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EVALUATION OF FACTORS AFFECTING THE FUNCTIONAL AND RADIOLOGICAL OUTCOMES AFTER PROXIMAL FIBULAR OSTEOTOMY IN PATIENTS WITH OSTEOARTHRITIS OF KNEE

Orthopaedics

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ABSTRACT

Background : Proximal fibular osteotomy has proven to be efficacious in bringing biomechanical change in the knee for reducing pain and improving the functional outcomes along with showing significant radiological evidence of the biomechanical change. The patient selection for deciding Proximal Fibular Osteotomy as the surgical modality for the patients of osteoarthritis of knee has been challenging task. This study aims at evaluating the factors affecting outcomes of PFO in Osteoarthritis knee including Age, Unilateral/Bilateral surgery and Preoperative Grade of OA knee on presentation. This evaluation helps in deciding the patient to be operated for PFO as well predicting the outcomes expected after surgery with respect to the studied factors. **Methods** : Total 29 knees with Osteoarthritis knee operated by PFO were included in the study and were followed up at 1 month, 3 months and 6 months postoperatively. Subgroup analysis was done for the functional and radiological outcomes after PFO in OA knee. The subgrouping system included Age grouping (41-60 years and 61-80 years), Surgery type (Unilateral and Bilateral knees PFO) and Grade of OA Knee (Kellgren Lawrence Scale 3 and 4) **Results:** No statistically significant differences were found in the effectiveness of PFO for knee osteoarthritis while comparing the subgroups including age groups, surgery type and preop OA grade. The VAS and Functional American Knee Society Scores showed significant improvements in both age groups (41–60 and 61–80 years), suggesting that PFO's efficacy is age-independent. Analyses comparing single and bilateral surgeries revealed similar results in terms of pain alleviation and functional enhancements, highlighting PFO's flexibility in meeting the surgical needs of individual patients. Similarly, regardless of the initial severity of osteoarthritis, PFO consistently relieves pain and improves function, according to an analysis based on the Kellgren-Lawrence Scale. **Conclusion** : This research guides us in patient selection and affirms the broad applicability and reliable benefits of Proximal Fibular Osteotomy (PFO) in treating knee osteoarthritis, demonstrating its effectiveness across various patient subgroups and profiles. PFO proves to be an efficient solution for managing symptoms, irrespective of factors such as age, type of surgery, or the severity of osteoarthritis on presentation.

KEYWORDS

Proximal Fibular Osteotomy, Osteoarthritis Knee, Bilateral PFO, VAS Score, Kellgren Lawrence scale , Knee Society Score .

INTRODUCTION

Proximal fibular osteotomy has proven to be efficacious in bringing biomechanical change in the knee for reducing pain and improving the functional outcomes along with showing significant radiological evidence of the biomechanical change. PFO has proved to be more feasible operative procedure for mild to moderate OA knee in Indian setting as it is cost-effective and there is no restrictions in activities of daily living like squatting and cross-legged sitting.

The patient selection for deciding Proximal Fibular Osteotomy as the surgical modality for the patients of osteoarthritis of knee has been challenging task. This study aims at evaluating the factors affecting outcomes of PFO in Osteoarthritis knee including Age, Unilateral/Bilateral surgery and Grade of OA knee on presentation. This evaluation helps in deciding the patient to be operated for PFO as well predicting the outcomes expected after surgery with respect to the studied factors.

METHODS

Total 29 knees with Osteoarthritis knee operated by PFO were included in the study and were followed up at 1 month, 3 months and 6 months postoperatively. Subgroup analysis was done for the functional and radiological outcomes after PFO in OA knee. The subgrouping system included Age grouping (41-60 years and 61-80 years), Surgery type (Unilateral and Bilateral knees PFO) and Grade of OA Knee (Kellgren Lawrence Scale 3 and 4). All the subgroups were evaluated for outcomes including pain relief w.r.t VAS score, functional improvement w.r.t. Functional American Knee Society Score and radiological improvement w.r.t. KL scale and change in tibiofemoral angle.

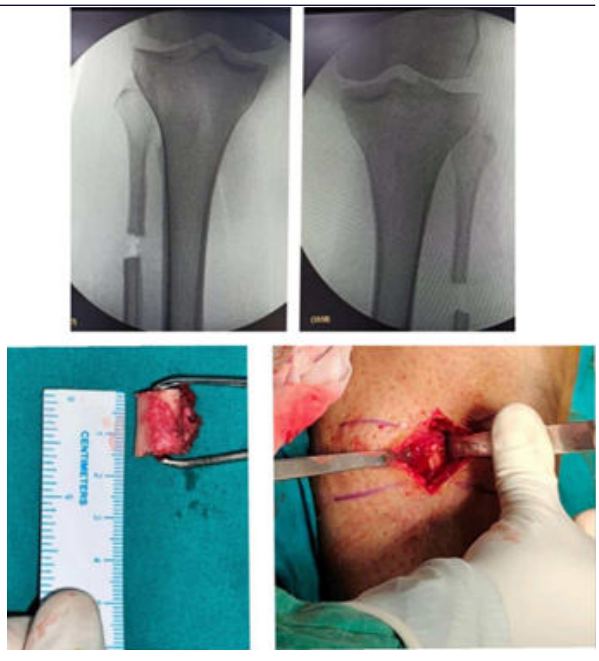

Figure 1 Intraoperative Clinical and Radiological images of Proximal Fibular Osteotomy Surgery

