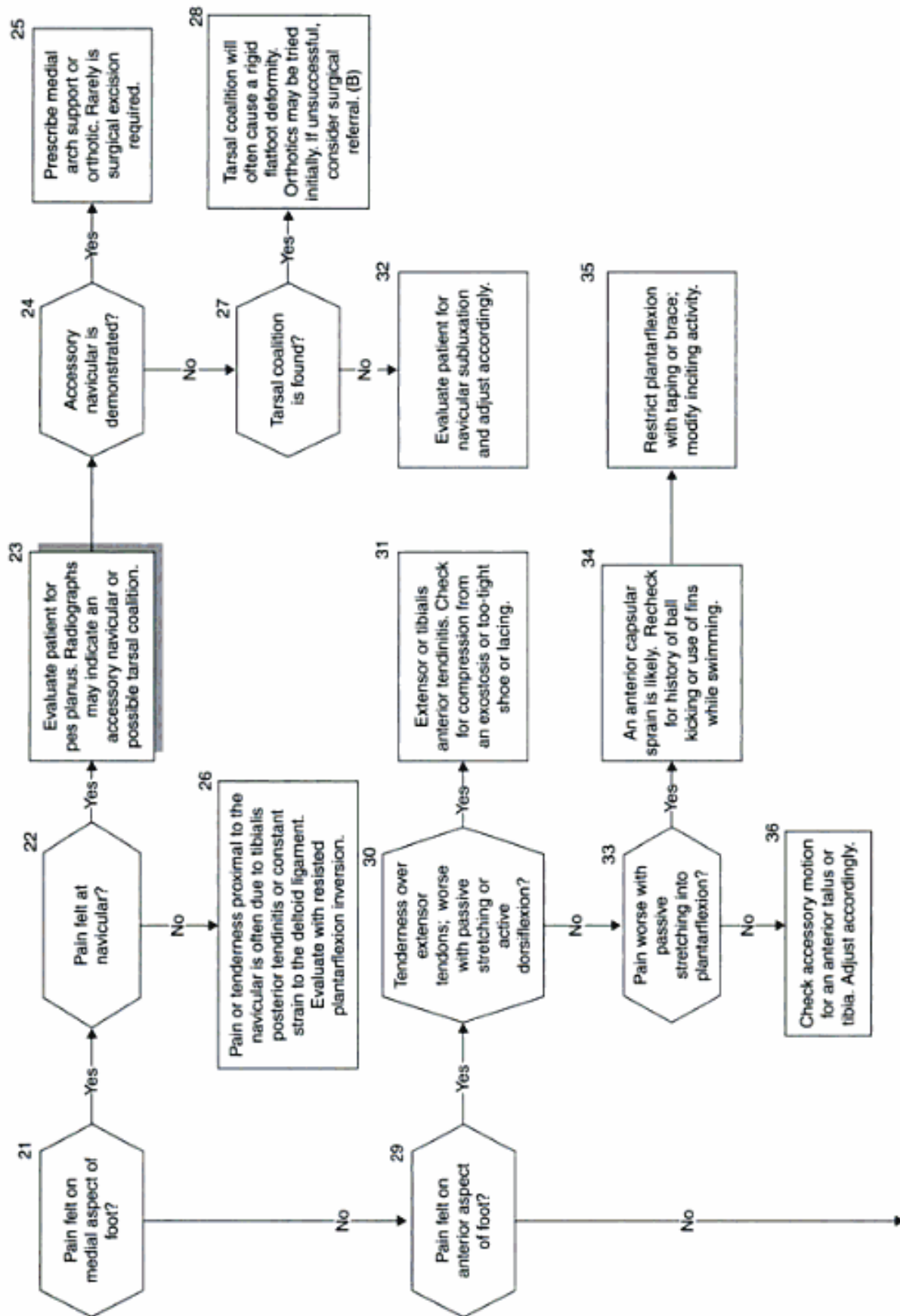


Figure 14-9 Nontraumatic or Insidious Onset of Foot Pain—Algorithm (continued)

