



FIGURE 2 • Left hand, first CMC joint injection.

4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle down into the joint.
6. Inject the steroid solution as a bolus into the joint. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to move his or her thumb through its full range of motion. This movement distributes the steroid solution throughout the CMC joint.
10. Reexamine the CMC joint in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive use of the thumb over the next 2 weeks.
- Consider the use of a thumb spica splint.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20600—Injection of small joint

PEARLS

- Applying traction to the thumb in a distal direction as shown in the photo will help open up the joint to accommodate the needle.



A video clip of thumb CMC joint injection can be found on the book's web site.

Metacarpophalangeal Joint

Metacarpophalangeal (MCP) joints of the hand are uncommon injection sites for most primary care clinicians. An MCP joint may become inflamed with osteoarthritis, inflammatory arthritis, or septic arthritis.

A small diameter needle is appropriate as this technique is only used to inject steroid solution into the MCP joint. There should not be a significant joint effusion to remove in the absence of infection.

Indications	ICD-9 Code	ICD-10 Code
Pain of MCP joint	719.44	M25.54
Sprain of MCP joint	842.12	S63.6
MCP joint arthritis, unspecified	716.94	M13.94
MCP joint arthrosis, primary	715.14	M19.04
MCP joint arthrosis, post-traumatic	716.14	M19.14
MCP joint arthrosis, secondary	715.24	M19.24

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Supine on the examination table with the head of the bed elevated 30 degrees.
- The affected wrist is held in a neutral position. The wrist is pronated and the patient is asked to make a loose fist.
- The hand is supported with the placement of chucks pads or towels.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient supine on the examination table, the clinician stands anterior to the affected hand.
2. Locate the affected MCP joint.
3. The point of entry is located directly over the MCP joint, just radial or ulnar to the extensor tendon.
4. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
5. After the landmarks are identified, the patient should not move the hand or fingers.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

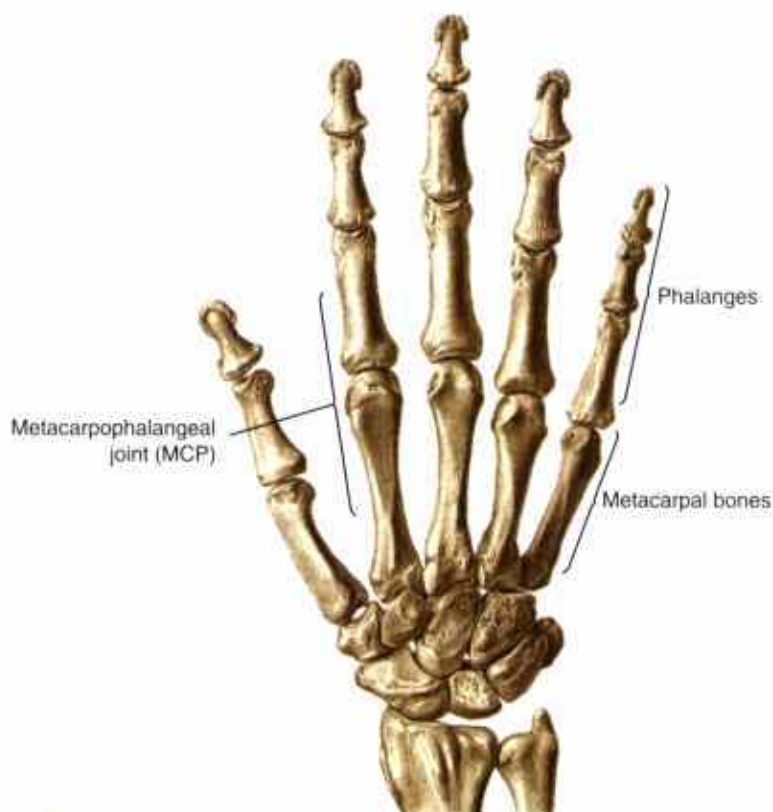


FIGURE 1 • Dorsal aspect of the right hand. (Adapted from Sobotta: Atlas der Anatomie des Menschen © Elsevier GmbH, Urban & Fischer Verlag München.)

EQUIPMENT

- 3-mL syringe
- 25-gauge, 5/8 in. needle
- 0.5 mL of 1% lidocaine without epinephrine
- 0.5 mL of the steroid solution (20 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe perpendicular to the skin with the needle tip directed posteriorly toward the first MCP joint.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle down into the joint.



FIGURE 2 • Metacarpophalangeal joint injection.

6. Inject the steroid solution as a bolus into the joint. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to move his or her MCP joint through its full range of motion. This movement distributes the steroid solution throughout the joint.
10. Reexamine the MCP joint in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive use of the affected hand and finger over the next 2 weeks.
- Consider the use of a volar wrist splint.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20600—Injection of small joint

PEARLS

- Approach the MCP joint dorsally, but avoid inserting the needle through the extensor tendon.
- Avoid the development of a subdermal wheal during injection. This indicates the deposition of steroid solution that may cause localized skin atrophy and hypopigmentation.

Trigger Finger

Stenosing tenosynovitis, or trigger finger, is the term given for tendinosis of the flexor tendons of the digits. This tendonopathy with nodule formation usually occurs as a result of repetitive compression injury. It is more common in patients with diabetes and rheumatoid arthritis. In this disorder, the nodule forms where the flexor tendon passes over the metacarpal head of a finger or, less commonly, the CMC joint of the thumb. With flexion of the digit, the nodule passes over the proximal edge of the first annular (A-1) pulley of the tendon sheath and becomes entrapped. This is a fairly common procedure performed by primary care providers. A discrete injection of corticosteroid at the nodule offers an effective nonsurgical treatment of this condition.

Indications	ICD-9 Code	ICD-10 Code
Trigger finger	727.03	M65.3

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Supine on the examination table with the head of the bed elevated 30 degrees.
- The affected wrist is held in a neutral position.
- The wrist is fully supinated.
- The hand is supported with the placement of chucks pads or towels.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient supine on the examination table, the clinician stands anterior to the affected hand.
2. Identify and mark the tender nodule located in the finger's flexor tendon and its sheath. This should be located over the metatarsal heads.
3. Mark a point 1 cm distal to the nodule.
4. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
5. After the landmarks are identified, the patient should not move the hand or the fingers.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

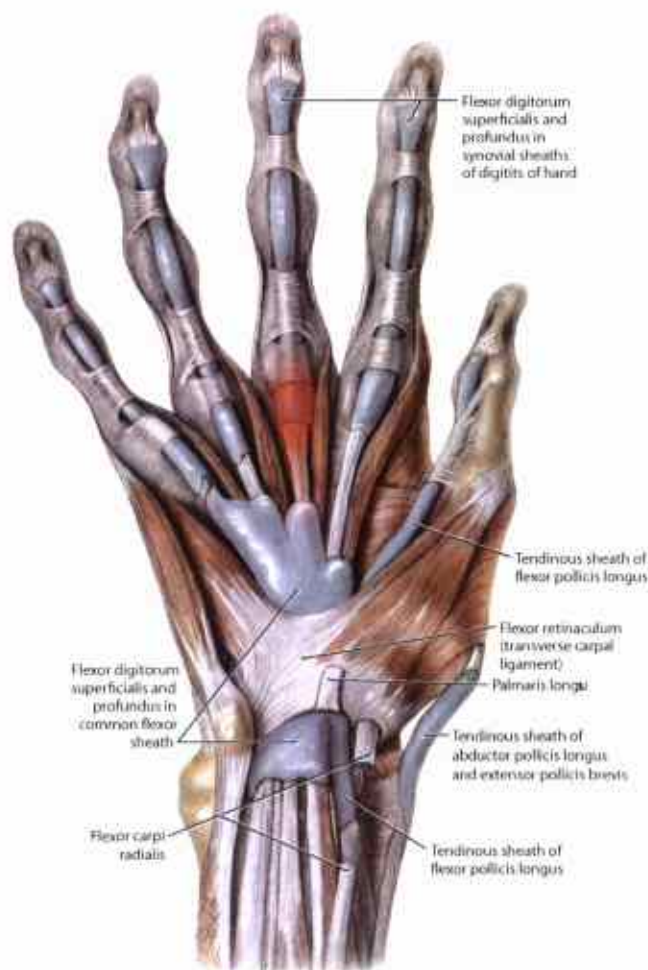


FIGURE 1 • Tendinous (synovial) sheaths of long flexor tendons of the digits. An inflamed nodule is shown in the flexor tendon of the long finger. (Adapted from Agur AMR, Dalley AF. *Grant's Atlas of Anatomy*, 12th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)

EQUIPMENT

- 3-mL syringe
- 25-gauge, 5/8 in. needle
- 0.5 mL of 1% lidocaine without epinephrine
- 0.5 mL of the steroid solution (20 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe at a 45 degree angle to the skin with the needle tip directed proximally.



FIGURE 2 ● Trigger finger injection.

4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle until the needle tip is located at the tendon nodule. Back up the needle 1 to 2 mm.
6. Slowly inject the steroid solution around the nodule into the tendon sheath. A subtle bulge in the shape of a sausage may develop in the tendon sheath.
7. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
8. Following injection of the corticosteroid solution, withdraw the needle.
9. Apply a sterile adhesive bandage.
10. Instruct the patient to move his or her finger through its full range of motion. This movement distributes the steroid solution throughout the tenosynovial sheath.
11. Reexamine the hand in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive repetitive handgrip activities over the next 2 weeks.
- NSAIDs, ice, heat, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20550—Injection of single tendon sheath

PEARLS

- The flexor tendon nodule may be approached from either a distal or a proximal direction. It however is easier to perform this injection in a distal-to-proximal direction.



A video clip showing a trigger finger injection can be found on the book's web site.

Muscular Trigger Points

Patients present frequently to primary care physicians with muscular trigger points. Trigger points are focal areas of muscular ischemia, spasm, and inflammation that can occur anywhere, but usually involve the back muscles. They occur most commonly in patients with fibromyalgia/fibrositis. Although the administration of local corticosteroid preparation is common, “dry needling” of the lesions or injection of anesthetic alone has also shown efficacy.

Indications	ICD-9 Code	ICD-10 Code
Fibromyalgia/Fibromyositis	729.1	M79.7
Myalgia/Myositis	729.1	M79.1
Spinal enthesopathy	720.1	M46.0
Cervicalgia	723.1	M54.2
Rheumatism unspecified	729.0	M79.0
Tension headache	307.81	G44.2

PATIENT POSITION

- Lying prone on the examination table.

LANDMARKS

1. With the patient lying prone on the examination table, the clinician stands lateral to the affected muscular trigger point(s).
2. Identify tender nodules that are usually located in the rhomboid or trapezius muscles.
3. The injection point is located directly over the nodule(s).
4. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
5. After the landmarks are identified, the patient should not move.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1 in. needle
- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads

- Sterile gauze pads
- Sterile adhesive bandage

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. With the nondominant hand, firmly press on either side of the nodule with the index and long fingers in order to “fix” the position of the muscular nodule.
4. Position the needle and syringe perpendicular to the skin with the tip of the needle directed toward the trigger point.
5. Using the no-touch technique, introduce the needle at the insertion site (Fig. 1).
6. Advance the needle carefully into the nodule until the needle tip is located in the center of the trigger point.
7. Inject the steroid solution as a bolus slowly into the nodule. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
8. Use the fanning technique to inject the nodule(s) in multiple locations.
9. Following injection of the corticosteroid solution, withdraw the needle.
10. Apply a sterile adhesive bandage.
11. Massage each of the injection sites to distribute the steroid solution throughout the trigger point(s).
12. Reexamine the area of involvement in 5 min to confirm pain relief.

