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Midterm outcome of proximal fibular osteotomy for medial compartment osteoarthritis- a prospective study

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ABSTRACT

Background: Primary osteoarthritis of knee is one of the most common degenerative conditions associated with disability. With more of varus knee medial compartment osteoarthritis is most common and early presentation. High tibial osteotomy (HTO) is technically demanding and associated with major complication like neurovascular injury, iatrogenic fracture, nonunion. Practically HTO is associated with longer bed immobilization and difficult to take bilateral condition.
Methods: We treated 38 patients 54 knees with proximal fibular osteotomy for primary medial compartment osteoarthritis excluding other condition like secondary and inflammatory from January 2017 to December 2017. Pre operative assessment of patients done on standing antero-posterior (AP) X-ray and knee injury and osteoarthritis outcome score (KOOS). Post operative assessment done on opening of medial joint line space on standing AP X-ray and KOOS score.
Results: Patients treated with PFO, there was change in the weight bearing axis, opening of the medial joint space, improvement in pain, functional outcome assesses with improvement in KOOS score. 8 patients experienced some catchy knee pain and swelling and deterioration of KOOS score.
Conclusions: PFO is simple, cost effective and can be surgical treatment option for primary medial compartment Osteoarthritis irrespective of age, though a greater number of patients with longer follow is needed, initial results are very promising in majority of patients and few patients shows deterioration in comparison to initial results but overall patient's satisfaction index is good.

Keywords: Osteoarthritis, Proximal fibular osteotomy, High tibial osteotomy, KOOS

INTRODUCTION

Knee osteoarthritis is chronic progressive degenerative condition associated with disability in older population due to pain and stiffness of the joint.[1] Etiology and predisposing factor of osteoarthritis is multifactorial.[2] Prevalence of osteoarthritis in India is 22% to 39%, more commonly it involve the female population and rapidly increased with the age.[3,4] 40 to 45% women with age have symptom and 70% to 75% have radiological evidence.[5,6] It is the 10th leading cause of non-fatal burdan.[5,6] 60% to 80% of mechanical load bear by the medial compartment of knee.[7]

High tibial osteotomy (HTO) and total knee arthroplasty (TKA) are two main surgical procedures to relives pain. HTO has its own limitation like very limited indication and associated with neurovascular injury, iatrogenic fracture, nonunion and time for osteotomy site to unite.[8,9] HTO has specific indication of medial compartment osteoarthritis. High tibial osteotomy is well documented joint preservation surgical procedure for younger medial compartment osteoarthritis but it requires four to six weeks

of phase of osteotomy site to heal. That is the main reason where patients miss the indication. Unicondylar knee arthroplasty (UKA) is also very well documented procedure for medial compartment osteoarthritis but associated with learning curve and cost constrain.

TKA is major surgical procedure and should not be substitute for joint preservation surgery and limited to involvement of late osteoarthritis. TKA is associated with major complication like infection, aseptic loosening, precaution use of floor related work and best results if done above 60 years, associated with inflammatory arthritis like rheumatoid arthritis.[10]

In comparison to above these two procedures proximal fibular osteotomy (PFO) is safe, cost-effective procedure not associated with major complication and allow early weight bearing. Though comparing TKA and HTO with PFO is not justifiable because of different indication of same disease at different stage. There is no substitute of TKA in inflammatory osteoarthritis.

The main objective of study to assess the clinical outcome of PFO in medial compartment osteoarthritis.

METHODS

From January 2017 to December 2017, we treated 38 patients with 54 knees at R. K. Life Line Hospital, Sirsa, Haryana. Age distribution was from 51 to 64 with mean age was 59.3 years. 23 female and 15 males were the distribution in our study. The study design is a prospective study. The diagnosis of primary medial osteoarthritis was made on standing AP X-ray with genu varum with reduction of medial joint space. Exclusion of trauma (secondary osteoarthritis), infection, systemic disease (inflammatory) done prior. All patients explained regarding the procedure in their own language, pictorial view of the procedure and its complication. Apart from regular surgical consent, consent also included the duration of analgesic used by the patients and other available surgical procedure (Figure 1). Ethical approval was taken from the hospital board.

