



Result of high Fibular Osteotomy (HFO) in Osteoarthritis knee

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ABSTRACT

To assess the effectiveness of high fibular osteotomy (HFO) in improving function and reducing pain among patients diagnosed with osteoarthritis knee admitted in the orthopedic department of Dibba Hospital Fujairah, United Arab Emirates. This is a descriptive, correlational cross-sectional study design. The study was conducted at the Orthopedic department Dibba Hospital Fujairah, United Arab Emirates, during the period from March 2019 to March 2020. All patients had knee osteoarthritis and were managed using HFO. All patients were adults and older than 18 years of age. Data was analyzed using the SPSS program. Ethical approval was gained from the hospital as well as from patients. The mean age of the patients was 32.5 ± 8.3 years. The study included 100 participants, among them, 28 were females, and 72 were males. There was a statistically significant relationship between knee injury and osteoarthritis outcome score and Lysholm. Also, knee x-rays images demonstrated clinical improvements among most of the patients. According to previous results, HFO and mesenchymal cell induced chondrogenesis (MCIC) should be considered for treating of medial compartment osteoarthritis, especially in patients with varus deformity.



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INTRODUCTION

Osteoarthritis is a common degenerative joint disease. It affects mainly large body joints, especially the knee joint. It causes movement limitation and severe pain (Naudie *et al.*, 1999). It also disrupts the daily living and affects the patients' quality of life. There are various established treatments for this condition. High tibial osteotomy (HTO) is considered a main technique for this condition. Also, uni-compartmental knee arthroplasty (UKA) is used to manage the symptoms. These methods are used for osteoarthritis of the medial aspect of the knee joint (Dettoni *et al.*, 2010). Since there are many post-surgical complications, arthroplasty procedures are now declining while preservative

joint procedures are becoming more used (Spahn *et al.*, 2013). This is noticed more among younger, active patients (Ryu *et al.*, 2018). It is noticed that patients aged younger than 60 years are perfect candidates for HTO with isolated medial knee osteoarthritis. This will improve their motion range and will keep their ligaments healthy (Lee and Byun, 2012). On the other hand, this procedure is prone to many complications among patients with mild varus deformity. It also needs long term rehabilitation following the surgery with special care to prevent nerve and vascular complications (Duivenvoorden *et al.*, 2014).

There is controversial about the clinical outcome of combined arthroplasty and HTO in patients with osteoarthritis and varus deformity (Laprade *et al.*, 2012). However, the improvement in the arthroscopic surgery improves the daily activity of patients and the quality of joint cartilage regeneration (Sprenger and Doerzbacher, 2003).

High fibular osteotomy (HFO) is a simple technique that reduces pain and improves osteoarthritis patient's quality of life (Kirgis and Albrecht, 1992). Furthermore, this surgical procedure makes the varus deformity better by reducing the force of the fibula that supports the varus alignment. It is noticed that the HFO technique only could not be enough for the correction. So, arthroscopic cartilage regeneration is combined to enhance the clinical outcomes (Zhang, 2015).

The two combined methods have succeeded in managing patients with osteoarthritis and medial knee varus deformity (Wang *et al.*, 2017). So, this study aimed to report the results of HFO and MCIC for treating osteoarthritis with knee varus deformity.

METHODS

Study Design

A descriptive, prospective design was employed for this study. Since this study aims to assess the effectiveness of HFO techniques, this is the most appropriate design.

This enables the researcher to measure the technique effectiveness and the outcome at a single point of time. This study design gives reliable results with a short time and less effort.

Study Setting

The study was conducted at the main orthopedic department at the Dibba Hospital Fujairah, United Arab Emirates.

The participants were selected over a year during the period from March 2019 to March 2020.

Participants

Participants in this study were patients admitted to the orthopedic department suffering from osteoarthritis and medial knee varus deformity. All study participants (patients) were adults above 18 years of age. Patients who were younger were excluded from the study. The patient's knee x-ray also shows grade III or IV of Kellgren-Lawrence.

Sample and sampling

Since the study was a prospective, cross-sectional study over one year, a convenient non-probability sample was selected according to the criteria in the section of participants. Thus, the study included only adult patients presented to an emergency room or admitted to the department during the study period.

Data collection

Data was collected by observation, referring to medical records for patients' information at the time of presentation and outcomes measurements following the surgery. Patients' information such as age, gender and others were all obtained from hospital records.

Instruments

The data was collected using a self-designed questionnaire. The study questionnaire contained two domains. First, characteristics of study participants. Second, validated tools for surgical scores. These tools were the Lysholm score, the Knee injury and Osteoarthritis Outcome Score (KOOS) and visual analogue score (VAS). The varus angle was measured by the angle between the anatomic axis of the femur and the anatomic axis of the tibia in a standing anteroposterior knee radiograph.

Statistical Analysis

Data obtained from the questionnaire were entered and analyzed using SPSS program version 23 computer software. Sociodemographic data are presented using descriptive statistics as means, median, percentages and standard deviation. Independent T-test and one-way Anova are used to show statistical significance among participants characteristics. The Chi-square test is used to show a relationship between categorical variables. Shapiro-Wilk test was used for normality analysis, and non-parametric tests were also used.

