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ORIGINAL RESEARCH

Functional outcomes of proximal fibular osteotomy in osteoarthritis knee

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ABSTRACT

Background: Osteoarthritis (OA) is the most common type of arthritis in clinical practice and is one of the leading causes of disability worldwide. The hands, knees, and hips are the most commonly affected joints, although any joint can be affected. Proximal fibular osteotomy (PFO) is an alternative treatment to high tibial osteotomy (HTO). It is a surgical procedure for medial compartment knee osteoarthritis (KOA). Hence this study was conducted to assess the functional outcomes of proximal fibular osteotomy in patients with knee osteoarthritis. **Materials & methods:** A total of 20 patients were assessed. The patients were placed in the supine position after administration of spinal anaesthesia. An approximately 5-cm longitudinal incision was made over the lateral aspect of the proximal fibula, and the fibula exposed between the peroneus muscle and soleus muscle. Knee pain was assessed using a Visual analogue scale. Medical joint space and the hip knee-ankle angle was measured. based on the whole lower extremity radiograph. **Results:** Significant improvement was observed in the mean VAS improved from preoperative value of 7.5 to 2.7 at 9 months postoperative follow-up. Significant improvement was observed in the Mean knee joint space from preoperative value of 0.42 to 0.67 at 9 months postoperative follow-up. Significant improvement was observed in the mean hip knee ankle angle from preoperative value of 179.2 to 166.9 at 9 months postoperative follow-up. **Conclusion:** A novel alternative approach for treating knee medial compartment arthritis is represented by PFO.

Key words: Proximal, fibular, osteotomy

INTRODUCTION

Osteoarthritis (OA) is the most common type of arthritis in clinical practice and is one of the leading causes of disability worldwide. Mechanical pain is the most common presenting symptom of this disease. The hands, knees, and hips are the most commonly affected joints, although any joint can be affected[1].It can affect small, medium, and large joints, although in terms of a painful disease, the knee is most frequently affected in up to 10% of men and 13% of women aged above 60 years, with evidence of symptomatic OA of the knee in the United States[2].

The knee is the largest synovial joint in humans and consists of bone structures (distal femur, proximal tibia, and patella); cartilage (meniscus and free cartilage); ligaments; infrapatellar fat pad; and synovium. The synovium is responsible for the production of synovial fluid that lubricates and nourishes the vascular cartilage. However, considering the frequent use and high stress on this joint, it is a frequent site of painful conditions, particularly OA [3,4]. Disease evaluation of OA is generally slow and can take years. Successively, the disease can also go through stages or show gradual evolution over time, making the severity and symptoms of the disease worse[5].

The etiology of OA is multi-factorial and includes joint injury, obesity, aging, and heredity.[6] . Studies using genetic mouse models suggest that growth factors, including transforming growth factor-β (TGF-β), Wnt3a and Indian hedgehog, and signaling molecules, such as Smad3, β-catenin and HIF-2α[7] are involved in OA development. One feature common to several OA animal models is the upregulation of Runx2.[8] Runx2 is a key transcription factor directly regulating the transcription of genes encoding matrix degradation enzymes in articular chondrocytes.[9]Proximal fibular osteotomy (PFO) is an alternative treatment to high tibial osteotomy (HTO). It is a surgical procedure for medial compartment knee osteoarthritis (KOA).Therefore, based on the aforementioned data, this study was conducted to assess the functional outcomes of proximal fibular osteotomy in patients with knee osteoarthritis.

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MATERIALS & METHODS

The present study was conducted in the Department of orthopaedics, Government Medical College and it included evaluation of the Functional outcomes of proximal fibular osteotomy in osteoarthritis of knee in 20 patients, selected from Orthopaedic outpatient department.A total of 20 patients were assessed. The patients were placed in the supine position after administration of spinal anaesthesia. An approximately 5-cm longitudinal incision was made over the lateral aspect of the proximal fibula, and the fibula exposed between the peroneus muscle and soleus muscle. PFO was performed by removing a 2 to 3 cm length of fibula at a site 6 to 10 cm distal to the caput fibulae. Full weight bearing and free mobilization was allowed postoperatively. Knee pain was assessed using a Visual analogue scale. Medical joint space and the hip knee-ankle angle was measured.based on the whole lower extremity radiograph. Line A was drawn from the centre of the femur head to the centre of the knee, and line B was drawn from the centre of the knee to the centre of the ankle. The hip-knee-ankle angle was the intersection angle a between lines A and B. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software version 18.0. Chi- square test and Mann Whitney U test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

