

Intra- Articular Needle Placement in the Patients of Osteoarthritis Knee for Viscosupplementation

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ABSTRACT

Background: Knee osteoarthritis is characterized by inflammation in the intra-articular space or synovial membrane, breakdown of articular cartilage, and sclerosis of the subchondral bone. The present study was conducted to evaluate intra- articular needle placement in the patients of osteoarthritis knee for viscosupplementation. **Methods:** T The present study was conducted on 54 patients of knee osteoarthritis of both genders. Intra-articular injection was planned in patients. The injections were performed using a 5 cm 21-gauge needle through anterolateral, and lateral midpatellar portals. Accuracy rates through each portal were recorded. **Results:** Out of 54 patients, males were 28 and females were 26. The portal of injection was through lateral midpatellar in which 46 injections were given intra- articular and 8 extra- articular. In antero- lateral portal, 44 were given intra- articular and 10 extra- articular. The difference was significant ($P < 0.05$). Kellegren-Lawrence grade 2 was seen in 82 knees and 3 in 26 knees. The difference was significant ($P < 0.05$). The accuracy rate of lateral midpatellar portal was 92.4% and for antero- lateral portal was 83.5%. The difference was significant ($P < 0.05$). **Conclusion:** Authors found that the lateral midpatellar approach had higher accuracy of needle placement than the anterolateral portal.

Keywords: Knee, lateral midpatellar, Osteoarthritis.

INTRODUCTION

Knee osteoarthritis is characterized by inflammation in the intra-articular space or synovial membrane, breakdown of articular cartilage, and sclerosis of the subchondral bone. The patients may have more severe joint symptoms, such as pain, swelling, stiffness, and limitations in their activities of daily living, if this condition leads to increasingly degenerative changes to the articular cartilage.^[1] Osteoarthritis of the knee joint with symptoms is a common presentation in primary care and can be a difficult problem for treating physicians and patients. Based on radiographic features, the Kellgren- Lawrence system classifies the severity of knee Osteoarthritis into 5 grades.^[2]

In osteoarthritis, there is a reduction in the elastoviscosity of the synovial fluid secondary to a decrease in the molecular weight and concentration of hyaluronic acid.^[3] Viscosupplementation is a therapeutic technique that addresses the decrease in synovial viscosity with the injection of exogenous high-molecular-weight hyaluronan molecules. Viscosupplementation was initially used to treat

post-traumatic osteoarthritis in racehorses and was later used to treat knee arthritis in humans in the early 1970s. In 1997, hyaluronan was approved by the Food and Drug Administration as a fluid prosthesis that is, an intra-articular substance to coat the articular surfaces.^[4]

The efficacy of these injections is diminished when they are placed inadvertently outside the joint. To achieve their maximum benefit, hyaluronic acid derivatives should be injected directly into the knee joint space. In the absence of a knee effusion, needle placement into the intra-articular space is a challenge.^[5] The present study was conducted to evaluate intra- articular needle placement in the patients of osteoarthritis knee for viscosupplementation.

MATERIALS AND METHODS

The present study was conducted in department of Orthopaedics. It comprised of 54 patients of knee osteoarthritis of both genders. Patients were informed regarding the study and their consent was obtained. Ethical clearance was obtained before starting the study.

Demographic profile such as name, age, gender etc. was recorded. Intra-articular injection was planned in patients. The injections were performed using a 5 cm 21-gauge needle through anterolateral, and lateral midpatellar portals. The needle placement was confirmed with fluoroscopy using contrast material. Injection through the anterolateral portal

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was performed with the patient in sitting position with the affected knee flexed to about 90°. After palpating the landmarks, the injection was given inferior to the patella, through the joint line either medial or lateral to the ligamentum patella directing the needle obliquely toward the intercondylar notch. Accuracy rates through each portal were recorded. Results were subjected to statistics. P value < 0.05 was regarded significant.

RESULTS

Table 1: Distribution of patients

Total- 54		
Gender	Males	Females
Number	28	26

[Table 1] shows that out of 54 patients, males were 28 and females were 26.