AFTERCARE

- NSAIDs, ice, heat, and/or physical therapy as indicated.
- Treatment of the underlying condition.
- Consider follow-up examination in 2 weeks.

CPT codes

- 20552—Injection of trigger point(s) in one to two muscle groups
20553—Injection of trigger point(s) in three + muscle groups.



FIGURE 1 • Muscular trigger point injection.

These codes are used only once each session, regardless of the number of injections performed.

PEARLS

- If the nodule or area of tenderness is large, use the fanning technique to inject in multiple locations.
- Avoid injecting the nodule so deeply so as to risk pneumothorax.



A video clip showing a muscular trigger point injection can be found on the book's web site.

Suprascapular Neuritis

Patients uncommonly present to the primary care office for evaluation of suprascapular neuritis. It is an underdiagnosed disorder that is the result of an entrapment neuropathy. The suprascapular nerve is vulnerable as it passes through the suprascapular notch and again at the spinoglenoid notch. Entrapment at the former leads to weakness of the supraspinatus and infraspinatus muscles as well as vague posterior unilateral shoulder pain that is described as a deep, dull, aching discomfort that is exacerbated with overhead throwing motions. Entrapment at the latter causes weakness of the infraspinatus muscle and is generally painless. Definitive treatment is surgical decompression, but a nerve block at the suprascapular notch can be used to manage this condition as well as perioperative shoulder pain.

Indications	ICD-9 Code	ICD-10 Code
Neuritis, unspecified	729.2	M79.2

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Sitting on an exam stool, with arms resting on the exam table and neck in a neutral position.

LANDMARKS

1. With the patient sitting on an exam stool, the clinician stands posterior to the affected scapula.
2. Find the midpoint between the tip of the acromion and the medial aspect of the spine of the scapula and mark it with an ink pen.
3. Find the coracoid process and mark it with an ink pen.
4. Draw a line between these two points and mark the midposition of this line.
5. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
6. After the landmarks are identified, the patient should not move.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1-1/2 in. needle

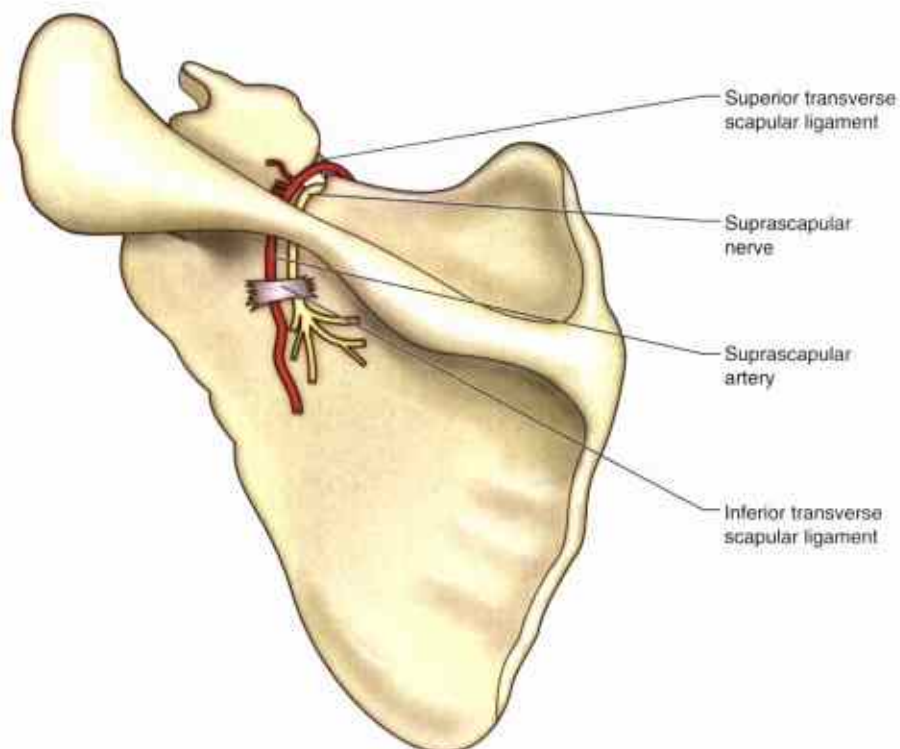


FIGURE 1 • Nerves and vessels of posterior scapular region (left).

- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile, adhesive bandage

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe perpendicular to the skin with the tip of the needle directed toward the suprascapular notch.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle completely through the supraspinatus muscle and touch the bone of the suprascapular fossa. Back up the needle 1 to 2 mm.
6. Aspirate to make sure that the needle tip is not in the suprascapular artery. If there is no blood return, then inject the steroid solution as a bolus into the muscle around the suprascapular nerve. The injected solution should flow smoothly into this area. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.



FIGURE 2 • Suprascapular neuritis injection.

9. Instruct the patient to move his or her shoulder through its full range of motion in external rotation and abduction. This movement distributes the steroid solution throughout the suprascapular fossa.
10. Reexamine the shoulder and scapula in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive abduction, external rotation, and overhead throwing motions of the shoulder over the next 2 weeks.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 64450—Injection, nerve block, therapeutic, other peripheral nerve or branch

PEARLS

- Always aspirate before injecting to make sure that the needle tip is not in the suprascapular artery.
- If there is no significant improvement in pain or weakness and the diagnosis has been confirmed by EMG, then refer the patient for surgical decompression of the superior or inferior transverse scapular ligaments.



A video clip showing a suprascapular neuritis injection can be found on the book's web site.

Scapulothoracic Syndrome

Scapulothoracic syndrome is a relatively uncommon problem. It usually affects middle-aged persons whose occupations require them to extend their arms for prolonged periods of time. This can also occur as a complication from preexisting shoulder lesions or in disabled patients who are unable to control the scapulothoracic relationship. The abnormal positioning causes a bursitis because of abnormal biomechanics of the scapula and the underlying posterior chest wall. Scapulothoracic syndrome is characterized by pain that may be localized to the medial superior border of the scapula or may radiate to the neck and shoulder. Treatment includes activity modification, physical therapy, NSAIDs, and injection of corticosteroids in the region of the medial superior scapular border.

Indications	ICD-9 Code	ICD-10 Code
Bursitis of shoulder	727.3	M75.5
Specified injury to scapula	719.48	S49.8
Unspecified injury to scapula	959.2	S49.9
Other specified arthropathy of scapula	716.81	M19.81
Unspecified arthropathy of scapula	716.91	M19.91

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Sitting erect on an exam stool, with ipsilateral hand on the contralateral shoulder.

LANDMARKS

1. With the patient seated on the exam stool, the clinician stands or sits behind the affected scapula.
2. Palpate to determine the area of most intense pain. This is usually along the medial superior scapular border of the scapula. Mark this site with an ink pen.
3. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
4. After the landmarks are identified, the patient should not move.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

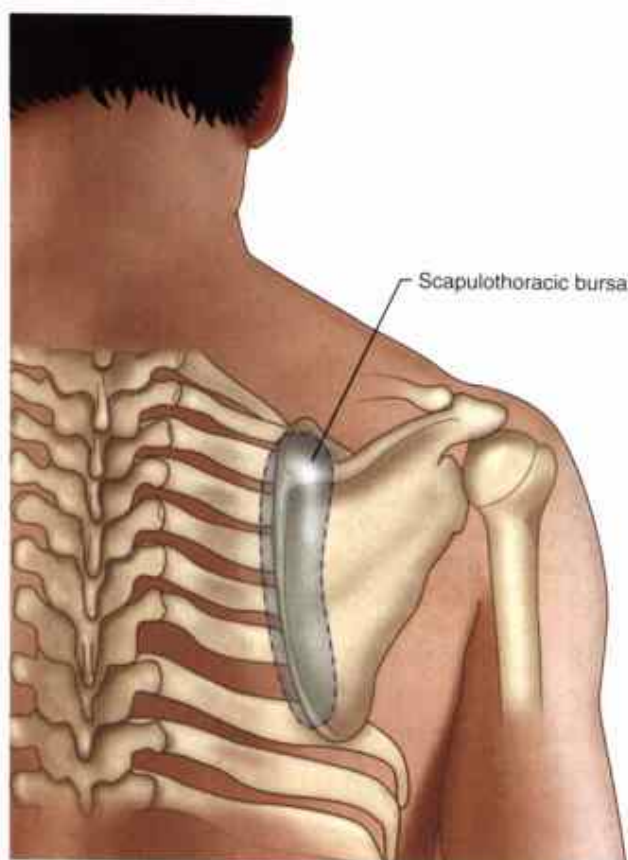


FIGURE 1 • Bursitis of the shoulder.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1-1/2 in. needle
- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe at a 20-degree angle to the skin with the tip of the needle directed toward the area of tenderness in the scapulothoracic space.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle into the point of maximal tenderness in a plane parallel to the undersurface of the scapula, not toward the chest wall.
6. Inject half of the steroid solution as a bolus at the point of maximal tenderness and the rest in the scapulothoracic space. The injected solution should flow smoothly



FIGURE 2 • Scapulothoracic injection.

into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.

7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to move his or her shoulder through its full range of motion. This movement distributes the steroid solution throughout the area.
10. Reexamine the scapula in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive abduction, reaching in front, pushing, pulling, and overhead throwing motions of the shoulder over the next 2 weeks.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20610—Injection of major joint or bursa

PEARLS

- Avoid injecting the area so deeply so as to risk pneumothorax.



A video clip showing a scapulothoracic injection can be found on the book's web site.

Sacroiliac Joint

Inflammation of the sacroiliac joints is a common condition seen by primary care physicians. Sacroiliitis may be caused by acute or repetitive traumata, spondyloarthropathies, degenerative arthritis, pregnancy, and rarely by an infection of the joint. The sacroiliac joint is a large joint that is easily identified, but can be challenging to access without imaging to guide the injection.

Indications	ICD-9 Code	ICD-10 Code
SI pain	724.6	M25.55
SI sprain	846.1	S33.6
Sacroiliitis	720.2	M46.1
SI joint arthritis—unspecified	716.95	M13.9
SI joint osteoarthritis—primary	715.95	M19.9

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Standing up with back in 30 degrees of forward flexion and hands/arms supported by the examination table.

LANDMARKS

- With the patient standing up with back in forward flexion, the clinician stands directly behind the patient.
- Identify tenderness over the sacroiliac joint. Mark it with ink.
- At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

EQUIPMENT

- 10-mL syringe
- 25-gauge, 1-1/2 or 3-1/2 in. needle
- 1 mL of 1% lidocaine without epinephrine
- 8 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage

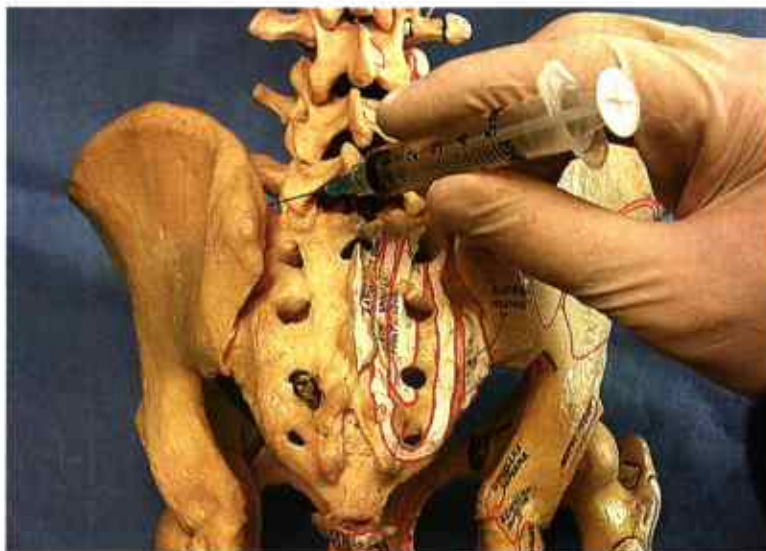


FIGURE 1 ● Sacroiliac anatomy—note the angle of insertion.



