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### Study of functional outcome of medial open wedge osteotomy using puddu plate in relieving knee pain in patients with Unicompartmental Osteoarthritis

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#### Abstract

Of the three joint compartments, the medial compartment is the most common site of knee OA presumably as a reflection of the distribution of loading with the majority of the load being placed on this compartment. This is a prospective study of patients who attended the orthopaedic out patient clinic in our hospital between September 2010 to October 2012. The patients were evaluated by clinical examination and weight bearing radiographs. Of the 13 knees operated, 4 had excellent outcome, 5 had good outcome, 2 had fair and 2 had poor outcome.

**Keywords:** Medial open wedge osteotomy, puddu plate, Osteoarthritis

#### Introduction

The knee is complemented with a selection of ligaments including the anterior and posterior cruciates, and the medial and lateral collateral ligaments. These serve to strengthen the knee structure as well as place restraints on the range of movements through which it can travel. Due to its location within the human skeleton, and the fact humans are bipeds, the knee joint is constantly exposed to varying forces which it must cushion and absorb to prevent the formation of pathological stresses.

Osteoarthritis (OA) of the knee is the most common form of joint disease and the prevalence of both radiographically evident and symptomatic knee OA has been reported to be higher and the prevalence with females is higher (Felson *et al.* 2005) [1]. The meta-analysis also reported that females tend to have more severe knee OA radiographically assessed than males and that the gender differences increase with age >55 years (Srikanth *et al.* 2005) [2].

Of the three joint compartments, the medial compartment is the most common site of knee OA (Ledingham *et al.* 1993) [3], presumably as a reflection of the distribution of loading with the majority of the load being placed on this compartment (Schipplein *et al.* 1991) [4].

The most common group of patients presents with unicompartmental medial or lateral femorotibial osteoarthritis. These patients complain about pain in the affected joint compartment during weight bearing. If pain is not located exclusively either over the medial compartment or the lateral joint space, the indication for osteotomy should be reconsidered. Femoropatellar pain with significant degenerative changes of the cartilage is considered as a relative contraindication for osteotomy. Special attention should be addressed to the subjective pain level, for example with the visual analogue scale (VAS).

#### Methodology

This is a prospective study of patients who attended the orthopaedic out patient clinic in our hospital between September 2010 to October 2012. The patients were evaluated by clinical examination and weight bearing radiographs. The patients who were found to have unicompartmental osteoarthritis with knee pain not relieved by conservative management and who satisfy the inclusion criteria were selected.

#### Indications

1. Pain and disability resulting from osteoarthritis that interfere with high-demand employment or recreation.
2. Evidence on weight bearing radiographs of degenerative arthritis that is confined to one

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- 3. The ability of the patient to use crutches after the operation and the possession of sufficient muscle strength and motivation to carry out a suitable rehabilitation program.
- 4. Good vascular status without serious arterial insufficiency or large varicosities.
- 5. Age < 60 years.

**Contraindications**

- 1. Narrowing of lateral compartment cartilage space.
- 2. Lateral tibial subluxation of more than 1 cm.
- 3. Medial compartment tibial bone loss of more than 2 or 3mm
- 4. Flexion contracture of more than 15 degrees.
- 5. Knee flexion of less than 90 degrees.
- 6. More than 20 degrees of correction needed.
- 7. Rheumatoid arthritis.

The patients were explained about osteotomy and its advantages and disadvantages were discussed. Those patients who were willing for the procedure were selected and their consent obtained.

Pre-operative planning is done by Miniaci method and pre-operative evaluation by Visual Analogue pain scale, Knee society knee scale and Japanese Orthopaedic Association Knee rating scale (See Appendix).

High tibial opening wedge osteotomy is done using puddy plate (10 mm or 12 mm) according to the desired wedge to be created. The surgical steps are as described before. Bone grafting was done in one patient and in all other eleven patients, bone grafting was not done.

**Post-operative protocol**

- 1. Post-operative protocol for the patients is
- 2. Immobilisation in a tube slab till end of 3 weeks.
- 3. Knee brace is applied and the patient is encouraged to do partial weight bearing using crutches or walker till the end of 7 weeks.
- 4. The patient is then allowed to weight bear completely.

