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Prospective and retrospective Study to Evaluate Role of High Tibial Osteotomy fixed with angle stable plate in treatment of Osteoarthritis of Knee

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ABSTRACT

Osteoarthritisis one of the most common joint disease encountered, affecting more than 80% of people over the age of 55.It is a major cause of musculoskeletal pain and single most important cause of disability and handicap in old age and, is therefore, an important healthcare burden. Osteoarthritis is not a single entity but rather a heterogeneous group of conditions showing common x-ray and pathological changes and is characterized by joint degeneration, loss of cartilage, alteration of subchondral bones etc.Osteoarthritis principally affects the knee and hip. High tibial osteotomy is a welle stablished procedure for the treatment of unicompartmental osteoarthritis of the knee. In osteoarthritis Varus and valgus deformities are fairly common but Varurs is more as compare to valgus & cause an abnormal distribution of the weight bearing stress within the joint. A total of 26 patients were enrolled for this study and all were treated with tomofix plate. Physical examination and radiographs were performed at regular follow-ups. Functional outcomes were analyzed using knee society scoring system. According to the grading used for functional assessment in knee scores there was definite improvement in the function of cases 22 (96.15%) at 1yrs. But up to 3 months patients required some walking aid in half of the cases. There was very little improvement in the functional knee score in 1 case. The pre-operatively mean functional knee score in 26 cases was 46.8 and post-operatively was 92.5 i.e. the mean improvement in functional knee score is 45.7 (the maximum functional knee score is 100).

Introduction

Osteoarthritis is one of the most common joint disease encountered, affecting more than 80% of people over the age of 55.Prevalence of osteoarthritis is higher in men before 45 years and more in women after 55years. It is a major cause of musculoskeletal pain and single most important cause of disability and handicap in old age and, is therefore, an important healthcare burden. Osteoarthritis is not a single entity but rather a heterogeneous group of conditions showing common x-ray and pathological changes and is characterized by joint degeneration, loss of cartilage, alteration of subchondral bone etc. Osteoarthritis is the result of mechanical and biological events that destabilize the normal processes of degradation and synthesis of articular cartilage chondrocytes, extracellular matrix and subchondral bone.Osteoarthritis principally affects the knee and hip, but also fingers and spine commonly and elbow, wrist, ankle less commonly.High tibial osteotomy is a well-established procedure for the treatment of unicompartmental osteoarthritis of the knee. In osteoarthritis Varus and valgus deformities are fairly common & cause an abnormal distribution of the weight bearing stress within the joint. If the deformity is one of the varus positions, stresses are concentrated medially and degenerative changes in the medial part of the joint are accelerated, if the deformity is one of valgus position, changes are accelerated in the lateral part. The biomechanical rationale for proximal tibial osteotomy in patients with unicompartmental osteoarthritis of knee is unloading of the involved joint compartment by correcting the malalignment and redistributing the stresses on the knee joint.

Properly done High tibial osteotomy with full corrected deformity in properly selected patient gives pain relief for 10-15 years. And delays the need of arthroplasty if required later.[1,2]

Aims & Objectives:

- To evaluate the radiological outcome of deformity correction and arthritic changes using serial x-ray and scanogram.
- To assess the clinical and functional outcome using knee society scoring system

Materials and methods

The study was carried out on 26 patients admitted in the department of Orthopedics, LLR & associated hospital, Kanpur during the period of 2010 -2018. The retrospective study was done from 2010 to May 2016 and prospective study from June 2016 to Oct. 2018. Prospective patients were followed up immediately after operation, at 4 weeks, at 3rd month, at 6th month post-operatively, and thereafter every 6 monthly. Patients with no relief of knee pain after 3 weeks of conservative treatment ,age <60 years, physiological young and active patients having unicompartmental involvement

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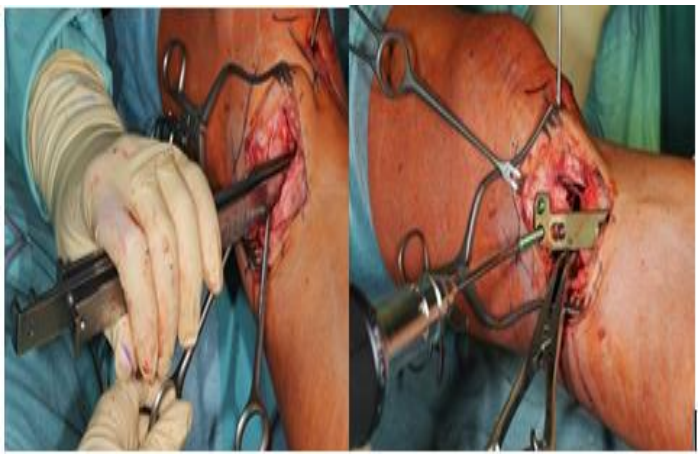
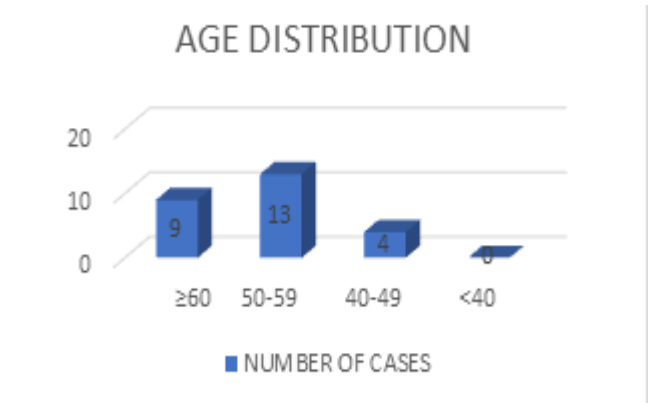
even in chronological age >60 years, pain restricting the daily activity, unicompartmental varus deformity,stage1/2 osteoarthritis according to Kellgren and Lawrence classification. Proper preoperative assessment of the patient was done before surgery to ensure adequate correction of deformity, degree of angle and size of wedge was measured from erect AP film.

