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Effectiveness of intraarticular steroids in osteoarthritis of knee

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Abstract

Knee osteoarthritis is a degenerative disease characterized by cartilage destruction which manifests as pain, stiffness and loss of joint motion. With increasing longevity, aging of population and increased incidence of obesity, osteoarthritis remains a potentially major health problem as well as global economic burden. Intraarticular steroids are frequently & effectively used to treat acute and chronic inflammatory conditions of joints, especially during osteoarthritis flare with evidence of inflammation like increasing pain and joint effusion. This reduces acute episodes of pain and increases joint mobility and rehabilitation. This was a prospective hospital based study of 240 Patient with osteoarthritis knee. Average age was about 54 ± 3 years, knee effusion detectable in 80% of patients and radiographic features of osteoarthritis in 91% cases at time of injection. Results showed significant improvement in pain and joint tenderness at 6 weeks after injection. There is consensus now that intraarticular steroids are extremely helpful in acute episodes of arthritic pain and efficacy is almost similar and equal to other modalities of intrarticular injection therapies. Intraarticular steroid injections are reasonably safe, reliable and time tested treatment of arthritic conditions and thus can be used as first line of treatment in flares of osteoarthritis with features of synovial inflammation to reduces crisis of pain and promote rehabilitational activities and bring back smiles to patients.

Keywords: Osteoarthritis knee, intraarticular steroids, arthritic flare-ups

Introduction

Knee osteoarthritis is a degenerative disease characterized by cartilage destruction which manifests as pain, stiffness and loss of joint motion^[1]. The course of this disease is gradually progressive leading to disability in older adults, with 10% of people aged more than 55 having painful and disabling symptomatic knee osteoarthritis^[2]. It remains most common cause of joint disease and eventually leading cause of joint disability worldwide^[3]. With increasing longevity, aging of population and increased incidence of obesity osteoarthritis remains a potentially major health problem as well as global economic burden^[4].

Osteoarthritis is pathologically a joint scenario characterized by synovitis, subchondral bone remodeling (thickening, bone collapse, bone cysts), degeneration of ligaments and menisci and hypertrophy of joint capsule with hall mark of cartilage destruction^[5]. In an osteoarthritic knee chondrocytes respond to mechanical and inflammatory stimuli and produce inflammatory mediators similar to injury response^[6, 7], as a result articular matrix protein gets fragmented and stimulate further matrix destruction⁶. With aging changes in cartilage, accumulation of advanced glycoend products makes cartilage more brittle and subsequently leading to increased production of chemokines and cytokines by chondrocytes^[6]. Synovial inflammation is hypothesized to result from foreign body reaction of synovial cells to cartilage degradation products produced within the joints or as a primary trigger of osteoarthritis process^[6, 8, 9]. This synovitis have been shown to play vital role in initiation and continuation of osteoarthritic process in joints^[6, 10, 11].

Intraarticular steroids are frequently used to treat acute and chronic inflammatory conditions, especially during osteoarthritis flare with evidence of inflammation and joint effusion, thus reducing acute episodes of pain and increasing joint mobility^[12, 13].

Materials and methods

This was a prospective hospital based study conducted in hospital for bone and joint surgeries Srinagar Kashmir during September 2012 to June 2014. Patient of osteoarthritis knee as per American College OF Rheumatology Criteria, detected during OPD consultation were enrolled in the study. Other arthritic conditions or arthritis associated with Rheumatoid arthritis, septic arthritis, tubercular arthritis, peripheral neuropathy, unstable joints, overlying features of superficial infection, history of steroid injection within previous 3 months, more than three reported knee injections, hyaluronic acid injection in previous 6 months, and loose bodies were excluded. Routine investigations for injection and other additive investigations to rule out arthritic states other than osteoarthritis were done.

All those patients attending our out patient department (OPD) who were not relieved by usual conservative treatment for osteoarthritis like NSAIDS (non steroidal anti inflammatory drugs), physical therapy, change in life style activities and convinced and agreed for explained procedure were taken up for study. After informed consent for procedure and study, patients were called on particular day of week for intraarticular corticosteroid (IACS) injection in procedure room of emergency theatre complex.