Permission and ethical considerations

An approved permission was gained from the research committee of our hospital. After an explanation of study objectives, patients were asked to volunteer to participate at our study. In addition,

Table 1: Comparison between preoperative and postoperative scores (n= 100)

Variable	Preoperative Mean + SD (Min-Max)	Postoperative Mean + SD (Min-Max)	T or Z	p
X-ray	10.5 + 2.0 (8.0 - 15.0)	1.4 (0.9, 0 - 3.0)	26.52	<0.001
Lysholm	29.2 + 7.0 (10.0 - 46.0)	81.9 (8.1, 64.0 - 94.0)	-33.72	<0.001
VAS	9.0 + 0.8 (7 - 10.0)	1.6 (0.8, 0 - 3.0)	-5.89	<0.001
KOOS	30.2 + 9.2 (7.7 - 50.6)	83.1 (8.3, 61.3 - 96.4)	-31.13	<0.001

verbal informed consent was gained from patients before collecting data.

RESULTS

The study involved 100 patients over a period of one year. The mean age of the study sample was 62.5 + 8.3 years. There were 28 females and 72 males. The cartilaginous lesions were found in all knee compartments; 70 patients suffered from one compartment lesion, 25 patients had two-compartment lesions, and 5 patients had three-compartment lesions. However, all patients had medial condylar lesions in the femur. The mean size of the lesion was 3.39 cm, with a range from 2-9 cm.

The VAS scale didn't meet the normality in the Kolmogorov-Smirnov test, and a non-parametric test was used. There was a statistically significant relationship between preoperative scores and postoperative ones. Lysholm and KOOS scores had a statistically significant relationship with VAS increase. On the other hand, the statistical relationship was a decrease in varus angle in an x-ray. This indicates improvement in patients' condition. Table 1 shows the scores of preoperative and postoperative assessments among study participants.

There were statistically significant differences among assessment scores before and after the surgery with patients' gender. However, there was no difference in scores of KOOS, VAS, Lysholm, and varus angles assessment before the surgery across all age groups. It was found that the age group sixty to seventy years demonstrated an increase that was statistically significant when compared with the age group of more than seventy years in KOOS scores.

DISCUSSION

Previous literatures demonstrated that HFO might be utilized as a good management for knee osteoarthritis, which may considerably improve the ankle between hip-knee-ankle and KOOS score for surgical patients (Tang et al., 2000). Nevertheless, the short surgical clinical state of affairs enhancements of certain patients stayed off (Amendola

and Bonasia, 2010). Therefore, the way to make better the end result of HFO is a vital concern. In distinction to HTO, that includes surgical types of management among patients with a surgical angle at operation might be monitored. Surgical ways quantity of HFO is a smaller amount. Therefore, patient choice started to be a vital issue for additional checkups prior to the surgical procedure.

This study aimed to look at the operative clinical consequences, and the indicators of short-term surgical outcomes to help the patient to choose the surgical procedure, to additionally make it clear regarding the surgery indications. Furthermore, to enhance surgical operation result of cure. During this study, KOOS and visual analogue scores were designated to be clinical indicators to be factors for analysis. Additionally, picture taking factors were designated and joint house dimensions. Settlement worth (Dong et al., 2016), an element reflective of the non-uniform degree of the highland leg bone, was additionally enclosed (Helminen, 2009).

The techniques used in our study was performed in many other studies before. This technique is recommended due to its high success rate when used for knee joint osteoarthritis with the presence of varus deformity. In 2018, it was reported that this technique is associated with zero complications among 147 patients and with a 100% success rate (Altman et al., 1986). The major advantage of these techniques is the high success rate, no or few complications and easy surgical performance.

There were some studies that reported results on this technique. It was reported in (Brandt et al., 2010) that these two techniques reduced the pain symptoms among 73% of 50 patients when performed the surgical procedures. Authors of the same studies stated that these techniques, when combined, might take a longer time than (Insall et al., 1989). There is a systematic review (Hunter et al., 2005) that concluded and both techniques together are the best techniques to relieve knee joint osteoarthritis. However, it is argued that these techniques are the best method with regard to complications and could be used without sedation or any

assistance (Hunter and Wilson, 2009). There is a need for more extensive research in the field and to include all reduction techniques (Tourville et al., 2013).

As a consequence of these patients, HFO was not enough to completely make the varus deformity better with a good prognosis (Yokoyama et al., 2016). Additionally, settlement worth was considered as an element in order to mirror the degree of leg bone angle (Kanamiya et al., 2002). The upper settlement is worth a lot of importance the result of lateral leg bone support and also the higher the end result of HFO. Such findings steered that HFO within the treatment and management of osteoarthritis of the knee joint was closely associated with considerable hood prognosis and healing rates. Patients who had an increase in the settlement worth to have HFO surgery might get a higher useful prognosis (Fife et al., 1991).

This is the first study, to the best of our knowledge, to present data on these combined techniques. We would recommend this technique to be involved in the practice of all orthopedics in managing patients diagnosed with osteoarthritis with medial varus deformity in the country. We also recommend to form a protocol for this technique and train orthopedic practitioners to perform it easily.

CONCLUSIONS

According to previous results, the high fibular osteotomy should be considered as initial surgical treatment for medial compartment osteoarthritis knee before going for any major procedure like total knee replacement because this is a minor surgical procedure with very good results in expert hands.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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