

Viscosupplementation – Literature Review of Recent Studies

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Abstract

Viscosupplementation, or intra-articular application of Hyaluronate, is a treatment indicated for patients with chondral injuries. However, even with strongly supported results, some studies and guidelines, such as the American Academy of Orthopedic Surgeons (AAOS) of 2013, discourage its use in clinical practice, giving as argument the lack of evidence. This literature review of recent articles will show that viscosupplementation has good indications of use, with scientific basis, mainly for active patients with mild to moderate knee arthritis, below 60 years old.

Keywords: Hyaline Cartilage; Injuries; Osteoarthritis; Viscosupplementation; Knee

Viscosupplementation, or intra-articular application of Hyaluronate, is a treatment indicated for patients with chondral injuries, more studied for knee joints use. However, it may be indicated in other joints such as ankle, hip and carpal, for example, however, with less evidence.

Studies show that intra-articular hyaluronic acid has the effect of decreasing chondral volume loss and preserving cartilage [1]. It also improves chondral integrity and decreases the formation of osteophytes, showing a deceleration of evolution to osteoarthritis [2]. These effects may also be demonstrated in magnetic resonance imaging, where it may lead to cartilage signal changes, for better, after the use of the medication [3].

It has also been demonstrated action in pain by anti-inflammatory effect and improvement of synovial fluid quality [2]. In this way it can be indicated even in initial chondral injuries because it is a safe, persistent and effective method [4-6].

Nowadays there is also indication for advanced arthrosis (classified as Kellgren and Lawrence degrees III and IV), because it may not improve articular function significantly in these cases, but it has an effect on pain reduction and, consequently, on the improvement of quality of life [4,7]. However, more recent studies suggest that the use of this treatment in more severe cases of osteoarthritis or obese patients may compromise its outcome [8,9]. Ricci., *et al.* [10]. suggest that the best response to treatment occurs in patients under 60 years of age. And Henrotin., *et al.* [5]. suggest that the best outcome occurs in mild to moderate degrees of knee arthrosis.

Recent study reports that hyaluronic acid has an important modulating action, mainly through the interaction with CD44 receptors present in fibroblast-like type B synoviocytes [2,4]. Therefore, in addition to the mechanical effects of promoting better distribution of forces, reducing pressure by weight and recovering the rheological properties of synovial fluid, hyaluronic acid also acts biochemically, decreasing the gene expression of cytokines and enzymes associated with osteoarthritis [4,7,11]. From the economic point of view, there is an increasing number of studies showing that, if incorporated into the treatment of knee osteoarthritis, viscosupplementation may be cost-effective and may even delay the progression to a total knee replacement surgery [5-7,11-13]. This delay in the evolution to surgery was proven by studies involving the analysis of a large number of cases [14-16].

Other treatment options failure should not be expected before indicating the viscosupplementation because it is known that the patients who will benefit most from this treatment are those with a lower degree of osteoarthritis and more active use of the joints [11].

However, even with strongly supported results, some studies and guidelines, such as the American Academy of Orthopedic Surgeons (AAOS) of 2013, discourage its use in clinical practice, giving as argument the lack of evidence. Even so, other guidelines from other societies, such as the American Medical Society for Sports Medicine (AMSSM) and ESCEO (European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis) strongly recommend the use of viscosupplementation, stating that such use is safe, with guaranteed effect up to 6 months after application [7,17,18]. The recommendation is that this treatment should be applied with the care of being individualized for each patient [17]. In addition, articles and authors criticize the method as the AAOS guideline was developed, citing that the articles used were not the best basis of evidence, and articles using the same criteria have recently reached different results [19,20].

The different molecular weight, of each type of hyaluronic acid, makes its result vary per the research. Studies suggest that products with molecular weights greater than 3000 kDa have better efficacy and fewer adverse effects than products weighing less than 3000 kDa [21]. The great problem of articles and literature reviews is to be able to compare different types of drugs, with different types of obtaining and molecular weights.

In addition, viscosupplementation studies still differ as to the type and degree of chondral injury, patients age, number of applications, and interval between doses [22-24].

He., *et al.* [25]. in a meta-analysis comparing the effect of hyaluronic acid application against triamcinolone application showed that the corticosteroid has a better effect in the first month, however the effect of the medications equals at 3 months and hyaluronic acid has a better effect with 6 months after application. Thus, the best indication would be to apply the association of these drugs. This 6 months of effect duration is confirmed by other recent studies [26,27]. as well as its superiority to triamcinolone and saline when it was used as placebo [29]. But there are some articles, in a small number, but also with strong evidence, which do not confirm the superiority of viscosupplementation when compared to placebo [22,30-32]. As a critique, many of these studies mix patients with different degrees of disease, different age groups and degree of activity. It should be noted here that even studies not funded by the pharmaceutical industry show that viscosupplementation has a better effect than placebo [33].