Table 2: Assessment of parameters

Portal	Total injection	Intra-articular	Extra-articular	P value
Lateral midpatellar	54	46	8	0.01
Antero-lateral	54	44	10	0.02

[Table 2] shows that portal of injection was through lateral midpatellar in which 46 injections were given intra- articular and 8 extra- articular. In antero- lateral portal, 44 were given intra- articular and 10 extra- articular. The difference was significant (P< 0.05).

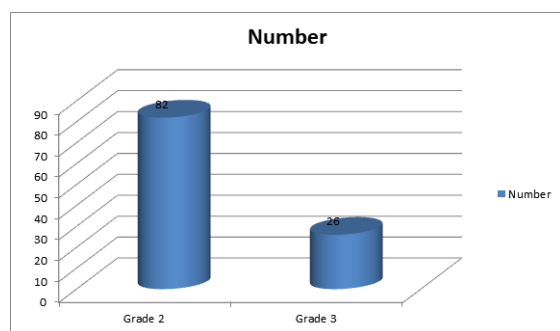


Figure 1: Kellgren-Lawrence grade

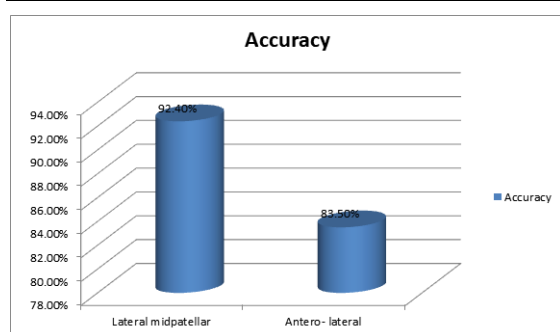


Figure 2: Accuracy rate with both portals

[Figure 1] shows that Kellgren-Lawrence grade 2 was seen in 82 knees and 3 in 26 knees. The difference was significant (P< 0.05).

[Figure 2] shows that accuracy rate of lateral midpatellar portal was 92.4% and for antero- lateral portal was 83.5%. The difference was significant (P< 0.05).

DISCUSSION

Osteoarthritis is one of the most common and costly chronic medical conditions. At present, there is no evidence that medical intervention alters the rate of deterioration of the articular surfaces of an affected joint. Most current therapies are directed toward minimizing pain and swelling, maintaining joint mobility, and reducing associated disability.^[6] The mechanism by which viscosupplementation alleviates arthritic knee pain has been related to the biomechanical effect of improving elastoviscosity, which creates better joint lubrication and shock absorption. Studies have indicated that exogenous hyaluronan stimulates endogenous production of hyaluronate by synoviocytes, thereby “normalizing” the viscosity of joint fluid in patients with osteoarthritis.^[7] It has been suggested that hyaluronan supplementation has a direct antiinflammatory effect on synoviocytes by inhibiting release of arachidonic acid or by blocking production of prostaglandin E2. Hyaluronan may also inhibit damage mediated by oxygen free radicals and phagocytosis. In addition, hyaluronate may exert a direct analgesic effect on intra-articular nociceptors, helping to relieve the symptoms of osteoarthritis.^[8] The present study was conducted to evaluate intra- articular needle placement in the patients of osteoarthritis knee for viscosupplementation.

In this study, out of 54 patients, males were 28 and females were 26. Jackson et al,^[9] assessed accuracy of needle placement in a prospective series of 240 consecutive injections in patients without clinical knee effusion. Of eighty injections performed through an anterolateral portal, fifty-seven were confirmed to have been placed in the intra-articular space on the first attempt (an accuracy rate of 71%). Sixty of eighty injections performed through an anteromedial approach were intra-articular on the first attempt (75% accuracy rate), as were seventy-four of eighty injections performed through a lateral midpatellar portal (93% accuracy rate).

We found that the portal of injection was through lateral midpatellar in which 46 injections were given intra- articular and 8 extra- articular. In antero- lateral portal, 44 were given intra- articular and 10 extra- articular. Telikicherla et al,^[10] performed to know the correct placement of needle inside the knee joint prior to Viscosupplementation by fluoroscopy using a contrast material in a prospective series of 94 consecutive injections. The accuracy rates through Lateral midpatellar and Anterolateral portals were lower than expected rate

(100%). A total of 43 out of 47 injections were intra-articular, indicating accuracy of 91.5% through lateral midpatellar portal, 41 out of 47 injections were intra-articular through anterolateral portal with accuracy of 87.4%.

