

A Practical Guide to

Joint & Soft Tissue Injection & Aspiration

Second Edition



James W. McNabb

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Access to Over
40+ Online Videos
of Injection
& Aspiration
Techniques*



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Injection & Aspiration

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**AN ILLUSTRATED TEXT FOR PRIMARY
CARE PROVIDERS**

Second Edition

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Wolters Kluwer | Lippincott Williams & Wilkins
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This textbook is dedicated to my family.

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Video clips of the following procedures can be found on the book's website.

SKIN AND SKIN STRUCTURES

Chalazion
Keloid Scar
Common Wart

HEAD AND NECK

Temporomandibular Joint
Greater Occipital Neuralgia
Cervical Strain and Sprain

UPPER EXTREMITIES

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Iliotibial Band Friction Syndrome

Tibialis Posterior Tendonitis

Ankle Joint—Anterior-Lateral Approach

Ankle Joint—Anterior-Medial Approach

Fibularis Brevis Tendonitis

Plantar Fasciitis

First Metatarsophalangeal Joint

Morton Interdigital Neuroma

Orthopaedic complaints are one of the most common problems faced in the primary care office. As the population ages, degenerative and inflammatory conditions increase. With the push to stay fit and exercise, these and overuse syndromes will be compounded.

Often times the primary care physician has a knee-jerk reaction to prescribe nonsteroidal anti-inflammatory drugs (NSAIDs) for every musculoskeletal condition that presents. In the short term, this may be acceptable. However, there is serious toxicity to systemic NSAIDs. Gastric erosions, acute renal insufficiency, and hypertension are but a few. It is estimated that over 110,000 hospitalizations, as well as 16,500 deaths, occur every year because of complications of the nonsteroidal drugs.^{1,2} Contrast this with the very low complication rate of joint and soft tissue injections and it becomes very clear that corticosteroid injections may be the treatment of choice for many conditions.³ Considering the low cost, efficacy, and ease of administration, it is a wonder why they are not used more often.

One of the objections to performing joint and soft tissue aspiration and injection is lack of training. This second edition of *A Practical Guide to Joint & Soft Tissue Injection & Aspiration* by McNabb provides step-by-step, evidence-based instruction on how to carry out virtually every condition amenable to injection therapy that can be performed in a primary care physician's office. This second edition has an expanded number of chapters (from 31 to 49). The matter-of-fact, straightforward discussion condenses years of experience into the written word. Although the first edition set the standard with full-color photographs, the second edition goes even further with stunning, high-definition videos filmed from the perspective of the provider and are available online for those who purchase this comprehensive, all-inclusive text.

A Practical Guide to Joint & Soft Tissue Injection & Aspiration, 2nd edition, provides a step-by-step, well-illustrated, bullet-type presentation to injection therapy for a diverse group of musculoskeletal disorders as well as for the treatment of chalazions, keloids, warts (using candida antigen), occipital neuralgia, and more. In addition, it reviews corticosteroids, viscosupplementation, and botulinum toxin (Botox).

Coding and billing (ICD-9 and ICD-10 codes), consent forms, and patient education materials are all included.

It makes sense for primary care physicians to provide joint and soft tissue aspiration. This not only allows early diagnosis (e.g., gout, septic arthritis) but also helps with optimal treatment and pain relief, as well as saves healthcare dollars and increases patient satisfaction with healthcare delivery. There is truly no reason why all primary care physicians should not be comfortable providing injection therapy for their patients, even when they are not entirely familiar with the anatomy involved. This text contains all the information needed for the novice to begin, as well as the latest updates for the experienced clinician.

I personally have given presentations to thousands over the past 30 years on the methods for joint injection and aspiration. I truly wish this text was available for all those early programs! Following the guidelines presented in this text, injection therapy is made understandable and straightforward.

In conclusion, I congratulate Dr. McNabb on compiling an excellent, comprehensive, practical, and useful text. His thoroughness leaves few questions for the reader and sets the standard for texts on musculoskeletal aspiration and injection.

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1. Roth SH. Nonsteroidal anti-inflammatory drugs: Gastropathy, deaths, and medical practice. *Ann Intern Med.* 1988;109(5):353-354.
2. Silverstein FE, Faich G, Goldstein JL, et al. Gastrointestinal toxicity with celecoxib vs nonsteroidal anti-inflammatory drugs for osteoarthritis and rheumatoid arthritis: The CLASS study: A randomized controlled trial. *JAMA.* 2000;284(10):1247-1255.
3. Rozenental TD, Sculco TP. Intra-articular corticosteroids: An updated overview. *Am J Orthop.* 2000;29(1):18-23.

Preface

There are precious few more rewarding moments in patient care, when one can provide almost immediate relief of pain and dysfunction when administering a diagnostic/therapeutic aspiration and/or injection. The second edition of this textbook provides a clear guide to those practitioners who wish to provide these types of procedures to their patients. There has been an increased awareness and demand for more information on these therapeutic modalities since its initial publication.

The primary audiences for this work are primary care physicians, physician assistants, nurse practitioners, residents in training and other qualified medical providers. Unfortunately, many of us have been taught to refer patients to orthopedic subspecialists if simple therapeutic measures such as the administration of NSAIDs do not produce the desired outcome. Additionally, musculoskeletal education is commonly deficient in many training programs. As a result, many primary medical providers have never learned how to offer these simple yet effective therapeutic techniques to treat a variety of common musculoskeletal and skin conditions seen routinely in primary care.

It is important that medical providers learn the techniques illustrated in this textbook to bring additional therapeutic options to their patient's medical care. This enhances the diagnostic acumen and therapeutic confidence of the clinician. Performing the injections painlessly with therapeutic effect builds positive physician-patient relationships. By keeping patients within the primary care physician's practice, this also promotes the medical home model. When effectively treating the medical condition without referral, patients experience an effective and efficient medical encounter at minimal cost and with no added inconvenience. A tangible benefit to the primary care practitioner is that procedural reimbursement provides a welcome source of income in these difficult economic times.

It has been a pleasure as well as a positive learning experience writing both editions of this textbook. Like the first edition, this text is an evidence-based guide that explains both the theory and the actual performance of joint and soft tissue injections and aspirations. This second edition was much more difficult to write than I anticipated. The challenge was to build on the success of the first edition by increasing the content and number of injections, while keeping the book truly practical. New features have been added including a section on injections of skin conditions that are not typically found in texts of this type. The section on Foundation Concepts was expanded to include synovial analysis, a new topical refrigerant spray—PainEase, additional viscosupplements, information on the use of botulinum toxin and musculoskeletal ultrasound. Significant additions of critical chapters describe head/neck injections and less common conditions in other body areas. Coding resources have been expanded to include the anticipated ICD-10 nomenclature. In the Appendix, an example of medical record documentation has been added. The most exciting component of this edition has been the inclusion of high definition videos of almost every procedure. These are case-based films that were recorded in my office on actual patients. The videos are available on the accompanying web site.

I would like to acknowledge the following people and organizations who taught, encouraged, and helped me write this textbook. This project is a culmination of 25 years of private practice and teaching. First, I must again thank my wife, Liz, for her support during the writing of this book, my medical education, and years of practice and teaching. Without you I could never have done this. Thanks go to my three children, Ian, Bryce and Caitlin, for their understanding. The leadership and faculty of training programs at the University of Wyoming—Casper, Scottsdale HealthCare, and Cabarrus Family Practice Residency Programs were instrumental in allowing me to expand my knowledge base, develop sports medicine curricula, and build expertise in evidence-based medicine. My office staff has been great—putting up with my demands and politely getting out of my way when I would rush down the hall with the video camera equipment. Without the confidence of my patients, I would not have been able to achieve mastery of these techniques—for that I remain privileged to serve as your family physician. I must acknowledge the opportunity to teach the Joint Injections workshops for both the North Carolina and American Academies of Family Physicians over the last ten years. Many thanks are directed to workshop participants for their participation and honest feedback. Special recognition is extended to family physician, Roy “Chip” Watkins, MD. He serves as my presentation partner as we teach the workshops. It is always enjoyable to engage him in conversations about teaching these procedures. Finally, a big thank-you to those at Wolters Kluwer Health, in particular, Kerry Barrett—the senior managing editor, Sonya Seigafuse—the acquisitions editor, and Chris Merillo who has processed the videos. They have treated me with the utmost professionalism, support, and patience during the long process of writing this second edition. To all involved and so many more unintentionally left unnamed—Thank you!

Introduction

The performance of joint and soft tissue injections and aspirations is a valuable skill that can be mastered by primary care physicians and qualified medical providers. These procedures can help relieve pain and improve function for the patient, at the same time empowering the clinician. It is essential that these techniques be used thoughtfully and precisely in conjunction with making the correct diagnosis of musculoskeletal disorders. This can be quite challenging at times but is no more difficult than diagnosing and treating any of the other medical conditions that the primary care physician encounters on a daily basis. Learning how to confidently make an accurate diagnosis of musculoskeletal conditions is beyond the scope of this text. Several good references are listed in the appendix.

Our primary consideration is the welfare of the patient. We must always endeavor to provide the best medical care at the least risk. This can be achieved by developing a cognitive knowledge base along with an accompanying set of complementary procedural skills. In addition, our focus must remain on providing a positive patient experience. This involves the provision of a safe and supportive environment while ensuring a pain-free procedural experience. Patient satisfaction from a positive experience along with a good clinical outcome is the primary goal.

An important concept is that aspiration and injection therapy is not an end in itself. It is only one treatment option. The withdrawal of fluid or the precise deposition of corticosteroid is a temporary measure that is generally used as an adjunctive therapy to other modalities. In many conditions, corticosteroid injection therapy has been demonstrated to give short- to intermediate-term pain/functional relief, but no difference in long-term results. In these cases, the initial treatment using corticosteroids and subsequent treatment of another modality gives optimal long-lasting results. Additional therapeutic options may include relative rest, compression, splinting/casting, ice, heat, ultrasound, stretching, physical therapy, and administration of other medications for pain control or even surgery. The performance of aspirations or injections alone, without correcting the underlying factors, is likely to result in recurrence if used without complimentary treatment.

In this text, the following primary learning objectives are identified:

- Describe the indications and contraindications for each procedure.
- Review the current medical literature.
- Select appropriate equipment/products for each injection or aspiration.
- Illustrate pertinent anatomic landmarks for each procedure.
- Demonstrate safe and effective technique.

Foundation Concepts

UNDERSTAND THE ANATOMY

It is critical that the clinician has a complete understanding of the three-dimensional anatomy in each area that is selected for injection or aspiration. A thorough knowledge of the target area structures brings a deeper understanding of the pathologic process causing the patient's symptoms. It also enables the provider to develop a list of alternative diagnostic possibilities. With this knowledge, the physician is able to take the next step. He or she should now be able to understand structural relationships beneath the surface of the skin. The physician is then able to think in three dimensions. While advancing the needle, it is important to "visualize" the location of the needle tip as it passes through the anatomic structures. Performing these thought processes enables the precise location of the needle. This results in improved clinical outcomes through the accurate placement of a therapeutic product or the insertion of a large-bore needle for fluid aspiration. Complications from needle trauma are minimized by avoidance of critical structures.

IDENTIFY THE LANDMARKS

For each injection or aspiration procedure, the physician must identify the pertinent local anatomic landmarks. These are areas that represent underlying bony prominences or easily identifiable soft tissues. The landmarks are specific to each injection site. After identification, the structures should be marked on overlying skin with ink by using either a ballpoint pen or a surgical marking pen. Next, the entry site for the needle is marked with ink and an indentation in the skin is created by applying firm pressure to the skin with the retracted tip of a ballpoint pen. This gives the clinician a visual frame of reference and standardizes the procedure from one patient to the next. No matter how much experience a physician has with a procedure, the process of marking the landmarks and entry site in ink should not be skipped. After committing the landmarks to a surface drawing, the patient is instructed not to move that area of the body. Movement will change the relationships between the skin ink marks and the underlying anatomy.