A Cochrane review has shown that viscosupplementation has rather great benefits when compared to placebo in relation to pain, function, and quality of life scores. Based on Grades of Recommendation Assessment, Development and Evaluation (GRADE), viscosupplementation for knee arthrosis leads to pain reduction and improved function with low risk of adverse effects. It is a viable option for young patients with not so severe disease, and future research is needed to evaluate the use in more advanced osteoarthritis, which molecular weight is more effective, if the cross-link preparations have a better effect, evaluate effect duration, safety and economic analysis of treatment [24].

Different guidelines with recommendation and no recommendation for viscosupplementation have disrupted the medical conducts, and it should be reaffirmed that the treatment of arthrosis should be individualized for each patient [23].

In this way, the use of this treatment should be part of the arsenal of the doctor who treats patients with chondral injuries. This is a difficult to treat pathology that causes a great loss of quality of life, and should be attacked with all available therapeutic methods, to avoid more aggressive and costly procedures, such as surgeries.

Conclusion

In conclusion, it is suggested that viscosupplementation should be used in patients with mild to moderate knee arthrosis (until Kellgren and Lawrence degree III), active, non-obese (by the BMI criterion), below 60 years old (relative indication, because the biological age of the patient should be assessed) associated with other forms of conservative treatment, such as physiotherapy, analgesics, muscle strengthening, change of lifestyle habits, etc. It is advisable to associate triamcinolone in the dose of 40 mg with the application to improve the results. In patients who do not fit these indications, it is suggested, if any type of intra-articular medication is indicated, the use of triamcinolone alone in the dose of 40 mg, which could be repeated every 3 months.

Bibliography

1. Wang Y, *et al.* "Effects of Hylan G-F 20 supplementation on cartilage preservation detected by magnetic resonance imaging in osteoarthritis of the knee: a two-year single-blind clinical trial". *BMC Musculoskeletal Disorders* 12 (2011): 195.
2. Li P Raitcheva D, *et al.* "Hylan G-F 20 maintains cartilage integrity and decreases osteophyte formation in osteoarthritis through both anabolic and anti-catabolic mechanisms". *Osteoarthritis Cartilage* 20.11 (2012): 1336-1346.
3. Magarelli N, *et al.* "Evaluation of magnetic resonance signal modification induced by hyaluronic acid therapy in chondromalacia patellae: a preliminary study". *Journal of Biological Regulators and Homeostatic Agents* 22.4 (2008): 247-252.
4. Liang KY, "Research progress of intraarticular injection of hyaluronic acid (HA) for osteoarthritis in recent three years". *Zhongguo Gu Shang* 23.12 (2010): 962-964.
5. Henrotin Y, *et al.* "Consensus statement on viscosupplementation with hyaluronic acid for the management of osteoarthritis". *Seminars in Arthritis and Rheumatism* 45.2 (2015): 140-149.
6. Campbell KA, *et al.* "Is Local Viscosupplementation Injection Clinically Superior to Other Therapies in the Treatment of Osteoarthritis of the Knee: A Systematic Review of Overlapping Meta-analyses". *Arthroscopy* 31.10 (2015): 2036-2045.
7. Maheu E, *et al.* "Efficacy and safety of hyaluronic acid in the management of osteoarthritis: Evidence from real-life setting trials and surveys". *Seminars in Arthritis and Rheumatism* 45.4 (2016): 28-33.
8. Eymard F, *et al.* "Obesity and radiological severity are associated with viscosupplementation failure in patients with knee osteoarthritis". *Journal of Orthopaedic Research* 35.10 (2017): 2269-2274.
9. Weick JW, *et al.* "Hyaluronic Acid Injections for Treatment of Advanced Osteoarthritis of the Knee: Utilization and Cost in a National Population Sample". *Journal of Bone and Joint Surgery* 98.17 (2016): 1429-1435.
10. Ricci M, *et al.* "Clinical comparison of oral administration and viscosupplementation of hyaluronic acid (HA) in early knee osteoarthritis". *Musculoskeletal Surgery* 101.1 (2017): 45-49.
11. Rezende MU, *et al.* "Conceitos Atuais em Osteoartrite". *Acta Ortopédica Brasileira* 21.2 (2013): 120-122.
12. Rosen J, *et al.* "Cost-Effectiveness of Different Forms of Intra-Articular Injections for the Treatment of Osteoarthritis of the Knee". *Advances in Therapy* 33.6 (2016): 998-1011.
13. Rezende UM and de Campos GC. "Viscosuplementação". *Revista Brasileira de Ortopedia* 47.2 (2012): 160-164.
14. Ong KL, *et al.* "Hyaluronic Acid Injections in Medicare Knee Osteoarthritis Patients Are Associated with Longer Time to Knee Arthroplasty". *Journal of Arthroplasty* 31.8 (2016): 1667-1673.
15. Altman R, *et al.* "Hyaluronic Acid Injections Are Associated with Delay of Total Knee Replacement Surgery in Patients with Knee Osteoarthritis: Evidence from a Large U.S. Health Claims Database". *PLoS One*. 10.12 (2015): e0145776.
16. Altman R, *et al.* "Association between Hyaluronic Acid Injections and Time-to-Total Knee Replacement Surgery". *Journal of Knee Surgery* 29.7 (2016): 564-570.
17. Trojian TH, *et al.* "AMSSM scientific statement concerning viscosupplementation injections for knee osteoarthritis: importance for individual patient outcomes". *British Journal of Sports Medicine* 50.2 (2016): 84-92.
18. Bruyère O, *et al.* "A consensus statement on the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO) algorithm for the management of knee osteoarthritis-From evidence-based medicine to the real-life setting". *Seminars in Arthritis and Rheumatism* 45.4 (2016): S3-S11.
19. Migliore A, *et al.* "The discrepancy between recommendations and clinical practice for viscosupplementation in osteoarthritis: mind the gap!". *European Review for Medical and Pharmacological Sciences* 19.7 (2015): 1124-1129.

