

## Outcome Analysis Following Medial Open Wedge High Tibial Osteotomy in Osteoarthritis of Knee

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**Abstract:** Due to changing lifestyle and increase in pace of life Osteoarthritis of knee is increasing in young age group. Treatment of a painful osteoarthritic knee joint in a young, active patient is extremely challenging and controversial. Excessive premature loading of articular cartilage result in early degenerative changes in knee joint. Instability may also be an contributing factor. In young age group medial unicompartmental Osteoarthritis is more common. Lateral closing Wedge High tibial Osteotomy has been described as a treatment option for misalignment in the older, less active adult. A New type of High Tibial Osteotomy in the form of Medial Open Wedge High Tibial Osteotomy is showing promising results in young osteoarthritis patients with several benefits and comparatively less complications. We conducted this study with twenty patients for eighteen months to evaluate the outcome of Medial Open Wedge High Tibial Osteotomy in young Indian osteoarthritis knee patients

**Key words :** Unicompartmental Osteoarthritis, Young Patient, Medial, Open Wedge High Tibial Osteotomy, Prospective study

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### I. Introduction

History of Osteoarthritis of knee may dated back when from quadruped Apes, ancient human started walking erect over its two legs. Knee joint is one of the most important joint in our body because it is the key joint for locomotion. Due to our changed lifestyle osteoarthritis of knee become a worldwide problem for disability and morbidity<sup>1</sup>. Earlier it was considered as a senile disease but now a day's its incidence has increased in significant number incomparatively younger population<sup>1</sup>. Osteoarthritis of knee may be unicompartmental, bicompartamental or tricompartmental. Due to varus stress medial compartmental osteoarthritis of knee is common in young population. The appropriate treatment for unicompartmental osteoarthritis of the knee remains controversial, especially in young active patients. Degeneration of articular cartilage occurs early in the course of medial compartment osteoarthritis of the knee. The influence of malalignment on the cause of symptoms and the subsequent progression of the disease are well known<sup>2</sup>.

High tibial osteotomy has been advocated in cases where conservative managements are not responding. Advantages over other procedures is, It not only corrects the mechanical axis but also effectively decompresses the diseased medial compartment and offer excellent pain relief<sup>3</sup>. Studies have also described regeneration of diseased articular cartilage into a near normal-appearing cartilage if a proper osteotomy is done at the correct time<sup>4</sup>. Overall it is a joint preserving surgery. Common problems with a high tibial osteotomy include difficulty in achieving an accurate correction<sup>5</sup>. In past decades mostly lateral closing wedge osteotomy was practiced. Though the closing wedge is the most stable high tibial osteotomy technique compared with the opening-wedge osteotomy and the barrel-vault (dome) osteotomy, it had various types of complications<sup>4</sup>. The most serious complication is peroneal nerve injury. Other complications are the need for fibular osteotomy or separation of the proximal tibio-fibular joint, contracture of the patellar tendon leading to patella baja, leg shortening leading to limb length discrepancy, and a high rate of other complications like compartment syndrome, delayed union or nonunion, infection, thrombophlebitis, pulmonary embolism, and intra-articular fracture<sup>6</sup>.

In our study we have done a medial biplaner opening wedge high tibial osteotomy with a low profile proximal tibial locking plate fixation with or without bone graft. We opted medial opening wedge

High Tibial Osteotomy to avoid those complications of lateral closing wedge procedure. In spite of that this procedure has some other advantages like (1) It has higher precision, (2) Risk of Peroneal nerve lesion

can be avoided , (3) Faster as well as (4) bone preserving surgery , (5) Can avoid fibular osteotomy and its complications , (6)Can manipulate osteotomy gap and corrective angle during surgery , (7)There is no instability of the lateral knee ligaments , (8) No disruption of the proximal tibio-fibular joint , (9) No limb length discrepancy and (10) Less complication during following TKR(if needed).

WE have used low profile locking plate to fix the osteotomy to allow early postoperative movement and weight bearing to the patient. Several recent studies<sup>7,8</sup> have strongly advocated this procedure in active young

patients. Few series have been published with this new technique. Till now very few study report is available about the outcome of this procedure in Indian population.

The aims of this prospective study was to evaluate the correction of osseous malalignment and to analyze the short term outcome of Medial opening wedge High Tibial Osteotomy in Indian population.

### **AIMS AND OBJECTIVE**

The aims and objective of this study is to evaluate the role of our technique of Medial Opening Wedge High Tibial Osteotomy fixed with low profile proximal tibial lock plate for unicompartmental osteoarthritis of knee in comparatively young population.