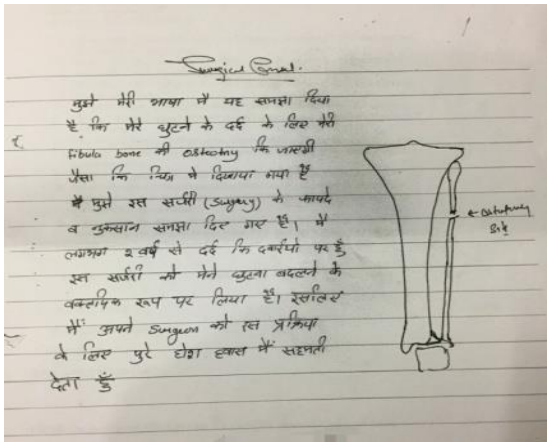

Figure 1: Additional surgical consent for PFO.

Patients placed supine under spinal anesthesia with tourniquet over the proximal thigh. Fibular head marked with the palpation method or in obese patient use of C-arm take to mark the fibular head as it is one of the vital steps. Skin incision marked at two places below the fibular head one at 6 cm and other one at 12 cm below the fibular head for 5 to 6 cm incision (Figure 2). Plane made between peroneus and soleus (Figure 3), periosteum elevated all around the bone, with the help of bone lever we tried to protect under lying structure (peroneal nerve) without putting pressure. 1.5 to 2 cm of fibula removed between 6 to 10 cm below the fibular head, bone wax use at the end cut of fibula for homeostasis. Surgical site closed in layer with compression bandage on it. Full weight bearing started on first post operative day. Post operative assessment done by KOOS score on 12th day (suture removal day), one month, three-month, six-month, one year and yearly onwards. We used mean median mode calculation to summarize data of our patient's age and KOOS score.

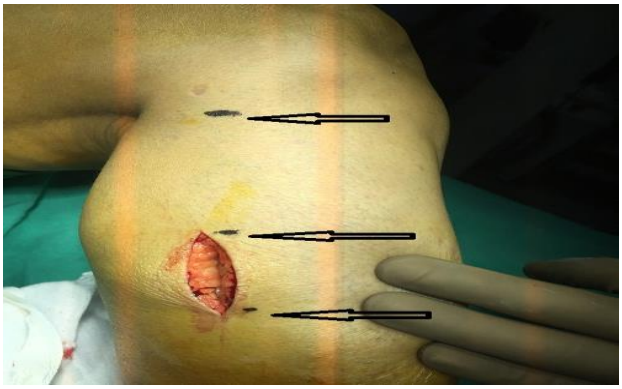

Figure 2: From above downward first mark fibular head, second 6 to 6.5 cm below and third mark 11 to 12 cm below the fibular head.

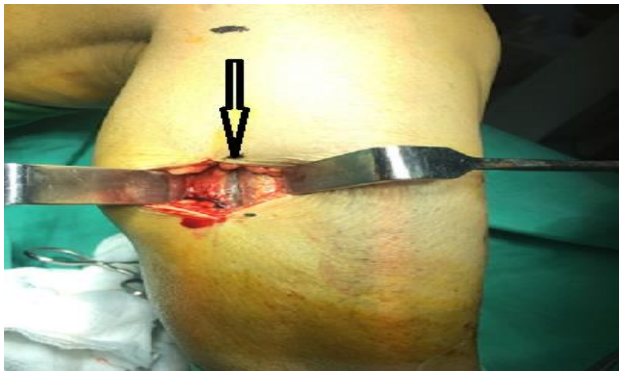

Figure 3: Plane made between peroneus at the dorsum aspect and soleus volar.

RESULTS

None of our patients lost the follow up. Follow up duration of our patients were 4 years. Preoperative assessment was done on the basis of KOOS score with Hindi language form filled by patients itself. KOOS includes symptom and

stiffness, pain subtotal, functions – daily living and sports recreational, quality of life and overall KOOS score. Preoperative assessment to look for involvement of the compartment and to exclude patella-femoral osteoarthritis by weight bearing AP X-ray and skyline X-ray was taken. Significant improvement in the pain and functional sub-set of the KOOS score was observed. Pre-operative KOOS score and KOOS score at 3 months shown in chart shows significant improvement (Figure 4 and Table 1). All patients were on regular use of analgesic every day or on alternative basis from past six months to one year.