FIGURE 2 ● Sacroiliac joint injection.

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle at a 30-degree angle laterally, relative to the sagittal plane, and 15 degrees inferiorly, relative to the transverse plane, with the tip of the needle directed toward the sacroiliac joint.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle slowly and carefully into the SI joint.
6. Inject the steroid solution as a bolus into the sacroiliac joint. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.

7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Reexamine the sacroiliac joint in 5 min to confirm pain relief.

AFTERCARE

- NSAIDs, ice, and/or physical therapy as indicated.
- Treatment of the underlying condition.
- Consider follow-up examination in 2 weeks.

CPT code: 20610—Arthrocentesis, aspiration, and/or injection of major joint or bursa

PEARLS

- The successful placement of this injection may need ultrasound or fluoroscopic guidance.



A video clip showing a sacroiliac joint injection can be found on the book's web site.

Hip Joint—Anterior Approach

Hip joint pain from arthritis or capsulitis is a common condition seen in primary care medical practice. This often occurs as a result of osteoarthritis, posttraumatic arthritis, and rheumatoid arthritis. Patients typically represent the middle-aged and older population. Septic arthritis in children is fortunately now a rare occurrence since the development of the *Haemophilus influenzae* and pneumococcal vaccines. Because of the joint's perceived inaccessibility, fear of vascular puncture, and the remote risk of avascular necrosis of the head of the femur, primary care physicians rarely perform aspiration and corticosteroid injections of the hip joint. In fact, access to this joint is straightforward. Furthermore, the success of this injection is significantly increased with the use of ultrasound imaging.

Indications	ICD-9 Code	ICD-10 Code
Hip pain	719.45	M25.55
Hip capsulitis	726.5	M16.1
Hip arthritis, unspecified	716.95	M13.95
Hip arthrosis, primary	715.15	M19.05
Hip arthrosis, posttraumatic	716.15	M19.15
Hip arthrosis, secondary	715.25	M19.25

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Supine on the examination table with the head of the bed slightly elevated.

LANDMARKS

1. With the patient supine on the examination table, the clinician stands lateral to the affected hip.
2. Find the inguinal ligament and then palpate the femoral artery 3 cm distal to it. From that point, move 3 cm laterally and mark that spot which is directly over the hip joint.
3. (Optional) Use ultrasound to image the hip joint.
4. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
5. After the landmarks are identified, the patient should not move the hip.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

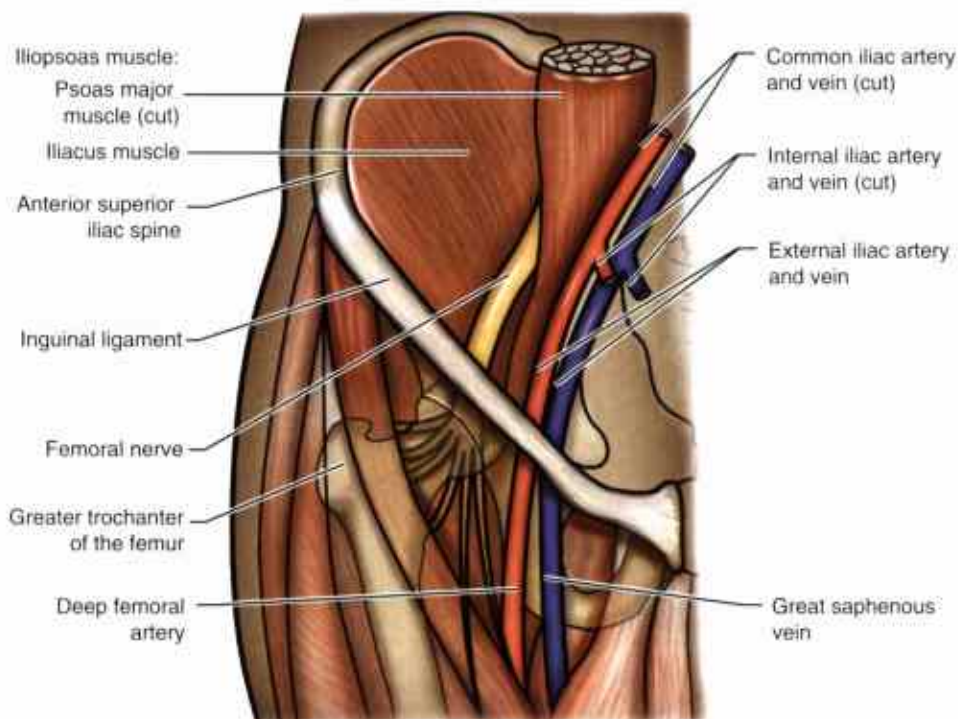


FIGURE 1 • Right anterior hip and femoral triangle.

EQUIPMENT

- 20-mL syringe—for aspiration
- 3-mL syringe—for the injection of corticosteroid/local anesthetic mixture
- 25-gauge, 1-1/2 in. needle in thin individuals. Otherwise, use a 25-gauge, 3-1/2 in. needle (for injections only)
- 20-gauge, 1-1/2 in. needle in thin individuals. Otherwise, use a 20-gauge, 3-1/2 in. needle (for aspirations and injections)
- 8 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. (Optional) Use an ultrasound to image the hip joint using an adjacent, but separate acoustic window (Figs. 2 and 3). This allows imaging separate from the injection site so that there is no contamination from the ultrasound gel. Alternatively, the entire site may be prepped in an aseptic manner and sterile ultrasound gel utilized.
2. Prep the insertion site with alcohol followed by the povidone-iodine pads.
3. Achieve good local anesthesia by using topical vapocoolant spray.
4. Position the needle and syringe perpendicular to the skin with the tip of the needle directed posteriorly toward the hip joint.



FIGURE 2 • Right hip ultrasound to determine the needle placement.

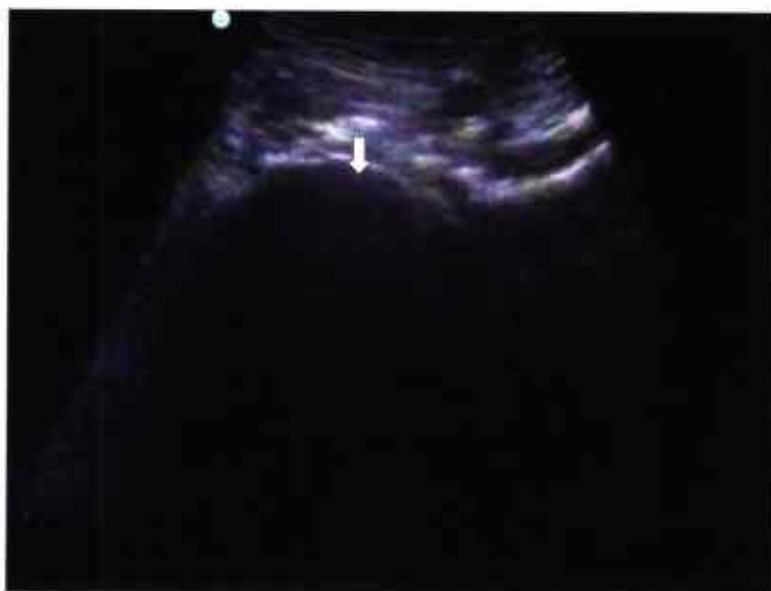


FIGURE 3 • Right hip ultrasound. Note the cortex of the head of the femur (indicated by arrow).

5. Using the no-touch technique, introduce the needle at the insertion site (Fig. 4).
6. Advance the needle toward the hip joint until the needle tip contacts the femoral head. Back up the needle 1 to 2 mm.
7. Inject the steroid solution as a bolus into the hip joint capsule. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
8. Following injection of the corticosteroid solution, withdraw the needle.
9. Apply a sterile adhesive bandage.



FIGURE 4 • Hip joint injection—anterior approach.

10. Instruct the patient to move his or her hip through its full range of motion. This movement distributes the steroid solution throughout the hip joint capsule.
11. Reexamine the hip in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive weight bearing and hip movement over the next 2 weeks.
- NSAIDs and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20610—Arthrocentesis, aspiration, and/or injection of the major joint or bursa

PEARLS

- In large individuals, ultrasound or X-ray fluoroscopic guidance of the spinal needle may be necessary.



A video clip showing a hip joint injection can be found on the book's web site.

Hip Joint—Lateral Approach

Hip joint pain from arthritis or capsulitis is a common condition seen in primary care medical practice. This often occurs as a result of osteoarthritis, posttraumatic arthritis, and rheumatoid arthritis. Patients typically represent the middle-aged and older population. Septic arthritis in children is fortunately now a rare occurrence since the development of the *Haemophilus influenzae* and pneumococcal vaccines. Because of the joint's perceived inaccessibility, fear of vascular puncture, and the remote risk of avascular necrosis of the head of the femur, primary care physicians rarely perform aspiration and corticosteroid injections of the hip joint. In fact, access to this joint is straightforward. Furthermore, the success of this injection is significantly increased with the use of ultrasound imaging.

Indications	ICD-9 Code	ICD-10 Code
Hip pain	719.45	M25.55
Hip capsulitis	726.5	M16.1
Hip arthritis, unspecified	716.95	M13.95
Hip arthrosis, primary	715.15	M19.05
Hip arthrosis, posttraumatic	716.15	M19.15
Hip arthrosis, secondary	715.25	M19.25

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Lying on the examination table in the lateral decubitus position on the unaffected hip.

LANDMARKS

1. With the patient lying on the examination table in the lateral decubitus position on the unaffected hip, the clinician stands posterior to the affected hip.
2. Identify the trochanter of the femur.
3. Mark a point 2 cm above the proximal aspect of the femoral trochanter.
4. (Optional) Use ultrasound to image the hip joint.
5. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
6. After the landmarks are identified, the patient should not move the hip.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

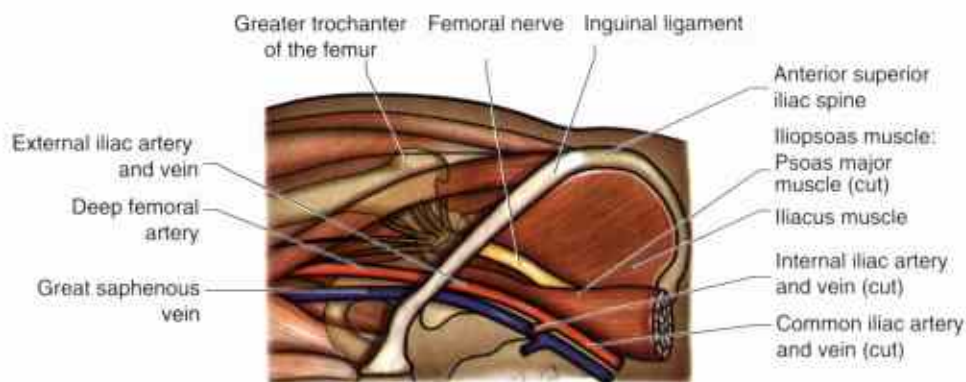


FIGURE 1 • Right anterior hip and femoral triangle.