Our main aims and objective were to evaluate the out-come of our study in respect to (1) Relieving pain , (2) Improving knee function, (3) Restoring stability and alignment , (4) Giving early mobilization , (5) Radiological improvement

### **II. Materials And Methods**

It was a Institution based study. Our study area was Medical College, Kolkata. Patients attending Orthopaedics outdoor, Medical College, Kolkata, with complaints of osteoarthritis were taken into consideration, depending on criteria depicted below. Institutional ethical committee clearance and informed consent of the patients were taken. From May, 2017 till November 2019 twenty patients have been operated and followed up for mean 13.21 months (8 months - 18 months).

Preoperative scanogram , PA and Lat. View of knee joint in standing position done. Patient was evaluated with Ahlbäck radiographic grade, the anatomical tibio femoral angle, patellar height, Pre and post operative mean knee and function scores of the American Knee Society and American Knee Society Pain Score.

**INCLUSION CRITERIA:** (1) Active patients with varus malalignment of the limb without evidence of radiographic subluxation or lateral thrust during gait, (2) An arc of motion of at least 90 degree, (3) Symptomatic overloading in the medial compartment, an intact lateral compartment, and normal medial soft-tissue coverage, (4) Post traumatic osteoarthritis patient

**EXCLUSION CRITERIA:** (1) Patients with open growth plates, (2) A previous lateral meniscectomy, (3) Rheumatoid arthritis , (4) Flexion contracture of  $>15^\circ$ , (5) Varus deformity  $>20^\circ$ , (6) Systemic or local infection, (7) Bone-healing disorders, (8) Heavy smoking (more than fifteen cigarettes or bidi per day), (9) Inadequate soft tissue overlying the medial tibial plateau, (10) A body mass index of  $>35 \text{ kg/m}^2$ , (11) An age of more than sixty years.

### **PARAMETERS TO BE STUDIED**

- a) Pre and post operative radiographic evaluation
- b) Pre and post operative mean knee and function scores of the American Knee Society
- c) Pre and post operative mean range of knee motion
- d) Pre and post operative The American Knee Society pain score
- e) Pre and post operative pain free walking distance

### **III. Methods**

On admission to the ward, a detailed history of the case was taken which include general information of the patient, occupation, socio-economic status, past history of any knee injury, any concurrent illness, relevant past illness, previous operative history etc.

A thorough and detailed General survey and clinical examination of major systems and detailed examination of involved limb, with particular evaluation of range of motion and the stability of the ligaments, was carried out. The skin and soft tissue over the affected leg also inspected.

Radiological diagnostics includes x-ray of the knee in three planes and a weight bearing x-ray of entire leg (Ortho Scanogram). Appropriate pre operative investigations (Routine blood, E.C.G, chest x-ray etc) were done. Blood investigations for RA factor, CRP, Uric Acid etc done where indicated.

Preoperative fitness and Anaesthetic assessment were done. Counseling about the aim of surgery, its different complications, advantage and disadvantages was explained in their own language in details.

Preoperative written consent was taken from the patient and one of his/her first degree relative. A proper pre-operative planning was done.

### **PRE OPERATIVE PLANNING**

This is a deformity correction surgery so proper preoperative planning and evaluation is the key for good post operative outcome. There are several methods available for determining the desired angle of correction. We had followed the procedure proposed by Miniaci et al<sup>9</sup>

STEP-1 : For preoperative assessment of the anatomy and the leg axis radiography of the knee joint in three planes (AP view , lateral view, tangential view) and a weight bearing x-ray of entire lower limb (ortho scanogram )were done. The weight bearing x-ray of the leg is essential to assess the correct indication and for the planning of any osteotomy around knee. Malrotation must be avoided by aligning the patella to the front in the centre of the femoral condyles .