THOUGHTFUL CONSIDERATION

As with any medical procedure, performing injections and aspirations places a great responsibility on the operator. These procedures should be done with a clear differential diagnosis and treatment plan in mind. They should never be performed indiscriminately. The medical provider must consider the indications, contraindications, weight of evidence in the medical literature, expected benefits, possible side effects, anticipated outcomes, diagnostic certainty, his or her personal experience with the procedure, clinical experience, the patient's response to previous injections, and respect for the patient's values before making a decision on whether or not to perform any intervention. This is

a very complex process that requires thoughtful contemplation. It is imperative that the clinician uses common sense and know his or her limits before performing any medical procedure. In some cases, following a conversation with the patient, it may be preferable to use an alternative approach or request specialty consultation, rather than performing any invasive procedure.

WHEN TO REFER TO A SUBSPECIALIST

There will be situations where referral to subspecialist colleagues is desirable and necessary. This would be the case whenever the provider feels uncomfortable performing a procedure. Other indications include instances where there is confusion regarding the correct diagnosis, the expected response to treatment has not occurred, joints are not easily accessible (hip or sacroiliac joints), arthrocentesis attempts have been unsuccessful; or septic arthritis, suspected inflammatory polyarthritis, recurrent monoarthritis unresponsive to treatment, or undiagnosed chronic monoarthritis. In these instances, the patient may be referred to an orthopedic surgeon, rheumatologist, interventional radiologist, or pain specialist. If an acute septic joint is suspected, the patient requires immediate inpatient hospitalization for joint drainage, debridement, intravenous antibiotics, and possibly an infectious disease consultation in the case of an atypical infection.

INDICATIONS FOR INJECTIONS AND ASPIRATIONS

There are many indications to perform injections and aspirations. From a diagnostic standpoint, the introduction of local anesthetic solution into a joint may allow a more comprehensive exam than is possible before relief of pain. Pain limits the musculoskeletal exam through voluntary or involuntary guarding of the affected area. Muscle spasm commonly develops in response, further limiting the range of motion of the area examined. Providing effective pain relief allows the clinician to adequately examine the area of interest. This is essential in order to determine the integrity of underlying structures including tendons, ligaments, and cartilage.

For example, a patient presents with acute traumatic shoulder pain. Upon examination, she complains of moderately severe pain, holds the shoulder at her side, and is unable to demonstrate shoulder abduction because of pain. After injection of 10 mL of 1% lidocaine, the patient is able to demonstrate full range of motion including unrestricted abduction. This indicates that there is not a complete tear of the rotator cuff structures. She may be able to continue to receive care directed by the primary medical provider without specialty referral at that time.

Fluid may also be obtained upon aspiration. If so, then it should be grossly examined for color, clarity, and the presence of blood. Normal fluid is clear and transparent. The fluid may contain blood that indicates a hemorrhagic cause—most commonly acute trauma. It may also be yellow due to xanthochromia from the breakdown of hemoglobin leaking from inflamed synovium. The clarity of the fluid may be altered by the presence of WBCs. Less commonly, crystals and cellular debris can decrease it. Information obtained from the microscopic examination of the fluid in order to assess it for cells, crystals, bacteria, and blood may be critically important and is discussed in a following chapter.

Therapeutically, there are many reasons to perform injections and aspirations. Removal of fluid from a joint alone can result in significant pain relief and restore joint range of motion. With relatively small joints such as the elbow, this can occur with the removal of 5 or 10 mL whereas with the knee, it is not uncommon to remove upward of 100 or even 150 mL in chronic conditions!

Indications for therapeutic injections include crystalloid arthropathies, synovitis, rheumatoid arthritis, other inflammatory arthritis, osteoarthritis, and osteoarthritis. Soft tissue indications include bursitis, tendonitis, tendinosis, epicondylitis, trigger points, ganglion cysts, neuromas, nerve entrapment syndromes, and fasciitis. With inflammatory joint and soft tissue conditions, therapeutic effect is achieved by the precise placement of a corticosteroid/local anesthetic mixture.

Injections of corticosteroids may also be given directly into lesions in patients with skin diseases as diverse as hypertrophic scars, keloids, lichen planus, lichen simplex chronicus, psoriasis, alopecia areata, and discoid lupus.

CONTRAINDICATIONS TO INJECTIONS AND ASPIRATIONS

While knowing the indications of aspirations and injections is important, it is perhaps even more valuable to recognize the situations where these procedures are contraindicated. Absolute contraindications include performance of a procedure on an uncooperative patient, lack of informed consent, history of true allergy to the proposed injected medication, previous documented severe steroid flare, injection through infected tissues, and injection of corticosteroid into critical weight-bearing tendons. In particular, the injection of steroid into and around the Achilles and patellar tendons may result in catastrophic rupture of these structures. Recovery from such rupture is often difficult, prolonged, and incomplete.

Many relative contraindications exist. These are variable and may apply only to certain patients or situations. Some of these include injections near critical structures such as arteries, veins, nerves, or pleural surfaces. Also, caution must be exercised in patients with coagulation disorders, allergy to the preservative in the injected solution, immunocompromised states, brittle diabetes, history of avascular necrosis, previous joint replacement at the injection site, and excessive anxiety concerning the procedure, and in patients with whom postprocedure instructions may not be followed.

In patients receiving corticosteroids, there may be the activation of latent disease or an exacerbation of intercurrent infections due to pathogens, including those caused by ameba, *Borrelia burgdorferi* (Lyme disease), *Candida*, *Cryptococcus*, *Mycobacterium*, *Nocardia*, *Pneumocystis*, *Strongyloides* (threadworm), and *Toxoplasma*. Latent or active amebiasis should be ruled out before initiating corticosteroid therapy in patients who have spent time in the tropics or present with unexplained diarrhea.

Patients taking warfarin, an oral anticoagulant medication, do not represent an absolute contraindication to injection or aspiration. Thumboo et al. in 1998 in the journal *Arthritis and Rheumatism* reported the results of a prospective cohort study of 32 joint and soft tissue injections and aspirations involving patients attending a rheumatology clinic taking warfarin with an INR <4.5. Patients followed up for 4 weeks after the procedure showed no significant hemorrhages.

SAFETY

In order to ensure patient and operator safety, the following procedures should be followed. First, define the local anatomic landmarks. This assures the provider that the needle is being advanced with a knowledge of the underlying structures. Next, always use universal precautions to avoid inadvertent contact with sharp objects and blood or all body fluids. In order to decrease the chance of needle stick injury, there are a variety of new safe-sharp needle systems available for use. It is the practitioner's responsibility to utilize one of these designs to avoid injury and maintain compliance with OSHA regulations. Finally, always use medical aseptic techniques when performing invasive procedures on any patient.

Using a medical aseptic technique does not mean that the procedure needs to be done in a sterile operating room environment. However, it does require that the provider takes the necessary precautions to ensure that there is no chance that infectious organisms are carried into the tissues by the needle. When performing injections and aspirations, the operator must always follow the “no-touch” technique.

The medically aseptic no-touch technique does not allow for any contact of the injection site after sterile preparation of the skin. After the local landmarks are identified, the injection site is marked with ink. Then, an impression in the skin is made at that site by applying firm pressure with the retracted tip of a ballpoint pen. Next, the injection site is cleansed with alcohol, followed with povidone-iodine. The povidone-iodine solution is allowed to dry. After these steps are completed, there is no further contact or touching of the site with any nonsterile objects. The only object that comes into contact with this site is the sterile needle. After the procedure has been completed, clean gauze is used to wipe the site and a sterile adhesive dressing is applied. If this technique is strictly followed, then it is unnecessary to use expensive sterile gloves, drapes, gowns, or masks while performing these procedures.

Always attempt to aspirate before injecting any substance. This will confirm that the needle tip is not inside a blood vessel. Performing this simple maneuver ensures that inadvertent intravascular injection of the injection solution does not occur.

Place the injection *within* a joint or bursa and *around* a tendon. An injection into the substance of a tendon is likely to weaken that structure. Rupture may follow—especially if it is a weight-bearing tendon such as the Achilles or patellar tendons. Also avoid injecting directly into nerves. Such an injection will be evident since the patient should report pain, paresthesias, or numbness at the time of needle contact with a nerve. In this case, simply withdraw the needle slightly and attempt to reposition the needle before injecting the corticosteroid solution.

After injection, the patient should remain in the office for at least 20 min. During this time, the office staff observes the patient for any signs of systemic or local reactions.

SYNOVIAL FLUID ANALYSIS

The acquisition of a sample of synovial fluid for microscopic analysis is the primary objective of arthrocentesis. Examination of the fluid can provide information critical to the diagnosis of the condition that has caused the joint effusion. This is especially important in the case of acute monoarthritis in which either septic or crystal arthritis may be present. After arthrocentesis has been successfully performed, the appearance of the fluid is observed. Normal fluid is clear and transparent. Fluid that is translucent, cloudy, or bloody should be noted. Next, the fluid is either immediately examined under a microscope or transferred as quickly as possible to a laboratory capable of providing further testing. If the specimen is sent for synovial fluid analysis, then it is placed in a glass tube anticoagulated with liquid ethylenediaminetetraacetate (EDTA). Do not use tubes that contain heparin, oxalate, or lithium since these anticoagulants confound crystal analysis. Fluid submitted for culture is transferred from the syringe to appropriate culture media. A general bacterial culture medium is appropriate for most cases of septic arthritis. However, gonorrhea is a common cause of septic monoarthritis. If this is suspected, then transport it in Thayer–Martin medium under CO₂. Cultures from other sites including the pharynx, cervix, urethra, and rectum are necessary if gonococcal disease is suspected. Plate the specimen in Sabouraud dextrose agar if a fungal infection is a consideration.

In the past, a number of tests for glucose, pH, and lactic acid were routinely recommended, but evidence-based investigation has disproved their value. Traditionally,

TABLE 1**Synovial Fluid Properties**

	Appearance	Viscosity	Cells/mm ³	% PMNs	Crystals
Normal	Transparent	High	<180	<10%	None
Osteoarthritis	Transparent	High	200–2,000	<10%	None
Rheumatoid arthritis	Translucent	Low	2,000–50,000	Variable	None
Psoriatic arthritis	Translucent	Low	2,000–50,000	Variable	None
Reactive arthritis	Translucent	Low	2,000–50,000	Variable	None
Gout	Translucent to cloudy	Low	2,000–50,000	>90%	Needle-like + birefringence
Pseudogout	Translucent to cloudy	Low	2,000–50,000	>90%	Rhomboid-like – birefringence
Septic arthritis	Cloudy	Variable	2,000–50,000+	>90%	None
Hemarthrosis	Red	Low	2,000–50,000	<10%	None

joint effusions have been classified as normal, noninflammatory, inflammatory, and hemorrhagic. The absolute cell count is the major discriminating factor between an inflammatory fluid and a noninflammatory fluid. Fluids with cell counts less than 2,000 cells/mm³ are likely to be noninflammatory and inflammatory fluids generally have more than 2,000 cells/mm³. The differential leukocyte count may add further information. A noninflammatory fluid generally contains less than 50% polymorphonuclear cells (PMNs) and an inflammatory fluid considerably more. Recent studies show that the only useful synovial tests in the setting of septic arthritis are the WBC count, percentage of PMNs, Gram stain, and culture.

Crystal analysis can be performed in any office equipped with a microscope. A single drop of fluid is placed on a clean slide and is examined under a cover slip. Crystals can be observed with plain microscopy and a preliminary identification made with regard to crystals, WBCs, and bacteria. A polarizing light microscope provides the gold standard for crystal identification. This is usually present only in a referral laboratory. Monosodium urate crystals found in gout appear needle shaped and are strongly negatively birefringent when examined under polarization. Calcium pyrophosphate dihydrate crystals are found in pseudogout. These are strongly refractile, short, shaped as rhomboid rods, and weakly positively birefringent. Crystals found in cells are more of a specific finding for gout or pseudogout (Table 1).

