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PRIMARY CARE PRACTICE

Advances in Chronic OA Management

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Intra-articular Injection Therapy for Osteoarthritis of the Knee

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Intra-articular injection therapy is just 1 item in the toolbox of treatments for osteoarthritis of the knee. Relative rest, oral analgesics (especially nonsteroidal anti-inflammatory drugs [NSAIDs]), physical therapy (especially quadriceps strengthening), knee braces and surgical intervention all may play a role in the management of a patient with knee OA. Still, a 45-year-old laborer may not have the time off from his job to wait for relative rest to be effective. A 75-year-old patient may have gastrointestinal or hematogenous pathology that precludes the use of NSAIDs. The cost of a knee brace may be prohibitive, or the location of the OA (e.g., within the anterior compartment) may limit the effectiveness of a brace or assistive device.

In these patients, intra-articular injection into the joint may be a safe and effective therapy to help alleviate discomfort and improve function. With several agents available to inject into the knee, knowledge of the indications, efficacy and safety for each is essential. This

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Knee Joint Injection

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Patients commonly present to a primary care practice for evaluation and treatment of knee disorders. Knee joint aspiration and injection may be a helpful procedure both for diagnosis and treatment of these complaints. Any fluid withdrawn may be sent for laboratory analysis to include cell count with differential, crystal analysis, Gram's stain and culture with sensitivity. When a local anesthetic is used, the injection can help the clinician differentiate the cause of pain. When the pain has been eliminated by the local anesthetic, the patient's knee can be reexamined more easily and completely without the limitation of pain, and the integrity of the ligaments may be more completely assessed.

From a therapeutic standpoint, removing fluid from the knee enhances range of motion and function. Following an acute injury, blood in the knee joint creates an inflammatory environment. A mixture of local anesthetic and corticosteroid is often used to decrease pain and inflammation. Finally, viscosupplements are often injected to treat pain and improve function in patients with knee osteoarthritis.

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Case Study

Optimizing the Nonsurgical Treatment of Glenohumeral Osteoarthritis

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A 65-year-old woman presents with bilateral shoulder pain. The pain has been chronic, but progressed on the left over the past 3 weeks. The patient injured her right shoulder skiing 8 years ago, and 2 years later she injured her left shoulder. The pain is present over the shoulders without radiation, is characterized as achy and persistent, and is worse with overhead activities and sleeping. She consulted an orthopedist who had prescribed physical therapy and anti-inflammatory medication. She subsequently developed a frozen shoulder on the left and has been living with the pain and reduced motion since that time. Over the last several weeks, she became frustrated with the pain and wishes to get evaluated.

The patient is a full-time gynecologist, performing surgery twice a week. She takes ibuprofen twice a day to help with the pain on surgery days and as needed on other days, but does not like to take medications. She exercises 2 to 3 times per week doing a circuit routine and 20 to 30 minutes on her elliptical machine or stationary bicycle. She has a history of hypertension, which is controlled with verapamil extended release.

Examination

The patient's blood pressure is 133/82 mm Hg, heart rate 73 bpm, height 5'6", weight 137 lbs, body mass index 22.1 kg/m^2. Generalized tenderness is noted over both shoulders. Atrophy of the supraspinatus muscles is noted bilaterally. Both active and passive assisted range of motion (ROM) is painful and decreased bilaterally in all cardinal planes, but more prominently on the left. Impingement testing is positive bilaterally. The patient has pain and is weak with rotator cuff testing bilaterally. Posterior examination reveals negative scapular winging, negative scapular slide test and positive scapular assistance test. Supine exam shows positive apprehension, negative relocation and negative clunk.

Diagnosis

X-rays of both shoulders revealed severe glenohumeral osteoarthritis (GHOA) with bone-on-bone apposition (see Figure). The focus of the discussion was the severity of OA in the patient's shoulder and a plan to reduce her pain and improve her ROM to allow her to continue to work as a surgeon. The patient is realistic about undergoing a shoulder replacement in the future.

