

## Functional outcome of medial opening high tibial osteotomy with L-plate fixation in uni compartmental osteoarthritis knee

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### Abstract

**Background:** Osteo-arthritis is one of the most prevalent diseases in our part of the world, and represents an enormous socio-economic burden to the society. The primary goal in treating patients is to alleviate pain.

**Objective:** The aim of our study is to determine the improvement in terms of alignment and pain relief after medial opening wedge high tibial osteotomy with L plate fixation in medial compartment osteoarthritis knee.

**Materials and methods:** This descriptive case study was conducted on 60 patients in Department of Orthopaedics and Spinal Surgery, Lahore from 1st October 2015 to 30th September, 2017. High tibial osteotomy with L plate fixation in medial compartment osteo-arthritis knee were done on 60 patients and the Patients were kept non weight bearing for 6 weeks. Radiographs were taken immediately post-operatively and at 6-12 weeks to assess the mechanical axis correction. Achievement of 6-10 degrees of anatomical valgus was considered significant and post-operative achievement of grade I or II Sikorski and Barrington pain scale was considered significant.

**Results:** There were 39 males (65%) and 21 females (35%). Male to female ratio was 1.8:1. Post-operatively, 50 patients (83.3%) had significant pain relief and 10 patients (16.6%) had no pain relief. Out of 60 patients, 53 patients (88.3%) had significant correction of the mechanical axis and 7 patients (11.6%) did not have post-operative correction of the mechanical axis.

**Conclusion:** Medial opening wedge high tibial osteotomy with L plate fixation is a valid option with good results in young patients

**Keywords:** Efficacy, pain, knee osteoarthritis, range of motion, Sikorski and Barrington pain-scale

### Introduction:

Osteo-arthritis (OA) is an increasing problem in our part of the world. It affects a vast majority of the population,<sup>1</sup> resulting in pain, functional limitation, disability, poor quality of life and substantial health super-intendency cost.<sup>2</sup> According to some population surveys, radiographic OA of the knee affects increasingly than 33% of persons age 60 years and older.<sup>3</sup> It may moreover stupefy the younger population secondary to mechanical stress or without traumatic meniscal injuries or ligamentous laxity with chronic knee malalignment.<sup>4</sup> The natural under-

tow of the disease manifests deleterious effects if left untreated, and symptomatic resurgence without any treatment seldom occurs.<sup>5</sup> The major risk factors in etiology of osteo-arthritis are wide age, increased BMI, nature of work, history of trauma and family history.<sup>6</sup> The underlying rationalization for minutiae of joint degeneration is the transubstantiation in the biomechanical turning which causes a-symmetrical weight distribution on the joint hence resulting in OA knee.<sup>4</sup>

Management of older patients with wide dis-

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ease is relatively straight forward and total knee replacement remains the gold standard of treatment.<sup>7</sup> On the other hand, younger patients with early disease pose a rencontre with treatment options stuff largely controversial.<sup>8</sup> Patients should be initially treated non-operatively with physiotherapy, orthoses, walking aids, non stridal anti-inflammatory drugs (NSAIDs) chondroitin sulphate, glucosamine intra-articular steroid injections, hyaluronic wounding and analgesics.<sup>9</sup>

Pharmacological therapy for pain relief is considered to be the under-structure constructive management. But pain killers are associated with side effects if used long term, especially NSAIDs have well known side effects that limit their usage.<sup>10</sup> Apart from this, they only tend to provide temporary pain relief. In some cases up to 3 months and are increasingly of time ownership techniques rather than therapeutic measures.

Anatomically, the knee is in 5-7 degrees of valgus. The mechanical turning is such that 60% of the soul weight is transmitted through the medial compartment while 40% passes through the lateral compartment.<sup>4</sup> Chronic mechanical stress or traumatic injury may rationalization shifting of the turning so that predominantly the medial compartment becomes overloaded which results in early degeneration of the medial compartment of the knee.

The main objective of surgery was to correct the unwont varus in the knee joint hence offloading the medial compartment of the knee and ultimately to unzip an corporeal valgus overcorrection of 6-10 degrees. Various techniques have been used to unzip the same. Controversy still exists as to the nomination between nomination of procedure i.e. opening and latter wedge osteotomy, type of graft, method of fixation and overall efficacy in comparison to uni-compartmental knee Arthroplasty.