STEP-2: From the scanogram we can determine and plan the osteotomy procedure. The osteotomy should be performed at the apex of the deformity. The metaphysis of the long bone is the region of best healing capacity. Under physiological condition the mechanical axis passes through the center of the knee or slightly medial to it. in a well aligned knee load distribution is not well balanced but physiologically 60% in the medial and 40% in the lateral compartment<sup>10</sup>.Therefore it is not sufficient to restore the physiological alignment in cases of medial osteoarthritis. Instead, overcorrection by shifting the weight bearing line slightly to the lateral compartments recommended. We first copy the full lower limb on a glassine paper with the original x-ray underneath(Photo 1)



Photo 1: Copy on glassine paper

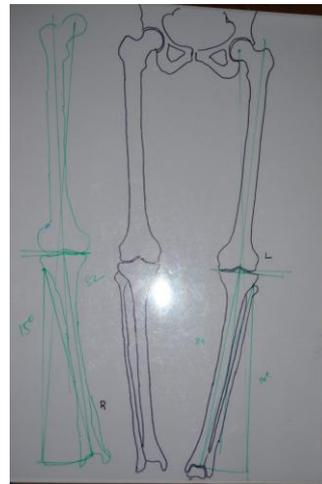
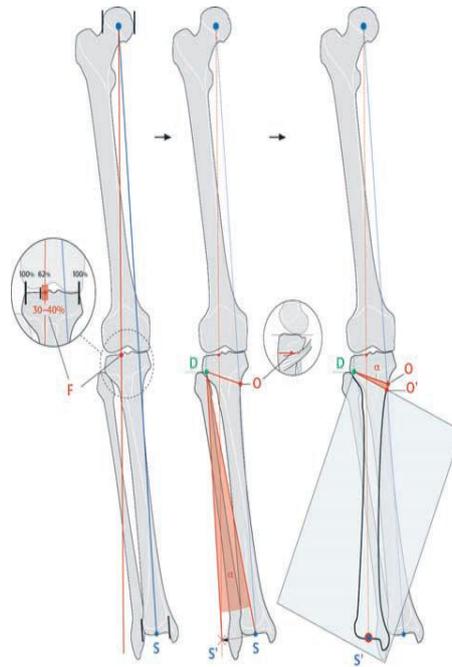


Photo 2: Final measurement on glassine paper

#### *Determining the angle of correction according to Miniaci*

The procedure recommended by Miniaci et al<sup>9</sup> was followed. According to them the post operative correction will be achieved if the proposed weight bearing line(WBL) goes starting from centre of the hip through a coordinate 60-70% of the tibial plateau width past the ankle(Line A).In medial opening wedge osteotomy, the hinge point(H) project on to the lateral proximal metaphysis on the level of the proximal border of tibiofibular joint, around 15mm below the subcondral sclerosis zone of the lateral plateau. Line A' connect the osteotomy hinge point(H) with the center of the ankle(S).Making the length of Line HS radius and point 'H' center, an angular arc is drawn from the center of the ankle to the intersection of Line A. This new intersecting point(S') and Point 'H' is now joined with the Line B. The angle made by Line B and Line HS is the planned correction angle( $\alpha$ ).This angle ' $\alpha$ ' is now drawn on the proximal tibia using the Hing point (H) as tip of the triangle. That angle ' $\alpha$ ' is the desired corrective angle.



Determining the proposed correction with the use of scanogram according to the method of Miniaci et al<sup>9</sup>. The mechanical axis is shifted to a point 62% lateral on the transverse diameter of the tibial plateau according to the criteria of Fujisawa et al<sup>10</sup>.

#### IV. Operative Procedure

All operations are performed under Spinal anaesthesia. Patient's position was Supine. Arthroscopy is performed first to assess both the compartments of affected knee. After proper dressing and draping an oblique incision made. Which was 6 to 8 cm long, extending from the medial aspect of the tibial tuberosity to the posterior border of the tibial plateau. The pes and medial collateral tendons were retracted distally to allow a blunt Hohmann retractor to be placed behind the postero medial aspect of the tibia to protect the neurovascular bundle. Then under fluoroscopic guidance two 2.5-mm guidewires were drilled into the tibial head to mark the direction of oblique osteotomy 5 cm distal to the joint line. A v-shaped osteotomy done. The first osteotomy started in the anterior one-third of the tibia at an angle of around 120°-130°, leaving the tibial tuberosity intact (Drawing). Second, the oblique osteotomy was performed in the posterior two-thirds of the medial aspect of the tibia distal to the guide wires, leaving a 10-mm lateral bone bridge.

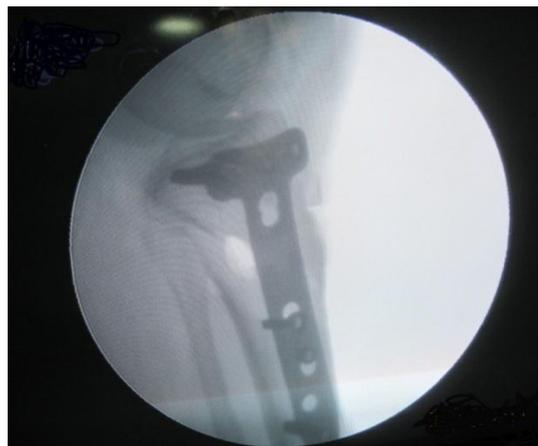
Osteotomy gap is opened first with graduated osteotomes and Fine-tuning of the mechanical axis was done with a calibrated wedge spreader and peroperatively checked by cable method.