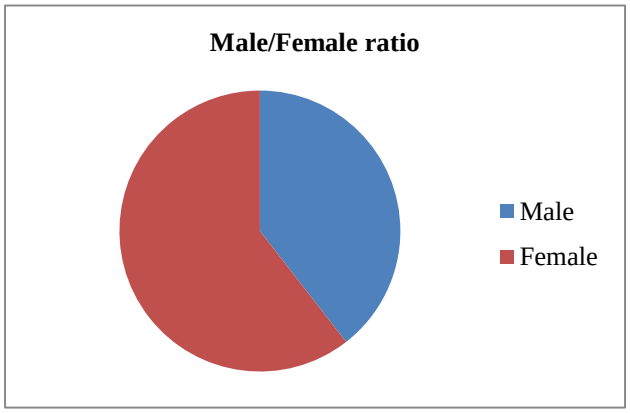

Figure 4: Male and female ratio involved in study.

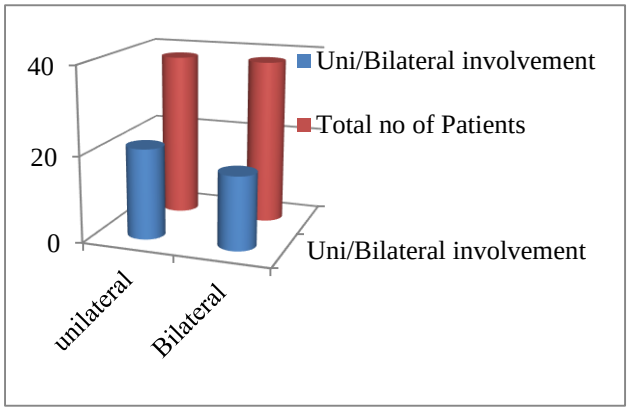

Figure 5: Involvement of unilateral or bilateral knee in patients.

Table 1: KOOS score on pre-operative and at three months.

KOOS sub-division	Pre-operative (%)	Three months (%)
Symptom and stiffness	39±3	79±3
Pain subtotal	50±3	83±3
Functional –daily living	41±3	82±3
Functional – sports and recreational	10±3	65±3
Quality of life	38±3	75±3
Total KOOS score	36±3	77±3

Radiological there was increase in the medial joint space and mild correction of the varus deformity (Figures 6 and 7).

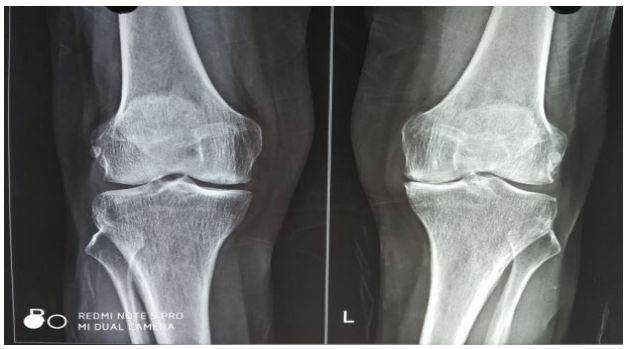

Figure 6: Pre-operative weight bearing X-ray.

Figure 7: At 3-month weight bearing X-ray.

Eight cases develop extensor hallucis longus (EHL) weakness, in our study 12th case was the first case of EHL weakness, which recovered over a period of four to six weeks. Four patients complain of burning sensation over the dorsum of foot, three patients complain of calf pain and cramps, all patients responded better with quadriceps, hamstring and ankle exercises with multivitamins supplement.

Eight cases reported some catchy sensation on frequent basis with knee pain and deterioration of the KOOS score over the period of six months to one year and remain same on further follow up. Pain subtotal and functional subset of KOOS affected much so overall score of those patients were 64%. Regular use of analgesic reduced in all the patients.

Average duration of the surgery was 33 minutes for unilateral extremity and all surgery was performed by the same surgeon.

