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Functional outcome of use of intra articular injection of hyaluronic acid in early osteoarthritis of knee

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Abstract

Aim: To evaluate the clinical and functional outcomes of using intra-articular hyaluronic acid injection to treat early osteoarthritis of the knee joint.

Methods: The study included 25 patients with early osteoarthritis ranging from grade 0 to grade 2. Patients were evaluated before and after the procedure using the Visual Analogue Scale (VAS) and the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) at 1 month and 6 month follow up, respectively.

The study group showed clinical improvement and excellent results, as evidenced by their VAS and WOMAC scores at 1 month and 6 month follow-up. In the study groups, no serious adverse effects were observed.

Conclusions: Our study determined that hyaluronic acid injection is a safe and effective method in treating early osteoarthritis.

Keywords: Early osteoarthritis, hyaluronic acid, WOMAC score.

Introduction

Osteoarthritis of knee is one of the most common degenerative musculoskeletal disorder. Slow cartilage deterioration, discomfort, and escalating chronic impairment are characteristics of OA [4]. It is anticipated that 3.8% of the total population is burdened by symptomatic knee OA [2, 3]. India's rural and urban populations are expected to have a relative prevalence of osteoarthritis of the knee joint of 3.9% and 5.5% [3, 5]. According to estimates, it ranks as the fourth most common cause of disability in elderly population. Radiological indicators and symptoms of osteoarthritis are present in close to 33% of all adults [4, 6, 7]. Osteoarthritis of knee is classified by Kellgren- Lawrence grading into 4 stages and treatment options for knee osteoarthritis include physiotherapy and pharmacotherapy, as well as surgical procedures such as arthroscopic debridement and knee replacement a patient is diagnosed to have early OA of the knee if they meet the two requirements listed

Below

1. Knee pain

2. Standard radiographs, Kellgren-Lawrence grade 0, I, or II (osteophytes only).

Intra articular hyaluronic acid injection is an able alternative treatment for early OA knee comparing to pharmacotherapy and physiotherapy. The extracellular matrix of cartilage and synovial fluid both include hyaluronic acid, which gives them their viscoelasticity and lubricating qualities [4]. The addition of exogenous HA, or its derivatives, by intra-articular injection addresses the degradation of hyaluronic acid in the synovial fluid of patients with knee osteoarthritis [6] and helps to restore the elastic and viscous properties of the synovial fluid, leading to pain relief and functional improvement. Additionally, HA inhibits chondrocyte death, interacts with mediators of inflammation and matrix turnover in joint cells, and has a biosynthetic chondroprotective impact [2].

Materials and methods

We conducted a prospective study on 25 patients with early osteoarthritis of knee who

attended the OPD of the department of Orthopedics, RMMCH & Hospital, Cuddalore during the period of August 2020-November 2022. The study was explained to all of the patients, and detailed informed consent was obtained.

Inclusion Criteria

- Patients with clinical and radiographic early OA knee (upto stage 2 KL grading)
- Patients above age 45 years
- Patients consenting for the study

Exclusion Criteria

- Patient suffering from inflammatory or post-traumatic knee arthritis
- Patient with previous surgeries around knee and joint instability
- Patient with congenital knee disorders
- Patients suffering from bleeding disorders
- Patients with immune deficiencies
- Patients who refuse to participate in the study

Procedures

After selecting those patients fulfilling the inclusion criteria, a weight bearing x-ray of both the knee joints in three planes (antero- posterior, lateral and Rosenberg views) will be taken and graded using the KELLGREN- LAWRENCE (K-L) radiographic atlas. Patients have been given 6ml of intra articular hyaluronic acid injection (10mg/ml) via the Anterolateral approach under strict aseptic precaution, Pt in supine position, parts painted and draped with knee flexed to 70-80°, lateral joint line is palpated easily and needle is inserted laterally of the patellar tendon ^[16], with the needle pointing towards the femoral notch ^[17,18]. This method only goes through Hoffa's fat pad, bypassing major blood vessels and the extensor apparatus. After inserting the needle, SF or any effusion is aspirated, 1ml of lignocaine given, followed by 6ml of intra articular hyaluronic acid injection given by preloaded sterile syringe, Passive mobilization of knee done for even distribution of the drug, patient observed for 20-30 min for any allergic reaction. After the procedure, all patients were sent home and advised to avoid strenuous exercises and excessive weight bearing. Mild analgesic and 3 day course of antibiotics given.