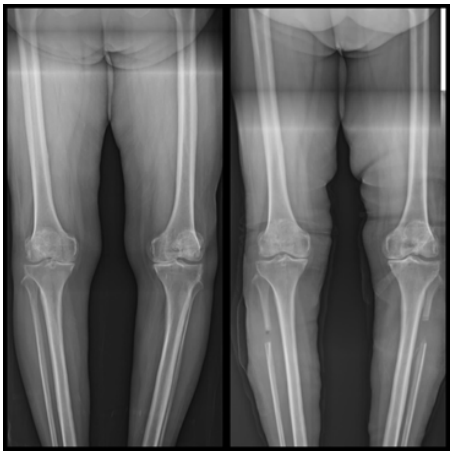

Figure 2 Preoperative and Immediate Post operative Scannogram of operated case of Proximal Fibular Osteotomy

RESULTS

Age Group Analysis

All postoperative time points for both the 41-60 and 61-80 age groups showed a decrease in VAS pain scores compared to preoperative levels. In comparison to the younger age group (41-60 years), the older age group (61-80 years) had somewhat larger mean differences. Regardless of the time point in question (preop vs. immediate, 1 month, 3 months, and 6 months), the p-values showed no statistically significant difference between the age groups, implying that age had no impact on the pain reduction outcomes.

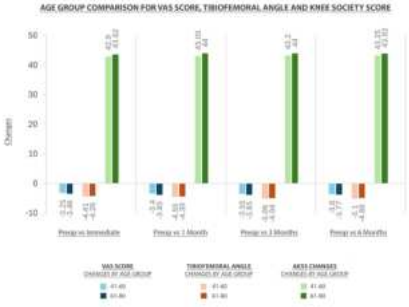

Fig.3 Analysis of changes in VAS score , Knee Society Score and Tibiofemoral angle in Age group 41-60 Vs 61-80

The Functional American Knee Society Scores showed significant improvements from preoperative levels to various postoperative time points in both age groups. The mean differences were similar across the age groups, with slightly higher improvements observed in the older age group (61-80 years). At any point in time, the p-values showed no statistically significant difference between the age groups, indicating that the functional improvements after surgery were unaffected by age.

The change in the Tibiofemoral Angle from the preoperative state showed consistent improvements across both age groups. Between the ages of 41 and 60, the mean changes were marginally greater than those between 61 and 80 at every postoperative time point. However, the p-values indicated no significant difference between the age groups, suggesting that the surgical intervention effectively corrected knee alignment regardless of age.

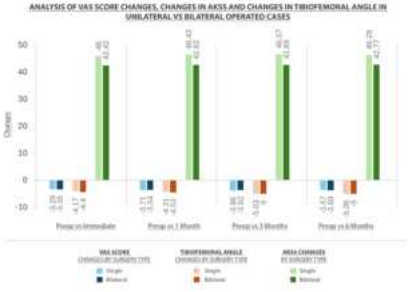

Fig.4 Analysis of changes in VAS score, Knee Society Score and Tibiofemoral angle in Unilateral Vs Bilateral Knee operated cases

Type Of Surgery (Unilateral/Bilateral) Analysis

The VAS scores for pain showed a decrease from preoperative levels in both single and bilateral surgery groups at all postoperative time points. The group that underwent bilateral surgery had somewhat larger mean differences than the group that underwent a single operation. At any time point (preop vs. immediate, 1 month, 3 months, and 6 months), the p-values showed no significant difference between the surgery types, indicating that the type of surgery did not really affect the pain reduction outcomes.

The Functional American Knee Society Scores demonstrated significant improvements from preoperative levels to various postoperative time points in both single and bilateral surgery groups. At three months postoperatively, there was a statistically significant difference between the groups that had undergone bilateral and single surgeries. Despite this, the p-values indicated no significant difference between the surgery types at most time points, suggesting that the functional improvements were comparable between single and bilateral surgeries.

The change in the Tibiofemoral Angle from the preoperative state showed consistent improvements across both surgery groups. The mean changes were similar between the single and bilateral surgery groups at all postoperative time points. The p-values indicated no significant difference between the surgery types, suggesting that the surgical intervention effectively corrected knee alignment regardless of whether it was single or bilateral.