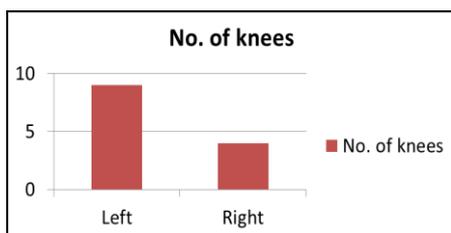
**Results**

Opening wedge osteotomy using puddy plate was performed in thirteen knees of twelve patients. Patients were analysed for any complications and their functional outcome was compared with their previous status.

**Table 1:** Gender

| Gender | No. of Patients |
|--------|-----------------|
| Male   | 5               |
| Female | 7               |

Of the 12 patients there were 5 male and 7 female patients

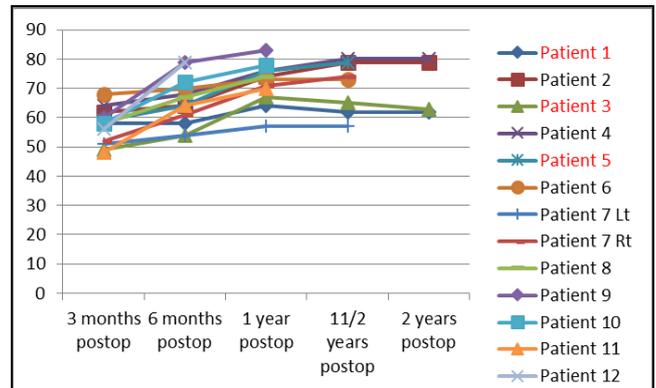


**Fig 1:** Side of Involvement

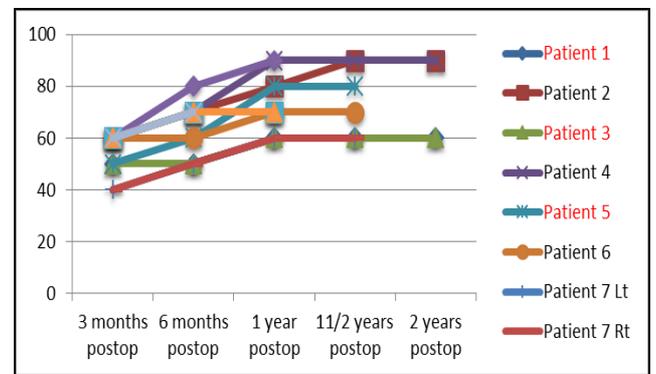
Of the thirteen knees operated, 9 were of left side and 4 of right side.

Of the 13 knees operated, 4 had excellent outcome, 5 had good outcome, 2 had fair and 2 had poor outcome.

The poor result of one patient is correlated to superficial infection and the other patient due to inadequate correction. Also to be noted is the scoring improved upto 1 year and thereafter it remained a plateau.



**Fig 2:** Knee Score



**Fig 3:** Function Score

**Discussion**

The results of total knee arthroplasty after osteotomy has variable results. Some studies state that there is no difference with primary arthroplasty whereas certain other studies like Haslam *et al.* have showed slightly poorer results which are comparable to revision arthroplasty. The opening wedge, however, has the advantage of preserving the bone stock for future arthroplasty [5].

The excellent and good results seen in 15% and 62% by knee score, 31% and 38% by function score and JOA scores respectively seen in this study are comparable with results of Kolb *et al.* [6] and Sen *et al.* [7].

The complications which are seen in this study could be prevented by proper pre-operative planning and correct surgical technique. Infection control is also essential as the medial aspect of tibia is devoid of soft tissues and proper postoperative care and rehabilitation is essential. 23% of patients had implant removal which is better compared with results of Brower *et al.* [8].

The consolidation of the wedge occurred in all 12 of our patients without bone grafting in about 3 to 6 months. This is comparable to the results of Kolb *et al.* [6].

This study has its limitations, as it is not a comparative study and the sample size of the study is small. As stated by Sen *et al.* [7], long term studies are lacking in high tibial osteotomies and are necessary for more clear idea about the outcome. But, this short term study shows that osteotomy of the knee is definitely a viable option in unicompartmental osteoarthritis of the knee.

### Conclusion

Medial open wedge osteotomy is a useful option in unicompartmental osteoarthritis and definitely relieves pain and improves functional outcome in patients.

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