For holding the osteotomy; Low profile precontoured proximal tibial locking plate is then inserted through a subcutaneous tunnel on the anteromedial aspect of the tibia and fixed with screws. In some cases tricortical iliac crest bone graft applied where cortical opening was >14mm. Wound closed with a drain





Fixation checked under C-Arm



**POST OPERATIVE CARE**

We encouraged knee movement as soon as the patient can tolerate pain. Drain removal and first dressing change done after 48hour. Stitch removal done on 12<sup>th</sup> postoperative day.

The patients left the hospital when they were able to walk with two crutches after an average of nine days (range, five to twenty-six days).

After six weeks full weight-bearing allowed.

**Follow-up**

All patients was followed up in regular intervals on 6week,12week,6month,12month,15month,18month post-operatively.

In every follow-up proper radiograph and through clinical examination with Pain and knee score was evaluated.

**STUDY TECHNIQUE**

Clinical, Functional, Radiological and Patients self assessment.

**FUNCTIONAL RESULTS =**

In our study considering various presentations of our patients with different variables suitable evaluatory criteria have been designed to assess end results of this study.

Criteria	Excellent	Good	Fair	Poor
Pain Score	40-45	35-39	30-35	<30
Knee Score	91-100	81-90	71-80	<70
Post-Op Fujisawa point	60-64% lateral on transverse diameter of tibial platue	55-59% or 65-70% lateral on transverse diameter of tibial platue	50-54% lateral on transverse diameter of tibial platue	<50 or >70% lateral on transverse diameter of tibial platue

We also classified patients according to their satisfaction grading into —

- Highly satisfied
- Satisfied
- Not satisfied

**V. Results And Analysis**

After obtaining all data ,it was tabulated and analysed statistically.After Through checkup 20 patients were included in our study.Among them 12 were (60%) Female and rest 8 were (40%) Male.The mean age of patients was 50.51yrs with the age ranging from 39-58 years.we operated twenty knees of twenty patients.Among them Thirteen (65%) are Right knee And seven (35%) are left knee.

**Table 1.** Distribution of patients according to the Side and Sex

Sex	Right side	Left side
Male	5	3
Female	8	4
Total	13(65%)	7(35%)

Mean height of the study group was 1.63±.09 mt.Mean height of female patients was 1.58±.08mt and mean height of male patients was 1.7±.05mt.Considering weight females ranged between 55-74 kg,average of 63kg and males ranged between 68-76kg with the average 68.62kg.Overall average weight of our patients was 64.98kg(S.D: ±6.07).Mean BMI of our Patients was 24.62±1.45.Male had mean BMI of 23.63±.72 and for female it was 24.29±1.43.Maximum of our patients (70%) were devoid of any comorbidity.As it was a comparatively new surgery learning curves were steep.Initially Operating time was approximately 3 hrs but with passing time it reduced significantly.Mean operating time was 126±25.3 minutes,ranging from 100minutes to 180 minutes.Mean follow up period was 13.21±3.21months (8-18months).

Pain was single most important complaint of all the patients during preoperative period.Mean Pain Score of all patients was 11.62±3.4 preoperatively. Out of twenty patients fourteen (70%) had a pain score of 10 with severe pain during preoperative period. After operation pain score improved significantly in all the patients.Mean Pain Score in postoperative period was 4.73±4.7.Except two patients all other scored >40.

Mean preoperative and postoperative ROM was 117.21±6.76 and 120.88±5.28 degree.Postoperative ROM improved in all patients except one who had wound infection and gaping which was covered with local transposition of flap.None of our patient developed extension lag. Mean preoperative Functional knee score was 46.56±8.18 (ranging from 35-60) which improved in all patients postoperatively.Postoperative mean functional knee score was 86.66±7.67 (range 75-100). For test for equality of variance p value is 0.78.In twenty patients no one has preoperative antero-posterior instebility.In respect to medio-lateral instebility ;only 2 of our patient had 5-10mm amd 1 had 12mm instebility.There was no change of stability in any patient after surgery.