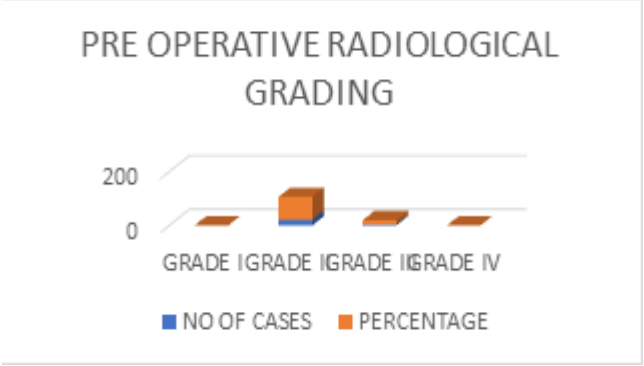


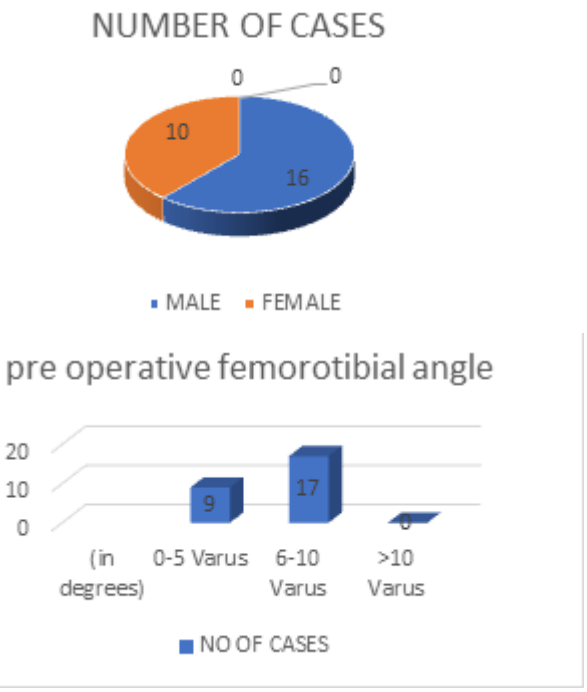
Observations and Results

The study was carried out on the patients admitted in the department of Orthopedics, LLR & associated hospital, Kanpur during the period of 2010 -2018. The retrospective study was done from 2010 to May 2016 and prospective study from June 2016 to Oct. 2018. Prospective patients were followed up immediately after operation, at 4 weeks, at 3rd month, at 6th month post-operatively, and thereafter every 6 monthly. In this study the mean age of patients at the time of operation was 55.88 years (52.4yrs for female and 58.06 yrs for male patients. All patients in this study had a genu varum deformity secondary to Osteoarthritis.Meanvarus in our study was 5.81.In this study the pre-operative pain score was 17.31± 7.1 (Knee Society Pain Score) range of motion score was 113± 2.06 degree.The roentgenograms were graded from 0-4 using KellgrenLawerence classification according to the severity of radiological changes. 22 patients (84.61%) had grade II changes and 04 patients (15.38%) grade III changes . No patient gave history of any trauma. The femorotibial angle was invarus alignment in all the cases . 09 cases (34.61%) had femorotibial angle between 0-5 degrees varus and 17 cases (65.38%) between 6-10 degrees varus.19 cases (73.07%) cases had pain score >40 post operatively (the maximum pain score for pain is 50). It was noted that the patients keep on improving for 1 years after osteotomy. The follow up in this study is relatively short and many patients complained of weakness or some swelling around the knee joint up to 3 months which finally improved with quadriceps strengthening excercise.According to the grading used for functional assessment in knee scores there was definite improvement in the function of cases 22 (96.15%) at 1yrs. All the cases regained their pre-operative range of movement.90.90% cases experienced the definite improvement in the pain. It was noted that the patients keep on improving with 2-3 years after osteotomy.