#### **Material and Methods:**

The descriptive case study was conducted in the Department of Orthopedics and Spine Surgery,

Ghurki Trust Teaching Hospital, Lahore from 1st October 2015 to 30th September 2017. 60 cases were selected with non probability non sampling technique. All patients of either sex between age 20-45 years having Ahlbäck grade I and II (table 2) with pre-op range of movement (ROM) 0-120° and having grade III or IV pain according to Sikorski and Barrington pain scale were included while patients having patellofemoral arthritis having pre-operative flexion contracture > 5° at the knee and having grade I or II pain according to Sikorski and Barrington pain scale were excluded. Informed consent were taken. Demographic information, history, complete examination were done and investigations including full length radiographs of the limb were done to measure the pre-operative mechanical axis. The procedures were carried out under spinal or general anesthesia. The tibial osteotomy was performed and after achieving the desired correction an iliac crest cortico-cancellous autograft was placed in the wedge and an L-plate with screws applied, to provide stability. Following the procedure, the knee was placed in a knee immobilizer and the patient was kept non weight bearing for 6 weeks. Radiographs were taken immediately post-operatively and then at 6 and 12 weeks to assess the degree of correction of mechanical axis. Mechanical axis refers to the angle formed between a line drawn from the center of the femoral head to the medial tibial spine and a line drawn from the medial tibial spine to the center of the ankle joint. It is measured on full length radiographs of the limb and shall be assessed accordingly. Serial evaluation were done after 3 months & 6 months. The goal of the surgery was to achieve 6-10 degrees of anatomical valgus of the knee which was considered significant & post-operative reduction in pain was assessed by the Sikorski and Barrington Pain Scale (Table 1) and compared to the preoperative score, and achievement of grade I or II was considered as significant. All data was entered initially entered on a proforma and then were analyzed accordingly using the SPSS version 16.0. The variables which were analyzed included demographic information, pain relief & correction of mechanical axis and of the

Table-1: Sikorski and Barrington Pain Scale

Stage	Description
Stage 1	No pain
Stage 2	Mild Pain
Stage 3	Moderate Pain
Stage 4	Severe Pain

Table-2: Ahlbäck grading of Osteoarthritis

Grade 1	Narrowing of joint space
Grade 2	Narrowing of joint space with marginal osteophytes
Grade 3	Narrowing of joint space with marginal osteophytes and subchondral sclerosis
Grade 4	Obliteration of joint space with erosion of bone/subchondral cysts
Grade 5	Obliteration of joint space with erosion of bone with instability and subluxation of joint.

Table-3: Frequency distribution of Post operative Pain relief

Pain Relief	Frequency(n)	Percentage(%)
Yes	50	83.3
No	10	16.7

Table-4: Frequency distribution of Post operative Mechanical axis correction

Mechanical Axis Correction	Frequency	Percentage
Yes	53	88.3
No	11	11.6

knee. The quantitative variables like age were presented as Mean+Standard deviation. The qualitative variables like pain relief & correction of mechanical axis are presented as percentages and frequencies.

### Results:

A total of 60 patients having Ahlbäck grade I and II knee osteoarthritis were included in this study. There were 39 males (65%) and 21 females (35%) with 35.3+6.86 years of mean age. Male to female ratio was 1.8:1. There were 13(21.6%) patients in age group 20-30 years, 47(78.3%) of patients in age group 31-45 years. 24(40%) of patients had Ahlbäck grade I pre-operatively, 36(60%) had Ahlbäck grade II. Pre-operatively, 38(63.3%) patients were classified as having Grade III pain while 22(36.7%) had grade IV pain, according to Sikorski and Barrington pain score. Table 2 showed that the pain relief in patients, 50 patients (83.3%) had significant pain relief post operatively and 10 patients (16.6%) had no pain relief. Out of 60 patients,

53 patients (88.3%) had significant correction of the mechanical axis and 7 patients (11.6%) did not have post-operative correction of the mechanical axis (table 3).

### Discussion:

Osteoarthritis is the commonest joint disease, sparing no age, race or geographic area. It shows increased prevalence with up-and-coming age. Upper tibial osteotomy for the treatment of osteo-arthritis of the knee was introduced in the 1960s without studies by Jackson and Waugh.<sup>11</sup> The outcome is achieved by transmitting the weight to the normal compartment from the tremorous compartment. Some studies oppose that the helpful effect of osteotomy is purely mechanical in nature,<sup>11,12</sup> but there is moreover vestige that this bio-mechanical principle of the operation might not be true.<sup>13</sup> Osteotomy remained the only nomination of surgical treatment for arthrosis of the knee surpassing the outstart of total knee arthroplasty (TKA), which reverted the treatment of osteo-arthritis, but upper tibial osteotomy is still indicated in various cases. Plane surpassing the outstart of TKA, proximal tibial osteotomy was recommended only for patients who had uni-compartmental osteo-arthritis of the knee. The major advantages of osteotomy are preservation of unorthodox stock and intra-articular structures. Upper tibial osteotomy is most often used with young and zippy patients. Symptomatic resurgence without any treatment is rare. The natural undertow of femorotibial arthrosis will manifest unfavorable results, pain and loss of function, if left untreated.<sup>14</sup>