Fig 1: Showing 6ml of intra articular hyaluronic acid (prefilled syringe)



Fig 2: Showing the position of the patient with parts painted and draped



Fig 3: Picture showing the injection of hyaluronic acid into lateral para patellar safe portal

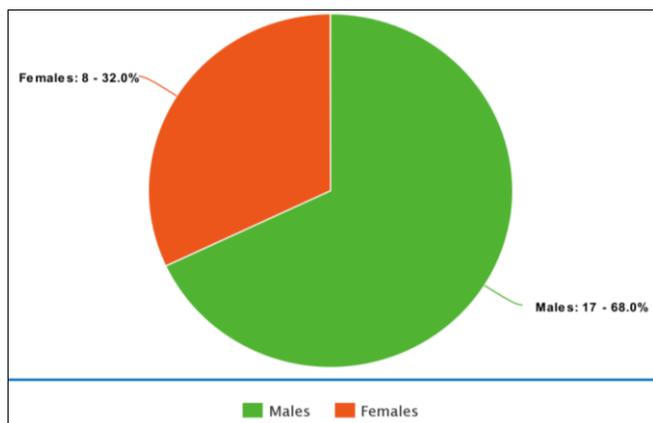
Follow up

Visual analogue score (VAS) and WOMAC score is used for the assessment. Pre injection scores were documented. Subsequently patients were followed up at 1 month and 6 month interval, a brief history and examination done and VAS & WOMAC scores were evaluated.

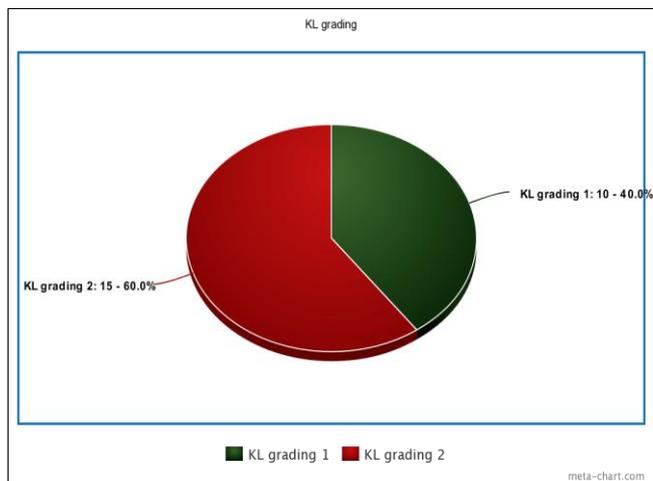
Results

The patients in the current study ranged in age from 46 to 62, with a mean of 52. In our study of 25 cases 17 were males and 8 were females. The male to female ratio was 0.7. In our study,

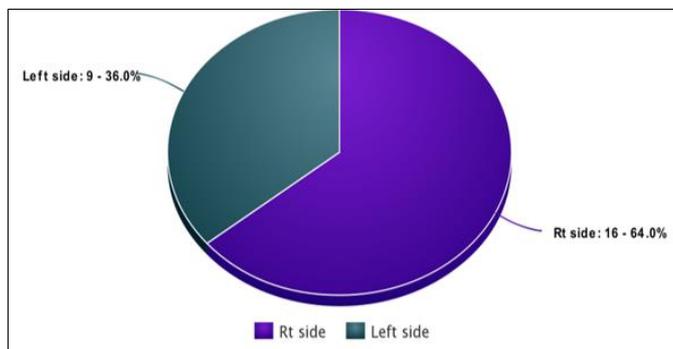
15 patients (60%) were diagnosed with Grade II OA, while 10 patients (40%) were diagnosed with Grade I OA, based on the Kellgren-Lawrence radiological scoring. In the first and sixth months follow up after receiving an intra-articular injection of hyaluronic acid, 22 of the 25 subjects showed improvement in their WOMAC and VAS scores, as shown in the table, which accounts for 88%. After the Sodium Hyaluronate injection, all WOMAC index showed a considerable improvement over the initial value. At the conclusion of the study, the majority of patients and researchers rated the treatment efficacy as moderate to effective. Consumption of paracetamol dropped from the beginning to the last follow-up. There were no systemic or significant adverse events reported.



