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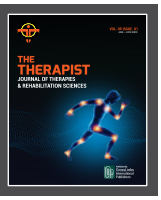

Original Article

Efficacy of Arthroscopic Debridement with Proximal Fibular Osteotomy in Early Medial Joint Osteoarthritis of the Knee

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ABSTRACT

In the USA alone, osteoarthritis affects > 3 billion people, making it the most predominant type of joint disorder. It costs the US more than $185 billion a year and is the primary cause of persistent disability in older persons. The results of our cases will help encourage local health researchers to continue this procedure and review the available resources thereof. **Objective:** To determine efficacy of arthroscopic debridement with proximal fibular osteotomy in early medial joint osteoarthritis of the knee in patients presented to tertiary care hospital. **Methods:** This descriptive Case Series was held in the Orthopedic Surgery department, MTI-Hayatabad Medical Complex, Peshawar from 30 Dec, 2020 to 30 Jun, 2021. Patients with medial knee osteoarthritis were treated by proximal fibular osteotomy combined with arthroscopic debridement. The efficacy of the knee function was evaluated by VAS score, AKSS, and ML ratio at 1 week and 3 months after operation. **Results:** As per frequencies and percentages for efficacy, 114 (69.1%) patients showed effective results of arthroscopic debridement. **Conclusion:** This study demonstrated that arthroscopic debridement with proximal fibular osteotomy is an effective procedure in the management of early medial joint osteoarthritis of the knee in terms of improved knee function.

INTRODUCTION

In the USA alone, osteoarthritis affects > 3 billion people, making it the most predominant type of joint disorder [1, 2]. It costs the US more than $185 billion a year and is the primary cause of persistent disability in older persons. The articular (hyaline) cartilage biochemical breakdown in the synovial joints causes it to primarily be a degenerative condition with inflammatory components. According to the current theory, osteoarthritis affects the synovia, subchondral bone, and articular cartilage in addition to the articular cartilage [3, 4]. Radiographic and clinical data are frequently used to make an osteoarthritis diagnosis. There are no particular clinical laboratory investigations that can be used to diagnose osteoarthritis [5, 6]. Plain radiography is the preferred imaging technique because radiographs are affordable, easily obtained, and can show subchondral bone sclerosis, joint-space loss and formation of cyst in the areas of weight-bearing [7]. In the majority of Low- and Middle-Income Countries with limited financial and medical resources, the proximal fibular osteotomy is an appropriate surgical choice [8, 9]. Uncertainty surrounds the precise workings of PFO's effectiveness. One theory for why proximal fibular osteotomy increases joint space and

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decreases pain is because it removes the fibula support that may otherwise produce genu various. One-sixth of the body's weight is supported by the fibula, therefore following surgery, PFO may rebalance or redistribute the strain on the lateral and medial tibial malleolus [10, 11]. Theoretically, arthroscopy for OA must ease symptoms by eliminating the inflammatory cytokines and debris that cause synovitis. Arthroscopic methods include debridement and lavage of the knee (e.g., smoothening of the deteriorated meniscus or shaving of rough cartilage) [12]. Debridement can remove loose cartilage flaps and meniscal fragments that have torn. Arthroscopy's significance in the management of knee OA, however, is debatable. Despite being frequently used, there isn't enough proof to support its substantial advantages. Treatment options should consider the joint mobility, patient's age, postoperative patient expectations and knee joint clearance. KOA has a large impact following arthroscopic cleanup [13]. The procedure has a success rate of roughly 70%. Patients with KOA who have high hopes for joint activities now have a better option thanks to this procedure. The outcomes of our cases will help local health researchers continue this procedure and review the resources available because, in my opinion, this procedure is simple, affordable, and effective for treating medial joint osteoarthritis of the knee and is most appropriate for patients in our local population.