Coventry has shown that upper tibial osteotomy improves the knee function and moreover allows healing of the reasoned ossein.<sup>15</sup> There is no significant loss of motion as a result of the osteotomy. It is associated with fewer complications, and the age of the patient at the time of the osteotomy does not stupefy the final outcome.<sup>16</sup> In the results of Odenbring et al., without arthroscopic follow-up, chondro-cyte proliferation could be seen to some extent in osteo-tomized knees, but the extent of ossein regeneration does not correlate with the clinical

outcome.<sup>16</sup> The relative soul weight and weedy correction are associated with the elapsing of survival equal to Coventry et al.<sup>17</sup> They showed a probability of 5 years survival probability of at least 90% 1 year without operation, if the valgus angulation was 8 deg or increasingly or if the patient's weight was 1.32 times the platonic weight or less. Without 10 years, the probability was at least 65%. If the valgus angulation at 1 year was less than 8 deg in a patient whose weight was increasingly than 1.32 times the platonic weight, the rate of survival decreased to 38% at 5 years and to 19% at 10 years. Rudan and Simurda<sup>18</sup> conducted a study in 79 knees with a midpoint follow-up of 5.8 years. They reported good or spanking-new results in 80% of patients. The optimal clinical results were associated with a correction of the femorotibial wile of between 6 deg and 14 deg. Undercorrection to less than 5 deg was associated with a upper failure rate. Overcorrection to a femorotibial wile of greater than 15 deg appeared to have an plane largest clinical outcome, but the results are aesthetically unacceptable to the patients. However, Odenbring et al. found no correlation between the stratum of correlation and the Lysholm score for patients under 50 years old.<sup>19,20</sup> The underlying concept overdue over correction is 'biomechanical treatment', based on the theory that realignment of the varus deformity reduces stress on the medial compartment of the knee joint. HTO works by transmitting the weight from the damaged medial compartment to the relatively spared lateral compartment. The probability of tremorous progression was much higher than the probability of significant varus recurrence in the long-term follow-up of patients with valgus-producing osteotomies.<sup>20</sup> Holden et al.<sup>21</sup> followed 51 knees for an stereotype of 10 years. They found no correlation between the quality of the results and the radiographic vestige of the severity of the arthritis preoperatively, the age of the patient, or the length of the follow-up. The most important factor influencing the quality of results was the overall level of disease in the knee as reflected in the pre-operative knee score. Deficiency of the posterior cruciate ligament at the time of the osteotomy did not prevent a good

result. The results showed that weightier results were achieved if the procedure was undertaken early in the undertow of the disease. Nagel et al.<sup>22</sup> followed 37 knees (34 patients) with uni-compartmental osteo-arthritis for 8 years. Some 82% of patients were satisfied with the results of the surgery. They results revealed that proximal tibial osteotomy is salubrious only for men who are 60 years old or less, have a varus deformity of the knee secondary to osteo-arthritis or osteo-chondritis dissecens, have a upper level of worriedness and wish to participate in such activities as standing or walking for several hours at a time, heavy lifting, climbing, jumping and sports including tennis and jogging. Interestingly, people who had low zippy scores pre-operatively and post-operatively were the ones most satisfied with the results.

There are few limitations in our study. The sample size was very low and were not representative of the whole country. Moreover, there were no comparison with other procedures like conservative management, arthroscopy etc. So, further studies needed for better results.

#### **Conclusion:**

High tibial osteotomy is a valid option for providing symptomatic relief of symptomatic early osteoarthritis knee in the young and active patient and has good functional outcome. It allows patient to regain range of movements, decreases disability and relieves pain. It allows for the preservation of bone stock and serves as a time buying procedure for the young patient prior to total knee Arthroplasty.

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#### **Role and contribution of authors:**

Dr Muhammad Imran, data collection

Dr Ammar Dogar, data collection

Dr Rehan wani, data analysis

Dr Saeed Ahmad, data analysis

Dr Haseeb Hussain, literature search

Dr Ashfaq Ahmed, article writing

Prof. Shehzad Javed, article review

Dr Rizwan Akram, article review and made some changes

Prof. Amer Aziz, critically review the article and made the final changes.

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