EQUIPMENT

- 20-mL syringe—for aspiration
- 3-mL syringe—for the injection of corticosteroid/local anesthetic mixture
- 25-gauge, 1-1/2 in. needle in thin individuals. Otherwise, use a 25-gauge, 3-1/2 in. needle (for injections only)
- 20-gauge, 1-1/2 in. needle in thin individuals. Otherwise, use a 20-gauge, 3-1/2 in. needle (for aspirations and injections)
- 8 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. (Optional) Use an ultrasound to image the hip joint using an adjacent, but separate acoustic window. This allows imaging separate from the injection site so that there is no contamination from the ultrasound gel. Alternatively, the entire site may be prepped in an aseptic manner and sterile ultrasound gel utilized.
2. Prep the insertion site with alcohol followed by the povidone-iodine pads.
3. Achieve good local anesthesia by using topical vapocoolant spray.
4. Position the needle and syringe perpendicular to the skin with the tip of the needle directed medially toward the hip joint.
5. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
6. Advance the needle toward the hip joint until the needle tip contacts the femoral head. Back up the needle 1 to 2 mm.
7. Inject the steroid solution as a bolus into the hip joint capsule. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
8. Following injection of the corticosteroid solution, withdraw the needle.
9. Apply a sterile adhesive bandage.
10. Instruct the patient to move his or her hip through its full range of motion. This movement distributes the steroid solution throughout the hip joint capsule.
11. Reexamine the hip in 5 min to confirm pain relief.



FIGURE 2 • Hip joint injection—lateral approach.

AFTERCARE

- Avoid excessive weight bearing and hip movement over the next 2 weeks.
- NSAIDs and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20610—Arthrocentesis, aspiration, and/or injection of the major joint or bursa.

PEARLS

- In large individuals, ultrasound or X-ray fluoroscopic guidance of the spinal needle may be necessary.

Piriformis Syndrome

Patients uncommonly present to the primary care office for the evaluation of piriformis syndrome. This is an often overlooked disorder that occurs when abnormal tightness of the piriformis muscle compresses the sciatic nerve. It may occur following trauma, vigorous physical activity, developmental abnormalities, cerebral palsy, or after total hip arthroplasty. The diagnosis may be made by excluding other causes of sciatica, palpating an abnormally tight and tender piriformis muscle, and the demonstration of a positive figure four test. Treatment consists of physical therapy as well as optional injections of corticosteroid or botulinum toxin.

Indications	ICD-9 Code	ICD-10 Code
Injury to the sciatic nerve at thigh/hip	956.0	S74.0

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Standing up with the back in forward flexion and hands/arms supported by the examination table.
- Alternatively, this injection may be performed with the patient lying in the lateral decubitus position on the examination table.

LANDMARKS

1. With the patient standing up with the back in forward flexion and hands/arms supported by the examination table, the clinician stands directly behind the patient.
2. Locate the S2 median sacral crest and the lateral aspect of the femoral trochanter.
3. Identify the point of maximal tenderness over the piriformis muscle. This will be one third to one half of the distance from the sacral crest.
4. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
5. After the landmarks are identified, the patient should not move.

ANESTHESIA

- Local anesthesia of the skin with a topical vapocoolant spray may be used, but it is not necessary in most patients.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1-1/2 in. needle

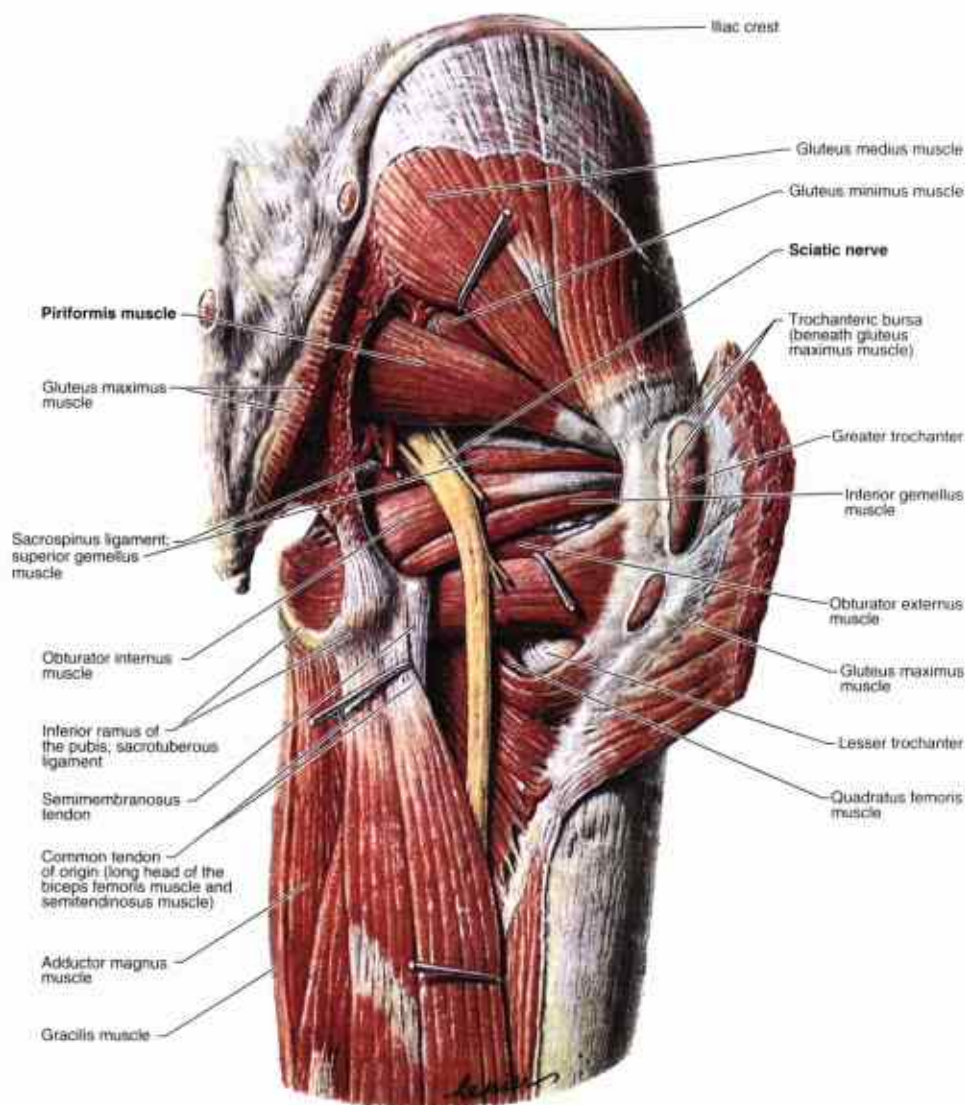


FIGURE 1 • Middle and deep gluteal muscles and sciatic nerve. (Adapted from Sobotta: Atlas der Anatomie des Menschen © Elsevier GmbH, Urban & Fischer Verlag München.)

- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using a topical vapocoolant spray.
3. Position the needle and syringe perpendicular to the skin with the tip of the needle directed anteriorly.



FIGURE 2 • Piriformis injection.

4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle until you feel that there is an increase in resistance in the muscle due to spasm and/or fibrosis. If the patient experiences sudden shooting pain down the leg, the sciatic nerve has been contacted. Withdraw the needle a few millimeter until there is no pain.
6. Aspirate to ensure no blood return and inject the volume of the syringe into the soft tissues. The injected solution should flow smoothly. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to move his or her hip through its full range of motion. This movement distributes the steroid solution throughout the course of the piriformis muscle.
10. Reexamine the piriformis muscle in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive use of the affected hip over the next 2 weeks.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20552—Injection of trigger point(s) in one to two muscle groups



A video clip showing a piriformis injection can be found on the book's web site.

Meralgia Paresthetica

Patients occasionally present to their primary care provider with burning pain, numbness, or paresthesias over the lateral aspect of the thigh. Meralgia paresthetica is most commonly caused by a compression neuropathy of the lateral femoral cutaneous nerve of the thigh as it passes through a tunnel formed by the lateral attachment of the inguinal ligament and the anterior superior iliac spine. It is more common in patients with diabetes. Percussion of the nerve over this tunnel just anterior to the anterior iliac spine or extending the thigh posteriorly may reproduce or worsen the symptoms. Treatment is directed at relieving the compression and usually consists of wearing looser clothing or losing weight. A corticosteroid injection at the site of compression often helps relieve the symptoms.

Indications

Neuritis, unspecified

ICD-9 Code

729.2

ICD-10 Code

M79.2

Relevant Anatomy: (Figs. 1 and 2)

PATIENT POSITION

- Lying supine on the examination table.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient supine on the examination table, the clinician stands lateral to the affected hip.
2. Find the anterior superior iliac spine and the pubic bone.
3. Firmly palpate the inguinal ligament that connects these two structures.
4. The lateral femoral cutaneous nerve of the thigh traverses the inguinal ligament about 2 cm inferior and medial to the anterior superior iliac spine under the inguinal ligament. Tap over this area or press firmly until discomfort is elicited. Mark that spot with ink.
5. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
6. After the landmarks are identified, the patient should not move the hip or leg.

ANESTHESIA

- Local anesthesia of the skin with a topical vapocoolant spray may be used, but it is not necessary in most patients.

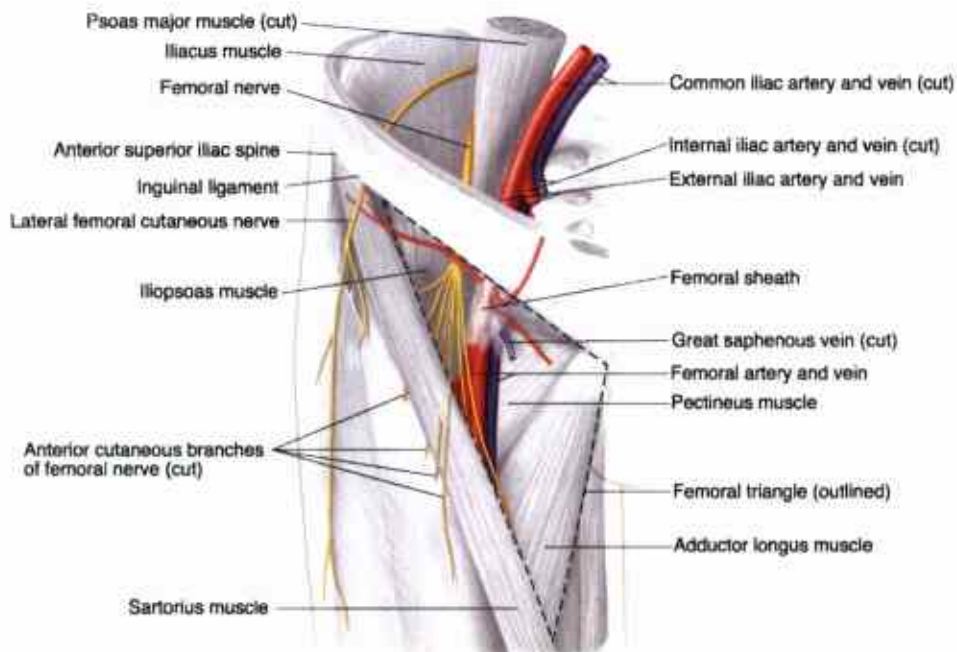


FIGURE 1 • Anterior right hip neurovascular structures. (Adapted from Tank PW, Gest TR. *Lippincott Williams & Wilkins Atlas of Anatomy*. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)

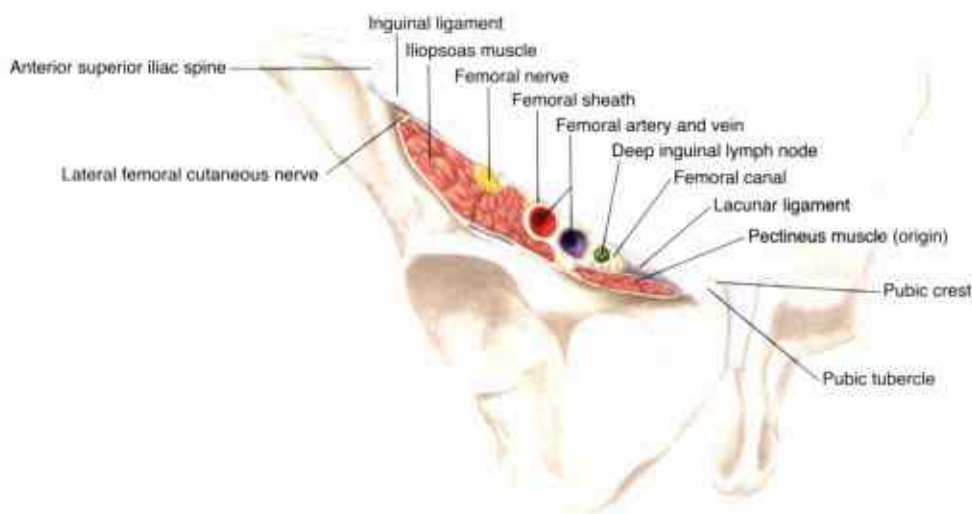


FIGURE 2 • Section through the femoral sheath. (Adapted from Tank PW, Gest TR. *Lippincott Williams & Wilkins Atlas of Anatomy*. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1-1/2 in. needle
- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage



FIGURE 3 ● Meralgia paresthetica injection.