SPECIAL MEDICAL CONDITIONS

Several medical conditions deserve special consideration. Diabetes is an increasingly common medical condition affecting the primary care physician's patient population. Because of the frequent association with obesity, these patients often place mechanical and metabolic stress on joint and soft tissues that can be amenable to treatment using injectable corticosteroids. However, the administration of steroids is known to elevate blood sugars above their usual levels. Recent studies have shown that corticosteroid injections are safe in patients with diabetes. The rise in blood sugars is minimal and well controlled with carbohydrate restriction, continuation of the usual diabetes treatment regimen, and close monitoring of blood sugars for 5 days following injection. However, the presence of diabetes may make treatment using injected corticosteroids less effective.

Concern has been raised regarding the performance of injections in patients taking oral anticoagulants including aspirin, NSAIDs, other antiplatelet agents, and warfarin. A prospective cohort study by Thumboo published in the *British Medical Journal* in 1998 demonstrated safe and effective joint and soft tissue injections and aspirations of 32 procedures on patients with therapeutic doses of warfarin. No episodes of hemarthrosis or abnormal bleeding were observed. This has also been the author's experience in many more patients (unpublished data).

Septic arthritis is a medical emergency. A joint infection is a very serious condition with dire consequences to the integrity of the joint and surrounding structures. All efforts must be made to diagnose septic arthritis immediately and provide emergent hospitalization. The patient requires treatment including surgical drainage/irrigation of the affected joint, administration of intravenous antibiotics, and pain control. This requires the coordinated care of the primary care physician, orthopedic surgeon, and possibly an infectious disease subspecialist. Common organisms causing joint infections are *Neisseria gonorrhoeae*, *Streptococcus/Staphylococcus* species and, increasingly, methicillin-resistant *Staphylococcus aureus*.

Rheumatoid arthritis presents unique challenges to the primary care provider. This is a destructive, rapidly progressive inflammatory arthritis. Lytic enzymes rapidly degrade the joint surfaces, synovium, and supporting structures unless the process is interrupted and controlled. Joint and soft tissue injections play an important role in medical care because they can be used to deliver relatively small doses of corticosteroids locally to augment the overall systemic management of this condition.

Management of pain involving joint replacements demands special consideration. Pain involving a joint replacement often occurs because the normal biomechanics of a joint are altered. Another cause of pain can be poorly fitting or loose components of prostheses. Simple injections of corticosteroids or other substances often do not lead to meaningful improvement in the patient's pain and certainly do not correct any underlying biomechanical abnormality. In these patients, it is often more prudent to not perform injections and to refer the patients back to their orthopedic surgeon for management of this challenging problem.

TOPICAL ANESTHESIA

Providing the patient with a pain-free experience is the responsibility of the primary care provider. In select injections, such as the posterior approach to the subacromial space, techniques such as stretching/pinching the skin and other dermal stimulation may give adequate distraction to the patient so that the pain from needle insertion is not felt.

Local anesthesia to needle introduction can be achieved by use of either topical or injectable local anesthetic agents. A topical vapocoolant spray can be used to give rapid onset of brief, but effective, skin numbness. These skin refrigerants cause a brief period of noncytotoxic freezing of the epidermis. This provides several seconds of local anesthetic effect, which blocks the pain associated with needle injections. The mechanism of action for anesthesia is to decrease nerve conduction velocity of the C fibers and A-delta fibers of the peripheral nerve system. This interrupts nociceptive input to the spinal cord.

To administer ethyl chloride, the bottle is held upside down approximately 18 in. from the treatment area. The stream is directed continuously on the injection site. After 10 to 20 s, freezing occurs, which is indicated by frosting of the skin. The needle is then immediately inserted into the skin. Care must be exercised when using ethyl chloride as this product is flammable. It should never be used in the setting of open flames or sparks—including hyfrecators, radiofrequency devices, or lasers.

Alternatively, the Gebauer Corporation manufactures PainEase (a proprietary mixture of 1,1,1,3,3-pentafluoropropane and 1,1,1,2-tetrafluoroethane). PainEase is available as an aerosolized mist spray and as a medium stream. Both are distributed in pressured cans and are nonflammable products. They may be used on intact skin, minor skin wounds, and intact mucous membranes. Gebauer's PainEase mist is administered by holding the can upright approximately 4 in. from the application site and spraying for 5 s on average. The fine droplets of mist are dispersed in a circular pattern about 2 in. in diameter. The medium stream spray produces a pinpoint stream that contacts the skin surface at a specific location. Both products are sprayed until the skin just turns white. Adequate local anesthesia for needle injection or minor surgical procedures lasts several seconds. PainEase is not carcinogenic or teratogenic and, thus, may be used safely in pregnancy when used as directed. Furthermore, this product offers advantages over ethyl chloride, including a larger field of anesthesia, lack of "running" of liquid down the skin, and nonflammability. With prolonged contact, both ethyl chloride and PainEase may damage polyvinylchloride coverings used to upholster examination tables. Barrier pads used during injections effectively keep the vapocoolant fluid from contact with the upholstery.

LOCAL INFILTRATION ANESTHESIA

The injection of local anesthetic into joints or soft tissues serves several purposes. Administration of the local anesthetic provides short-term pain relief. This allows for patient feedback. It may provide a more comprehensive examination of the affected area without the limitation of pain. In general, a local anesthetic is mixed in the same syringe as the corticosteroid solution. The added volume of the local anesthetic helps dilute the corticosteroid. This enables dispersion of steroid in a large joint space or bursa. Although mixing with local anesthetics is not recommended by the manufacturers of injectable corticosteroids, it is uniform practice with physicians administering injections. Pain relief following injection confirms the proper placement of corticosteroid both to the clinician and to the patient. Although pain may return after the anesthetic wears off, the patient can be assured that the injected corticosteroid should begin to exert its clinical effect after 24 to 48 h.

There are a few local anesthetic choices. Most commonly, lidocaine is used. Lidocaine for local anesthetic injection is commercially available as 0.5%, 1%, and 2% concentrations. It is available with or without epinephrine. For joint and soft tissue injections the author exclusively uses 1% lidocaine without epinephrine. This is commonly available in 50 mL multiuse bottles containing methylparaben, a preservative. Lidocaine is also available as 2 mL single-use preservative-free vials. The 2% solution of lidocaine confers no clinically important advantages and increases the risk of toxicity following administration of large amounts. The inclusion of epinephrine likewise offers no clinical advantages and is not used in these procedures to dilute the corticosteroid. In fact, lidocaine with epinephrine is acidic and causes significant transient local burning pain upon injection. The only time that the author uses 1% lidocaine with epinephrine during these procedures is when providing local anesthesia prior to performing a knee aspiration and/or injection.

Bupivacaine (Marcaine, Sensorcaine) is another commonly used local anesthetic. It has a longer onset of action but offers extended anesthetic effect. It affords 6 to 8 h of local anesthesia. Multiuse vials also contain 1 mg of methylparaben as a preservative. Many physicians prefer to mix lidocaine with 0.25% bupivacaine in order to give the patient rapid onset of local anesthesia with an extended duration. However, there is no proven clinical benefit using this approach. Because of the additional steps

required to draw up the separate anesthetics, preparation of this combination may increase the chance of contamination and needle stick injury. It may also give the patient a false sense of security since there is prolonged initial pain relief before the tissues have healed. Since the negative feedback from pain is absent for an extended period of time, the patient might suffer further injury such as tendon rupture through inadvertent use of the affected body area.

The pH of local anesthetics can be buffered to decrease local pain. The pH of 1% lidocaine without epinephrine is 6.5 while the pH of 1% lidocaine with epinephrine is 4.5. Bupivacaine is isotonic. Adding sterile sodium bicarbonate to lidocaine with epinephrine at a ratio of 1:10 neutralizes the mixture and has been shown to provide significant pain relief. However, this is not a clinically important issue with joint injections because plain lidocaine is used and not lidocaine with epinephrine.

INJECTABLES

Corticosteroids

Corticosteroids used for injection purposes are synthetic derivatives of hydrocortisone. Because these compounds reduce pain and swelling, they are commonly injected into inflamed joints and soft tissues for therapeutic effect. The exact mechanism of action of corticosteroids is complex with various sites of action. They bind to glucocorticoid receptors regulating gene transcription. There is a vascular stabilizing effect by inhibition of endothelial expression of adhesion molecules for neutrophils. Capillary dilation and vascular permeability are reduced. By altering the effect of protein synthesis, corticosteroids also reduce cytokines and other inflammatory mediators. There is also a decline in the number of macrophages and PMNs that migrate into the area. The end effect is to reduce the amount of inflammation, thereby reducing swelling and pain.

Several different corticosteroids are commercially available to use for joint and soft tissue injections (Table 2). These include triamcinolone acetonide (Kenalog), triamcinolone diacetate (Aristocort), triamcinolone hexacetonide (Aristospan), methylprednisolone acetate (Depo-Medrol), betamethasone acetate and sodium phosphate (Celestone

TABLE 2
Properties of Injectable Corticosteroids

Corticosteroid	Relative Anti-inflammatory Potency	Solubility (%Wt/Vol)	Biological Half-life (h)
Hydrocortisone acetate (Hydrocortone)	1	High 0.002	8–12
Triamcinolone acetonide (Kenalog)	5	Intermediate 0.004	12–36
Triamcinolone hexacetonide (Aristospan)	5	Intermediate 0.0002	12–36
Methylprednisolone acetate (Depo-Medrol)	5	Intermediate 0.0014	12–36
Betamethasone acetate and sodium phosphate (Celestone Soluspan)	25	Low	26–54
Dexamethasone acetate (Decadron-LA)	25	Low	26–54

Soluspan), and dexamethasone acetate (Decadron-LA). The agents differ with regard to their potency, solubility, and biological half-life (Table 2). Potency is measured against hydrocortisone. Different products have varying effects and solubility in the tissues. The solubility is inversely proportional to the biologic duration of effect of the agent. Hydrocortisone is rarely used because of its high solubility and short duration of action. It also has significant mineralocorticoid activity that is not shared by the other agents.

Few studies have been done that directly compare the various agents in terms of their efficacy and duration of action. Furthermore, no studies have been done that conclusively determine which corticosteroid is preferred for injection of joints or soft tissues. Without good data, the selection of the particular corticosteroid agent is left to the preference of the individual clinician. Considering medication availability, cost, and past experience, the author prefers to use triamcinolone acetonide (40 mg/mL). If another corticosteroid is chosen, then the equivalent dosage and volume of administration may be calculated from the comparison table (Table 3).

The dose of corticosteroid to be used generally depends on the injection site, disease process, and degree of inflammation. Suggested doses of corticosteroid are listed in each individual chapter. Table 3 presents equivalent dosages of corticosteroids used for injection. For the purpose of this book, all doses are expressed in milligrams of triamcinolone acetonide suspension (Kenalog). If the physician chooses to use another steroid, then the comparative dosage can be calculated from the table. For instance, if the chapter in this text indicates that 20 mg of triamcinolone is to be used for injection into the wrist joint, then one could use 20 mg of Kenalog, 20 mg of Aristospan, 20 mg of Depo-Medrol, 4 mg of Decadron-LA, or 3 mg of Celestone Soluspan.

In general, corticosteroid injections should be performed no more often than every 3 months. This is done to prevent the systemic complication of hypothalamic–pituitary–adrenal axis suppression, osteoporosis, and local articular degradation.