In the procedure room in supine position with knee extended, after all aseptic precautions and proper draping, patella was localized with palpation and entry point on lateral aspect of knee was noted. After slightly lifting patella, skin was penetrated with wide bore needle usually 18G at 45 degrees and advanced under patella towards medial side of joint with application of negative pressure until the joint fluid begins to enter the syringe. The fluid aspiration was aided by gentle pressure on medial side^[14]. This was followed by injection of methyl prednisolone 40-60 mg with 22 G needle. After

infiltration with steroid injection joint was wrapped with cotton and crepe bandage and patient was instructed to take rest for about 24 hours^[14]. Oral antibiotic Coamoxyclav was given for 3 days. Patients were followed weekly for initial 2 weeks then every monthly till 6 months thereafter as need arises.

Results

Total of 240 patients were enrolled in study with full follow up with 134 of them females. Average age being about 54±3 years (table 1), N=156 in 50 -59 age group followed by n=36 in 60-69 age group.

Average body weight was 60 kg. In 50% cases left knee was involved and 40% cases right knee was involved while in 10% cases both knees were affected. Majority of patients were females (n=82) involved in house hold activities followed by daily wagger group of population (table 2) and farming class of population.

On clinical examination knee effusion was detectable in 80% of patients. In all patients radiographs (both knees anteroposterior and 30 degree lateral) were taken before injection which showed both decreased joint space and osteophytes in about 91% cases and isolated osteophyte formation in 48% of patients (table 3).

Variables regarding pain, tenderness and range of motion before and after steroid injection are presented show a considerable improvement within two weeks of injection and benefit persisted well beyond 6 weeks after injection, with improvement in pain, tenderness and range of motion (table 4). The joint line tenderness is the only appreciable sign which is elicited easily after treatment.

This study makes it clear that intrarticular steroids are effective in relieving pain and decreasing tenderness in case of osteoarthritis (table 5).

Table 1: age wise patient distribution.

Age group (in years)	No. of patients	Percentage
40-49	24	10
50-59	156	65
60-69	36	15
79& above	24	10

Table 2: occupational patient status

Occupation	No. of patients	Percentage
Housekeeper	82	35
Dayworker/labourer	54	21
Farmer	36	15
Service/govt employ	35	15
Others	33	14

Table 3: Radiographic variables

Radiographic variable	No. of patients	Percentage of total patients
Decreased joint space	60	25
Osteophytes	115	48
Both	218	91

Table 4: Clinical parameters in relation with steroid injection.

Variables	Before injection	2 weeks after injection	6 weeks after injection
VAS (0-10)	7.19±2.4	2±1.3	3±2.5
Joint tenderness (0-4)	2.57±0.57	0.98±0.52	1.2±0.45
Range of motion	30-100°	20-110°	10-130°

Table 5: Clinical parameters in relation with steroid injection statistical significance

S. No.	Variables	Before Injection	2 weeks after Injection	6 weeks after injection	P value
01	VAS (0-10)	7.19±2.4	2.0±1.3	-	<0.001
	Joint tenderness	2.57±0.57	0.98±0.52	-	<0.0001
02.	VAS (0-10)	7.19±2.4	-	3.0±2.5	<0.0001
	Joint tenderness	2.57±0.57	-	1.2±0.45	<0.0001
03.	VAS (0-10)	-	2.0±1.3	3.0±2.5	<0.0001
	Joint tenderness	-	0.98±0.52	1.2±0.45	0.45

Discussion

In our study majority of patients were females, which is explained by increased incidence of OA in females and in our culture females are usually squatting during cooking and other household activities. Labourer and farmers likewise are indulged in activities which produce tremendous stress on articulating cartilage and predispose to osteoarthritis. As is evident from study these are usually from low to middle class family for whom total or partial joint replacement is not an early option as they have their dependence on daily earnings and usually are unskilled workers, which is not possible from cost point of view as well as alternative job which can be safe in replaced knees.

