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Functional outcome and pain relief in using intra articular hyaluronic acid injection in osteoarthritis knee

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Abstract

Background: Osteoarthritis (OA) is the most common disease of joints in adults around the world. The aim of the study was to assess functional outcome and pain relief in using intra articular injection hyaluronic acid in symptomatic osteoarthritis knee.

Methods: It was a prospective clinical study with 6 months of follow-up was conducted in the Dept. of Orthopaedics, Govt Stanley Medical College and Hospital, Chennai. Clinically proven n=45 osteoarthritis knees (OA) of 41 patients included in study on the basis of inclusion and exclusion as 4 patients having bilateral OA knee. Enrolled patients were treated by one dose of intra articular injection of Hyaluronic acid (20 mcg/2ml) in affected knee joint. Functional outcome and clinical assessment was done by pain with visual analogue score (VAS) and by knee range of movements, doyle's index

Results: 45 patients participated in study and reported statistically significant improvement in VAS score in mild and moderate osteoarthritis of knee from 4.86 and 7.51 points respectively pre-treatment level to 3.0 and 5.41 points respectively at three months post Hyaluronic acid injection follow up, improvement in joint tenderness and improved significantly clinically as well as statistically in mild to moderate group while in severe group no clinical and statistically significant improvement was observed in any parameter.

Conclusion: We concluded that intra articular injection hyaluronic acid should be considered as safe and effective modality of treatment in selected group of mild to moderate osteoarthritis only. The added advantage that Intra articular Hyaluronic acid injections can last up to 6 months from the time of administration when compared to others which is proven in this study.

Keywords: Hyaluronic acid, OA knee, VAS score

Introduction

Osteoarthritis (OA) is one of the most types of musculoskeletal illnesses internationally [1]. It is predicted that 3.8% of the world's population be afflicted by symptomatic knee OA [2, 3]. This equates to approximately 277 million human beings residing with knee OA worldwide. The prevalence of OA is comparable across the globe and it is anticipated to grow dramatically as the population ages, specifically in low and-middle socio economic countries. The prevalence of osteoarthritis of knee joint in rural and urban India is predicted to be 3.9% and 5.5%, respectively [3-5]. It's far estimated to be the fourth main reason for disability in elderly. Nearly 33% of all adults have radiological signs and symptoms of osteoarthritis [6, 7].

Treatment of OA mainly involves symptom control, with a hope of enhancing knee mobility, which finally calls for knee replacement surgical treatment as the sickness progresses. Treatment commonly followed includes a combination of pharmaceutical interventions (i.e., analgesics and anti-inflammatory medications) and intra-articular injections of corticosteroids or hyaluronic acid (HA) similarly to energetic treatment (i.e., bodily remedy, exercises, orthotics, or manual therapy aimed at enhancing electricity and mobility) [8-10]. As knee OA advances and conservative remedies are now not effective for reducing signs and symptoms, surgical tactics emerge as important [10].

Intraarticular injections have an additional non operative approach for OA control while non-pharmacologic and medical treatment plans provide inadequate alleviation of signs and symptoms.

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Intra articular injections of hyaluronic acids have been permitted by FDA for patients with osteoarthritis of the knee [10]. Some researches have already been established about the efficacy of hyaluronic acid injection in remedy of symptomatic OA knee [11-13]. The clinical benefit of IA HA on knee OA may rely on 2 mechanisms:

1. Mechanical viscosupplementation of the joint (allowing lubrication and shock absorption), and
2. The reestablishment of joint homeostasis by inducing endogenous collagen production, which continues long after the exogenous injection has left the joint [15].

Aim

This prospective observational study is being conducted to assess the final results and outcome of intra-articular hyaluronic acid in treatment of osteoarthritis of knee as a non operative remedy. This study had been conducted after getting appropriate ethical committee approval.

Materials and Methods

In this study we prospectively studied on 45 patients who were suffering from Osteoarthritis knee attending the department of Orthopedics, Govt. Stanley Medical College & Hospital, Chennai of both males and female patients of symptomatic osteoarthritis knee (OA Knee). Patient having massive cardiovascular disease, renal or hepatic ailment, pregnancy, malignancy, diabetes, previous surgical operation around knee joint and joint instability excluded from our observation. All of the patients had been explained about the

Clinical Examination	Mild(16 Patients)	Moderate(22 Patients)	Severe(7 Patients)
Pain at rest {VAS score}	4.86	7.51	8.91

From the above table one can understand that pain at rest is very less in mild category and very much intolerable in severe category. For severe category patients even though surgery advised some refused surgery and some not considered for surgery due to associated co morbid medical conditions which

study and detailed informed consent was received. The ones who gave consent to participate in the study had been enrolled in. Participants have been administered with one dose of intra articular injection of Hyaluronic acid (20mcg/2ml). Intra articular injections have been administered with a team of three doctors with the help of ultrasound machine to identify the joint cavity with strict aseptic precautions after aspiration of any effusion if present. Sufferers were followed up frequently for 6 months. No analgesics prescribed for the duration of follow up except tab paracetamol (500 mg) SOS. At baseline, the demographic statistics and medical records of the patients become acquired. Evaluation of results achieved on the idea of VAS score, Joint tenderness assessed by way of the use of Doyle's index as a 4 factor scale (zero- no tenderness, 1-patient complained of pain, 2-affected person complained of pain and winced, 3 affected person complained of ache, winced and withdrew the joint)⁽¹⁶⁾, knee range of movements.