METHODS

This Descriptive Case Series was held in the Department of Orthopedic Surgery, MTI-Hayatabad Medical Complex, and Peshawar from 30 Dec, 2020 to 30 Jun, 2021. The sample size was 165 selected by non-probability consecutive sampling keeping 70% proportion success of rate arthroscopic debridement with proximal fibular osteotomy with 7% margin of error, 95% confidence interval calculated on WHO formula for sample. Patients of either gender having age between 45 to 75 years age visiting Ortho Surge OPD with complaints of stiffness, joint pain, limitation and effusion of joint function and patients diagnosed for knee osteoarthritis as per operational definition. Patients undergone any other surgery or severe trauma in the affected limb confirmed on patient's history, diagnosed for rheumatoid arthritis and tumors confirmed on patient's history, and lost to follow up were excluded. First and foremost, approval was taken from the Hospital's Ethical Committee and REU Department of CPSP Karachi, after which patients meeting inclusion criteria was enrolled in the study from Ortho OPD of the hospital. After taking verbal informed consent from the patients, complete examination was carried out and demographic data of the patient was recorded. Patients with medial knee osteoarthritis was treated by proximal fibular osteotomy in combination with arthroscopic debridement. The efficacy of the knee function was evaluated by VAS score, American Knee Society Score (AKSS) (clinical and functional), and medial to lateral knee joint space ratio (ML ratio) were recorded preoperatively 3 months after operation. All the information such as age, gender, gender, age, side, disease duration, OA stage, visual analogue scale (VAS) score and efficacy was recorded on a pro-forma attached to this synopsis. Data were analyzed and entered in SPSS version 20.0. Descriptive statistics were used for data analysis. Mean and SDs was calculated for numerical variables like age, VAS Pain Score, AKSS, and disease duration. The percentages and frequencies were calculated for categorical variables like side, Efficacy and OA stage. Efficacy was stratified with age, gender and OA stage in order to see effect modifiers. Post stratification chi square test was applied keeping p-value <0.05 as significant.

RESULTS

This study enrolled 165 medial knee osteoarthritis patients. Following are the results of this study: Mean and SDs for age was 61.46+7.493 years. Mean and SDs for duration of disease was 5.52+1.33 months. VAS Pain Score after 1 week was 7.47+0.991 and decreases to 5.23 ±1.25 after 3 months. The mean functional AKSS and ML ratio after 1 week was 46.32 ±12.28 and 0.29 ±0.21 which increased to 58.22 ±13.92 and 0.39 ±0.22 after 3 months respectively. About 82 (49.7%) patients were 45-50 years of age group while 83 (50.3%) patients were 51- 75 years of age group. About 128 (77.6%) male patients and 37 (22.4%) female patients were recorded. The incidence of left side and right side of knee were involved in 48 (29.1%) and 117 (70.9%) patients respectively. Based on OA grades, there were 28 (17.0%) patients who had grade 1, 18 (10.9%) patients had grade 2, 66 (40.0%) patients had grade 4 while 10 (6.1%) patients were suffering from grade 5 OA of Knee. The baseline characteristics are shown in Table 1.

Variables	Mean±SD
Age (Years)	61.46 ±7.493
Duration of Disease (Months)	5.52±1.333
VAS Pain (Score)	7.47±0.991
Parameters	**Frequency (%)**
Age groups (years)	
45-50	82 (49.7%)
51-75	83 (50.3%)
Gender	
Male	128 (77.6%)
Female	37 (22.4%)
Side of Knee Involved	
Left	117 (70.9%)
Right	48 (29.1%)
OA Grades	
G-1	28 (17.0%)
G-2	18 (10.9%)

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G-3	66 (40.0%)
G-4	43 (26.1%)
G-5	10 (6.1%)

Table 1: Baseline characteristics of patients (n=165)

As per frequencies and percentages for efficacy, 114 (69.1%) patients showed effective results of arthroscopic debridement as shown in Table 2.

Efficacy	Frequency(%)
Yes	114 (69.1%)
No	51 (30.9%)
Total	165 (100.0%)

Table 2: Frequencies and Percentages for Efficacy of Arthroscopic Debridement (n=165)

Efficacy of arthroscopic debridement was stratified with age, gender, and OA stage/grade at Table 3 and Table 4 respectively.

		Age Groups		Total	p-Value
		45-50 Years	51-75 Years		
Efficacy	Yes	59	55	114	0.429
		72.0%	66.3%	69.1%	
	No	23	28	51	
		28.0%	33.7%	30.9%	
Total		82	83	165	
		100.0%	100.0%	100.0%	

Table 3: Stratification of Efficacy with Age Groups (n=165)

		Age Groups					Total	p-Value
		Grad-1	Grad-2	Grad-3	Grad-4	Grad-5		
Efficacy	Yes	17	10	53	26	8	114	0.078
		60.7%	55.6%	80.3%	60.5%	80.0%	69.1%	
	No	11	8	13	17	2	51	
		39.3%	44.4%	19.7%	39.5%	20.0%	30.9%	
Total		28	18	66	43	10	165	
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Table 4: Stratification of Efficacy with OA Stage / Grade (n=165)

Table 5 compares the follow-up VAS pain score, AKSS, and ML ratio after 1 week and 3 months.