Preoperative mean American Knee Society Score was 40.24±8.14.Mean Knee score on 6week and 12 month postoperatively was 68.65± 5.95 and 91.24±6.15 respectively.Knee score improved post operatively in all patients significantly (p value 0.23).

**RADIOLOGICAL ASSESSMENT**

Pre and postoperative Ahlbäck radiographic grade remain same.

**Anatomical Femoro Tibial Angle(aFTA)**

Pre operative: 2.79°±0. 75 varus(ranging from 2°-5° varus) . Which became postoperatively: 7.22°±0.57 (ranging from 6°-8° valgus).

Pre operative **Mechanical Femoro Tibial Angle(mFTA)** was 8.31°±1.54 varus(ranging from 6°-11° varus) .Postoperative it became 2.01°±0.49 valgus(ranging from 1°-3° valgus).For equality of variance p value was 0.0001.

**Mechanical Medial Proximal Tibial Angle(mMPTA)**

Preoperative mean mMPTA was 83.64°±1.1.Postoperative mean mMPTA was 92.83°±1.7(p value 0.04). Preoperative **Mean Axis Deviation(MAD)** of all patients was 19.21±2.11mm. of varus (ranging from 16.5-23mm varus) and after HTO post operative MAD was 11.97±1.17mm valgus(ranging from 10-13 mm valgus). All patients Except 1 have postoperative MAD value of 30-40% lateral to centre of knee joint .

**POST OPERATIVE FUJISAWA POINT**

Post-Op Fujisawa point	Number of patients	Percentage(%)
60-64% lateral on transverse diameter of tibial platue	15	75%
55-59% or 65-70% lateral on transverse diameter of tibial platue	4	20%
50-54% lateral on transverse diameter of tibial platue	1	5%

All osteotomy site was united proprly.Mean union time was 9 months (ranging from 6-15 months).

**COMPLICATIONS**

One patient had superficial wound infection which was healed by regular dressing and changing of antibiotics.

In another patient a small part of a broken drill bit remained within the bone.  
One patient had deep wound infection and gaping which needed local transposition flap coverage.

**FINAL RESULTS**

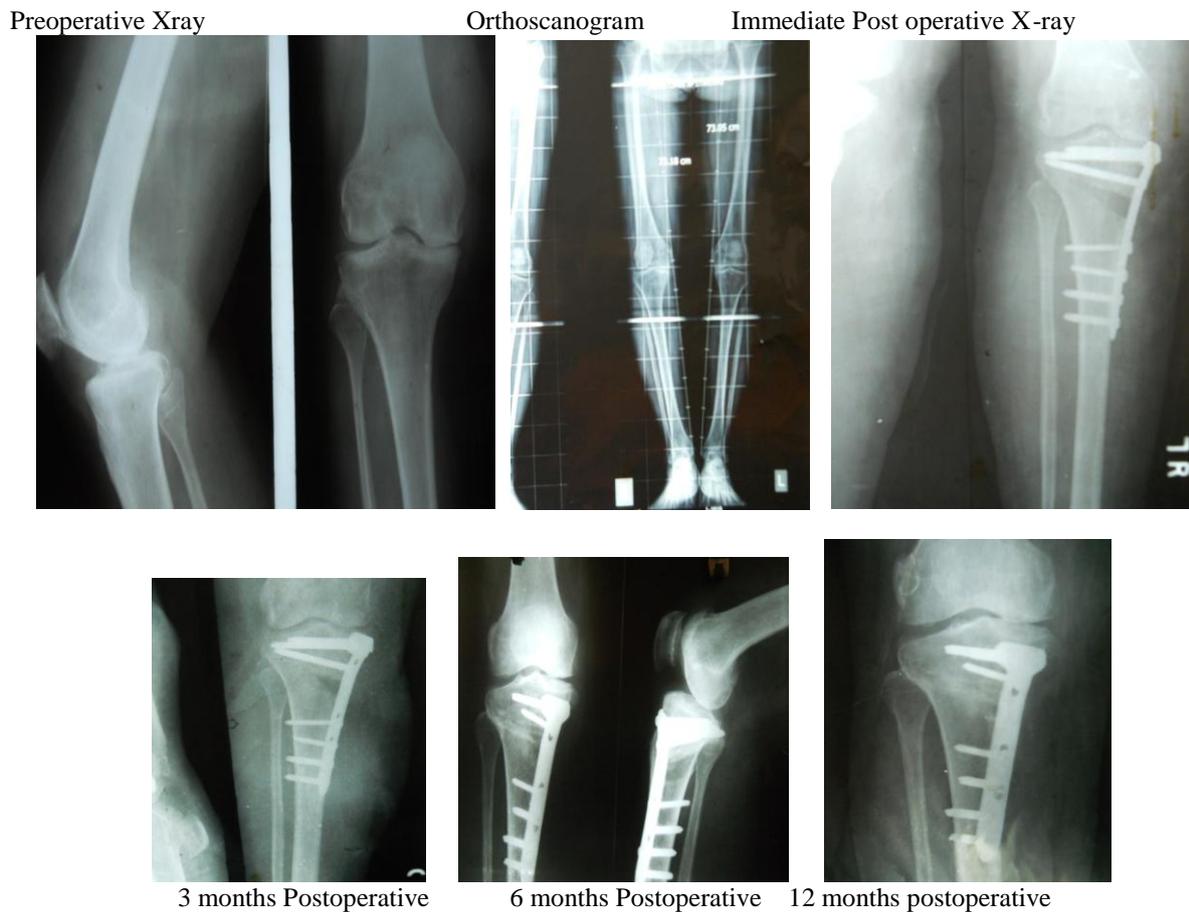
After analyzing all pre and post operative data and match them with standard criteria for qualitative assessment we found that 14 patients(70%) had Excellent , 5 patient(25%) had Good and 1 patient(5%) had Fair result.