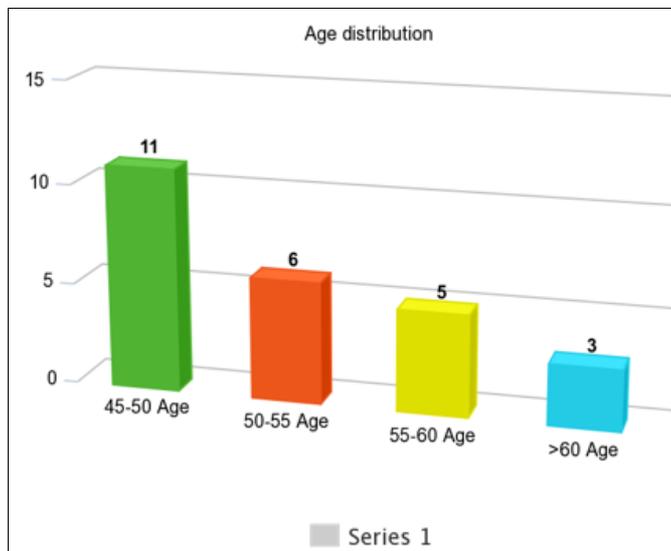
Graph-1: Gender Distribution



Graph-2: KL grading of study population



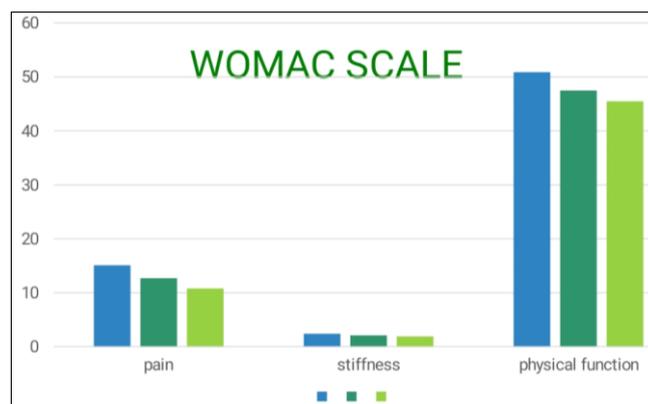
Graph-3: Side Distribution



Graph 4: Age distribution

Table 1: WOMAC Score

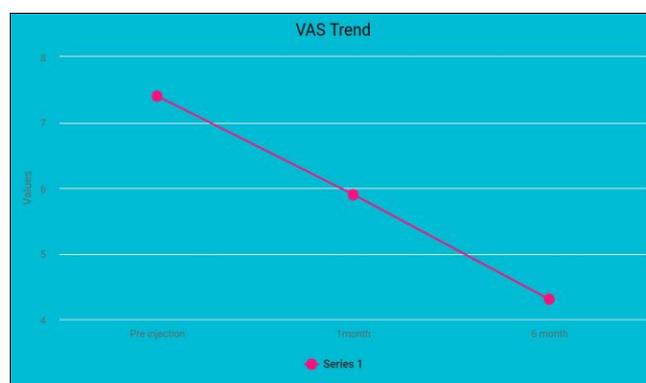
	Mean	SD
Pre-injection	28.83	2.36
1 month	26.64	2.84
6 month	25.14	2.86