Mean age of the patients with OA of knee was 55 years. Forty five percent of the patients (9 patients) belonged to the age group of 56 to 65 years. 65 percent of the patients (13 patients) of the present study were females while the remaining 35 percent were males (7 patients). 57.33 percent of the patients were of Kellgren and Lawrence Grade II, while the remaining 42.67 percent of the patients were of Kellgren and Lawrence Grade III. Significant improvement was observed in the mean VAS improved from preoperative value of 7.5 to 2.7 at 9 months postoperative follow-up. Significant improvement was observed in the Mean knee joint space from preoperative value of 0.42 to 0.67 at 9 months postoperative follow-up. Significant improvement was observed in the mean hip knee ankle angle from preoperative value of 179.2 to 166.9 at 9 months postoperative follow-up.

Table 1: Age-wise distribution of patients

Age group (years)	Number of patients	Percentage of patients
45 to 55	6	30
56 to 65	9	45
More than 65	5	25
Total	20	100

Table 2: Mean VAS score at different time intervals

Time interval	Mean VAS	SD	p- value
Pre-operative	7.5	0.57	0.001 (Significant)
Postoperative	5.9	0.62	
Postoperative 6 weeks	3.8	0.66	
Postoperative 12 weeks	4.3	0.72	
Postoperative 6 months	3.6	0.37	
Postoperative 9 months	2.7	0.71	

Table 3: Mean knee joint space at different time intervals

Time interval	Mean joint space	SD	p- value
Pre-operative	0.42	0.023	0.001 (Significant)
Postoperative	0.28	0.013	
Postoperative 6 weeks	0.51	0.025	
Postoperative 12 weeks	0.36	0.019	
Postoperative 6 months	0.44	0.027	
Postoperative 9 months	0.67	0.017	

Table 4: Mean hip knee ankle angle at different time intervals

Time interval	Mean hip knee ankle angle	SD	p- value
Pre-operative	179.2	0.68	0.033 (Significant)
Postoperative	172.7	0.81	
Postoperative 6 weeks	160.2	0.71	
Postoperative 12 weeks	169.2	0.89	
Postoperative 6 months	162	0.86	
Postoperative 9 months	166.9	0.72	

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DISCUSSION

Osteoarthritis is the most common disease of joints in adults around the world [10]. The technique of osteotomy in knee osteoarthritis was first reported by Volkmann in 1875, wherein he had described a simple high tibial osteotomy (HTO) for surgical management of knee osteoarthritis. According to Wardle *et al*[11], combined tibial and fibular osteotomy was observed in Royal Southern Hospital, Liverpool in the year 1928. In the present study, mean age of the patients with OA of knee was 55 years. Majority of the patients belonged to the age group of 56 to 65 years. Our results were in concordance with the results obtained by previous authors who also reported similar age range of patients with OA in their respective studies. Literature from the past studies also shows that OA indeterminately occurs in elderly age group.[12. 13]

We observed a significant improvement in the mean VAS improved from preoperative value of 7.5 to 2.7 at 9 months postoperative follow-up. Similar results were observed in the studies conducted by Subash Y et al and Prakash L et al who also observed similar findings.[14,15] We observed a significant improvement in the Mean knee joint space and hip knee able postoperatively. Our results were in concordance with the results obtained by Sukumaran S et al and Subash Y et al.[16- 17]

Conversion to total knee arthroplasty following PFO was observed in four cases reported by Yang et al[18] after one year follow-up. Lu et al[19] reported no conversion to total knee Arthroplasty following PFO in their study. The other authors did not mention conversion to total knee Arthroplasty. It was noted by Lu et al that the disease progression had stopped when PFO was used in conjunction with medial meniscectomy.

A novel surgical procedure, known as PFO, has surfaced as a treatment option aimed at alleviating pain and enhancing joint function among individuals suffering from knee osteoarthritis. Notable outcomes observed in the current research encompassed notable relief of medial discomfort and enhancement in the medial joint space. Following PFO intervention, a significant portion of participants experienced immediate pain reduction; however, both the underlying mechanism responsible for this effect and the short duration of follow-up remain unclear. Intriguingly, sustained amelioration in pain was noted over time with some patients even reporting complete absence of discomfort during their final assessment. Moreover, postoperative mobility notably improved compared to pre-surgery levels. Additionally, specific cases demonstrated enhanced axial alignment within the lower extremity post-PFO surgery is particularly evident among those presenting severe genu varus deformities.

CONCLUSION

A novel alternative approach for treating knee medial compartment arthritis is represented by PFO. Additional research studies are advised to be conducted in this area.

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