The author typically uses two syringe sizes when injecting corticosteroids. A 3-mL syringe is used for most of the injection sites. This accommodates 1 mL of the 1% lidocaine and 1 mL of corticosteroid. A 10-mL syringe is used for large joints such as the subacromial space, and sacroiliac, hip, and knee joints. In this case, 8 mL of 1% lidocaine is mixed with 1 mL of the corticosteroid. These syringes may be prepared at the time of the procedure, or ahead of time, and be stored in a cabinet protected from heat and light for up to 2 weeks before use. When injecting a corticosteroid–local anesthetic mixture, a common observation made is that the corticosteroid often precipitates toward the bottom of the syringe. Immediately before the corticosteroid–local anesthetic mixture is injected, 1 mL of air is aspirated into the syringe creating a “mixing bubble” (Fig. 1). The syringe

TABLE 3
Equivalent Dosages of Injectable Corticosteroids

Corticosteroid Preparation	Trade Name	Equivalent Dose/Volume (mg/mL)
Triamcinolone acetonide	Kenalog	40
Triamcinolone hexacetonide	Aristospan	40
Methylprednisolone acetate	Depo-Medrol	40
Dexamethasone acetate	Decadron-LA	8
Betamethasone acetate and sodium phosphate	Celestone Soluspan	6

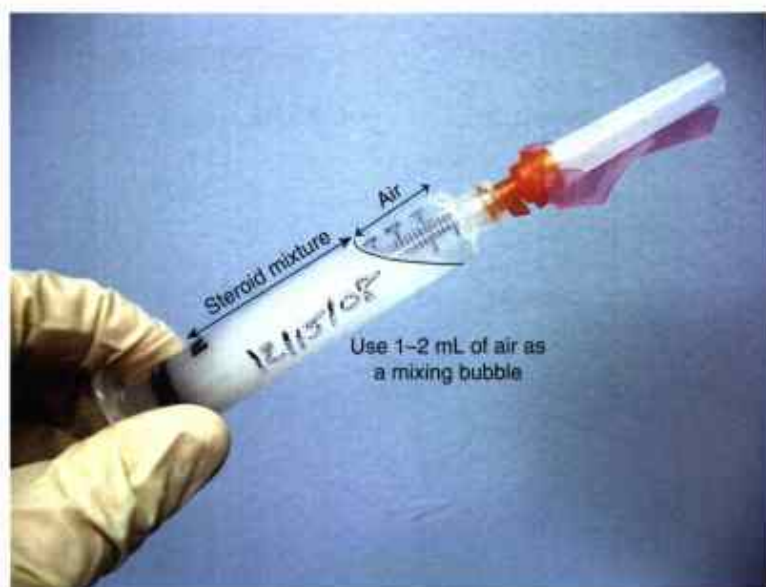


FIGURE 1 • Mixing bubble.

is then rapidly rotated in order to disperse the corticosteroid in the local anesthetic evenly throughout the syringe. The needle of the syringe is then pointed upward and the small volume of air expelled before the needle is inserted into the skin at the target site.

There is a common misconception that distributing the corticosteroid over a wide area enhances the effect from soft tissue injections. Practitioners frequently use a “fanning” or “peppering” technique to distribute the solution across the area of involvement. This, however, is frequently unnecessary. The solution is injected as a bolus and will passively move in the tendon sheaths and local fascial planes. Consideration may be given to “fanning” when injecting back trigger points and trochanteric bursitis.

Viscosupplementation

Hyaluronan (sodium hyaluronate) is a natural complex sugar of the glycosaminoglycan family. The concentration and size of endogenous hyaluronan are reduced in the joint fluid of patients with osteoarthritis. Currently, there are several products available for injection that can be used to supplement this substance in joint fluid. These commercial agents are high molecular weight derivatives of hyaluronan, which are synthetically derived from rooster combs or produced by bacterial fermentation and extraction. The exact mechanism of action of viscosupplementation is unknown, but may involve physical cushioning of the knee joint, anti-inflammatory action, and/or the stimulation of production of endogenous hyaluronan by synoviocytes.

Injectable hyaluronan is commercially available in the United States as the products Synvisc (Genzyme), Orthovisc (Depuy Mitek), Hyalgan (Sanofi-Aventis), Supartz (Smith & Nephew), and Euflexxa (Ferring) (Table 4). They are classified not as medications, but as medical devices by the U.S. Food and Drug Administration. These agents are approved only for the treatment of pain in osteoarthritis of the knee in patients who have failed to respond adequately to conservative nonpharmacologic

TABLE 4**Viscosupplementation Products**

Viscosupplementation products—synthetically derived from rooster combs

Synvisc (Genzyme) www.synvisc.com

8 mg/mL—2-mL syringe given as three weekly injections

Orthovisc (Depuy Mitek) www.orthovisc.com

15 mg/mL—2-mL syringe given as three to four weekly injections

Hyalgan (Sanofi-Aventis) www.hyalgan.com

10 mg/mL—2-mL syringe given as five weekly injections

Supartz (Smith & Nephew) www.supartz.com

10 mg/mL—2.5-mL syringe given as five weekly injections

Neovisc (Stellar) www.stellarpharma.com/NeovisC1.htm. (European and Canadian approval only at this time.)

10 mg/mL—2-mL syringe given as three to five weekly injections

Viscosupplementation products—produced by bacterial fermentation and extraction

Euflexxa (Ferring) www.euflexxa.com (only product in class that is FDA approved at this time)

10 mg/mL—2-mL syringe given as three weekly injections

Durolane (Q-Med) www.durolane.com. (European and Canadian approval only at this time.)

20 mg/mL—3-mL syringe given as a single injection

Non-animal-stabilized hyaluronic acid (NASHA)

Ostenil (TRB Chemedica) www.ostenil.ca. (European and Canadian approval only at this time.)

10 mg/mL—2-mL syringe given as three weekly injections

Suplasyn (Bioniche) www.suplasyn.com. (European and Canadian approval only at this time.)

10 mg/mL—2-mL syringe given as three weekly injections

therapy and simple analgesics such as acetaminophen. The safety and effectiveness of the use of these viscosupplements in other joints have not been established.

Evidence-based support in the medical literature for the use of hyaluronan derivatives is incomplete. The most optimistic studies show clinical improvement up to 1 year following injection. However, there may be specific utility when treating patients who have brittle diabetes mellitus, those who have failed corticosteroid injections, patients who have received frequent corticosteroids and are in danger of the significant side effects from repeated administration, or those patients who have a rare allergy to corticosteroids or have developed steroid flare. Use of injected hyaluronan may allow appropriate postponement of total knee replacement surgery.

Although these products are similar, Synvisc, Orthovisc, and Euflexxa are given intra-articularly as a series of three weekly injections. Both Hyalgan and Supartz are administered in a series of five injections at weekly intervals. All three preparations are prepackaged in sterile syringes. They are expensive and knowledge of the reimbursement process is recommended.

The most commonly reported adverse reactions are transient local pain, swelling, effusion of the injected knee, and rash. Administration is contraindicated in patients with allergies to avian proteins, feathers, or egg products or in patients with known hypersensitivity to hyaluronan products. Since Euflexxa is produced by bacterial fermentation, the concerns about avian allergy do not apply.

Botulinum Toxin

Botulinum neurotoxin is a group of seven related proteins produced by *Clostridium botulinum*. Of these, only type A and type B neurotoxins are approved for use in the United States. Botulinum toxin irreversibly binds to the presynaptic nerve membrane and blocks formation and transmission of acetylcholine at the neuromuscular junction. The neuromuscular effect of botulinum causes a flaccid paralysis of the injected muscles. It effectively creates a “medical splinting” of the target musculotendinous unit that prevents continued use. This functional-forced rest of the area for approximately 3 months allows the pathology to heal.

Injections are performed with a Teflon-coated, 24-gauge needle connected to an electromyographic machine. Those muscles with highest clinical and EMG activity are injected. Therapeutic effect from the injection usually occurs in the first 7 days and the response lasts for an average of 12 weeks. Injections usually are repeated every 3 to 4 months. Recovery occurs through proximal axonal sprouting and muscle reinnervation by formation of a new neuromuscular junction.

Effective treatment using botulinum toxin has been demonstrated in the treatment of various musculoskeletal disorders including cervical dystonias, cervicogenic headache, temporomandibular joint disorders associated with increased muscle activity, myofascial pain disorder, piriformis syndrome, limb dystonia (writer’s cramp), and lateral epicondylitis. A list of the botulinum toxin products currently approved for use in the United States is displayed in Table 5. At this time, the use of botulinum neurotoxin for the treatment of pain is approved only by the U.S. Food and Drug Administration for cervical dystonia. Use of botulinum toxin for other pain is considered off-label use and may be considered appropriate only for patients with a condition that does not respond to, or is judged inappropriate for, more conservative treatment.

Other

Other agents that are currently investigational may earn a regular place in the practice of joint injections. These include intrasynovial NSAIDs, Sarapin (a solution of soluble salts of the volatile bases from sarraceniaceae—the pitcher plant), autologous blood, and biologic agents such as Etanercept. An exciting future treatment may involve injecting appropriate viral vectors into joints to transfer genes into synoviocytes for the treatment of rheumatoid arthritis, inflammatory arthritis, and osteoarthritis.

TABLE 5

Botulinum Neurotoxin

Botulinum neurotoxin type A products

Botox (Allergan) www.allergan.com

100 units/vial

Dysport (Ipsen) www.dysport.com

500 units/vial

Botulinum neurotoxin type B product

MyoBloc (Solstice Neurosciences) www.myobloc.com/hcp

5,000 units/mL

EQUIPMENT

It is highly recommended that medical providers organize the equipment needed to perform injections and aspirations. Organizing all equipment in such a manner presents the materials conveniently to the practitioner. This decreases the amount of time required to gather all of the necessary items. It also reduces the possibility of inadvertent medical errors. Organizing all equipment/supplies should be done well before the procedure is performed. Based on provider or organization preference, four options can be utilized.

1. A dedicated cabinet
2. An injection tray
3. An injection cart
4. Injection packs

The cabinet works well in a setting where the provider always works out of the same room. It keeps the supplies centralized and visible but requires collection of the various components at the time a procedure is performed. Both a large plastic tray and an injection cart provide a portable option for organizing materials. These may work well in a large clinic or teaching setting. Another option is to create “injection packs” that include all of the supplies used universally in these procedures.

After years of performing these procedures, the author’s preferred option is the use of the injection packs along with organizing materials in a dedicated cabinet in each examination room. When a patient presents with a condition that the office staff suspect might require an injection or aspiration, they place a pack along with the appropriate-size prefilled lidocaine/corticosteroid syringe on the counter in the exam room. Should the author agree that a procedure is necessary, he uses those materials but is also free to select other needle lengths and syringe sizes from the cabinet. This preprocedure organization enhances office organization, increases efficiency, and reduces the possibility of a medical mistake.



FIGURE 2 • Equipment for injections and aspirations.

Items that should be collected (Fig. 2):

- Gloves—nonsterile exam gloves
- Ballpoint pen
- Barrier “chucks” pads—nonsterile
- Alcohol pads
- Povidone-iodine pads (not swab sticks)
- Gauze pads—nonsterile
- Adhesive bandages
- Hemostat surgical clamp (optional)
- Syringes
 - 3 mL
 - 5 mL
 - 10 mL
 - 20 mL
 - 60 mL
- Needles
 - 20 gauge—1 in.—for drawing medications and aspiration of small joints
 - 18 gauge—1-1/2 in.—for aspiration of large joints and bursa
 - 25 gauge—1/2, 1, and 1-1/2 in.—for injections
 - 25 gauge—3-1/2 in. spinal needles—for deep injections (rarely used)
- Ethyl chloride or PainEase vapocoolant spray
- Lidocaine: 1% plain
- Lidocaine 1% with epinephrine—used only for local anesthesia when performing knee aspirations.
- Steroid of choice (triamcinolone 40 mg/mL)
- Viscosupplementation agent of choice—ordered as needed

MUSCULOSKELETAL ULTRASOUND

There is a growing body of literature that demonstrates the efficacy of musculoskeletal ultrasound as an aid for accurate needle placement. In “expert” hands, the discrete placement of a needle tip into even a large joint may occur only half of the time. Without confirmation of needle placement by diagnostic imaging, the only way to ensure joint entry is by aspiration of synovial fluid. Ultrasound guidance of injections into joints, bursa, and tendon sheaths increases the success rate to nearly 100% in experienced hands. Imaging can be performed either at the same time of the aspiration/injection or prior to the needle procedure itself. Ultrasound guidance has the potential to improve clinical outcomes, especially in joints and tendons that are difficult to access.