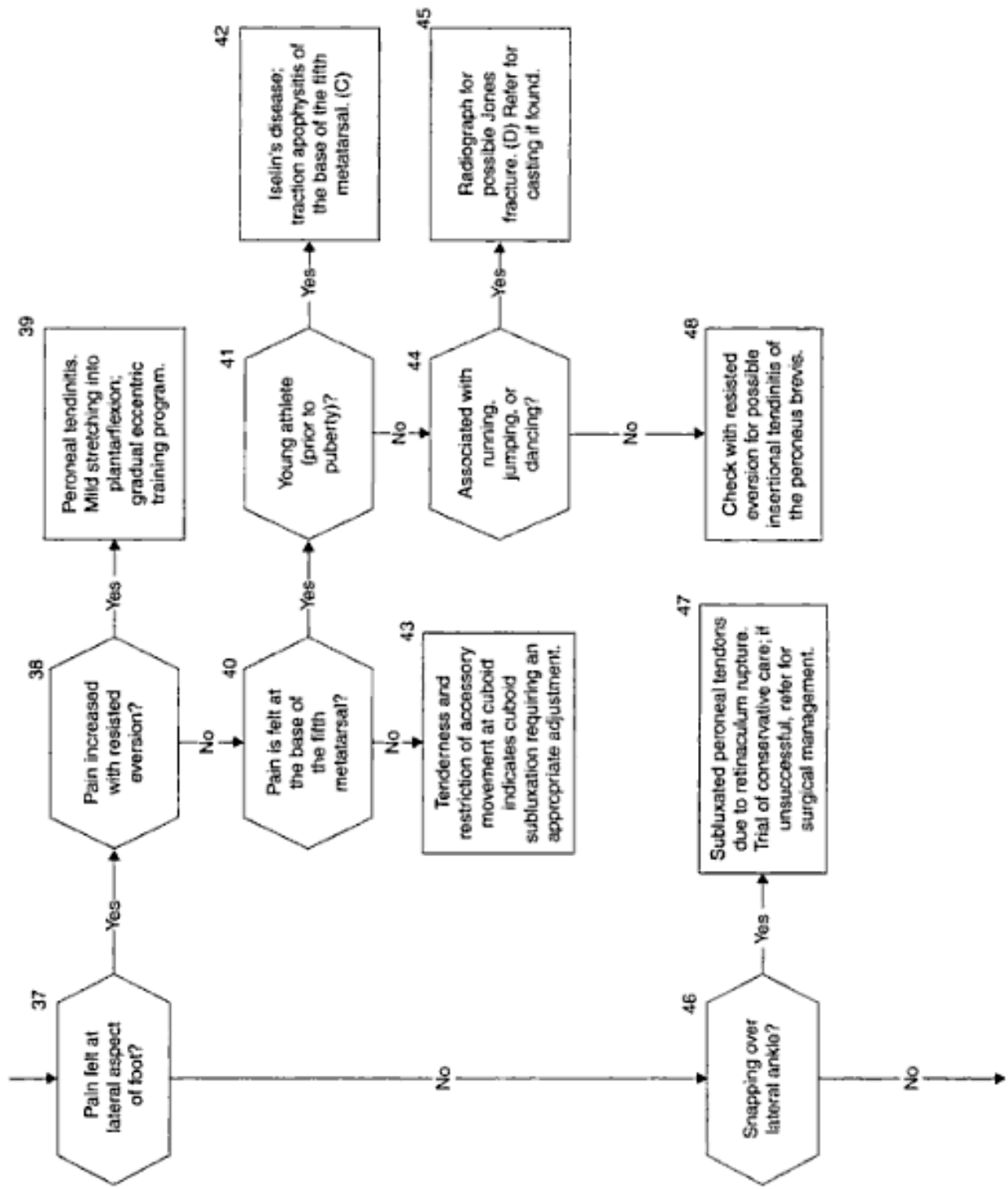


Figure 14-9 (continued)