Variables	Week 1	3 Months	p-Value
VAS Pain Score	7.47±.991	5.23 ±1.25	<0.001
Clinical AKSS	55.82±5.99	62.52 ±5.81	<0.001
Functional AKSS	46.32 ±12.28	58.22 ±13.92	<0.001
ML ratio	0.29 ±0.21	0.39 ±0.22	<0.01

Table 5: Comparison of VAS pain score after 1 week and 3 months follow-up

DISCUSSION

The present study mainly focused on the efficacy of arthroscopic debridement with proximal fibular osteotomy in early medial joint osteoarthritis of the knee in patients presented to tertiary care hospital and found that arthroscopic debridement with proximal fibular osteotomy is an effective procedure in the management of early medial joint osteoarthritis of the knee in terms of improved knee function. In the USA alone, osteoarthritis affects > 3 billion people, making it the most predominant type of joint disorder. The articular (hyaline) cartilage biochemical breakdown in the synovial joints causes it to primarily be a degenerative condition with inflammatory components. Numerous studies reported that osteoarthritis affects the synovia, subchondral bone, and articular cartilage in addition to the articular cartilage [13, 14]. Knee osteoarthritis is the most frequent kind of arthritis in the elderly population and a primary cause of disability. In contrast, Jewell *et. al.*, reported that with high tibial osteotomy, there is a likelihood of tibial plateau fracture and proximal necrosis in elderly patients with severe osteoporosis, hence it is not a recommended procedure for older people [15]. In the present study, the VAS Pain Score at 1 week was 7.47 ±0.991 which decreased to 5.23 ±1.25 after 3 months. However, after one week, the mean functional AKSS and ML ratio are 46.32 ±12.28 and 0.29 ±0.21, respectively, increasing to 58.22 ±13.92 and 0.39 ±0.22 after three months. Similarly, numerous studies found that clinical and functional AKSS of knee improved among patients underwent arthroscopic debridement with proximal fibular osteotomy [16, 17]. Keen *et al.*, found that there was fair variation in functional AKSS outcome. Pain relief and various alignment provided by PFO mechanism is still to be known [18]. Various parameters such as bone density, age, and bone mass decrease in load bearing joints. Tibia lateral condyle supported by fibula leads to tibial condyles non-uniform settlement with cartilage degeneration and settlement on medical side [19]. PFO reduced tibial plateau lateral half support, resulting in correction of loading force lateral shift and various deformity. The shifting of the loading force to the less deteriorated cartilage in the lateral half results in pain alleviation and functional improvement [19]. Kraus *et al.*, proposed the non-uniform settlement idea [20]. Felson *et al.*, reported that radiographic and clinical data are frequently used to make an osteoarthritis diagnosis. There are no particular clinical laboratory investigations that can be used to diagnose osteoarthritis [21]. Plain radiography is the preferred imaging technique because radiographs are affordable, easily obtained, and can show subchondral bone sclerosis, joint-space loss and formation of cyst in the areas of weight-bearing. Kraeutler *et al.*, in the majority of LMICs with limited financial and medical resources, the PFO is an appropriate surgical option. Uncertainty surrounds the precise workings of PFO's effectiveness [22]. One theory for why PFO increases joint space and decreases pain is because it removes the fibula support that may otherwise produce genu various. One-sixth of the body's weight is supported by the fibula, therefore following surgery, PFO may rebalance or redistribute the strain on the lateral and medial meniscus of the tibia. Loughlin *et al.*,

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described the risk of nerve damage following a combined tibia and fibula osteotomy [23]. Four cases of PFO conversion to total knee replacement were noted by Hunter DJ *et al.*, after a year of follow-up. The combination of a fibular osteotomy was done to improve the likelihood of successful union after the treatment. In younger individuals with osteoarthritis, the tibial osteotomy operation has long been the go-to treatment. Dagenais *et al.*, reported no conversion to complete knee arthroplasty after PFO [24]. The switch to complete knee arthroplasty was not mentioned by the other writers. According to their findings the use of PFO in conjunction with medial meniscectomy had halted the course of the disease. When PFO and HTO were put side by side, a statistically significant reduction in surgical time, hemorrhage, and complication rates was found. Additionally, it was revealed that the clinical outcome scores were better than those of the HTO group. According to Lee *et al.*, the fibula-soft tissue complex's lateral support for the osteoporotic tibia may cause non-uniform settlement and bilateral plateau degeneration[25].

CONCLUSIONS

The present study concluded that proximal fibular osteotomy is an affective, short, and safe treatment procedure for medical joint Osteoarthritis. PFO can improves functional and clinical outcomes, reduces knee joint discomfort, and raises the ML ratio. The improvements last one year after surgery.

Authors Contribution

Conceptualization: FAJ
Methodology: FAJ, MS, AU
Formal analysis: SZ
Writing-review and editing: SSA, IA, AU

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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