20. Bannuru RR., *et al.* "Did the American Academy of Orthopaedic Surgeons osteoarthritis guidelines miss the mark?". *Arthroscopy* 30.1 (2014): 86-89.
21. Altman RD., *et al.* "Product Differences in Intra-Articular Hyaluronic Acids for Osteoarthritis of the Knee". *American Journal of Sports Medicine* 44.8 (2016): 2158-2165.
22. Ammar TY., *et al.* "Viscosupplementation for treating knee osteoarthrosis: review of the literature". *Revista Brasileira de Ortopedia* 50.5 (2015): 489-494.
23. Altman RD., *et al.* "Assessment of clinical practice guideline methodology for the treatment of knee osteoarthritis with intra-articular hyaluronic acid". *Seminars in Arthritis and Rheumatism* 45.2 (2015): 132-139.
24. Evaniew N., *et al.* "Cochrane in CORR®: Viscosupplementation for the treatment of osteoarthritis of the knee". *Clinical Orthopaedics and Related Research* 472.7 (2014): 2028-2034.
25. He WW., *et al.* "Efficacy and safety of intraarticular hyaluronic acid and corticosteroid for knee osteoarthritis: A meta-analysis". *International Journal of Surgery* 39 (2017): 95-103.
26. Kearey P., *et al.* "Improvement in condition-specific and generic quality of life outcomes in patients with knee osteoarthritis following single-injection Synvisc: results from the LOBRAS study". *Current Medical Research and Opinion* 33.3 (2017): 409-419.
27. Duymus TM., *et al.* "Choice of intra-articular injection in treatment of knee osteoarthritis: platelet-rich plasma, hyaluronic acid or ozone options". *Knee Surgery, Sports Traumatology, Arthroscopy* 25.2 (2017): 485-492.
28. Tammachote N., *et al.* "Intra-Articular, Single-Shot Hylan G-F 20 Hyaluronic Acid Injection Compared with Corticosteroid in Knee Osteoarthritis: A Double-Blind, Randomized Controlled Trial". *Journal of Bone and Joint Surgery* 98.11 (2016): 885-892.
29. Johansen M., *et al.* "Exploring reasons for the observed inconsistent trial reports on intra-articular injections with hyaluronic acid in the treatment of osteoarthritis: Meta-regression analyses of randomized trials". *Seminars in Arthritis and Rheumatism* 46.1 (2016): 34-48.
30. Jevsevar D., *et al.* "Viscosupplementation for Osteoarthritis of the Knee: A Systematic Review of the Evidence". *Journal of Bone and Joint Surgery* 97.24 (2015): 2047-2060.
31. Filardo G., *et al.* "Platelet-Rich Plasma Intra-Articular Knee Injections Show No Superiority Versus Viscosupplementation: A Randomized Controlled Trial". *American Journal of Sports Medicine* 43.7 (2015): 1575-1582.
32. Pai SK., *et al.* "Are intra-articular injections of Hylan G-F 20 efficacious in painful osteoarthritis of the knee? A systematic review and meta-analysis". *International Journal of Clinical Practice* 68.8 (2014): 1041-1047.
33. Printz JO., *et al.* "Conflict of interest in the assessment of hyaluronic acid injections for osteoarthritis of the knee: an updated systematic review". *Journal of Arthroplasty* 28.8 (2013): 30-33.

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