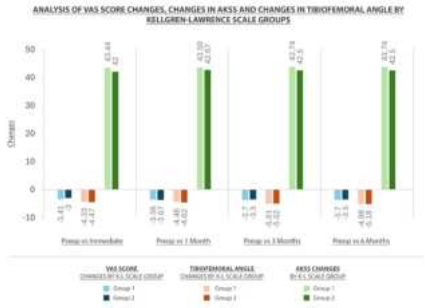

Fig. 5 Analysis of changes in VAS score , Knee Society Score and Tibiofemoral angle in KL grade 3 patients Vs KL grade 4 patients

Oa Knee Grade On Presentation Analysis (W.R.T. Kellgren Lawrence Scale)

The VAS scores for pain showed a decrease from preoperative levels in both Kellgren-Lawrence Scale groups (Group 1 i.e. KL scale of 3 and Group 2 i.e. KL scale of 4) at all postoperative time points. At various points in time, Group 1 had slightly larger mean differences than Group 2. However, no significant difference was found between the groups at any point in time (preop vs. immediate, 1 month, 3 months, and 6 months), suggesting that the pain reduction outcomes were unaffected by the severity of the osteoarthritis at the start.

The Functional American Knee Society Scores demonstrated significant improvements from preoperative levels to various postoperative time points in both Kellgren-Lawrence Scale groups. At three months postoperatively, the difference was most pronounced ($p = 0.5634$), and overall, Group 1 had somewhat larger mean differences than Group 2. Nevertheless, there was no statistically significant difference between the groups at any time point, indicating that the functional improvements after surgery were unaffected by the severity of the osteoarthritis at the outset.

DISCUSSION

Understanding the varying effects of PFO depending on the stage of the disease requires an understanding of the osteoarthritis severity breakdown provided by Vaish A [4] et al. Similar to other studies, ours covers a range of osteoarthritis Grades, enabling a comparison of PFO outcomes at various severities. This is essential for adjusting surgical choices to the unique requirements of each patient depending on the particulars of their osteoarthritis.

We found that PFO is effective at different stages of knee OA, and the follow up data from Deng XT [11] et al. suggested that these benefits

are maintained Regardless of the initial severity of knee OA

In order to assess outcomes related to the severity of osteoarthritis, patients were stratified based on the Kellgren-Lawrence (K-L) grading system in both the current study and the study by Huda N [12] et al. Similar to our study, where a sizable portion of patients also had moderately severe OA, they had most of their patients in the K-L grade II category. This similarity shows how PFO can be used to effectively manage moderate levels of OA and supports the generalizability of our findings across studies.

Age-wise, the cohorts in both studies included a wide range of ages. Although Huda N [12] et al.'s study did not specifically highlight age-related outcomes, the study's overall consistent improvement in WOMAC scores suggests that age may not be a significant predictor of PFO success.

The improvement in VAS score, American Knee Society Score and Kellgren Lawrence grade were slightly higher in older age group as compared to younger age group. The improvement in VAS score was slightly higher in subgroup operated for bilateral PFO as compared to unilateral. The improvement in VAS score, American Knee Society Score and Kellgren Lawrence Scale was slightly higher in subgroup having preoperative KL grade of 3 as compared to subgroup having KL grade of 4. However, no statistically significant differences were found in the effectiveness of Proximal Fibular Osteotomy (PFO) for knee osteoarthritis, regardless of age, type of surgery, or grade of OA knee. It also showed significant improvements in pain, function, and knee alignment across a range of clinical conditions and demographics. The VAS and Functional American Knee Society Scores showed significant improvements in both age groups (41–60 and 61–80 years), suggesting that PFO's efficacy is age-independent. Analyses comparing single and bilateral surgeries revealed similar results in terms of pain alleviation and functional enhancements, highlighting PFO's flexibility in meeting the surgical needs of individual patients. Similarly, regardless of the initial severity of osteoarthritis, PFO consistently relieves pain and improves function, according to an analysis based on the Kellgren-Lawrence Scale. This research affirms the broad applicability and reliable benefits of Proximal Fibular Osteotomy (PFO) in treating knee osteoarthritis, demonstrating its effectiveness across various patient subgroups and profiles. PFO proves to be an efficient solution for managing symptoms, irrespective of factors such as age, type of surgery, or the severity of osteoarthritis on presentation. The present study shows the efficacy of PFO in managing knee osteoarthritis across diverse demographic groups and varying degrees of disease severity. This study guides us in the process of patient selection and has shown that PFO significantly improves pain, functional mobility, and knee alignment without being influenced by factors such as age, type of surgery (unilateral or bilateral) or initial severity of osteoarthritis. The research highlights the adaptability and effectiveness of Proximal Fibular Osteotomy (PFO), demonstrating its consistent ability to reduce joint stress and improve the quality of life for individuals with knee osteoarthritis. These findings support the broader use of PFO as a dependable surgical treatment for osteoarthritis patients, offering significant potential for enhancing clinical outcomes and advancing orthopedic practices. Nevertheless, further studies with larger sample sizes are suggested to gain a deeper understanding of PFO's outcomes in knee osteoarthritis and to potentially establish it as a standard treatment approach for this condition.

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