Figure 1. Left Shoulder X-Ray

X-rays of both shoulders revealed severe glenohumeral osteoarthritis.
Source: Scottsdale Sports Medicine Institute

Management

The patient's goals are relief of pain, allowing her to work as a fully functional and capable surgeon, and slowing the progression of the disease long enough to delay total shoulder arthroplasty. Surgery is currently

unrealistic given the patient's profession and schedule, and she wishes to maximize use of nonsurgical options as long as possible.

The primary components of a treatment program for patients with GHOA consist of modalities to control pain, ROM exercises, and strength and endurance training to improve rotator cuff stability and scapular strength. Initial goals for patients with GHOA are to reduce pain to enable activities of daily living and independence by improving ROM and strength. In patients with unilateral GHOA, the contralateral shoulder serves as a goal for regaining ROM and strength.[1]

Many therapeutic modalities, such as electrical stimulation, ultrasound, heat, ice, phonophoresis and iontophoresis, have been used to treat GHOA. During early rehabilitation these techniques are used mainly to reduce pain and increase local blood flow. Mobilization and passive stretching are used along with other modalities to decrease abnormal glenohumeral joint shear forces[2] and to improve gross ROM of the glenohumeral joint. Loss of ROM after a shoulder injury follows a predictable pattern: external rotation, abduction and internal rotation are most limited, followed by forward flexion.[3] Patients who have GHOA cannot actively forward flex; passively, these patients will follow the predictable pattern.

Of all the physical therapy treatments recommended for patients with GHOA, progressive strengthening of the rotator cuff and scapular musculature holds the greatest theoretical advantage. The importance of the rotator cuff muscle-tendon units in controlling and centering the humeral head, especially during midrange movement patterns, cannot be underestimated.[4] Submaximal strengthening exercises that selectively recruit the rotator cuff musculature and exercise patterns that place the shoulder in neutral, nonimpinging positions form the basis for clinic- and home-based rehabilitation.

Medication Options

Several pharmacologic strategies are available for treating the pain and inflammation of GHOA. Understanding the cause of GHOA pain will help the patient appreciate the reasoning behind pharmacologic treatment. Oral medications include acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs) and supplements, such as chondroitin sulfate and glucosamine. Topical NSAIDs and lidocaine patches may be of benefit.

Oral viscosupplementation is used with all forms of OA. Chondroitin and glucosamine are both over-the-counter supplements. Glucosamine stimulates chondrocyte production and acts as a mild anti-inflammatory.[5] More than 30 studies of these supplements have been published, but most are small, several are double-blinded, and few are prospective. Chondroitin, the most abundant glycosaminoglycan, inhibits degenerative enzymes.[5] No definitive evidence demonstrates that glucosamine and chondroitin are cartilage protectors, at what stage of OA these supplements may be most effective, or whether glucosamine is more effective when taken with chondroitin. More high-quality, long-term trials in large populations are needed before definitive indications can be established. Patients should be advised that supplements may or may not work and that side effects, though minimal, may include gastrointestinal distress.

Intra-articular Injection

In the United States, viscosupplementation with hyaluronic acid (HA) is used primarily for OA of the knee. HA helps maintain the articular cartilage surface by lubricating and providing a medium to retard the deterioration of the cartilage matrix in degenerative joints. Although many studies have investigated the treatment of knee OA with HA, few studies have explored its use for the shoulder. HA is FDA-approved for use in OA only in the knee; the FDA does not support the use of HA in GHOA.

One trial investigated the use of HA injections in patients with shoulder pain.[6] Although not an elaborate study, 23 of the 29 patients who had shoulder pain had varying degrees of OA (not subclassified). HA injections provided 21 patients with some degree of pain relief and improved ROM. The use of HA in GHOA is based on the parallel findings of the osteoarthritic knee.