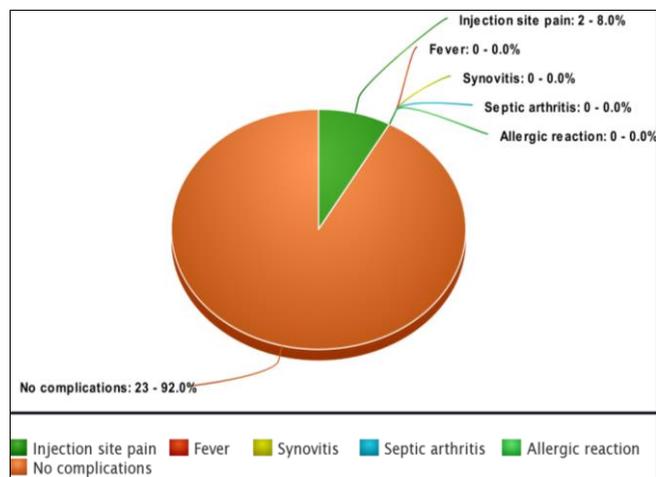
Graph 5: WOMAC Scale

Table 2: VAS Score

VAS Score	Mean	SD
Preinjection	7.4	0.9
1 month	5.9	0.7
6 month	4.3	0.7



Graph-6: VAS trend



Graph 7: Complications

Discussion

For patients with early knee osteoarthritis, viscosupplementation such as HA is a suitable therapy option. Low-molecular weight formulations have an impact that lasts longer, and patients can see improvements in their clinical results for up to a year. Although the effects of intra-articular low molecular weight HA tend to last longer than those of intra-articular steroids and high molecular weight HA, the onset of action appears to be slower. The requirement for periodic injections is a drawback of low molecular weight HA. There were no known negative effects from the treatment. This injection technique is convenient and safe option to treat early osteoarthritis of knee. An important component of the cartilage matrix and synovial fluid in healthy joints is hyaluronic acid (HA), a kind of Mucopolysaccharide also known as glycosaminoglycan. The content and molecular weight of hyaluronic acid have a major role in determining the synovial fluid's viscosity (MW). Hyaluronic acid is considerably less concentrated and has a lower molecular weight in osteoarthritis. Exogenous HA is manufactured as a variety of MW preparations, including cross-linked formulations of hyaluronic acid, in the ranges of low (range: 500,000-730,000 Da), intermediate (800,000-2,000,000 Da), and high MW (average: 6,000,000 Da) (hylans). So far, a lot of authors have backed the idea that intra-articular hyaluronan (HA) therapy can both alleviate symptoms and potentially slow down the loss of joint structure. Repeated intra-articular hyaluronic acid injections have been shown to be both beneficial and safe. Numerous studies show that sodium hyaluronate is well tolerated and equally effective following multiple sessions of therapy as it is following a single course^[9].

The use of HA for the treatment of OA knee is encouraged by the analysis by Lo *et al.*^[10].

As of right now, no clinical trial has recorded a case of septic arthritis. The majority of adverse reactions are modest and transient at the injection site. 1%-2% of patients experienced a painful post-injection reaction, and the discomfort did not for more than 2 days.

Rarely were systemic allergic responses resulting from individual hypersensitivity reported. As a result, viscosupplementation appears to be a successful and secure treatment.

Hyaluronic acid (HA) was found to be effective in the randomised, controlled, multicenter experiment ran by chevalier *et al.* to compare the efficacy and safety of a single injection of HA vs a placebo. Using the WOMAC® pain

score, the primary end measure was change from baseline over a period of 26 weeks^[11].

In a different RCT, Diracoglu *et al.* examined the short-term impacts of intra-articular HA on proprioception, isokinetic muscular force, pain, and functional conditioning in patients with knee OA. The authors came to the conclusion that intra-articular HA injections can temporarily improve pain and function in people with knee OA^[12].

Conclusion

Viscosupplementation, such as HA, is an acceptable treatment option for patients with early knee osteoarthritis. Low-molecular-weight preparations have a longer duration of action, and patients can see improvements in clinical outcomes for up to a year. Low molecular weight intra-articular hyaluronic acid injections has slow onset of action compared to that of intra-articular steroids and high molecular weight HA, but the effects appear to last longer. The need for multiple injections is one of the disadvantages of low molecular weight HA. There were no reported side effects from the treatment. This injection method is both safe and convenient. As a result, intra-articular injection of low molecular weight HA is a risk-free and cost-effective treatment option for early OA knee.

Conflict of Interest

Not available

Financial Support

Not available

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