

Hyaluronic Acid Injections for Knee Osteoarthritis

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[What are the changes that occur in osteoarthritic joint?](#)

Osteoarthritis is characterized by a loss of the articular cartilage, which has a highly limited capacity to heal itself. Along with these cartilage changes, a reduction in the elastic and viscous properties of the synovial fluid occurs. Hyaluronic acid is naturally present in the joint synovial fluid. With the progression of the wear and tear in the joint, the molecular weight and concentration of the naturally occurring hyaluronic acid decreases leading to changes in the elasticity and viscosity of the synovial fluid. Theoretically, this loss of elasto-viscosity decreases the lubrication and protection of the joint tissues and is one postulated mechanism of pain production in osteoarthritis.

[How osteoarthritis is treated?](#)

Knee osteoarthritis is a common problem that requires skill from the treating doctor, especially in patients who do not respond well to first and second lines of therapy. Traditional nonsurgical management, consisting of lifestyle modification, in particular weight loss and avoid overdoing or unnecessary bending of the knee joint, physical therapy and pharmacologic therapy (e.g., analgesics, anti-inflammatory medications), is usually the first treatment option, however, it is sometimes ineffective or leaves residual symptoms. Supplement therapy such as glucosamine and chondroitin sulphate tablets have been used successfully in good percentage of the patients. However, there is a group of patients remained who continue to suffer from joint pain. After exclusion of those who are in need to have surgical joint replacement, the remaining portion of the patients would be good candidates for hyaluronic acid therapy, provided that there are no other contraindications.

[What is Hyaluronic Acid?](#)

Hyaluronan (hyaluronic acid active product) occurs naturally in the synovial fluid that surrounds the joints. Hyaluronan is a thick liquid that helps lubricate the joints, making them work more smoothly. It's also a shock absorber. It prevents your bones from bearing the full force of impact when you walk.

In people with osteoarthritis, the consistency of hyaluronan becomes thinner. As a result, it does a worse job of cushioning the bones. The idea behind hyaluronic acid joint injections is to replace some of the natural supply that's been lost.

How does it work? (Viscosupplementation)

The pathologic changes of synovial fluid hyaluronic acid, with its decreased molecular weight and concentration, led to the concept of visco-supplementation. Visco-supplementation came into clinical use in Japan and Italy in 1987, in Canada in 1992, in Europe in 1995 and in the United States in 1997. Two main hyaluronic acid products are currently available: naturally occurring hyaluronan and synthetic hylan G-F 20. Hylans are cross-linked hyaluronic acids, which gives them a higher molecular weight and increased elastoviscous properties. The higher molecular weight of hylan may make it more efficacious than hyaluronic acid because of its enhanced elastoviscous properties and its longer period of residence in the joint space (i.e., slower resorption).

The exact mechanism of action of visco-supplementation is unclear. Although restoration of the elastoviscous properties of synovial fluid seems to be the most logical explanation, other mechanisms might exist. The actual period that the injected hyaluronic acid product stays within the joint space is in the order of hours to days, but the time of clinical efficacy is often on the order of months. Other postulated mechanisms to explain the long-lasting effect of visco-supplementation include possible anti-inflammatory and anti-nociceptive properties, or stimulation of in vivo hyaluronic acid synthesis by the exogenously injected hyaluronic acid.

Adverse Reactions

In most of the trials of hyaluronan and hylan, rates of adverse reactions have been low (generally zero to 3 percent). No systemic reactions were attributed to hyaluronic acid though allergic reactions have been reported in small number of cases. Most of the reported adverse reactions consisted of minor localized joint pain or effusion, which was almost always resolved within one to three days. Case reports of induced pseudogout exist. It is unclear whether these local reactions were caused by the hyaluronic acid itself or by the injection procedure. No long-term side effects have been reported.

Indications

The ideal candidate for intra-articular hyaluronic acid has yet to be defined. Studies are inconclusive regarding the best responders with respect to age, level of osteoarthritis as defined radiographically, level of symptoms and level of physical activity. Ultrasonography also helps to assess for the joint inflammation and degree of cartilage break down. Intra-articular hyaluronic acid injections should be considered in patients with significantly symptomatic osteoarthritis who have not responded adequately to standard non-pharmacologic and pharmacologic treatments or are intolerant of these therapies (e.g., gastrointestinal problems related to anti-inflammatory medications). Patients who are not candidates

for total knee replacement or who have failed previous knee surgery for their arthritis, such as arthroscopic debridement, may also be candidates for visco-supplementation. Total knee replacement in younger patients may be delayed with the use of hyaluronic acid.

Injection Technique

Hyaluronic acid is supplied in 2-mL / 6-mL prefilled syringes. Repeat courses of visco-supplementation can be performed after six months.

A knee joint can be injected several ways. One approach is to have the patient lie supine on the examination table with the knee flexed 90 degrees. In this position, the anterior portions of the medial and lateral joint lines can easily be palpated as dimples just medial or lateral to the inferior pole of the patella. Often, the medial joint line is easier to palpate and define and can be chosen as the site of injection. Alternatively, the knee joint can be approached with the knee extended, again with the patient lying supine. Most commonly the superolateral edge of the patella is the site of injection, but other quadrants of the knee near the patellar edges can also be chosen. With this approach (knee in extended position), the needle is generally aimed under the patella.

Whichever approach is used, the actual injection site can be marked with a fingernail imprint or the barrel of a pen. Next, sterile preparation with a povidone iodine preparation (Betadine) and alcohol can be performed. A 22- to 25-gauge needle can be used for the injection. Ethyl chloride spray can be used for local anesthesia. Following puncture through the skin and into the joint space, the injection is accomplished. If resistance is encountered, redirection of the needle may be necessary.

If effusion is present, aspiration of the joint is recommended before the injection to prevent dilution of the injected hyaluronic acid. The aspiration can be performed at the same site as the injection, as previously described. The same needle can be left in place and used for the aspiration and the injection. In either case, the aspiration may require a larger bore needle, such as an 18- or 20-gauge needle. Following local anesthesia with intradermal lidocaine or ethyl chloride spray, the needle can be placed into the joint for aspiration. When aspiration is completed, hemostat clamps can be used to grasp and stabilize the needle, while the aspiration syringe is detached from the needle. The syringe containing hyaluronic acid can then be attached to the same stabilized needle followed by injection. Alternatively, separate needle sticks can be performed, one for aspiration and another for injection.

No excessive weight-bearing physical activity should take place for one to two days following injection. Otherwise, no specific post-injection instructions are necessary.

How well do the injections work?

Although nothing is guaranteed 100%, but most of the patients respond well the therapy. Data below is a rough estimate of the response to the injection therapy.

1. It takes about a month from the last injection until maximal relief is achieved.
2. About 85-90% of patients report improvement.
3. Improvement lasts for up to 6-9 months, then the injections may need to be repeated.
4. Hyaluronic acid injections work as well or better than regular use of non-steroidal anti-inflammatory drugs (NSAIDs), e.g. aspirin, ibuprofen.
5. Hyaluronic acid injections may give longer relief than corticosteroid injection

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