In another study, patients with GHOA treated with HA had a significant decrease in pain and significant improvements in activities of daily living, based on visual analog scale, University of California–Los Angeles and Simple Shoulder Test scores. More patients reported sleeping comfortably after treatment (56%) than before (15%). However, the authors were unable to conclude which patients would benefit from HA therapy.[7] Another prospective trial showed that at 3 months, the visual analog scale ratings significantly decreased from 61.2 to 37.1 after 1 or 2 injections of HA.[8]

One study evaluated the efficacy of HA vs. methylprednisolone acetate in arthritis in 84 patients at 1-, 3- and 6-month intervals. The HA group showed a significant pain reduction, improvement in Constant-Murley and Shoulder Pain and Disability Index scores, and patient satisfaction scores at all 3 follow-up times. In the corticosteroid group, improvements in pain, functional outcomes and satisfaction were present only at 1 month. Outcomes were relative to the degree of arthritis and the presence of rotator cuff tears.[8]

Intra-articular corticosteroid injections have been used for decades to treat various disorders of the glenohumeral joint. Much of the evidence supporting the use of corticosteroids is anecdotal. Indeed, level 1 and 2 evidence supporting the use of intra-articular corticosteroids is lacking. Confounding variables, such as use of physiotherapy, analgesics and NSAIDs, also make arriving at definitive conclusions or recommendations difficult.[9] Corticosteroid injections may be used as an adjunct in refractory cases of GHOA if oral anti-inflammatory medications do not result in significant improvement after 4 to 6 weeks. These injections should be used no more than 3 to 4 times per year.

Follow-up

The patient pursued the nonoperative approach outlined above, including physical therapy to address her degenerative glenohumeral joint and scapulothoracic mechanics. She took oral anti-inflammatories and routinely used ice and heat for pain relief. She underwent a series of intra-articular injections of hyaluronic acid over the course of 2 years with some pain relief. Intra-articular corticosteroids were used a couple times during those 2 years and did give her some relief as well. Over the 2 years, she has been able to minimize her pain enough to live at a level of satisfaction as well as continue to operate as a surgeon at a high level. She had been referred to an orthopedic surgeon who was kept abreast of her status and willing to perform a total shoulder arthroplasty when she was ready. ■

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Injection After Aspiration

Should injection following aspiration be elected, remove the large syringe from the 18-gauge needle while the needle is still in the joint capsule, and immediately attach either a 10-mL syringe filled with the local anesthetic/corticosteroid mixture or a proprietary syringe with viscosupplement. In the case of a viscosupplement injection, injection must be accomplished through a large-bore needle; the agent's viscosity will not allow injection through a 25-gauge needle. However, aqueous corticosteroid solutions will easily pass through narrow-gauge needles. The usual amount of 1% plain lidocaine used in the mixture ranges from 2 mL to 8 mL, based on clinician preference, and is mixed in the same syringe with 40 mg to 80 mg of either triamcinolone or methylprednisolone. Inject the product as a bolus into the knee joint capsule. This should flow easily into the joint space. If increased resistance is encountered, advance or withdraw the needle slightly before attempting further injection.

Following injection of the corticosteroid solution or viscosupplement, withdraw the needle and apply a sterile adhesive bandage. Instruct the patient to move his or her knee through its full range of motion. This movement distributes the steroid solution throughout the knee joint. Reexamine the knee after 5 minutes to confirm pain relief.

Postinjection

Upon discharge from the office, the patient should be counseled to expect that any pain relief experienced immediately after the procedure will subside as the effect of the local anesthetic wanes. Typically, 24 to 48 hours are needed for the corticosteroid to provide pain relief. Although a viscosupplement injection for treatment of knee OA often immediately improves knee joint crepitus, reduction in pain may take 2 to 3 weeks to be noticed.

Patients are advised to limit unnecessary weight-bearing activities and to avoid excessive use of the affected knee for 2 weeks following injection. Patients may consider the use of a compression knee wrap and treat any residual pain with NSAIDs or ice. Physical therapy may be indicated based on the patient's comprehensive treatment regimen. Consider scheduling a follow-up appointment for reevaluation of the patient's condition. ■

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