If imaging is done concurrently, then the entire procedure may be performed in a sterile field using sterile gel and a sheath for the ultrasound head. Alternatively, the ultrasound imaging can be done in real time, utilizing an acoustic window adjacent to, but not directly involving, the injection site. The advantage in this situation is that the ultrasound field does not require a sterile environment and the injection/aspiration is done as usual. In both of these cases, the needle tip is guided to its target in a live image, and direct visualization of the success or failure of placement is seen and may also be recorded.

In the case of ultrasound done prior to the injection, the sonographic landmarks are noted and then marked on the skin. After prepping the skin in an antiseptic fashion, the injection/aspiration is done immediately afterward as a separate procedure. The advantage of this procedure is that it can be done by a single operator. However, it does not allow real-time imaging confirmation of placement.

TECHNIQUE

When performing injections and/or aspirations, it is important that the medical provider follows a standardized routine. This helps organize the clinician, prepares the patient, and reduces the possibility of procedural omissions. The following steps should be done in the order presented:

1. Determine the medical diagnosis and consider relevant differential diagnoses.
2. Discuss the proposed procedure and alternatives with the patient.
3. Obtain written informed consent from the patient.
4. Collect and prepare the required materials.
5. Correctly position the patient for the procedure.
6. Identify and mark the anatomic landmarks and injection site with ink. (Do not allow the patient to move the affected area from the time that the marks are placed until after the procedure is completed.)
7. Press firmly on the skin with the retracted tip of a ballpoint pen to further identify the injection site.
8. Prepare the site for injection by cleansing with an alcohol pad followed by two applications of povidone-iodine pads.
9. Allow the povidone to dry for full antibacterial effect.
10. Provide local anesthesia as indicated through use of tactile distraction, vapocoolant spray (ethyl chloride or PainEase), and/or injected local anesthesia.
11. Using the no-touch technique, introduce the needle at the injection site and advance it precisely into the treatment area.
12. Aspirate fluid (optional) and send it for laboratory examination if indicated. If injecting corticosteroid immediately following aspiration, do not remove the needle from the joint or bursa. In this case, grasp the needle hub firmly (with a hemostat clamp if necessary), twist off the original syringe, and then immediately attach the second syringe that contains the corticosteroid.
13. Inject corticosteroid solution into the treatment area. Always aspirate before injection to avoid intravascular administration. Do not inject the medication against resistance.
14. Withdraw the needle.
15. Apply direct pressure over the injection site with a gauze pad.
16. Apply an adhesive dressing.
17. Provide the patient with specific postinjection instructions.

COMPLICATIONS

Complications from injections and aspirations fall into two categories—systemic and local. Systemic complications include vasovagal reactions, lidocaine allergy, lidocaine toxicity, cardiac arrhythmias, seizures, flushing, increased blood sugars in patients with diabetes, impaired immune response, psychological disturbances, adrenal suppression, irregular menses, abnormal vaginal bleeding, and osteoporosis. Local complications may involve bleeding, infection, osteonecrosis of juxta-articular bone, ligament rupture, tendon rupture, subcutaneous atrophy, and skin depigmentation. Pneumothorax has been reported as a complication of trigger point injections of back muscles. Injuries to the radial artery can occur with attempted aspiration of large volar wrist ganglion cysts.

Patients receiving corticosteroid therapy are at increased risk for infection or reactivation of an infection due to potentially decreased immune resistance with an inability to localize infections. The risk of infection exists with any pathogen (viral, bacterial, fungal, protozoan, or helminthic) in any location of the body. Infections

may be mild or severe, and the risk for complications increases with corticosteroid dose. Also, corticosteroid therapy may mask some signs of current infection.

Steroid flare is a local reaction thought to be due to the development of steroid crystals in the soft tissue and/or synovial space. The reaction occurs 6 to 24 h following corticosteroid injection. Although steroid flare is thought to be common, this is controversial, since an identical reaction can occur from chemical synovitis due to methylparaben, a preservative. Multiuse vials of plain lidocaine, lidocaine with epinephrine, and bupivacaine all contain 1 mg of methylparaben. If a patient has a history of a steroid flare or "lidocaine allergy," single use vials of 1% lidocaine that do not contain a preservative might be carefully used instead. In either case, an acute postinjection reaction can be managed by the use of NSAIDs and ice application after a repeat aspiration confirms that there is no infection.

AFTERCARE

Immediately following the aspiration and/or injection, apply pressure to the bandage, covering the site. Once the provider is assured that the patient is stable and is not at risk of falling, the patient should be brought down from the exam table. Gentle massage and slow range of motion should be encouraged to enable distribution of the corticosteroid throughout the joint space or soft tissues. After discharge from the office, patients should be advised to look for and immediately report any adverse reactions. Of primary importance is recognizing the early signs of infection. Therefore, any swelling, redness, increased warmth, proximal red streaking, or fever greater than 100°F should be reported immediately.

Patients often experience complete resolution of pain following injection with a local anesthetic. Because of pain relief and absence of negative feedback, there is an increased risk of further injury to the treated area. They should be informed that the initial pain relief is being provided by the injected local anesthetic and that its effect will only be temporary. In the case of plain 1% lidocaine, pain relief can be expected to last only about 1 h. The anti-inflammatory effect of the injected corticosteroid product usually has a 24 to 48 h onset of action. Patients should be informed that the pain is expected to return in about an hour and decrease again in 1 to 2 days.

Additional instructions may be given following aspiration and/or injection. The patient might be directed to apply ice to the affected area. NSAIDs may be prescribed depending on the clinical situation. Studies have shown that immobilization of the affected area is not necessary, but reduced usage and activity modification are often helpful. A compressive elastic wrap or splint might be indicated. An aftercare patient education handout that outlines the possible adverse reactions and specific instructions is a useful tool (see Appendix 2).

DOCUMENTATION OF THE PROCEDURE

A very important step in the provision of medical services is the description of the events that occurred. This serves not only as the official medical record, but also as a billing record and a legal document. The note should affirm that discussion of the proposed procedure and the alternative treatments occurred, that possible complications were discussed, and that all questions were answered. The note must include the fact that written informed consent was obtained. Then, it should document patient position, anesthesia, supplies used, and the physical steps involved in performing the procedure. There must be a record of any pertinent findings, complications encountered, and the patient's postprocedure condition. Finally, a list of patient instructions, treatment plan,

and follow-up care must be documented and signed by the medical provider and any supervisors if necessary.

See the example of documentation for a knee joint aspiration and injection in Appendix 3. This may be modified as needed to meet the needs of the specific aspiration/injection procedure, patient, provider, and medical system. A review of this document by legal representatives prior to implementation is recommended.

BILLING AND CODING

In order to receive appropriate reimbursement, it is essential that clinicians assign the proper code(s) for the procedure(s) performed. This ensures fair reimbursement for the work done at the visit. A complete description of the procedures performed during the patient encounter must be documented in the medical record in order to support the level of coding. At the time of publication, the following Current Procedural Terminology (CPT) 2009 codes are employed to bill for injections and aspirations:

- 20526—Injection, therapeutic, carpal tunnel
- 20550—Injection(s), single tendon sheath, or ligament, aponeurosis (e.g., plantar “fascia”)
- 20551—Injection(s), single tendon origin/insertion
- 20552—Injection(s), single or multiple trigger point(s) in one to two muscles
- 20553—Injection(s), trigger point(s) in three or more muscles
- 20600—Arthrocentesis, aspiration and/or injection, *small* joint or bursa
- 20605—Arthrocentesis, aspiration and/or injection, *intermediate* joint or bursa
- 20610—Arthrocentesis, aspiration and/or injection, *major* joint or bursa
- 20612—Aspiration and/or injection of ganglion cyst(s), any location
- 64450—Injection, nerve block, therapeutic, other peripheral nerve or branch

CPT 2009 defines small joints as those in the fingers and toes. Temporomandibular, acromioclavicular, wrist, elbow, ankle, and olecranon bursae are defined as intermediate joints or bursa. Large structures are the glenohumeral joint, sacroiliac joint, hip joint, knee joint, and the subacromial bursa.

According to their definitions, the CPT codes 20550, 20551, 20600, 20605, and 20610 are used once for each tendon, joint, or bursa injected. If more than one tendon, joint, or bursa is injected at a visit, then the codes are listed multiple times for each separate structure that is injected. In addition, the modifiers –51 or –59 are used to indicate when multiple procedures are performed. Usually –59 is used to code for multiple injections at different sites, but the specific modifier used is determined by the preference of each insurance carrier. Note that trigger point injection CPT codes 20552 and 20553 are used only once each session, regardless of the number of injections performed. CPT 2009 gives specific instructions when reporting multiple ganglion cyst aspirations/injections. In this case, the code 20612 is used and the modifier –59 appended.

CPT 2009 does not specifically define the proper code to be used for corticosteroid injection of either the ulnar nerve in cubital tunnel syndrome or injection of the interdigital nerves of the feet in Morton’s neuroma. While most clinicians use the tendon injection codes for this, the author feels that until CPT descriptors change, the code 64450 most accurately reflects the procedure performed in these conditions.

Medicare and most insurance companies apply the multiple surgery rule when paying for multiple injections. They reimburse 100% for the first procedure, 50% for the second, and 25% for third and subsequent procedures.

Diagnostic codes must be listed in order for an insurance company to justify payment for the injection/aspiration procedure. These codes follow the standard International

TABLE 6**2009 HCPCS J Codes for Injectables**

J-Code	Material	Unit (mg)
J3301	Kenalog	10
J3303	Aristospan	5
J1020	Depo-Medrol	20
J1030	Depo-Medrol	40
J1040	Depo-Medrol	80
J0704	Celestone Soluspan	6
J1094	Decadron-LA	1
J7322	Synvisc	16
J7324	Orthovisc	30
J7321	Hyalgan	20
J7321	Supartz	25
J7323	Euflexxa	20
J0585	Botulinum toxin type A	1
J0587	Botulinum toxin type B	1

Classification of Diseases (ICD) system. In each of the injection chapters of this book, both the most commonly used ICD-9 (<http://www.cdc.gov/nchs/icd9.htm>) and ICD-10 (<http://www.who.int/classifications/icd/en/>) codes are listed.

J codes are used to charge for the injected corticosteroid consumed during the procedure. Therapeutic injectable products, such as corticosteroids and viscosupplementation agents, are billed in addition to the injection administration codes (Table 6). The J codes are not used for local anesthetics since their use is considered a necessary part of the procedure much like the needle and syringe. The charge is reflected as the number of units used during the procedure. For instance, the J code for Kenalog is expressed in 10mg units. If the injection is done with 40mg of Kenalog, then the patient is charged four units of J3301. The most common current J codes used for injection are listed in Table 6.

An evaluation and management (E&M) code can be billed if the documentation of the visit supports the necessity and completeness of the evaluation. Otherwise, only the CPT code and associated J code can be used if a separate, distinct, medically necessary evaluation is not performed.

INFORMED CONSENT

As with any invasive procedure, informed consent must be obtained from the patient. For the purpose of documentation, this should be done in a written format. The patient must also have an adequate opportunity to ask questions including a discussion of alternative methods of diagnosis and treatment. An example of an informed consent form is included in Appendix 1.

EVIDENCE-BASED MEDICINE

Intra-articular and soft tissue steroid injections are common procedures performed by primary care physicians. They have enjoyed acceptance and are frequently used to treat various musculoskeletal conditions. Although significant therapeutic efficacy is claimed

from over 40 years of published research, a closer examination of the literature yields less convincing evidence of significant long-term improvement of specific, measured outcomes. The available data support short-term benefit from injected corticosteroids. There is currently insufficient quality data to provide a definitive answer on the efficacy of corticosteroid injections. However, lack of discrete medical evidence does not necessarily mean that these procedures are ineffective. Even gold standard evidence-based medicine resources such as Cochrane Reviews suffer from performing meta-analysis using studies with data that are flawed. New investigations that are methodologically sound are needed to measure outcomes of corticosteroid injections given for the treatment of specific conditions.