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using a topical vapocoolant spray.
3. Position the needle and syringe perpendicular to the skin with the tip of the needle directed posteriorly.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 3).
5. Advance the needle 2 to 3 cm until the needle tip is located under the inguinal ligament.
6. Inject the steroid solution as a bolus into the area. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to move his or her hip through its full range of motion. This movement distributes the steroid solution throughout the area.

AFTERCARE

- Treatment is directed at relieving the compression and usually consists of wearing looser clothing or losing weight.
- Consider follow-up examination in 2 weeks.

CPT code: 64450—Injection, nerve block, therapeutic, other peripheral nerve or branch

Trochanteric Bursitis

Injection of corticosteroids for the treatment of trochanteric bursitis is a common procedure for primary care physicians. This condition is an overuse injury caused by repeated friction of the insertion of the gluteus maximus as it passes over the femoral trochanter. This may occur following repeated stair climbing, walking up an incline, or prolonged pressure over the trochanter.

A small diameter needle is appropriate as there will not be a fluid collection.

Indications	ICD-9 Code	ICD-10 Code
Trochanteric bursitis	726.5	M70.6

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Lying on the examination table in the lateral decubitus position on the unaffected hip.

LANDMARKS

1. With the patient lying on the examination table in the lateral decubitus position on the unaffected hip, the clinician stands behind the patient.
2. Identify and mark the point of maximal tenderness over the trochanteric bursa.
3. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
4. After the landmarks are identified, the patient should not move the hip.

ANESTHESIA

- Local anesthesia of the skin with topical vapocoolant spray may be used, but is not necessary in most patients.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1-1/2 in. needle
- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad

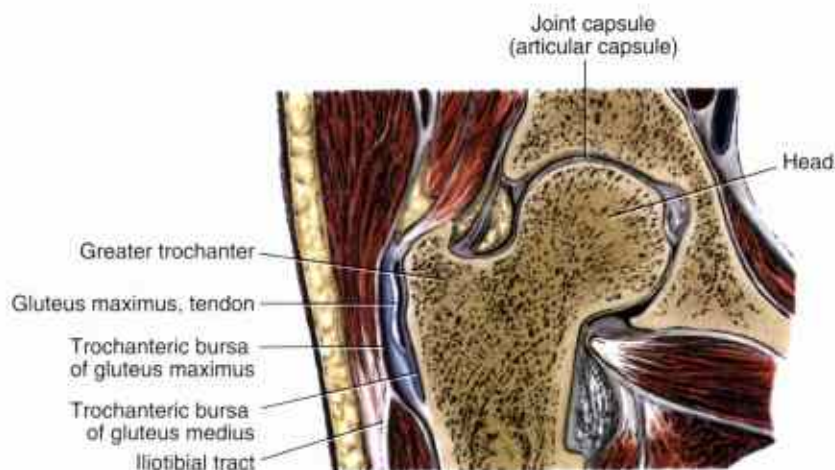


FIGURE 1 • Right anterior hip joint. (Adapted from Agur A, Lee MJ. *Grant's Atlas of Anatomy*. 10th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 1999:336.)

- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe perpendicular to the skin with the tip of the needle directed medially.
4. Using the no-touch technique, introduce the needle at the insertion site.
5. Advance the needle toward the femoral trochanter until the needle tip touches the bone. Back up the needle 1 to 2 mm.
6. Inject the steroid solution as a bolus steadily in the area of the trochanteric bursa. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to massage the area and move his or her hip through its full range of motion. This movement distributes the steroid solution throughout the trochanteric bursa.
10. Reexamine the area of the trochanteric bursa in 5 min to confirm pain relief (Fig. 2).

AFTERCARE

- Avoid excessive hip movement over the next 2 weeks.
- NSAIDs, ice, heat, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20551—Injection of tendon origin or insertion



FIGURE 2 ● Trochanteric bursitis injection.

PEARLS

- Consider fanning this injection to disperse the corticosteroid solution over a wider area.



A video clip showing a trochanteric bursitis injection can be found on the book's web site.

Hip Adductor Tendonitis

Patients occasionally present to the primary care office for the evaluation and treatment of pain upon adduction of the hip. The pectineus, adductor longus, magnus, and medius muscles connect the medial aspect of the femur to the pubic bone. Acute injury or chronic overuse may cause tendonitis or tendonopathy of the hip adductors. The adductor longus is most commonly injured, and patients classically present with pain with palpation of the muscle belly and insertion, passive stretching, and resistance to contraction. In chronic tendonitis, treatment is often lengthy and difficult. Physical therapy is the cornerstone of treatment. It may be facilitated by the judicious use of corticosteroid injections given around the affected tendon(s).

Indications	ICD-9 Code	ICD-10 Code
Enthesopathy of the hip	726.5	M76.8

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Lying supine on the examination table.
- If pain permits, flex, abduct, and externally rotate the hip.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient lying supine on the examination table, the clinician stands lateral and posterior to the affected hip.
2. Locate the symphysis pubis and trace the pubic bone laterally until the origin of the hip adductor muscles.
3. Determine the site of maximal tenderness over the tendons and mark it with an ink pen.
4. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
5. After the landmarks are identified, the patient should not move the hip.

ANESTHESIA

- Local anesthesia of the skin using a topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1-1/2 in. needle

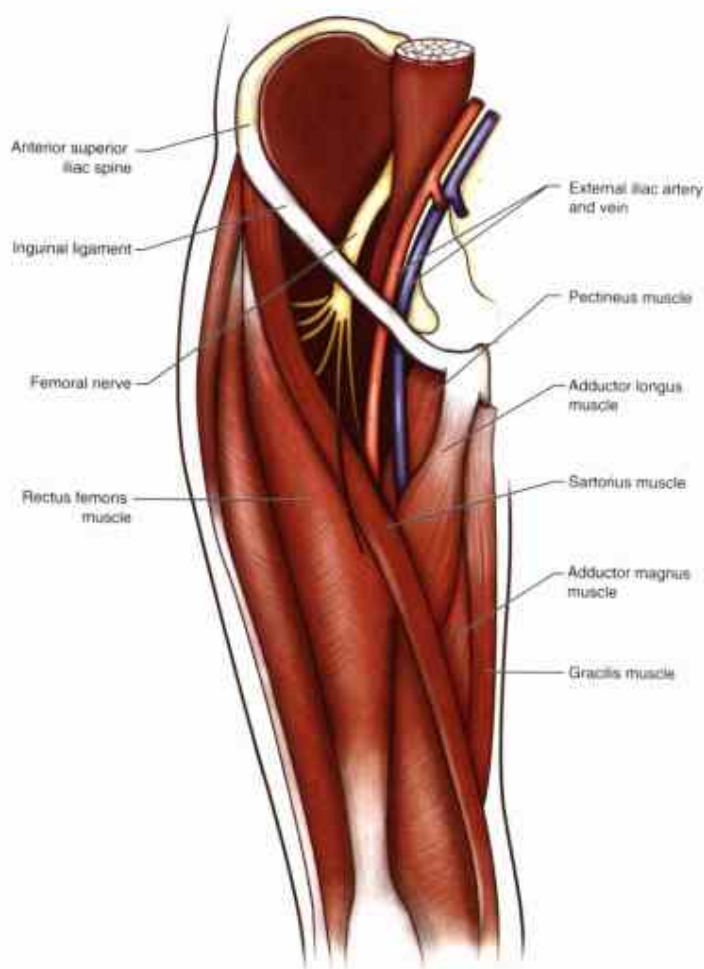


FIGURE 1 • Anterior muscles of thigh and femoral triangle.

- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using a topical vapocoolant spray.
3. Position the needle and syringe at an angle of 30 degrees to the skin with the tip of the needle directed proximally toward the pubic bone.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle so that it is positioned around the affected tendon, but not in the substance of the tendon.



FIGURE 2 • Hip adductor tendonitis injection.

6. Inject the steroid solution as a bolus around the adductor tendon(s). The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to massage the area and move his or her hip through its full range of motion. This movement distributes the steroid solution along the adductor tendon(s).
10. Reexamine the medial aspect of the hip in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive use of the hip—especially hip abduction and adduction over the next 2 weeks.
- Begin a program of physical therapy.
- NSAIDs, ice, and heat as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20551—Injection of tendon origin or insertion

PEARLS

- This injection can be superficial—especially in thin persons. Depositing corticosteroid in the subcutaneous tissues can result in the complication of skin atrophy and hypopigmentation. Avoid the development of a subdermal wheal while performing all injections of corticosteroid solutions.



A video clip showing a hip adductor tendonitis injection can be found on the book's web site.

Knee Joint—Lateral Suprapatellar Approach

Aspiration and injection of the knee joint are common procedures for primary care physicians. The suprapatellar approach to the knee joint is the easiest to perform and is well accepted by patients. Because of supine positioning, patients do not see the approaching needle and anxiety is diminished. This approach is considered a safe procedure since there are no major arteries or nerves in the immediate path of the needle. Also, since the injection is done using the suprapatellar approach, it is extra-articular, but still within the joint space. As a result, joint fluid can be removed and injections performed without direct, large-needle injury to the articular cartilage. Using local anesthetic, this injection can help the clinician differentiate the cause of knee pain. After pain has been eliminated as a complicating factor, the knee can be reexamined to assess integrity of the ligaments and menisci.

Indications	ICD-9 Code	ICD-10 Code
Knee pain	719.46	M25.56
Knee sprain, unspecified site	844.9	S83.6
Knee arthritis, unspecified	716.96	M13.96
Knee arthrosis, primary	715.16	M19.06
Knee arthrosis, posttraumatic	716.16	M19.16
Knee arthrosis, secondary	715.26	M19.26

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Lying supine on the examination table with both knees slightly flexed and supported with folded towels or chucks pads as needed for patient comfort.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient lying supine on the examination table, the clinician stands lateral to the affected knee.
2. Locate the superior aspect of the patella.
3. Draw a line vertically 1 cm superior to the proximal margin of the patella (Fig. 2).
4. Next, draw a line horizontally 1 cm below the posterior edge of the patella.
5. Identify the point where these two lines intersect.