Results

45 patients participated during this study out of that 21 were males and 24 females of 35-85 years people. Most of the knees had moderate grade of degenerative joint disease (OA) (22 patients) in line with Kellegren Lawrence criteria followed by severe (7 patients) (who refused surgery) and mild (16 patients)

Clinical examination prior to the treatment

preclude surgery. So, they have given one dose steroid to improve some movements and to alleviate pain.

Clinical examination after 6 months of ia hyaluronic acid administration

Clinical Examination	Mild(16 Patients)	Moderate(22 Patients)	Severe(7 Patients)
Pain at rest {VAS score}	3.0	5.41	8.24

After 6 months the patients were again examined and VAS score recorded and compared to the previous assessment. Post intra articular injection pain at rest is clearly improved in mild and moderate osteoarthritis knee and to very less extent in severe OA knee. So it is proven that intra articular Hyaluronic acid injections are effective in improving the patients of Osteoarthritis significantly in mild and moderate Osteoarthritis.

Discussion

Hyaluronic acid (HA) is a type of mucopolysaccharide also called as glycosaminoglycan which is a major constituent of synovial fluid and cartilage matrix in normal joints. The viscous properties of the synovial fluid are mainly dependent on the concentration of Hyaluronic acid and its molecular weight (MW). In osteoarthritis, the concentration and molecular weight of Hyaluronic acid are comparatively decreased. The exogenous HA available for the purpose of intra articular viscosupplementation is formulated as different MW preparations enlisted below 1. low (range: 500,000–730,000 Da), 2. intermediate (800,000–2,000,000 Da), and 3. high MW (average: 6,000,000 Da) this includes cross-linked formulations of Hyaluronic acid (hyalans) [11, 12, 17, 18].

The exact mechanism of how the exogenous Hyaluronic Acid works in osteoarthritis knee is unknown. However, the explained mechanism of Hyaluronic Acid activity occurs in 2 stages: 1) mechanical stage and 2) pharmacological stage. During the mechanical stage, synovial fluid is replaced by higher concentrations of Hyaluronic Acid thereby improving viscosity. This also restores the shock-absorbing and lubricating abilities of reduced synovial fluid and maintains a boundary layer around nociceptors (receptors for pain), reducing pain induction. The pharmacological stage induces the biosynthesis of endogenous Hyaluronic Acid and extracellular matrix components of cartilage, which reduces proteoglycan loss in cartilage and programmed cell death of chondrocytes. It also reduces inflammatory cell activities to reduce HA degradation and acts by reducing stimulation of pain mediators. The endogenous synthesis of Hyaluronic Acid by synovial fibroblasts is influenced by the concentration and molecular weight of Hyaluronic Acid in the extracellular environment. With the use of low molecular weight Hyaluronic Acid preparations only weak binding occurs and the biosynthesis of Hyaluronic Acid may not be sufficiently stimulated. With exogenous Hyaluronic Acid of intermediate MW, strong binding occurs and because of the high number

of receptors stimulated endogenous Hyaluronic Acid biosynthesis is enhanced. While maximal receptor binding occurs with high MW Hyaluronic Acid [12, 17, 18].

Corticosteroids and Hyaluronic Acids are commonly used modes of management of knee Osteoarthritis not responding to more conservative therapy. Few direct comparisons of intra articular corticosteroids to Hyaluronic Acid injections have been performed. Therefore, current guidelines make no recommendations as to which class should be initially employed once the clinician is decided to use intra articular injection therapy for knee osteoarthritis [13, 14]. Effect of intra-articular Hyaluronic acid was assessed by recording pain at rest, joint line tenderness and range of movements clinically in all groups.

There was a notable effect of intra articular hyaluronic acid in decreasing pain at rest (VAS) and joint tenderness from baseline to 6 months in this study. The relief of symptoms was higher among the patients of mild and moderate than severe category patients. There was no significant decrease in VAS and joint tenderness among the patients of severe osteoarthritis. No change was observed in range of movement. This correlates to the similar observations that were made by other observers.

Conclusion

Intra articular Hyaluronic acid injections can be a good and able alternative to non pharmacologic interventions in mild and moderate Osteoarthritis

The added advantage that Intra articular Hyaluronic acid injections can last up to 6 months from the time of administration when compared to others which is proven in this study.

Limitations of this study

Large volumes have to be studied to ascertain the importance of Hyaluronic acid as a visco supplementation in case of osteoarthritis.

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