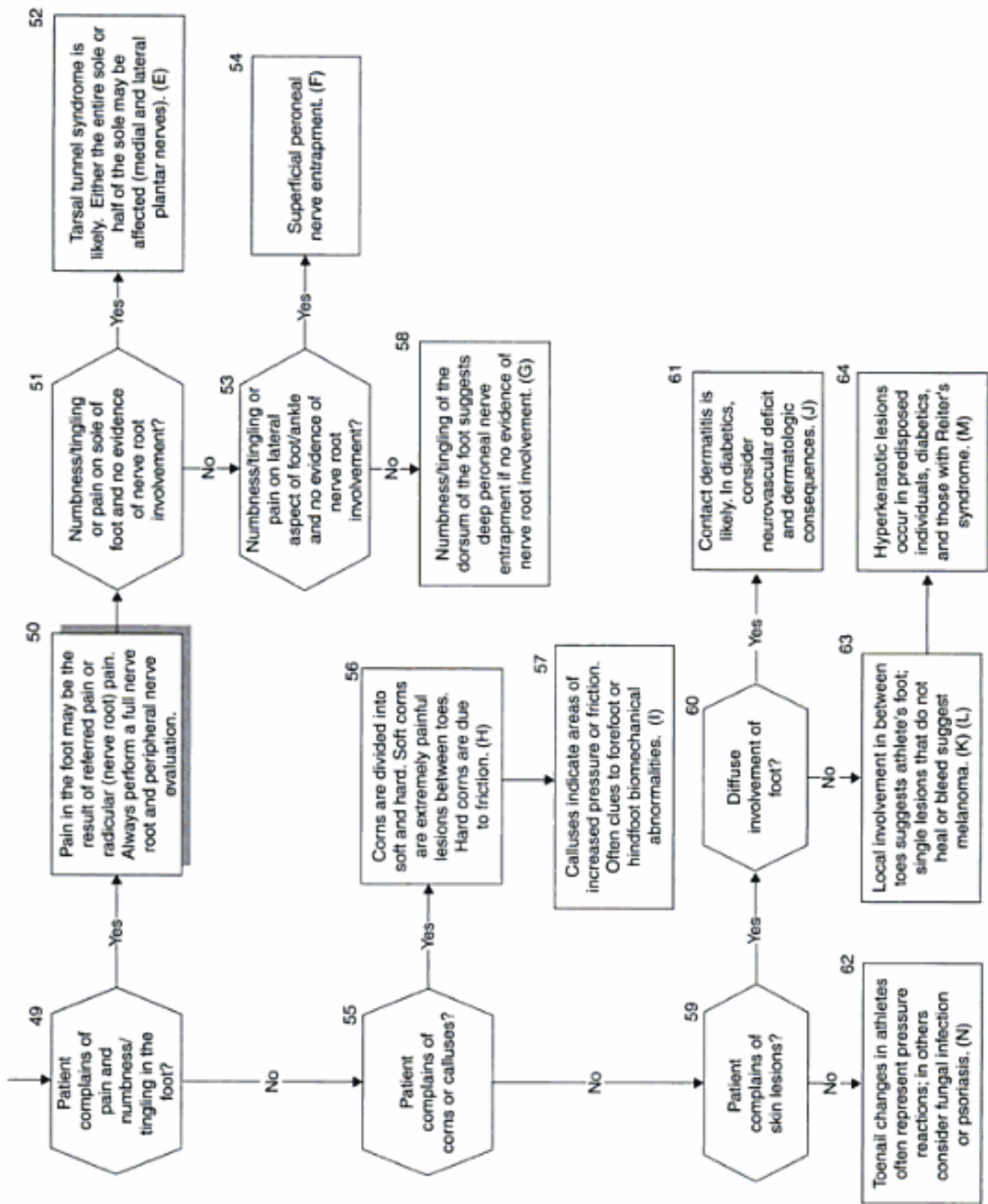


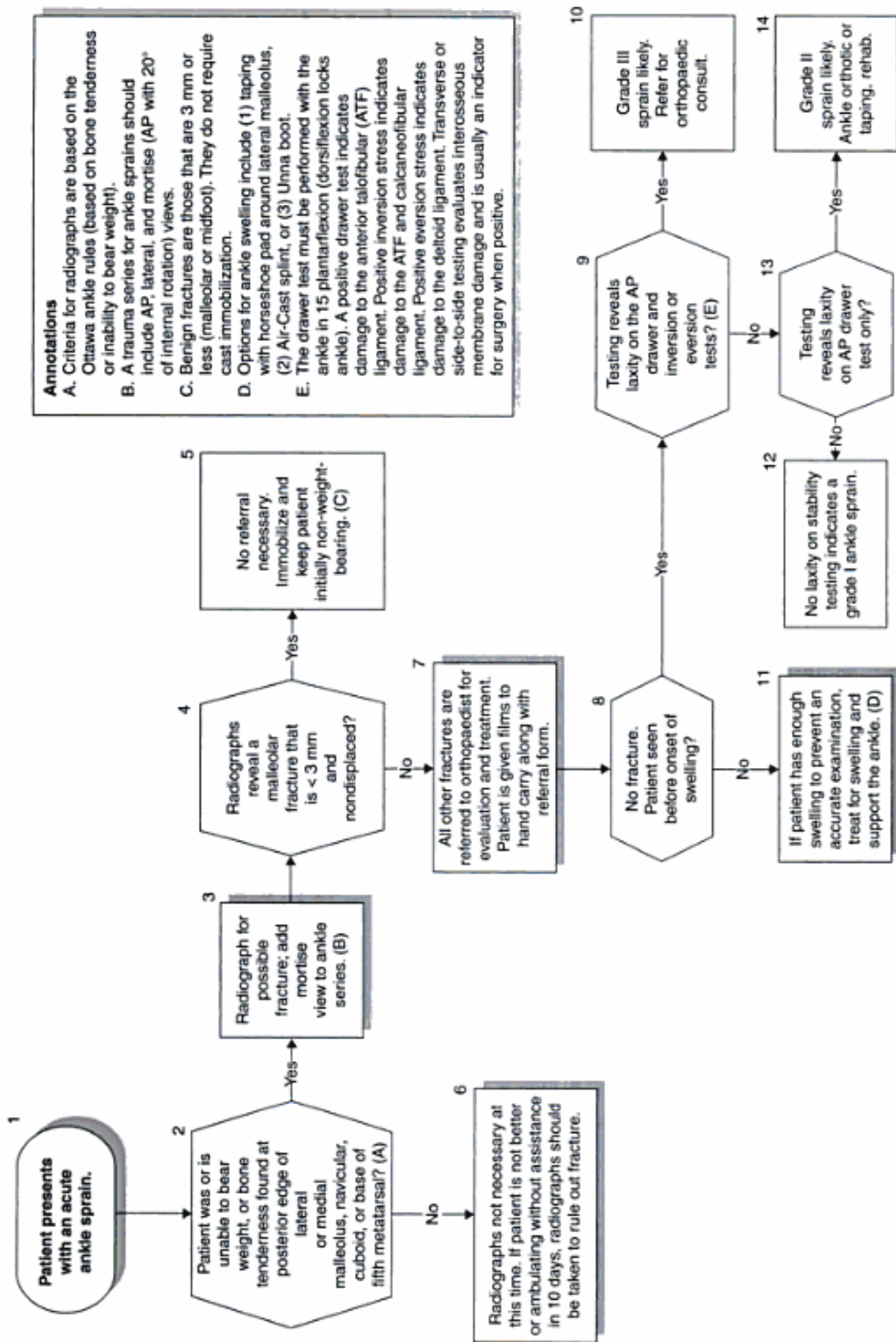
Figure 14-9 Nontraumatic or Insidious Onset of Foot Pain—Algorithm (continued)