PEARLS

- Review and mark anatomic landmarks before aspirating or injecting.
- Visualize the anatomy and the procedure in three dimensions.
- Always use the no-touch technique.
- Aspirations: Use a 18-gauge needle for large joints or bursa. Use a 20-gauge needle for intermediate joints.
- Use a 25-gauge needle for small joints.
- Injections: Use a 25-gauge needle.

Chalazion

A chalazion is an acute or chronic granuloma that forms due to inflammation and obstruction in the meibomian glands (or tarsal glands) on the conjunctival surface of either the upper or the lower eyelids. The obstruction in these small sebaceous glands may occur due to allergy, acne in adolescence, or rosacea. A chalazion contains many steroid-responsive immune cells including macrophages, plasma cells, polymorphonuclear cells, and eosinophils. Patients with this condition present not uncommonly to the primary care office, and although considered self-limited, it may last for weeks to months before spontaneously disappearing. Traditional conservative treatment includes the application of local heat, lubricant eye drops, careful cleansing of the eyelid, and topical antibiotics (although this condition, unlike a hordeolum, is not an infectious process).

An often unrecognized procedure is the simple injection of a small amount of corticosteroid into the substance of the chalazion. The procedure is quick and well tolerated and results in almost uniform resolution of the chalazion lesion within days of administration. Additional advantages of this technique over traditional excision or incision/curettage include its simplicity, less pain, considerably decreased cost, no requirement of special instruments, no need for postoperative eye patching, and convenience for both the provider and the patient.

Indications	ICD-9 Code	ICD-10 Code
Chalazion	373.2	H00.1

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Supine on the examination table with the head of the bed elevated 30 degrees.
- The patient's hands are folded in his or her lap.
- The clinician stands lateral to the patient, on the same side as the chalazion.

ANESTHESIA

- Local anesthesia of the eyelid is not used. Local injection of anesthetic into the soft tissue surrounding the chalazion causes swelling that obliterates the location of the chalazion. Topical vapocoolant spray cannot be used around the eyes. Furthermore, the needle used for the injection is very tiny at a 30-gauge size and, thus, only minimal discomfort is experienced when it is inserted into the eyelid.

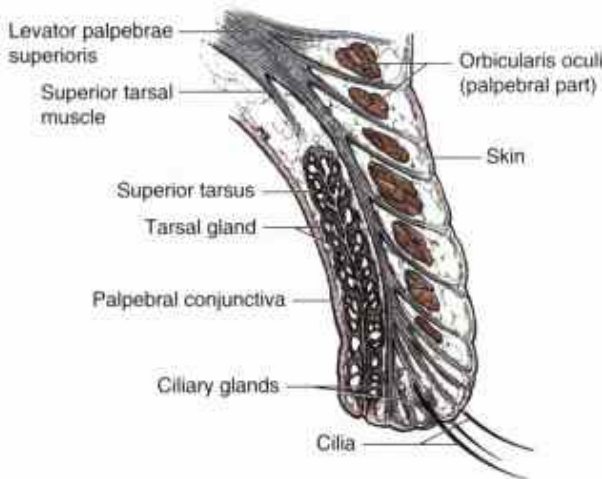


FIGURE 1 • Superior eyelid. The tarsus forms the skeleton of the eyelid and contains the tarsal glands. (From Moore KL, Dalley AF. *Clinically Oriented Anatomy*. 5th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2006.)

EQUIPMENT

- 3-mL or a tuberculin syringe
- 30-gauge, 1/2 in. needle
- 0.1 mL of the steroid solution (40 mg/mL of triamcinolone acetonide)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads

TECHNIQUE

1. Corneal eye shields may be used to protect the cornea and globe. (Ellman International Inc. 3333 Royal Ave, Oceanside, NY 11572, phone: 1-800-835-5355, web site: <http://www.ellman.com/>)
2. Prep the insertion site with alcohol followed by the povidone-iodine pads
3. A chalazion clamp may also be used, if desired, to stabilize the lesion. However, use of this instrument requires local and topical anesthesia.
4. With your fingertips, apply lateral traction to the eyelid to stretch and fix the skin.
5. Approach the eyelid from a lateral to a medial direction.
6. To ensure safety, make sure that the needle is oriented parallel to the surface of the globe of the eye.
7. Using the no-touch technique, insert the needle through the skin external to the eyelid about 0.5 cm lateral to the chalazion (Fig. 2).
8. Advance it slowly and carefully into the center of the lesion.
9. After insertion into the chalazion, confirm accurate placement by moving the needle slightly from side to side to ensure that the lesion moves with the needle.
10. Inject 0.1 mL of the steroid into the chalazion.
11. Remove the needle and apply direct pressure with the gauze pad.

AFTERCARE

- None needed.
- Consider follow-up examination in 1 week.



FIGURE 2 ● Chalazion injection.

CPT code: 68200—Subconjunctival injection

PEARLS

- After the needle has been inserted into the chalazion, confirm accurate placement by moving the needle slightly from side to side to ensure that the lesion moves with the needle.
- One third of the cases may require a second injection.
- If the chalazion continues to recur after two injections, it should be evaluated for malignancy. In this case, more aggressive traditional measures should be used, including curettage through a cruciform incision, primary excision, or excision/destruction using radiofrequency surgery.
- Potential complications may include inadvertent corneal injury, penetration of the globe, cataract from administration of steroid in the globe, and skin depigmentation.



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

Keloid Scar

Keloid scars occur as the result of an abnormal overgrowth of dense fibrous tissue that develops in areas of prior skin trauma. The tissue elevates above the surface of the surrounding skin, extends beyond the borders of the original wound, does not regress spontaneously, and often recurs after excision. Keloids usually occur during the second and third decades of life, with a higher prevalence in those with darker pigmented skin. They are most commonly asymptomatic but can present with itching and pain if they become irritated or enlarge.

Since surgery can make keloids worse, intralesional corticosteroid injection is the primary treatment. Corticosteroids reduce excessive scarring by decreasing collagen synthesis, suppressing vascular endothelial growth factor and decreasing production of inflammatory mediators and fibroblast proliferation during wound healing.

These injections can be done as primary treatment or following scalpel excision. If done in combination with excision, the intralesional injection of corticosteroid is typically performed 2 to 3 weeks postoperatively. The dose of triamcinolone acetonide injected at any one time ranges from 10 to 40 mg, depending on the size of the scar. Injections may be repeated at 6-week intervals until the keloid scar flattens and any discomfort is controlled. Studies examining the effects of corticosteroid injections alone show a 5-year response rate of 50% to 100%. When surgical excision is combined with steroid injection, the response rates increase to 85% to 100%.

Complications of repeated corticosteroid injections include skin atrophy, telangiectasia formation, hypopigmentation, and a depressed scar.

Indications	ICD-9 Code	ICD-10 Code
Keloid scar	701.4	L91.0

PATIENT POSITION

- Supine on the examination table.
- Rotate the patient's head away from the side that is being injected. This minimizes anxiety and pain perception.
- The clinician stands on the side of the patient that allows best access to the keloid scar.

ANESTHESIA

- Local anesthesia of the injection site with topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1 or 1-1/2 in. needle depending on the size of the keloid
- 0.25 to 1 mL of the steroid solution (40 mg/mL 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 parallel to the surface of the skin at the edge of the keloid with the tip of the needle directed toward the center of the keloid scar.
4. Using the no-touch technique, introduce the needle at the edge of the keloid (Fig. 1).
5. Advance the needle into the lesion.
6. Perform a uniform injection of 10 to 40 mg/mL of triamcinolone acetonide into the papillary dermis of the keloid.
7. Avoid injection into the epidermis or subcutaneous tissues.
8. Following the injection of the corticosteroid solution, withdraw the needle.
9. Apply a sterile adhesive bandage.

AFTERCARE

- None needed
- Follow-up examination in 6 weeks

CPT code: Intralesional injections—11900 (one to seven lesions) and 11901 (>seven lesions)



FIGURE 1 • Keloid injection.

PEARLS

- If the keloid continues to recur after several injections, more aggressive measures may be used, including scalpel excisions using Z-plasty or W-plasty techniques or the injection of other agents including bleomycin, 5-fluorouracil, or interferon. Alternatively, radiation, cryosurgery, laser, and imiquimod may be employed.
- Avoid superficial injections as they may increase the likelihood of dermal complications.



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

Common Wart

Patients very commonly present to the primary care office for evaluation of common warts. These verrucous structures are the focal dermal expression of human papilloma virus infections. Common warts may be treated with various modalities including cryotherapy, radiofrequency surgery, laser ablation, cautery, curettage, and injection therapy. Perilesional injection therapy has been shown to be effective in the treatment of common warts. Candida antigen introduced at the edge of the wart incites a host immune response that causes spontaneous regression. In addition, HPV-directed cell-mediated immune response plays a role in the resolution of distant untreated warts.

Candida antigen is available as “Candin” (Allermed Labs, 7203 Convoy Court, San Diego, CA 92111, phone: 1-800-221-2748, web site: <http://www.allermed.com>) or the generic (Hollister Stier Labs Inc. 3525 N. Regal, Spokane, WA 99207, phone: 1-800-992-1120, web site: <http://www.hollisterstier.com>).

Indications	ICD-9 Code	ICD-10 Code
Common warts	078.10	B07
Genital warts	078.11	A63.0
Plantar warts	078.12	B07

PATIENT POSITION

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

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1/2 in. needle
- Up to 1 mL of 1% lidocaine without epinephrine
- Up to 1 to 4 mL of the Candida antigen
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage
- Nonsterile, clean chucks pad

TECHNIQUE

1. Prepare the injection solution:
 - a. For Candin: Mix equal parts of Candin and 1% lidocaine without epinephrine.
 - b. For generic: Mix one part Candida antigen to four parts 1% lidocaine without epinephrine.
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 parallel to the surface of the skin at the edge of the wart with the tip of the needle directed toward the wart.
5. Using the no-touch technique, introduce the needle about 0.5 mL from the edge of the wart (Fig. 1).
6. Advance the needle into the dermis at the edge of the wart.
7. Perform an intradermal injection immediately adjacent to the wart using 0.1 to 0.3 mL of the solution per wart. Limit total amount at any one visit to 1 mL.
8. Avoid injection into the subcutaneous tissues.
9. Following injection of the solution, withdraw the needle.
10. Apply a sterile adhesive bandage.

AFTERCARE

- None needed.
- Instruct the patient to expect the following local symptoms postinjection as their immune system is reacting to the antigen: itching, drying of the wart, lesion turning a black color, peeling of the treated tissue, spontaneous regression, and localized erythema.
- Consider follow-up examination in 2 to 4 weeks.

CPT code: Intraleisional injections—11900 (one to seven lesions) and 11901 (>seven lesions)



FIGURE 1 • Common wart injection.

PEARLS

- Candida antigen should not be used after a previous unacceptable adverse reaction such as extreme hypersensitivity or allergy to this antigen or to a similar product.
- Adverse reactions may include rash, adenopathy, and persistence of wart(s).
- Repeat injection in one month if there is any residual wart.
- 65% to 75% of warts treated with Candida antigen injection resolve after the first injection.
- 50% of the remaining warts respond after a second injection.
- There is no listed J code for Candida antigen. As such, insurance companies do not provide reimbursement for the antigen. Unfortunately, the injection code does not cover this cost and the antigen itself is more expensive than the reimbursement for the procedure. Therefore, if providing this treatment, consider asking the patient to fill a prescription at a pharmacy, bring the injectable to the office, and then perform the procedure.



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

Temporomandibular Joint

Patients commonly present to the primary care office for evaluation of jaw pain from temporomandibular joint dysfunction and/or arthritis. Injection of corticosteroid into the temporomandibular joint (TMJ) space is an effective treatment option for this difficult-to-treat condition. More recently, research is showing safe and effective treatment using hyaluronic acid. The Food and Drug Administration has not approved hyaluronic acid for clinical use at the time of this publication.