We found that Kellegren-Lawrence grade 2 was seen in 82 knees and 3 in 26 knees. The accuracy rate of lateral midpatellar portal was 92.4% and for antero- lateral portal was 83.5%. Park et al,^[11] evaluated the accuracy of needle placement through superolateral, midlateral and medial portals for K-L grading knees. This study was conducted in 126 knees with Osteoarthritic knees graded as The Kellgren-Lawrence grade 2 and 3 cases each of which had accuracy rates of 100% and 100%, 97% and 90%, and 77% and 67% for the superolateral, midlateral and medial approaches respectively.

Manufacturers of hyaluronan-based preparations have recommended that the injection be placed into a “dry” joint. In the absence of an effusion, needle placement requires the use of anatomic landmarks and tactile feedback to help the physician to position the needle. Several anecdotal, and a few published, methods have been proposed to increase the accuracy of intra-articular placement of the needle in the absence of an effusion. These include preinjection of air or saline solution, aspiration of moisture into the barrel of the syringe, minimal retraction of the needle tip after palpation of an articular cartilage or bone surface, or fluoroscopic injection of contrast material.^[12]

CONCLUSION

Authors found that the lateral midpatellar approach had higher accuracy of needle placement than the anterolateral portal.

REFERENCES

- Balazs EA. The physical properties of synovial fluid and the special role of hyaluronic acid. In: Helfet AJ, editor. Disorders of the knee. 2nd ed. Philadelphia: Lippincott; 1982. p 61-74.
- Balazs EA, Denlinger JL. Viscosupplementation: a new concept in the treatment of osteoarthritis. J Rheumatol Suppl. 1993;39:3-9.
- Smith MM, Ghosh P. The synthesis of hyaluronic acid by human synovial fibroblasts is influenced by the nature of the hyaluronate in the extracellular environment. Rheumatol Int. 1987;7:113-22.
- Altman RD, Moskowitz R. Intraarticular sodium hyaluronate (Hyalgan) in the treatment of patients with osteoarthritis of the knee: a randomized clinical trial. Hyalgan Study Group. J Rheumatol. 1998;25:2203-12.
- Pelletier JP, Martel-Pelletier J. The pathophysiology of osteoarthritis and the implication of the use of hyaluronan and hylan as therapeutic agents in viscosupplementation. J Rheumatol Suppl. 1993;39:19-24.
- Tobetto K, Yasui T, Ando T, Hayaishi M, Motohashi N, Shinogi M, Mori I. Inhibitory effects of hyaluronan on arachidonic acid release from labeled human synovial fibroblasts. Jpn J Pharmacol. 1992;60:79-84.
- Forrester JV, Balazs EA. Inhibition of phagocytosis by high molecular weight hyaluronate. Immunology. 1980;40:435-46.
- Presti D, Scott JE. Hyaluronan-mediated protective effect against cell damage caused by enzymatically produced hydroxyl (OH.) radicals is dependent on hyaluronan molecular mass. Cell Biochem Funct. 1994; 12:281-8.
- Jackson DW, Evans NA, Thomas BM. Accuracy of needle placement into the intra-articular space of the knee. JBJS. 2002 Sep 1;84(9):1522-7.
- Telikicherla M, Kamath SU. Accuracy of needle placement into the intra-articular space of the knee in osteoarthritis patients for viscosupplementation. Journal of clinical and diagnostic research: JCDR. 2016;10(2):15.
- Park Y, Lee SC, Nam HS, Lee J, Nam SH. Comparison of Sonographically Guided intra-articular injections at 2 different sites of the knee. J Ultrasound Med. 2011;30(12):1669-76.
- Douglas RJ. Aspiration and Injection of the Knee Joint: Approach Portal. Knee Surg Relat Res. 2014;26(1):1-6.

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