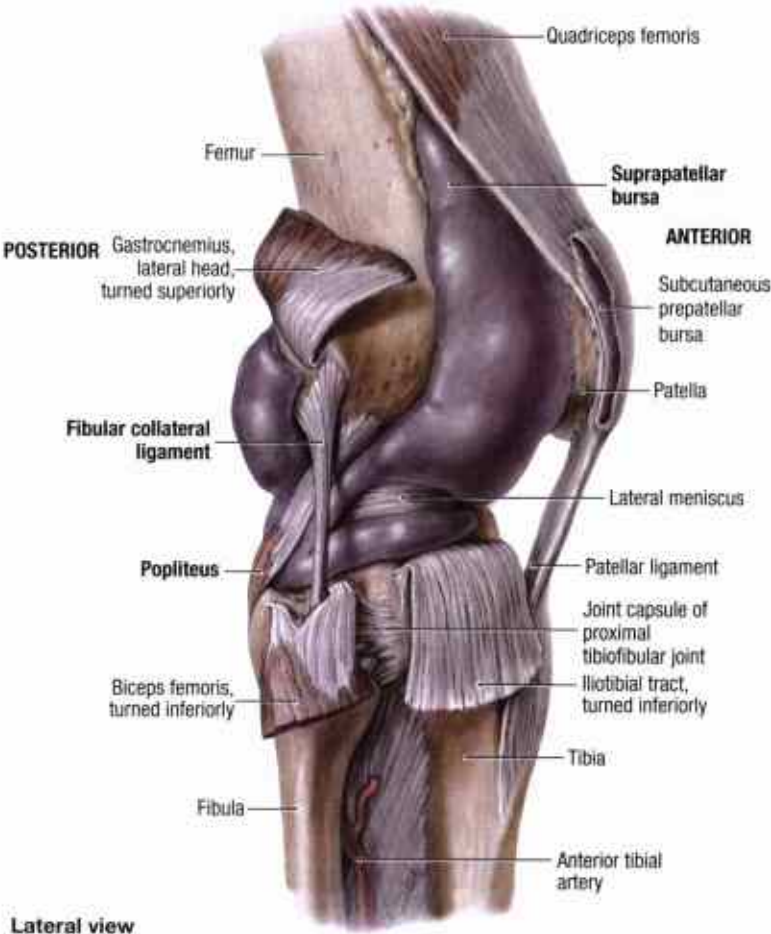


FIGURE 1 • Right lateral knee—distended joint capsule. (From Agur AMR, Dalley AF, Grant's Atlas of Anatomy, 12th Ed, Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)



FIGURE 2 • Right lateral knee—with lines drawn.

6. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
7. After the landmarks are identified, the patient should not move the knee.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.
- Local anesthesia and vasoconstriction of the skin and soft tissues may be augmented using an injection of 10 mL of 1% lidocaine with epinephrine (optional).

EQUIPMENT

- 10-mL syringe—for anesthesia (optional)
- 20- to 60-mL syringe—for aspiration
- 10-mL syringe—for injection of the anesthetic/corticosteroid mixture
- 25-gauge, 1-1/2 in. needle—for anesthesia (optional)
- 18-gauge, 1-1/2 in. needle—for aspiration
- 10 mL of 1% lidocaine with epinephrine—for local anesthesia (optional)
- 8 mL of 1% lidocaine without epinephrine—to dilute the corticosteroid
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- Viscosupplementation agent of choice—if indicated
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. (Optional) Use an ultrasound to image the knee joint using an adjacent, but separate, acoustic window. This allows separate imaging from the injection site so that there is no contamination from the ultrasound gel. Alternatively, the entire site may be prepped in an aseptic manner and sterile ultrasound gel utilized (Fig. 3).
2. Prep the insertion site with alcohol followed by the povidone-iodine pads.
3. Achieve good local anesthesia by using topical vapocoolant spray.
4. Using the no-touch technique, introduce the 25-gauge, 1-1/2 in. needle for local anesthesia at the insertion site. Inject a total of 10 mL of 1% lidocaine with epinephrine to provide adequate local anesthesia. Deposit the anesthetic under the skin, in the soft tissues, and over the periosteum (optional).
5. Position the 18-gauge, 1-1/2 in. needle and syringe perpendicular to the skin, at a right angle to the other two previously drawn skin lines and with the tip of the needle directed medially.
6. Using the no-touch technique, introduce that needle at the insertion site.
7. Advance the needle toward the anterior surface of the distal femur until the needle tip is located in the joint capsule. Apply suction to the syringe while advancing the needle. The appearance of fluid in the syringe indicates that the joint capsule has been entered (Fig. 4). The needle may contact the distal femur itself. Should that happen, withdraw and advance the needle as needed to “walk” it over the femur and into the joint capsule.
8. Multiple syringes may be required in order to drain all of the synovial fluid.



FIGURE 3 ● Right knee joint distended with intra-articular fluid. Note bulging of the joint capsule above the patella.

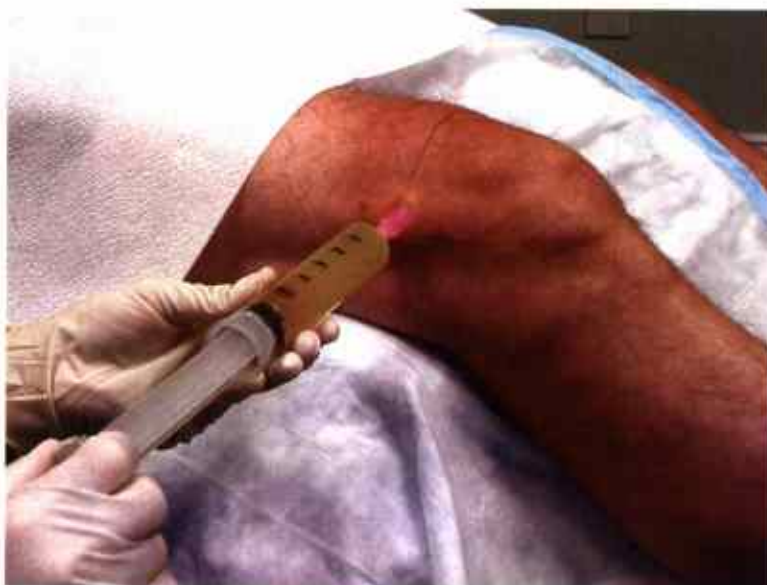


FIGURE 4 ● Right knee aspiration of distended joint—first of the two syringes.

9. If injection following aspiration is elected, remove the large syringe from the 18-gauge needle and then attach the 10-mL syringe filled with the steroid solution (Fig. 5) or the proprietary syringe prefilled with viscosupplement (Fig. 6).
10. Inject the steroid solution as a bolus into the knee joint capsule. The injected solution should flow smoothly into the joint space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
11. Following injection of the corticosteroid solution or viscosupplement, withdraw the needle.
12. Apply a sterile adhesive bandage.



FIGURE 5 • Right knee corticosteroid injection.



FIGURE 6 • Right knee viscosupplementation injection.

13. Instruct the patient to move his or her knee through its full range of motion. This movement distributes the steroid solution throughout the knee joint.
14. Reexamine the knee in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive use of the affected knee over the next 2 weeks.
- Consider the use of a compression knee wrap.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20610—Arthrocentesis, aspiration, and/or injection of major joint or bursa

PEARLS

- Although both the lateral and medial approaches may be used, the preferred approach is from the lateral aspect. This approach affords the operator more room, avoids inadvertent kicking of the clinician by the patient with the uninvolved leg, and preserves patient modesty.
- If the clinician has the unusual situation of experiencing difficulty finding the joint capsule, then either of the following maneuvers can be attempted.
 - Squeeze the interior aspect of the patella and displace it superiorly—thereby shifting the joint fluid and filling the superior aspect of the joint space.
 - Redirect the needle in a distal direction to target the undersurface of the patella. However, this technique may result in an injury to the patellar cartilage.
- Ultrasound-assisted aspiration and injection are indicated in the situation where an effusion is not present or is a small “pocket” of fluid. Ultrasound is also very useful in locating fluid in the knee joint to ensure the accuracy of injecting expensive viscosupplementation products.



A video clip showing a knee injection can be found on the book's web site.

Knee Joint—Infrapatellar Approach

Aspiration and injection of the knee joint are common procedures for primary care physicians. The infrapatellar approach to the knee joint is more difficult to perform than the suprapatellar approach. It is also less well accepted by patients since it may be done with the patients sitting where they can see the approaching needle. There is increased anxiety to this procedure and the patients are at increased risk of injury if they develop a vasovagal reaction and fall from the exam table. Also, since the injection is intra-articular, the knee cartilage over the distal femur frequently suffers direct damage from the 18-gauge needle. Using local anesthetic, this injection can help the clinician differentiate the cause of knee pain. After pain has been eliminated as a complicating factor, the knee can be reexamined to assess integrity of the ligaments and menisci.

Indications	ICD-9 Code	ICD-10 Code
Knee pain	719.46	M25.56
Knee sprain, unspecified site	844.9	S83.6
Knee arthritis, unspecified	716.96	M13.96
Knee arthrosis, primary	715.16	M19.06
Knee arthrosis, posttraumatic	716.16	M19.16
Knee arthrosis, secondary	715.26	M19.26

Relevant Anatomy: (Fig. 1)

- See previous chapter

PATIENT POSITION

- Lying supine on the examination table with the affected knee flexed at an angle of 30 degrees.
- Alternatively, the patient may be sitting on the examination table or a wheelchair with both knees flexed at 90 degrees.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. Although both the lateral and medial approaches may be used, the preferred approach is from the lateral aspect. This approach avoids inadvertent kicking of the clinician by the patient with the uninvolved leg and preserves patient modesty.
2. With the patient lying supine on the examination table, the clinician stands lateral to the affected knee.

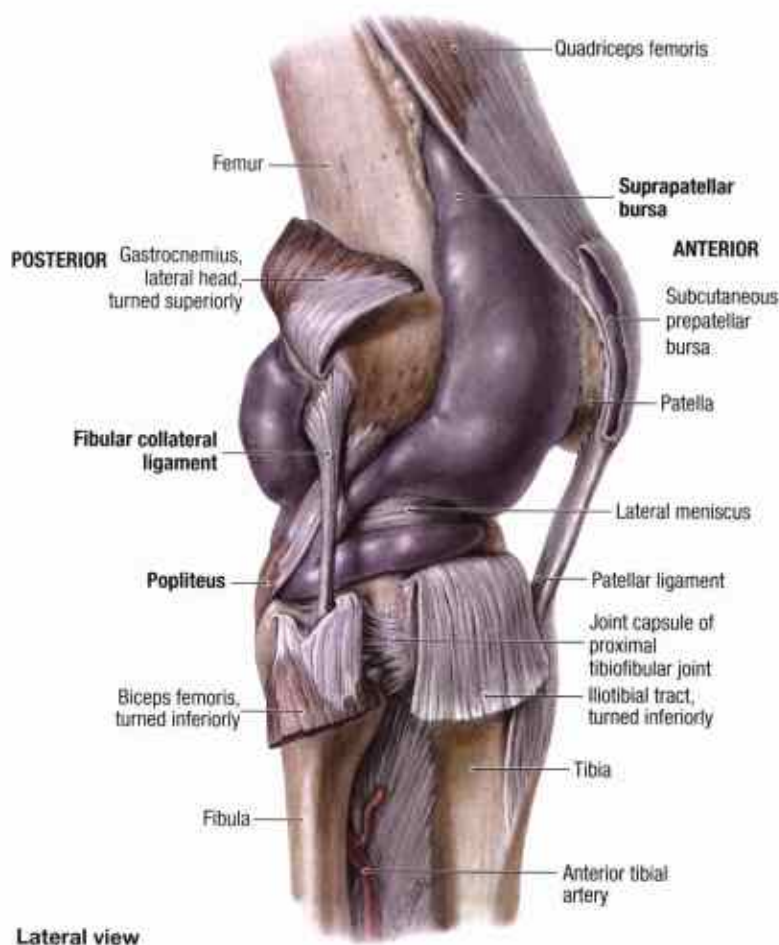


FIGURE 1 • Right lateral knee—distended joint capsule. (From Agur AMR, Dalley AF. *Grant's Atlas of Anatomy*. 12th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)

3. With the patient sitting up on the examination table or in a chair, the clinician sits in front of the affected knee.
4. Locate the patellar tendon.
5. At the midpoint of the tendon, move about 1 cm laterally. There is usually a depression at that spot. Mark it with ink.
6. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
7. After the landmarks are identified, the patient should not move the knee.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.
- Local anesthesia and vasoconstriction of the skin and soft tissues may be augmented using an injection of 5 mL of 1% lidocaine with epinephrine (optional).