Annotations continued

- E. Tarsal tunnel syndrome may be due to trauma or hyperpronation. Orthotic management with appropriate foot manipulation is usually effective. However, surgical decompression may be necessary with causes other than pronation.
- F. Involvement of the superficial peroneal nerve is usually due to ankle sprains. If orthotic support is ineffective, refer for lidocaine/cortisone injection.
- G. The deep peroneal nerve may be compressed by tightly laced shoes or talar osteophytes. Shoe modification may be effective. Talar osteophytes may need surgical excision.
- H. Hard corns are seen with hammer toes and claw toes; especially at the fifth toe. Treatment involves paring and padding the area, and shoe modification.
- I. Calluses under the first metatarsal head is found with forefoot valgus; under the second, third, and fourth with forefoot varus.
- J. The diabetic foot is prone to vascular insufficiency and infection. Neurologic compromise often eliminates the painful warning needed to alert the patient to a problem.
- K. Athlete's foot is a fungal infection that occurs mainly in the lateral toeweb. Made worse by toe approximation from shoes, warm weather, and activity. Try OTC drugs first. Keep feet dry and use shoes that can aerate.
- L. Malignant melanoma is rare; however, any bleeding lesion or nonhealing lesion requires dermatologic referral.
- M. Hyperkeratosis may be hereditary or acquired. Fissures may develop and predispose the diabetic to infection. Fissures may be glued together (Krazy glue); general treatment is with topical keratolytics and buffing away thick layers.
- N. When the shoe box is too tight, pressure on toenails may result in "black" toenails or other changes. Psoriatic involvement usually occurs on all the toes. Fungal infection usually occurs with "skipped" normal nails.

Key: CT, computed tomography; OTC, over-the-counter.

Figure 14-10 Initial Ankle Sprain Evaluation—Algorithm



Annotations

- A. Criteria for radiographs are based on the Ottawa ankle rules (based on bone tenderness or inability to bear weight).
- B. A trauma series for ankle sprains should include AP, lateral, and mortise (AP with 20° of internal rotation) views.
- C. Benign fractures are those that are 3 mm or less (malleolar or midfoot). They do not require cast immobilization.
- D. Options for ankle swelling include (1) taping with horseshoe pad around lateral malleolus, (2) Air-Cast splint, or (3) Unna boot.
- E. The drawer test must be performed with the ankle in 15 plantarflexion (dorsiflexion locks ankle). A positive drawer test indicates damage to the anterior talofibular (ATF) ligament. Positive inversion stress indicates damage to the ATF and calcaneofibular ligament. Positive eversion stress indicates damage to the deltoid ligament. Transverse or side-to-side testing evaluates interosseous membrane damage and is usually an indicator for surgery when positive.