Final Results	Number of patients	Percentage
Excellent	14	70%
Good	5	25%
Fair	1	5%
Poor	0	0%

**OVERALL PATIENT SATISFACTION GRADING**

Among 20 patients 16 patients (80%) was highly satisfied, 3 patients (15%) were satisfied and 1 patient (5%) was not satisfied. Overall satisfaction rate was 95%.

Satisfactory grading	No. of patients	Percentage
Highly satisfied	16	80%
Satisfied	3	15%
Not satisfied	1	5%



**VI. Discussion**

Osteoarthritis is a prehistoric disease. It is one of the commonest crippling disease of mankind. Osteoarthritis (OA) is a complex disease entity that is difficult to diagnose and define. The Subcommittee on Osteoarthritis of the American College of Rheumatology Diagnostic and Therapeutic Criteria Committee defined osteoarthritis (OA) as "A heterogeneous group of conditions that lead to joint symptoms and signs which are associated with defective integrity of articular cartilage, in addition to related changes in the underlying bone at the joint margins"<sup>11</sup> Clinically, the condition is characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion, and variable degrees of local inflammation. The concept that binds the different conditions labelled 'OA' together is a pathological one. The pathological definition is of

a condition characterised by focal areas of loss of articular cartilage within synovial joints, associated with hypertrophy of bone (osteophytes and subchondral bone sclerosis)

and thickening of the capsule. In this sense it is the reaction of synovial joints to injury. Histologically, the disease is characterized early by fragmentation of the cartilage surface, cloning of chondrocytes, vertical clefts in the cartilage, variable mineral deposition, remodeling, and eventual violation of the tidemark by blood vessels. This phenomenon can occur in any joint but knee and hip are commonest. This pathological change, when severe, results in radiological changes (loss of joint space, Osteophytes formation, subchondral sclerosis and cystic changes). In the report named "Global burden of osteoarthritis in the year 2000", WHO<sup>1,16</sup> stated that OA was estimated to be the 10th leading cause of non-fatal burden in the world, accounting for 2.8% of total YLD. Osteoarthritis is more common in women than men but the prevalence increases dramatically with age. Our study also reflects this fact. In our study 60% of the patients (12 out of 20) are Female and rest 40% (8 out of 20) are male. Osteoarthritis of the knee is a major cause of mobility impairment. According to Gupta et al.<sup>12</sup> Knee joint, by far is the most commonly affected joint in India. Previously it was considered as a senile disease but with changing socio-economic strata more and more comparatively young population are affected with this disease. In young age group uni condylar OA is common than other variants of OA.

Treating young OA patient is a real challenge. An attempt at conservative therapy should be undertaken before any surgical procedure. Once this conservative modalities fail, pain increase and condition of the knee deteriorates then operative intervention has to be considered. Surgical modalities which are available can broadly be divided into three categories-

1. Arthroscopic Surgery
2. Osteotomy- Osteotomy for uni compartmental OA of knee are mostly High Tibial Osteotomy. It may be Medial Opening Wedge or Lateral Closing wedge osteotomy or dome osteotomy.
3. Arthroplasty- In the form of Unicompartmental Arthroplasty or Total knee replacement.