Preoperative Follow Up 2 Year Postoperative







Discussion

The present study was conducted on 26 patients.. There were 61.53% male and 38.46% female cases. Mean age of Patients in our study was 55.88 years with maximum age of 65 years and minimum 45 years the maximum patients (50%) were in the 50-59 years age. In this study the mean age of patients at the time of operation was 55.88 years (52.4yrs for female and 58.06 yrs for male pts). The mean age in Choi HR. (2001)[3], Koshino T (2004)[4], Dehoux. E (2005)[5],Takeuchi R(2008)[6] and Zaki SH(2009)[7] studies were 59.0 years, 59.6 years , 45.2 years,69 yrs and 39.5yrs respectively. All patients in this study had a genu varum deformity secondary to Osteoarthritis. Mean varus in our study was 5.81± 1.49 degree. In this study the pre-operative pain score was 17.31± 7.1 (Knee Society Pain Score) range of motion score was 113± 2.06 degree. By comparing the pre-operative knee score (pain, range of motion and stability) of all patients, the maximum affected was the pain score and pain was the primary cause of morbidity and that was the main reason for which high tibial osteotomy was done.The roentgenograms were graded from 0-4 using Lawerence classification according to the severity of radiological changes. 22 patients (84.61%) had grade II changes and 04 patients (15.38%) grade III changes . The femorotibial angle was invarus alignment in all the cases . 09 cases (34.61%) had femorotibial angle between 0-5 degrees varus and 17 cases (65.38%) between 6-10 degrees varus. Study by Takeuchi R,(2009)[8] partial weight bearing was started from first week using Tomofix with artificial bone graft to fill osteotomy gap in our cases partial weight bearing allowed after 7-10 days. Full weight bearing in our cases after 4-6 weeks in locking plate with autologous bone graft taken from iliac crest in medial open wedge osteotomy. In study by Takeuchi R, (2009)[8] full weight bearing was allowed after 2 weeks in unilateral cases using tomofix. All cases experienced definite improvement in the pain. The average pain score pre-operatively was 17.31±7.1 and post-operatively was 40.75± 5.76 (the maximum pain score for pain is 50)the percentage increase in pain score post-operatively was 24.It was noted that the patients kept on improving for 1 years after osteotomy. The pre-operatively mean functional knee score in 26 cases was 46.8 and post-operatively was 92.5 i.e. the mean improvement in functional knee score is 45.7 (the maximum functional knee score is 100). There was very little improvement in the functional knee score in 1 case. In our study the mean tibiofemoral angle in standing was 6.23 ± 1.5 degrees varus pre-operatively and 6.1± 1.79 degrees valgus post-operatively. Similar correlation of deformities were reported in the studies of Koshino T (2004)[9] and Spahn G (2005)[10] in which the tibiofemoral angle in standing was 6 degrees and 7 degrees varus pre-operatively and 9 degrees and 3.7 degrees post-operatively respectively. In this study the results were rated as excellent in 24 cases (92.30%) good in 2(7.7%) and poor in 0 cases (0%). This compares well with the study of Pfahler M (2003)[11] with 90% excellent and 10% poor result. In the study of U.Munzinger (2004)[12] results were good to excellent in 71.50% cases, fair in 10.70% and poor in 17.80% cases. In Wu LD (2004)[13], Zhou YX (2003)[14] and Miklos Papp (2004)[15] studies results were excellent in 97.30%, 88.00%, and 91.30% cases at two years. In the study of Hernigou-P (1987)[16], best result were obtained when the femorotibial angle attained was 3 to 6^0 post operatively. Under correction and over correction were related to poor results.In our study, the patients who attained valgus post-operatively, definitely showed the better results. The cases in which post-operative femorotibial angle was between 0-4 degree 1 case (3.8%) the mean increment in pain score was 16.67±7.63 .In 24 cases (92.3 %) in which the post-operative femorotibial angle was between 5-7 degrees valgus, the mean increment in pain score was 24.41±6.7. and more than 7 degree valgus 1 case had a improvement in pain score of 13.20. It was noted that the patients keep on improving with 2-3 years after osteotomy. Many patients complained of weakness or some swelling around the knee joint up to 3 months which finally improved with quadriceps strengthening exercise. There is negligible complications only two patients complaints plate impingement & one patient suffered with superficial infection.

Conclusion

The outcome seems to correlate with radiological grading, femuro-tibial angle, varus deformity, bone quality degree of angle and size of wedge.

- High tibial osteotomy provides significant relief in pain in osteoarthritic knees with early disease.
- It can provide satisfactory relief in patients with even grade 3 osteoarthritis.
- Function of the knee improves following high tibial osteotomy.
- There is a definite correlation between the post-operative valgus obtained and relief in the pain.
- Medial opening wedge osteotomy fixed with TOMOFIX gives stable fixation across the osteotomy without fear of loss of correction. With such implants early rehabilitation can be started.
- This procedure is associated with minimum number of complications.

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