DISCUSSION

Knee osteoarthritis is one of the most common degenerative conditions associated with morbidity. TKA is associated with predictable outcome in terms of pain relief in late stage of osteoarthritis. In Indian population due to varus, osteoarthritis of knee starts from medial

compartment.[11] However, TKA is expensive procedure and sometimes it's required a revision. Our region and especially rural Indian population patients avoid total replacement surgery at any cost.[12] Best result of TKA is obtained if patients are of older age group and if done for inflammatory arthritis. Longevity of TKA reduced if performed in younger age with primary osteoarthritis.[13] Main aim of joint preservation surgery is to fill the age gap from starting of osteoarthritis to all compartments osteoarthritis and provide some surgical procedure which reduces the intake of analgesic. In initial stage of osteoarthritis conservative method as life modification, knee strengthening exercises, analgesic and nutraceuticals. Medial compartment osteoarthritis sets in where conservative trail fails. There are few surgical modalities are available for medial osteoarthritis like HTO and UKA. The aim of HTO to treat young population with medial osteoarthritis by joint realignment but it is associated with few complications like delayed weight bearing, risk of non-union or delayed union and wound infection. HTO is predictable with change in the weight bearing axis so proper planning and learning curve is required. UKA is again an expensive procedure without addressing the cause of the disease.

The possible mechanism of PFO is due to redistribution of weight bearing axis on tibial plateau as explained by yang et al by removing fibula soft tissue complex (Figure 8).[14]

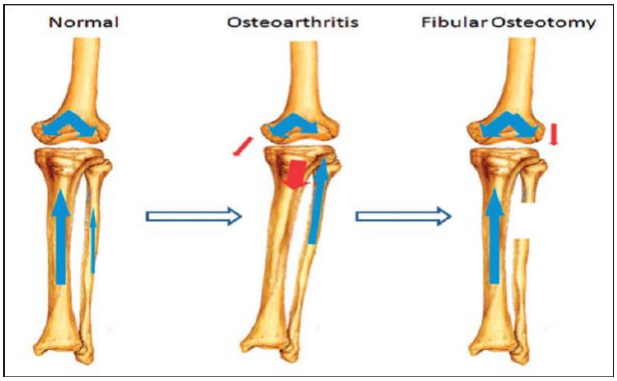

Figure 8: Yang et al theory behind proximal fibular osteotomy.

Isolated EHL weakness in eight cases explained by a normal anatomical variation of deep peroneal nerve branch that supply to EHL run close proximity to the Fibular periosteum approximately 58 to 93 mm distal to fibular head.[15] KOOS scoring system is reliable indicator of patient's recovery.[16] KOOS cover all subset of the outcome and its patients depended.

In comparison to HTO, PFO is equally effective for medial osteoarthritis in term of pain relief and function. The additional advantage of the procedure was immediate weight bearing and pain relief. PFO also help to improve axial alignment and medial joint space. There should be no comparison between TKA and PFO as both are different surgical option for same disease at different stages. Surgical scar mark of the procedure is away from the knee joint and neither it changes the biomechanics of the joint so future conversion to total knee replacement is easy on naive joint.

We should also consider that in our study eight patients deteriorated after few months of the surgery but none of the patient's experience the similar complain like initial stage. So, we should explain the patients about all aspects consent.

We require the longer follow up and large pool of the patients with different region to assess the clinical outcome of the procedure. We had enrolled only 38 patients operated during one year and follow up of our study is only four years.

CONCLUSION

Young patients with their early 50 medial compartment OA, realignment surgery (HTO) is preferred option because of reproducibility and longevity.

Patients with 50 to 60 years of age or older with medial compartment osteoarthritis, patients who are on analgesic, patients who do not want longer stay with delayed weight bearing PFO is a safe surgical option with predictable outcome and pain relief. Conversion of PFO to TKA is like performing on an untouched knee.

TKA indications are very clear for late-stage primary osteoarthritis, inflammatory arthritis with predictable outcome. Any joint preservation surgery should not be confused as an additional option for TKA; it is there to fill the gap of pain free interval from early osteoarthritis to late osteoarthritis.

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Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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