Corticosteroids have both anti-inflammatory and immunosuppressive effects but actual mechanism of action is complex as they act directly on nuclear steroid receptors and regulate inflammatory and immunosuppressive cascade. They reduce vascular permeability, inhibit accumulation of inflammatory cells, phagocytosis, production of neutrophil superoxides, metalloproteases and metalloprotease activity and prevent synthesis and secretion of various inflammatory mediators like prostaglandins [15, 16]. As a result they decrease acute pain and improve joint mobility [17]. With correlation of chondrolysis with acute flare of osteoarthritis, IACS (intraarticular corticosteroids) for short term use are highly recommended [9, 11]. In 2006 Cochrane review, short term efficacy of corticosteroids in osteoarthritis knee have been confirmed [18], this was also highlighted in systemic review by HEPPEL *et al.* [19] and meta-analysis by BANNURU *et al.* [20]. Some studies found IACS (intraarticular corticosteroids) superior to placebo in western ontario and mc master universities osteoarthritis index (WOMAC) total subscale scores at four weeks [21] and others extending benefit upto 26 weeks [22, 23]. Anderson *et al* suggested presence of effusion and lesser radiographic severity of Knee osteoarthritis as predictors of good response to treatment up to 26 weeks [23]. Intra articular steroids have very rare side effects, the infrequent reaction flare to intra articular corticosteroids begins 6-12 hours after injection and resolves spontaneously by 1-3 days [24]. Some studies reveal that even multiple steroid injections of steroids showed no significant evidence of cartilage degradation [25, 26, 27]. American College Of Rheumatology subcommittee on Osteoarthritis knee recommends Corticosteroids as effective method of reducing pain [28], however American society of Orthopedic surgeons interpreted the evidence inconclusive and were unable to recommend for or against the use of intraarticular corticosteroids (IACS) in their guideline for symptomatic OA knee [29]. In randomized control trial by Seth *et al.* [13] and review by Printz *et al.* [30], financial conflicts of interest in studies for treatment of knee Osteoarthritis with hyaluronic acid demonstrate that 63% studies were industry funded. None of these studies with at least one company employ as one author reported an unfavorable conclusion about efficacy of Hyaluronic acid in treatment of osteoarthritis. It is therefore recommended that clinicians be aware of potential financial

conflict of interest of authors reporting on use of hyaluron and carefully evaluate the recommendations from these studies based on objectives of study designs [12, 13]. American college of Rheumatology subcommittee on OA has no recommendation regarding use of intra-articular hylanurates [28]. similarly American society of orthopaedic surgeons doesn't recommend use of intra articular hylanurate for patients with symptomatic OA of knee [29]. In experimental study on animals with Osteoarthritis, platlet rich plasma (PRP) was reported to decrease chondrocyte apoptosis, increasing proteoglycan in cartilage thus prevention against OA [31-37]. However PRP formulations are complex and many of questions regarding mechanism of action in Osteoarthritis joints *in vivo* remains unanswered [39, 39]. Andial *et al* concluded that PRP acts via complex way as it has about 300 proteins and actual effects mediating the beneficial activity are exactly not known [40]. American society of orthopaedic surgeons working group interpreted the evidence to be inconclusive as to the benefit of Intra articular PRP injections and were unable to recommend for or against the use of intraarticular PRP in their guidelines for patients with symptomatic Osteoarthritis of the knee [29].

Current literature indicates that intra-articular steroid injections are safe and have positive effects for patient satisfaction.

Conclusion

Intraarticular corticosteroid injections are highly beneficial in treatment of acute episodes of osteoarthritic flare in symptomatic mild to moderate arthritic knees with reasonable safety and relief from pain equally effective to other modalities of intraarticular injections and very very economical.as long as patient is disabled by episodes of acute pain steroid injection can be given as first line of treatment followed by physiotherapy and activity modification to reduce dramatically pain as well as morbidity.

The authors declare that there is no conflict of interest.

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