Selection of appropriate patient is very important and selecting appropriate treatment modality is very difficult and crucial. According to Salisbury RB et al.<sup>13</sup> the use of arthroscopy of the knee to treat uni compartmental arthritis is controversial because the procedure cannot alter the natural history of the disease. In our study we found Preoperative uni condylar arthroscopic OA grading was mostly of grade II (60%) and others grade I (40%). No patients turned up for follow up arthroscopy.

High tibial osteotomy has long been recognized as beneficial for the treatment of osteoarthritis involving the medial or lateral compartment of the knee. Several authors<sup>4,14,23</sup> showed that a previously narrowed joint space will widen postoperatively and both subchondral cysts and sclerosis will regress if stress in the affected compartment is reduced sufficiently. Coventry<sup>15</sup> said that such a stress reduction occurs in the medial compartment of the knee when the mechanical axis is transferred from the medial compartment to the center of the joint or just lateral to the center of the joint. Koshino<sup>16</sup> said, this alignment is achieved with the knee between 8 and 10 degrees of valgus.

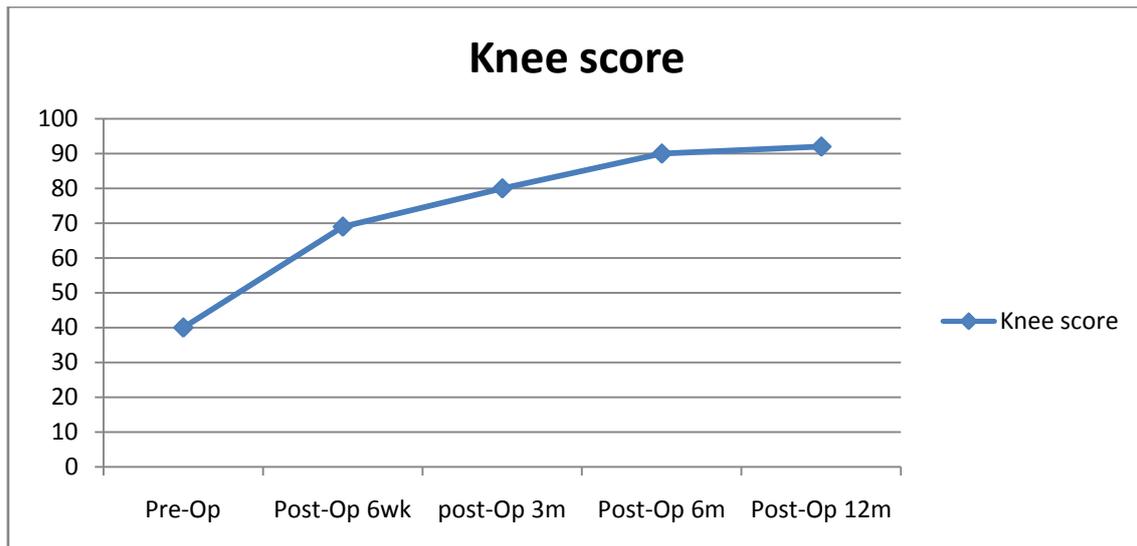
Before the era of TKR, throughout the world HTO was widely practiced with significant good results and functional outcome<sup>17</sup>. At that time Lateral Opening wedge high tibial Osteotomy was the common procedure.

The aim of valgus HTO is to transfer the mechanical axis from a position medial to midline of the knee to a position lateral to midline of the knee, helping to decrease joint loading and subsequently delay medial joint osteoarthritis. The study was conducted with the aims and objectives of improving clinical and radiological outcome of patients on the basis of Knee Score, Pain Score and to achieve proper correction of varus deformity of knee. In our study mean age of the patients was 50.51±5.42 years which is corroborative with other studies<sup>17,18,19,20</sup>. They also found pre-operative level of activity to be the best predictor of post-operative level and thus recommended HTO in young active patients less than 60 years old.

Male female ratio of our study is also similar to other authors<sup>16,17</sup>. We found Right knee dominance which is similar to other studies<sup>16,17,21</sup>. From here we can comment that osteoarthritis of knee in young age group is more common in dominant side.

We measured Height and lower limb lengths pre and postoperatively and found no limb length discrepancy. During operation blood loss was never significant so none of our patients needed postoperative blood transfusion.