Indications	ICD-9 Code	ICD-10 Code
TMJ dysfunction	524.60	K07.6
Jaw sprain	848.1	S03.4
TMJ arthritis, unspecified	716.98	M13.98
TMJ arthrosis, primary	715.18	M19.08
TMJ arthrosis, posttraumatic	716.18	M19.18
TMJ arthrosis, secondary	715.28	M19.28

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

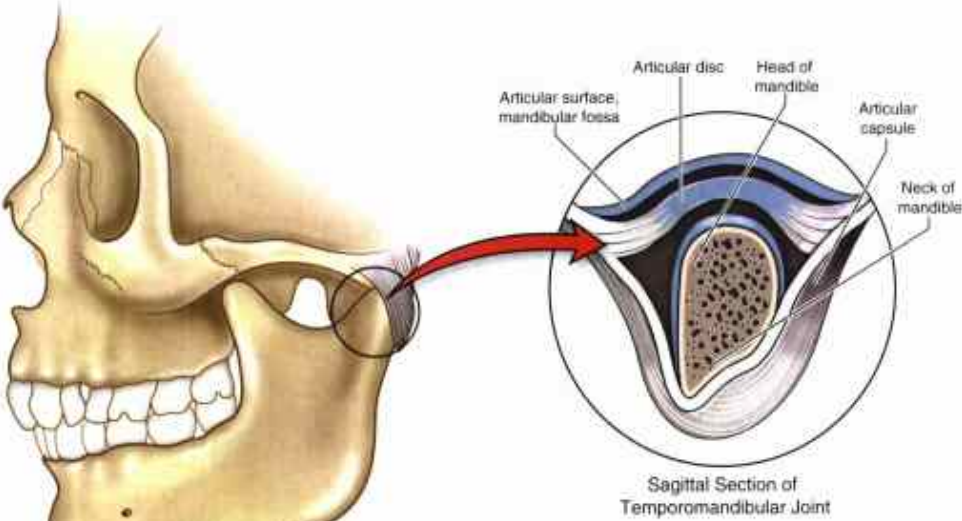
- Sitting on the exam table.
- The patient's hands are folded in his or her lap.

LANDMARKS

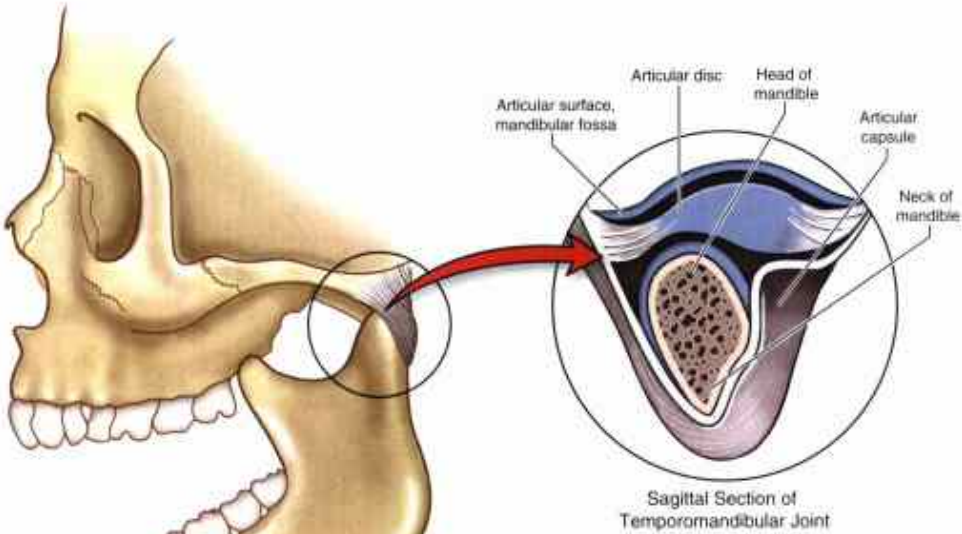
1. With the patient seated on the exam table, the clinician stands lateral and posterior to the affected jaw.
2. Palpate the TMJ with the mouth in the closed and then the fully open positions.
3. Identify the sulcus that forms with jaw opening and mark that spot with ink.
4. At that site, press firmly 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 jaw.
6. The patient must keep his or her mouth open until the completion of the procedure.

ANESTHESIA

- Local anesthesia of the skin using topical vapocoolant spray may be used but is not necessary in most patients. If using a spray, make sure that "overspray" of the vapocoolant chemical does not enter the patient's eyes or external ear canal.



A



B

FIGURE 1 • Sagittal view of the Temporomandibular Joint. **A:** Jaw closed. **B:** Jaw open.

EQUIPMENT

- 3-mL syringe
- 25-gauge, 1 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

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 from a posterior approach at a 30-degree angle to the sagittal plane into the sulcus with the tip of the needle directed anteromedial toward the posterior aspect of the TMJ.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle toward the joint until the needle tip is located in the joint capsule. There will be a decrease in resistance when entering the joint capsule. After entering the joint space, the needle will touch the articular surface or the articular disc. Back up the needle 1 to 2 mm.
6. Inject the steroid solution as a bolus into the TMJ articular 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.
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 jaw through its full range of motion. This movement distributes the steroid solution throughout the joint capsule.
10. Reexamine the TMJ in 5 min to confirm pain relief.



FIGURE 2 • TMJ injection.

AFTERCARE

- Avoid excessive use of the jaw by avoiding chewing gum, chewing tough foods, and excessive talking over the next 2 weeks.
- NSAIDs, ice, and/or physical therapy as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 20605—Arthrocentesis, aspiration, and/or injection of the intermediate joint or bursa

PEARLS

- Be aware that there are reports of articular degeneration following corticosteroid joint injections.



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

Greater Occipital Neuralgia

Patients occasionally present to the primary care office for the treatment of headaches caused by greater occipital neuralgia. This condition is a result of compression of the C2 sensory fibers supplying the greater occipital nerve. Etiologies include neck injury from head trauma or whiplash, repetitive neck movements, prolonged muscle contraction/spasm, osteoarthritis, tumors, rheumatoid arthritis, syphilis, and herpes zoster. The pain from greater occipital neuralgia occurs unilaterally over the occipital/neck junction. It is usually described as a dull aching pain with exacerbations of piercing, throbbing, or electric shock-like pain. Typically, the pain of occipital neuralgia begins in the neck and then spreads to the vertex, ear, frontal area, or even the eyes. Diagnosis is made on the basis of history and reproduction of the pain upon compression of the greater occipital nerve against the edge of the occiput. Various treatments of the pain include chiropractic manipulation, local nerve block, injection of corticosteroids, antidepressants, antiseizure medications, peripheral nerve stimulation, occipital cryoneurolysis, rhizotomy, surgical neurolysis, or microdecompression.

Indications	ICD-9 Code	ICD-10 Code
Occipital neuralgia	723.8	M79.2

Relevant Anatomy: (Fig. 1)

PATIENT POSITION

- Sitting on an exam stool with neck flexed and leaning forward with arms resting on the exam table.

LANDMARKS

1. With the patient seated on the exam stool, the clinician stands directly behind the patient.
2. Find the external occipital protuberance of the occipital bone in the midline.
3. Palpate 2 to 3 cm lateral to the midline along the superior nuchal line. At the point where the greater occipital nerve courses over the occipital bone, pressure over the nerve will elicit pain. Mark that spot 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 neck.

ANESTHESIA

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

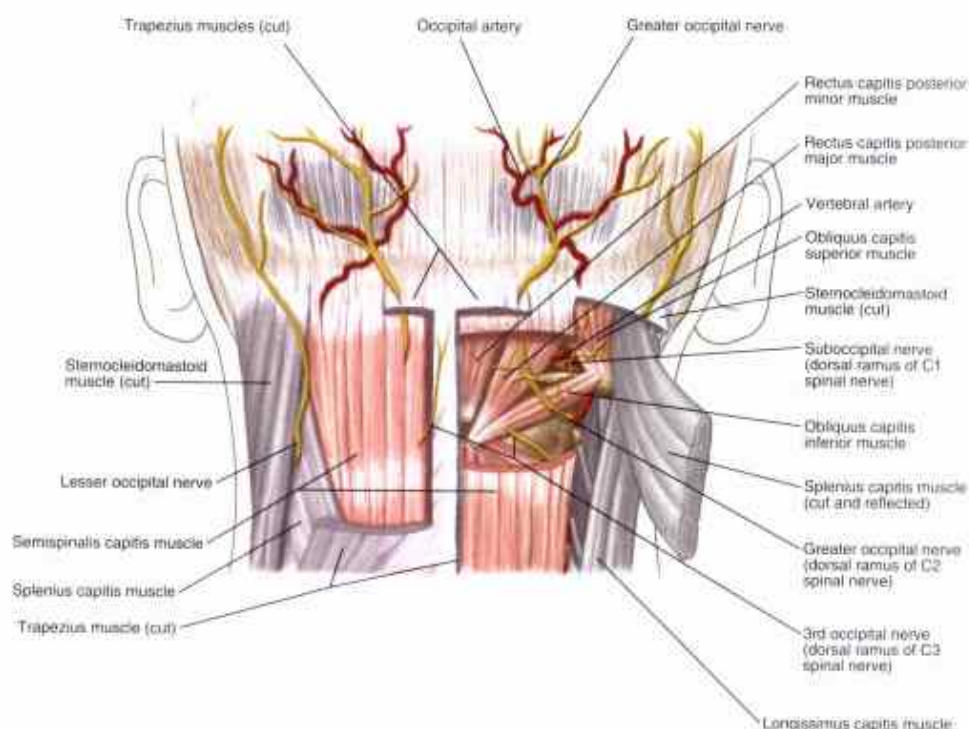


FIGURE 1 • Suboccipital region. (From Tank PW, Gest TR. *Lippincott Williams & Wilkins Atlas of Anatomy*. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)

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 acetate)
- One alcohol prep pad
- Two povidone-iodine prep pads
- Sterile gauze pads
- Sterile adhesive bandage

TECHNIQUE

1. Part the hair and prep the insertion site with alcohol followed by the povidone-iodine pads.
2. Achieve good local anesthesia by using topical vapocoolant spray (optional).
3. Position the needle and syringe perpendicular to the skin with the tip of the needle directed anteriorly toward the nuchal line of the occiput.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 2).
5. Advance the needle toward the location of the greater occipital nerve until the needle tip contacts the occiput at the superior nuchal line. Back up the needle 1 to 2 mm.
6. Inject the steroid solution as a bolus around the greater occipital nerve. The injected solution should flow smoothly into the tissues. 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 • Greater occipital neuralgia injection.

9. Instruct the patient to gently massage the area with a piece of gauze. This movement distributes the steroid solution around the nerve.
10. Reexamine the greater occipital nerve in 5 min to confirm pain relief.

AFTERCARE

- NSAIDs, ice, physical therapy, chiropractic manipulation, or other modalities as indicated.
- Consider follow-up examination in 2 weeks.

CPT code: 64405—Injection of greater occipital nerve

PEARLS

- Take time to learn this injection that is safe, effective, and straightforward to perform.



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

Cervical Strain and Sprain

Patients very commonly present to the primary care office for evaluation and treatment of neck strain and sprain. These conditions are the result of acute injury or chronic repetitive motion. Depending on the biomechanics involved, any of the neck muscles shown below in the anatomic plates may be injured. Intramuscular injections of anesthetic may be helpful in cases where the diagnosis is unclear. Corticosteroid injections are not indicated for the treatment of acute trauma. However, they may play a role in managing inappropriate inflammation causing chronic pain. Botulinum toxin A injections have utility when injected into cervical trigger points in the treatment of whiplash-associated headache pain. Epidural, nerve root, and facet joint injections are outside the scope of this text.

Indications	ICD-9 Code	ICD-10 Code
Cervical sprain and strain	847.0	S13.4

Relevant Anatomy: (Figs. 1 and 2)

PATIENT POSITION

- Sitting on an exam stool with the neck flexed and leaning forward with the arms resting on the exam table.