EQUIPMENT

- 5-mL syringe—for anesthesia (optional)
- 20- to 60-mL syringe—for aspiration

- 10-mL syringe—for injection of the anesthetic/corticosteroid mixture
- 25-gauge, 1-1/2 in. needle—for anesthesia (optional)
- 18-gauge, 1-1/2 in. needle—for aspiration
- 5 mL of 1% lidocaine with epinephrine—for local anesthesia (optional)
- 8 mL of 1% lidocaine without epinephrine—to dilute the corticosteroid
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- Viscosupplementation agent of choice—if indicated
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. (Optional) Use an ultrasound to image the knee joint using an adjacent, but separate, acoustic window. This allows imaging separate from the injection site so that there is no contamination from the ultrasound gel. Alternatively, the entire site may be prepped in an aseptic manner and sterile ultrasound gel utilized.
2. Prep the insertion site with alcohol followed by the povidone-iodine pads.
3. Achieve good local anesthesia by using topical vapocoolant spray.
4. Using the no-touch technique, introduce the 25-gauge, 1-1/2 in. needle for local anesthesia at the insertion site. Inject a total of 5 mL of 1% lidocaine with epinephrine to provide adequate local anesthesia. Deposit the anesthetic under the skin, in the soft tissues, and over the periosteum (optional).
5. Position the 18-gauge, 1-1/2 in. needle and syringe perpendicular to the skin with the tip of the needle directed into the center of the knee.
6. Using the no-touch technique, introduce that needle at the insertion site (Fig. 2).
7. Advance the needle toward the center of the knee until the needle tip is located in the joint capsule. Apply suction to the syringe while advancing the needle. The appearance of fluid in the syringe indicates that the joint capsule has been entered.



FIGURE 2 • Left knee injection—lateral infrapatellar approach.

8. Multiple syringes may be required in order to drain all of the synovial fluid.
9. If injection following aspiration is elected, remove the large syringe from the 18-gauge needle and then attach the 10-mL syringe filled with the steroid solution or the proprietary syringe prefilled with viscosupplement.
10. Inject the steroid solution as a bolus into the knee joint capsule. The injected solution should flow smoothly into the joint space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
11. Following injection of the corticosteroid solution or viscosupplement, withdraw the needle.
12. Apply a sterile adhesive bandage.
13. Instruct the patient to move his or her knee through its full range of motion. This movement distributes the steroid solution throughout the knee joint.
14. Reexamine the knee in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive use of the affected knee over the next 2 weeks.
- Consider the use of a compression knee wrap.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20610—Arthrocentesis, aspiration, and/or injection of major joint or bursa

PEARLS

- Because of potential direct needle injury to articular cartilage, the infrapatellar approach should only be used in circumstances where the suprapatellar approach cannot be performed. This may occur in patients with local cellulitis, soft tissue injury, or in a patient confined to a wheelchair who cannot be easily moved onto an examination table.
- Ultrasound-assisted aspiration and injection are indicated in the situation where an effusion is not present or is a small “pocket” of fluid. Ultrasound is also very useful in locating fluid in the knee joint to ensure the accuracy of injecting expensive viscosupplementation products.

Prepatellar Bursitis

Prepatellar bursitis is a relatively common aspiration and injection site for primary care physicians. Successful aspiration is usually easy because the location of bursa is readily evident. The subcutaneous prepatellar bursa may become inflamed and accumulate fluid when subjected to repeated excessive pressure or friction. The fluid may consist of blood in acute trauma, thick proteinaceous mucoid fluid after repetitive injury, or purulence if infected. Corticosteroids should never be administered if an infectious bursitis is suspected.

A large diameter needle is appropriate as this technique is used to aspirate large volume of fluid. Occasionally, the clinician may elect to inject a steroid solution if the fluid recollects—as long as an infection can be excluded.

Indications	ICD-9 Code	ICD-10 Code
Prepatellar bursitis	726.65	M70.4

Relevant Anatomy

- See Figure 1 in the chapter—Knee Joint—Lateral Suprapatellar Approach

PATIENT POSITION

- Lying supine on the examination table with both knees slightly flexed and supported with folded towels or chucks pads as needed for patient comfort.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient lying supine on the examination table, the clinician stands lateral to the affected knee.
2. The point of maximal fluctuance is identified.
3. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
4. After the landmarks are identified, the patient should not move the knee.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

EQUIPMENT

- 20-mL syringe
- 3-mL syringe—for optional injection

- 18-gauge, 1-1/2 in. needle
- 1 mL of 1% lidocaine without epinephrine—for optional injection
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)—for optional injection
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the 18-gauge needle and syringe with the tip of the needle directed toward the area of maximal fluid collection.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 1).
5. Advance the needle into the center of the bursa.
6. Aspiration should be easily accomplished. Use multiple syringes if the effusion is large.
7. If injection following aspiration is elected, grasp the hub of the needle, remove the large syringe, and then attach the 3-mL syringe filled with the steroid solution.
8. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
9. Following complete aspiration, and possible injection of corticosteroid solution, withdraw the needle.
10. Apply a sterile adhesive bandage followed by a compressive elastic bandage.
11. Reexamine the knee in 5 min to confirm pain relief.



FIGURE 1 • Prepatellar bursitis aspiration.

AFTERCARE

- Avoid excessive use of the affected knee over the next 2 weeks.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20605—Aspiration and/or injection of intermediate bursa

PEARLS

- If the prepatellar bursitis is due to an infection or acute hemorrhagic event, do not follow aspiration with corticosteroid injection.
- Injection of corticosteroid solution is usually reserved for recurrent bursitis.

Pes Anserine Bursitis

Injection of corticosteroids for the treatment of pes anserine bursitis is a rare procedure for primary care physicians. The pes anserinus is the common insertion for the tendons of the sartorius, gracilis, and semitendinosus muscles. It is located over the medial aspect of the proximal tibia about 2 to 5 cm below the anteromedial joint margin of the knee. Pain and swelling may occur with overuse or excessive valgus stress on the knee. It is most commonly seen in overweight, middle-aged, and older women. A small-diameter needle is appropriate as there will not be a fluid collection.

Indications	ICD-9 Code	ICD-10 Code
Pes anserine bursitis	726.61	M70.5

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Lying supine on the examination table with both knees slightly flexed and supported with folded towels or chucks pads as needed for patient comfort.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient lying supine on the examination table, the clinician stands lateral to the affected knee.
2. The point of maximal tenderness over the proximal medial anterior tibia is identified.
3. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
4. After the landmarks are identified, the patient should not move the knee.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1 in. needle
- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetoneide)

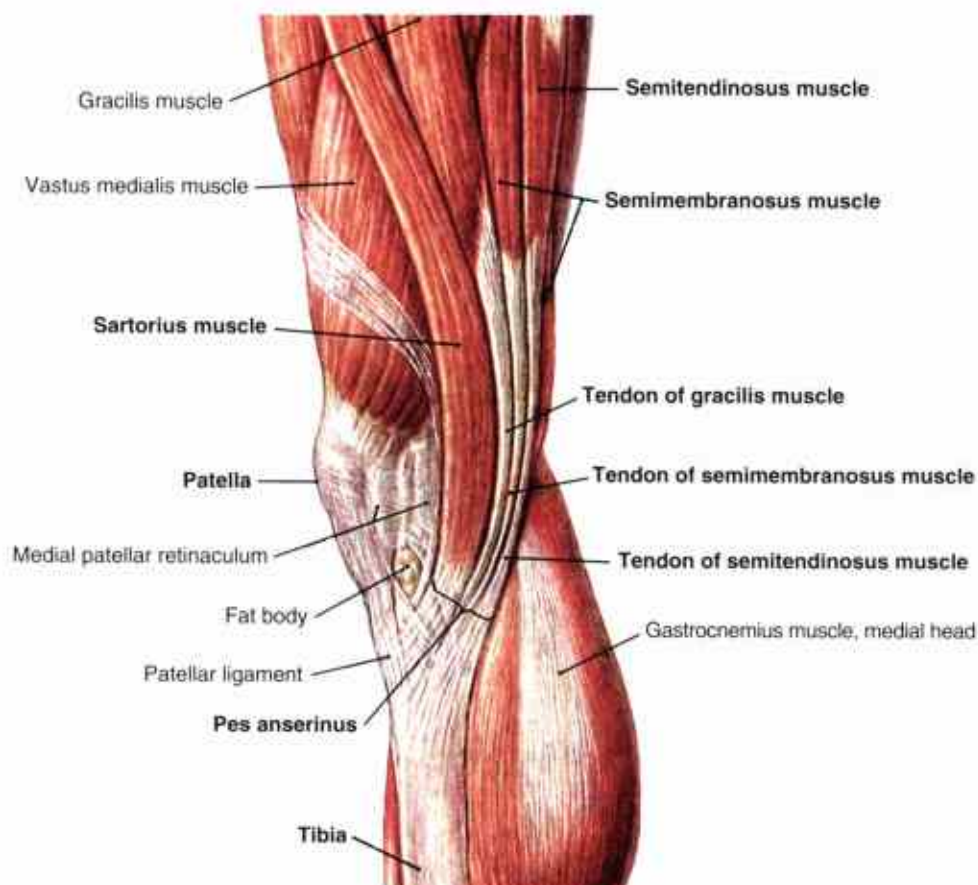


FIGURE 1 • Medial right leg. (Adapted from Sobotta: Atlas der Anatomie des Menschen © Elsevier GmbH, Urban & Fischer Verlag München.)

- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile, adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe perpendicular to the skin with the tip of the needle directed toward the area of maximal tenderness at the insertion of the tendons.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle toward the bone of the proximal medial tibia. Back up the needle 1 to 2 mm.
6. Inject the steroid solution as a bolus into this area. The injected solution should flow smoothly into the space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.



FIGURE 2 • Left knee pes anserine bursitis injection.

9. Instruct the patient to massage this area and move his or her knee through its full range of motion. This movement distributes the steroid solution throughout the pes anserine bursa and related tendons.
10. Reexamine the pes anserine bursa in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive knee extension and adduction over the next 2 weeks.
- Consider the use of a knee compression wrap.
- NSAIDs, ice, heat, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20551—Injection of single tendon origin or insertion

PEARLS

- The pes anserine bursa is superficial. As a result, this injection can be complicated by the development of skin atrophy and hypopigmentation. Avoid the development of a subdermal wheal while injecting the corticosteroid solution.
- Since this is an unusual diagnosis, also consider a medial meniscal tear, chondral fracture, or osteonecrosis of the tibia.