Mean Pain Score in postoperative period was 42.98±4.67. Only 1 patient scored 30 i.e. mild pain only on walking and stairs and 1 patient scored 35. All other patients scored >40. p value of this study is 0.07. The American Knee Society pain score improved significantly from 22.9 ± 6.4 points preoperatively to 47.4 ± 5.2 points at the time of the latest follow-up (p < 0.0001). This finding also corroborates with several other studies<sup>16,21,22</sup>. Though some author reported<sup>16,21,22</sup> much improvement in Functional knee score and American Knee Society score, we have found good ROM and Functional Knee Score in our study postoperatively.



In our study it was observed that knee score improved over time which is evident in the graphical representation. It became possible due to postoperative early mobilisation, Muscle strengthening exercises, ROM exercises and other rehabilitation programme with excellent cooperation from patients' side.

We had pre operative anatomical Femero-tibial angle (aFTA) of  $6.26^{\circ} \pm 1.1$  varus (ranging from  $5^{\circ}$ - $8^{\circ}$  varus) and postoperative aFTA was  $7.22^{\circ} \pm 0.57$  (ranging from  $6^{\circ}$ - $8^{\circ}$  valgus). For equality of variance p value was 0.006. Zaki et al. reported The mean preoperative Tibio-Femoral angle was 7 degrees varus (range 6–10) and mean postoperative Tibio-Femoral angle was 6.5 deg valgus (range 7–11). Post operative Optimum valgus correction is still controversial<sup>5,16,17,25</sup>.

After HTO post operative Mean Axis Deviation (MAD) was  $11.97 \pm 1.17$  mm valgus (ranging from 10-13 mm valgus). All patients have postoperative MAD value of 25-30% lateral to centre of knee joint. We have measured Postoperative Fujisawa point as it is a very important deciding factor for accuracy of the surgery, final alignment of the limb and functional outcome. In present study Fujisawa point of 15 patients (75%) remained within 60-64% lateral on the transverse diameter of the tibial plateau. None of the patients had postoperative Fujisawa point <50% or >70% lateral on the transverse diameter of the tibial plateau. We had applied Iliac crest bone graft in case of osteotomy >14mm<sup>8,12</sup>. We had applied bone graft in 7 patients. We had found that osteotomy gap filled up comparatively quickly (6-9 months) in case of bone grafting than non bone grafts (12-15 months), which is comparative with other authors<sup>8,12</sup>.

We used an internal fixator in the form of locking plate that is intended to hold the attained correction without additional bone substitutes filling the osteotomy gap.

Regarding complication one patient had superficial wound infection which was healed by regular dressing and changing of antibiotics. In one patient a small part of a broken drill bit remained within the bone. One patient had deep wound infection and gaping which needed local transposition flap coverage. There was  $5^{\circ}$  postoperative fixed flexion deformity in one patient. In subjective patient's satisfaction assessment we had documented pre and postoperative Visual Analogue Scale scoring. During preoperative period 18 patients (90%) had significant pain among them 12 (60%) had very difficulty in walking and climbing stairs (score 6-8) and 2 patients (10%) was almost non ambulatory (Score 10). After operation 14 patients (70%) became painless, 4 patients had mild pain only during stairs use and 1 still complained of pain both after walking about 5 blocks and during stairs use. Patient satisfaction is an important aspect of every operative procedure. In this study most of the patients (80%) were highly satisfied. Considering overall results 14 patients (70%) came out with excellent result, 5 patients (25%) was good and 1 patient (5%) had poor result. Other researchers<sup>5,8,9,16</sup> found similar results.

Valgus HTO may result in Lateral compartment osteoarthritis if correction is more<sup>25,26</sup>. In our study we did not encounter such complication.

## VII. Conclusion

In this present study we have seen that our procedure of medial open wedge high tibial osteotomy is very effective in young uni compartmental Osteoarthritis patients with predictable results. We had fixed the osteotomy gap with low profile precontoured proximal tibial locking plate. This procedure offers freedom from pain, excellent range of movement and functional outcome with minimum post operative complications. It delays the need of total TKA significantly. Main advantage of our study is providing early knee movement and weight bearing. As our study is a medial opening wedge procedure so we had avoided all the complications of high tibial

lateral closing wedge osteotomy as well. This osteotomy is comparatively easy to perform than lateral closing wedge osteotomy. With the calibrated osteotome guide we had achieved precise osteotomy angle which is very important for achieving post operative satisfactory results. It is a bone preserving surgery and there is no limb length discrepancy. This is a deformity correcting surgery so it has a steep learning curve. In our society people used to try bear pain till the situation goes beyond control. So getting young osteoarthritis patient with proper indications is not easy and convincing them about this new procedure was another big deal.

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