LANDMARKS

1. With the patient seated on the exam stool, the clinician stands directly behind the patient.
2. Locate the cervical spinous processes of the posterior neck.
3. Palpate the area of maximal tenderness in the muscles of the posterior neck. Direct pressure over this area will elicit pain and is often associated with muscle spasm. Mark the spot(s) with an ink pen.
4. At the injection site(s), press firmly on the skin with the retracted tip of a ballpoint pen. The indentation(s) represents the entry point for the needle.
5. After the landmarks are identified, the patient should not move the neck.

ANESTHESIA

- Local anesthesia of the skin with topical vapocoolant spray may be used as needed, but is not mandatory.

EQUIPMENT

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

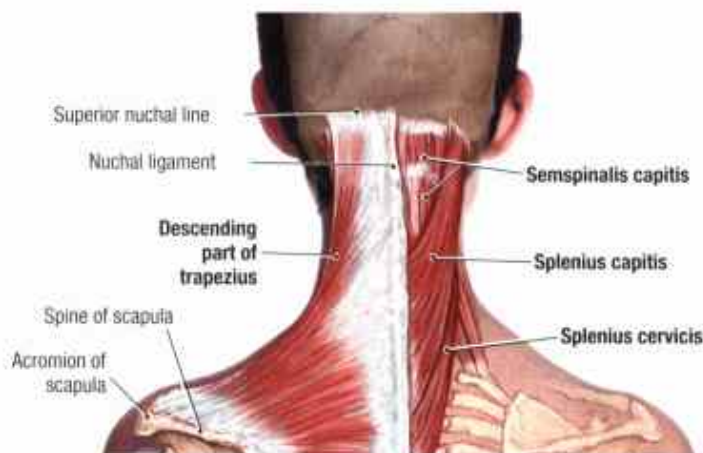


FIGURE 1 ● Posterior cervical region: Trapezius. (From Agur AMR, Dalley AF. *Grant's Atlas of Anatomy*. 12th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)

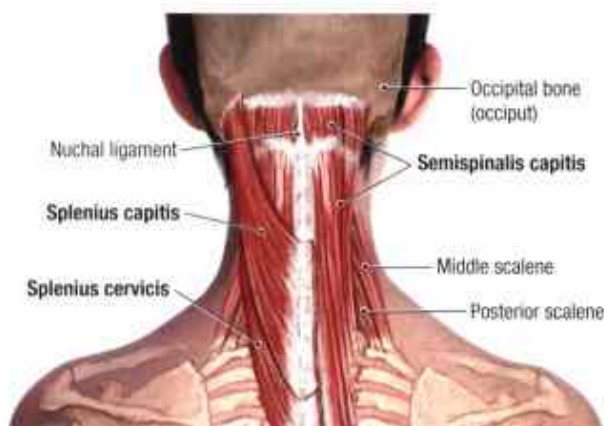


FIGURE 2 ● Posterior cervical region: Semispinalis. (From Agur AMR, Dalley AF. *Grant's Atlas of Anatomy*. 12th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)

- 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 target muscle.
4. Using the no-touch technique, introduce the needle at the insertion site (Fig. 3).
5. Advance the needle into the body of each muscle, delivering the full volume of the syringe divided between all of the sites. If only one site is located, then only give half of the volume of the syringe into that spot.



FIGURE 3 ● Cervical strain and sprain injection.

6. Following injection of the corticosteroid solution, withdraw the needle.
7. Apply a sterile adhesive bandage.
8. Instruct the patient to massage the area and move his or her neck slowly through its full range of motion. This movement distributes the steroid solution in the injected muscles.
9. Reexamine the neck in 5 min to confirm pain relief.

AFTERCARE

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

CPT codes

20552—Injection of trigger point(s) in 1 to 2 muscle groups

20553—Injection of trigger point(s) in 3+ muscle groups

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

PEARLS

- When injecting into neck structures, always make certain to aspirate before giving the injection because of the rich network of blood vessels.



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

Subacromial Space Injection—Posterior Approach

Patients commonly present to the primary care office for evaluation of shoulder pain. Almost all shoulder disorders that can be treated by injection therapy involve the rotator cuff complex. These disorders are either primary from acute injury—usually superimposed on chronic degeneration—or secondary to impingement. Since the subacromial space encompasses the rotator cuff complex as well as the proximal aspect of the biceps tendon, it allows easy access to these structures for corticosteroid treatment. In patients with longstanding degenerative disease, the subacromial bursa commonly perforates into the glenohumeral joint creating communication between the two structures.

The posterior approach to the subacromial space is the easiest to perform and is well accepted by patients. Since they cannot see the approaching needle, anxiety is diminished. A small diameter needle is appropriate as this technique is only used to inject anesthetic and/or steroid solution into the subacromial space. A large diameter needle is not necessary since fluid does not collect in the space. The posterior approach is considered a safe procedure since there are no major arteries or nerves in the immediate path of the needle.

Indications	ICD-9 Code	ICD-10 Code
Shoulder pain	719.41	M25.51
Rotator cuff sprain	840.4	S43.4
Rotator cuff tendonitis	726.10	M75.1

Using local anesthetic without steroid, this injection can help the clinician differentiate the cause of vague shoulder pain. Relief of pain after the local anesthetic is injected into the space confirms the presence of subacromial pathology. This is known as the “impingement test.”

Relevant Anatomy: (Figs. 1 and 2)

PATIENT POSITION

- Sitting on the examination table.
- The patient's hands are folded in his or her lap. The hand of the shoulder that is not involved is placed over the hand of the shoulder that is to be injected.
- This allows consistency of positioning of the shoulder so that the landmarks do not change from the time that they are identified and marked until the time of injection.

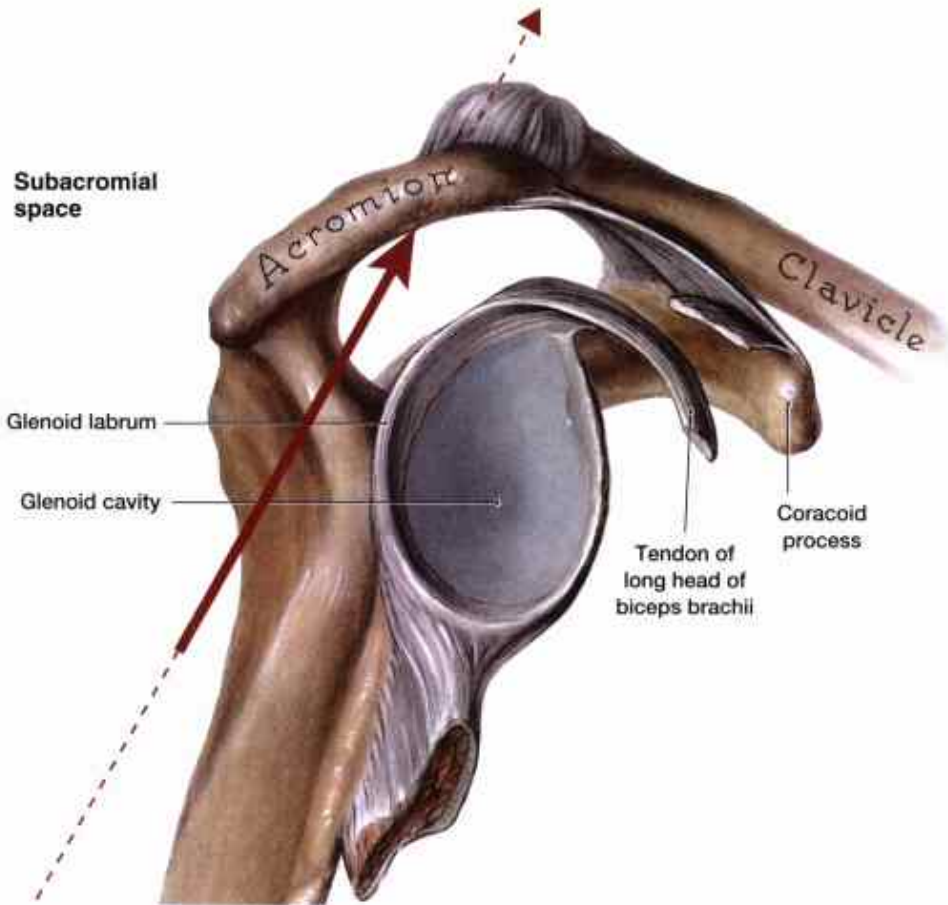


FIGURE 1 • Right lateral shoulder (red arrow indicates path of the needle). (Adapted from Agur A, Lee MJ. *Grant's Atlas of Anatomy*. 10th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 1999:456.)

LANDMARKS

1. With the patient seated on the examination table, the clinician stands lateral and posterior to the affected shoulder.
2. Find the lateral edge of the acromion and mark it with an ink pen.
3. Palpate the posterior edge of the acromion and mark that.
4. Having identified the posterior lateral corner of the acromion, drop a vertical line down from that point and mark a spot 2 cm below the posterior lateral corner.
5. At that site, press firmly with the retracted tip of a ballpoint pen. This indentation represents the entry point for the needle.
6. Next, identify the target site by placing the index finger of your nondominant hand over the superior aspect of the acromion posterior to the AC joint. This will be the target for the tip of the needle (Fig. 3). If your index finger is at the target site—on top of the acromion—it will be protected from accidental needle stick.
7. After the landmarks are identified, the patient should not move the shoulder or arm.

ANESTHESIA

- Local anesthesia of the skin with lidocaine or topical vapocoolant spray is not necessary in most patients.

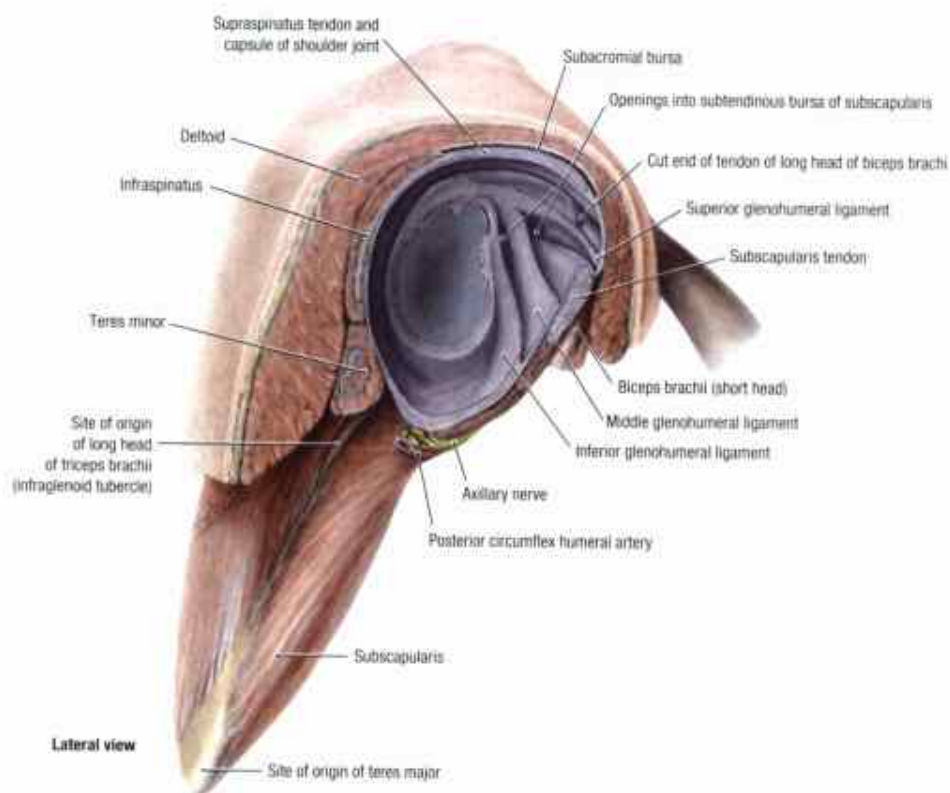


FIGURE 2 • Interior of right shoulder. (From Agur AMR, Dalley AF. *Grant's Atlas of Anatomy*. 12th Ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009.)



FIGURE 3 • Right shoulder injection landmarks.