Iliotibial Band Friction Syndrome

Injection of corticosteroids for the treatment of iliotibial band friction syndrome is a fairly common procedure for primary care physicians who care for long distance runners. This overuse condition occurs as a result of friction of the iliotibial tract as it passes over the lateral femoral condyle. A small-diameter needle is appropriate as there will not be a fluid collection.

Indications	ICD-9 Code	ICD-10 Code
Iliotibial band syndrome	728.89	M76.3

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Lying supine on the examination table with both knees slightly flexed and supported with folded towels or chucks pads as needed for patient comfort.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient lying supine on the examination table, the clinician stands lateral to the affected knee.
2. The point of maximal tenderness over the lateral femoral condyle is identified.
3. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
4. After the landmarks are identified, the patient should not move the knee.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1 in. needle
- 1 mL of 1% lidocaine without epinephrine
- 1 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad

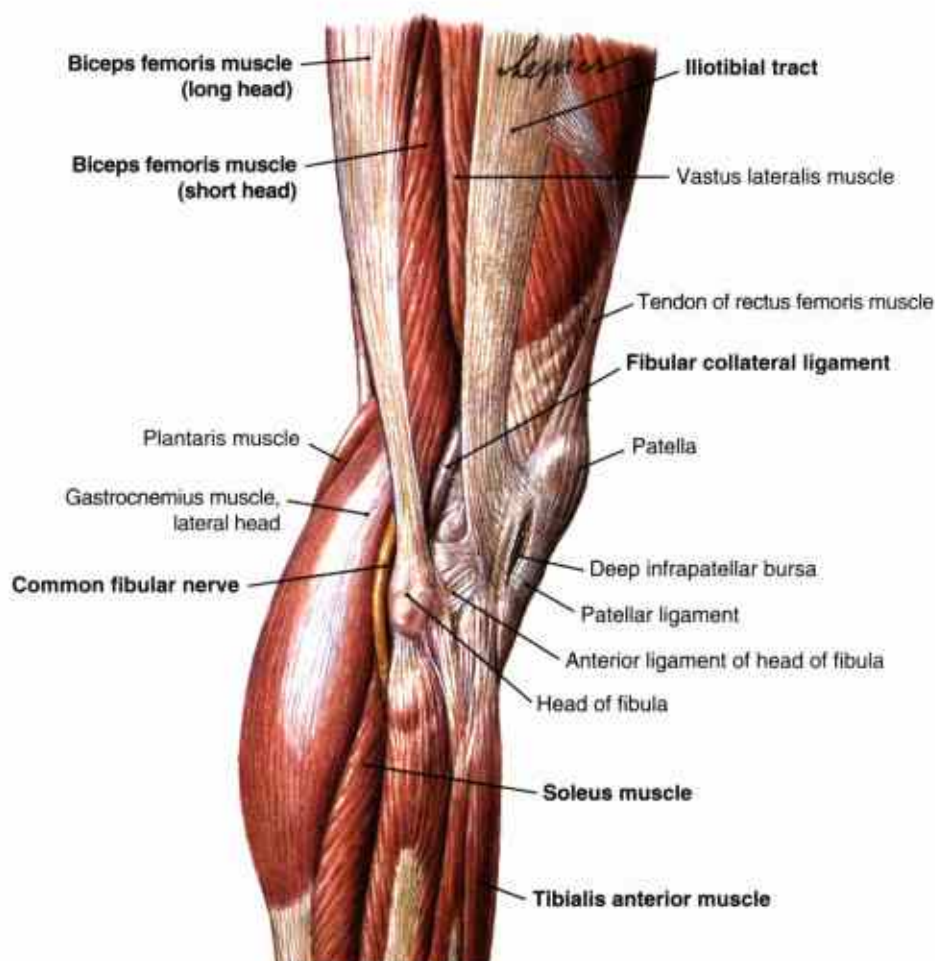


FIGURE 1 • Lateral right leg. (Adapted from Sobotta: Atlas der Anatomie des Menschen © Elsevier GmbH, Urban & Fischer Verlag München.)

- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile, adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe perpendicular to the skin with the tip of the needle directed toward the area of maximal tenderness over the lateral femoral condyle.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle through the iliotibial band and touch the bone of the lateral femoral condyle. Back up the needle 1 to 2 mm.
6. Inject the steroid solution as a bolus into this area. The injected solution should flow smoothly into the tissues. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.



FIGURE 2 • Left leg iliotibial band injection.

7. Following injection of the corticosteroid solution, withdraw the needle.
8. Apply a sterile adhesive bandage.
9. Instruct the patient to massage this area and move his or her knee through its full range of motion. This movement distributes the steroid solution throughout the pes anserine bursa and related tendons.
10. Reexamine the lateral aspect of the knee in 5 min to confirm pain relief.

AFTERCARE

- Relative rest with avoidance of excessive running for the next 2 weeks.
- Consider the use of a knee-compression wrap.
- IT band stretching exercises.
- NSAIDs, ice, heat, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20551—Injection of single tendon origin or insertion

PEARLS

- The iliotibial band can be superficial, especially in thin persons. As a result, this injection can be complicated by the development of skin atrophy and hypopigmentation. Avoid the development of a subdermal wheal while injecting the corticosteroid solution.



A video clip showing a iliotibial band injection can be found on the books website.

Tibialis Posterior Tendonitis

The tibialis posterior muscle originates from the interosseous membrane and the adjacent posterior surface of the tibia in the proximal third of the leg. It curves behind the medial malleolus, passes under the flexor retinaculum, and inserts into the tuberosity of the navicular bone. The muscle plantarflexes the ankle and inverts the foot. Tibialis posterior tendon dysfunction is an often unrecognized disabling cause of progressive flatfoot deformity and is the most frequently ruptured tendon in the rear foot. Tenosynovitis of the tibialis posterior tendon occurs as a result of altered mechanics of the foot, acute trauma, and chronic overuse or with inflammatory conditions such as rheumatoid arthritis. Patients present with pain, difficulty walking, and swelling along the medial malleolus and the arch of the foot. Discrete injections of corticosteroids decrease pain and facilitate physical therapy. Orthotics are often used to support the arch. Surgery is required in the case of tendon rupture.

Indications	ICD-9 Code	ICD-10 Code
Tibialis posterior tenosynovitis	726.72	M76.8

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Supine on the examination table with the hip in full external rotation, knee slightly flexed, and the ankle in a neutral position.
- Alternatively, lying on the examination table on the affected side with the knee slightly flexed and the ankle in a neutral position.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient lying supine on the examination table, the clinician stands or sits medial to the affected ankle.
2. Palpate the medial malleolus of the tibia.
3. Locate the tibialis posterior tendon immediately behind and below the medial malleolus.
4. Determine the location of maximal tenderness along the tendon.
5. Identify a point along the tendon 1 cm distal to the point of maximal tenderness and mark it in ink.
6. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
7. After the landmarks are identified, the patient should not move the ankle.

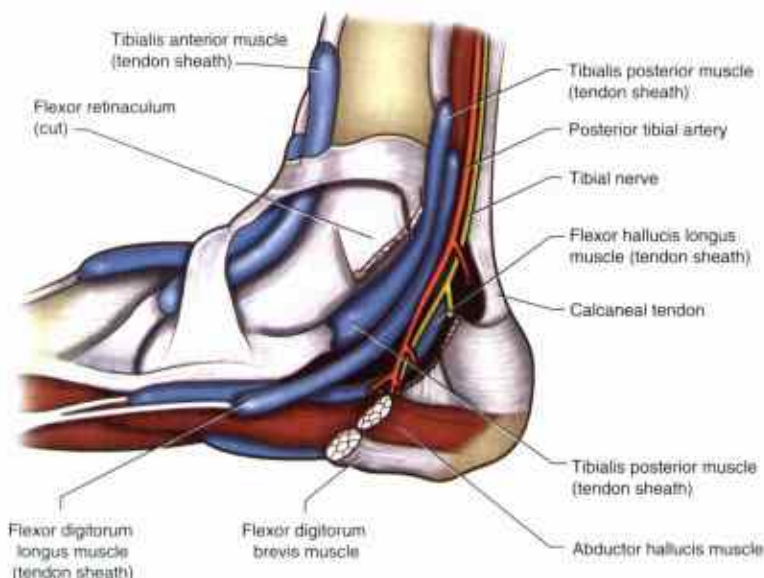


FIGURE 1 • Medial aspect of the right foot.

ANESTHESIA

- Local anesthesia of the skin with topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 5/8 in. needle
- 0.5 mL of 1% lidocaine without epinephrine
- 0.5 mL of the steroid solution (40 mg of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile, adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. Prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray.
3. Position the needle and syringe with the needle tip directed proximally at a 30 degree angle to the surface of the skin.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle until it touches the tibialis posterior tendon. Back up the needle 1 to 2 mm.
6. Slowly inject the volume of the syringe around the tendon. The injected solution should flow smoothly into the synovial sheath. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.
7. Following injection of the corticosteroid solution, withdraw the needle.



FIGURE 2 • Tibialis posterior tendonitis injection.

8. Instruct the patient to move his or her ankle through its full range of motion. This movement distributes the steroid solution throughout the tibialis posterior tendon sheath.
9. Reexamine the tendon in 5 min to confirm pain relief.

AFTERCARE

- Avoid excessive use of the foot over the next 2 weeks.
- Begin a program of physical therapy.
- Use orthotics or motion-control running shoes if there is excessive foot pronation.
- NSAIDs, ice, and heat as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20550—Injection of single tendon sheath

PEARLS

- This injection can be superficial. Depositing corticosteroid in the subcutaneous tissues can result in the complication of skin atrophy and hypopigmentation. Avoid the development of a subdermal wheal while performing all injections of corticosteroid solutions.



A video clip showing a tibialis posterior tendonitis injection can be found on the book's web site.

Tarsal Tunnel Syndrome

Tarsal tunnel syndrome is an uncommon condition encountered in primary care. It represents a compressive injury to the posterior tibial nerve as it passes underneath the flexor retinaculum at the level of the medial malleolus. It may occur due to trauma from crush injury, stretch injury, fractures, dislocations, and severe ankle sprains. Other causes include valgus foot deformity, compression from bony prominences, and systemic conditions such as diabetes, hypothyroidism, rheumatoid arthritis, or amyloidosis. Typical symptoms are pain and paresthesias that radiate from the medial ankle. A positive Tinel sign may be elicited posterior to the medial malleolus. Electrodiagnostic tests can help confirm the diagnosis. Conservative treatment options include relative rest, physical therapy, orthotics, splints, and the injection of corticosteroids. Surgical decompression of the tarsal tunnel is required for persistent symptoms.

Indications	ICD-9 Code	ICD-10 Code
Tarsal tunnel syndrome	355.5	G57.5

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Supine on the examination table with the hip in full external rotation, the knee slightly flexed, and the ankle in a neutral position.
- Alternatively, lying on the examination table on the affected side with the knee slightly flexed and the ankle in a neutral position.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.

LANDMARKS

1. With the patient lying supine on the examination table, the clinician stands medial to the affected ankle.
2. Locate the medial malleolus of the tibia and then the insertion of the Achilles tendon into the calcaneus.
3. Midway between these two structures, palpate the posterior tibial artery.
4. The posterior tibial nerve is located about 0.5 cm posterior to the posterior tibial artery. Mark the nerve with ink.
5. At that site, press firmly on the skin with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
6. After the landmarks are identified, the patient should not move the ankle.