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Correction of medial compartmental osteoarthritis knee joint by high tibial closed wedge osteotomy with tension band wiring and cortical screw fixation in a rural set up

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Abstract

Introduction: Osteoarthritis of the Knee is a Chronic debilitating disease excessive pressure leads to breakdown of the cartilage matrix, architectural changes in the subchondral bone, further altering the joint geometry.

Aims and Objective: The effect of TBW with 2 cortical screws in cases of uni-compartmental O.A. Knee joint 32 cases were studied.

Result: Lateral wedge osteotomy done 1.5 cm distal to joint margin to avoid fracture of tibial plateau intraoperatively. Height of wedge is taken dependent on varus angle calculated from x-rays, for each degree 1 mm height of wedge is taken. 2 cortical screws fixed distal to osteotomy site.

Conclusion: It is a cost effective technique with use of minimum hardware and early post operative mobilization in patients who cannot afford Knee Arthroplasty in a rural set up.

Keywords: knee joint, medial compartmental, chronic debilitating

Introduction

Osteoarthritis of the Knee is a Chronic debilitating disease excessive pressure leads to breakdown of the cartilage matrix, architectural changes in the subchondral bone, further altering the joint geometry. Most of the patients present with unicompartmental osteoarthritis (Medial compartment) with varus deformity compromising their day to day activities and finally leading to painful arthrosis. Prevalence of osteoarthritis of knee is 5% to 13% in India. Our cultural and religious habits and daily activities need most of the Indians particularly in rural side to squat and sit cross legged. With unicompartmental or total arthroplasty sitting cross legged or squatting are restricted. Osteotomy of the tibia was originally used to address osteoarthritis of the knee with an objective to shift load bearing from one arthritic tibiofemoral compartment to the other, less affected compartment (Unloading of Involved Joint) Whereas in HTO (using double TBW and 2 cortical screws with washers), patient is mobilized in immediate post operative period and patient can resume sitting cross legged and squatting by 8th week.

This procedure is cheap and cost effective as compared to other procedures, the cost of implants being approximately Rs.500 to 600 only. One of the biggest advantages of HTO is need for knee arthroplasty can be postponed for minimum period of 12- 15 years as found in literature.

Biomechanics

In the standing position and chiefly during walking, the body weight tends to adduct the femur on the tibia, thus increasing the load on the medial compartment. The lateral muscular forces tend to adjust a dynamic equilibrium in the knees. The lateral force and the body weight result in an overload distribution of about 60% in the medial compartment and 40% in the lateral compartment.

In medial compartment arthritis, the resulting lateral force is displaced medially. This progressive joint destruction causes knee deformity, which, in a vicious circle, aggravates

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arthritis in the medial compartment, resulting in a varus deformity at knee joint.

Because of the progressive nature of the disease, many patients with osteoarthritis of the knee eventually require operative treatment. A variety of procedures have been described for treatment of the osteoarthritic knee which include

- arthroscopic debridement,
- osteochondral/chondrocyte transplantation,
- high tibial osteotomy
- distal femoral osteotomy
- Benjamin's double osteotomy
- arthroplasty
- arthrodesis

Various methods of treatment in High Tibial Osteotomy (HTO) are-

1. Plaster cast.
2. External fixator.
3. Coventry plate.
4. Broad dynamic compression plate.
5. Locking compression plate.
6. JESS.
7. TBW (minimal instrumentation)
8. Buttress plate

Tension Band Wiring Principle in HTO

By using double TBW distracting forces are converted into converging forces at the lateral closed wedge osteotomy site by anchoring the Tension band around the Ilio tibial band at its attachment at the Gerdy's tubercle.

Materials and Methods

32 cases (12 Males and 20 Females) of Medial compartment osteoarthritis presenting in the OPD of Rural Medical college and hospital, Loni between the period of 2008-2013 were treated by High Tibial closed wedge osteotomy and 2 cortical screws, 2 washers and Double Stainless Steel wire fixation (TBW Technique). Majority were in between age group of 55-65 years.

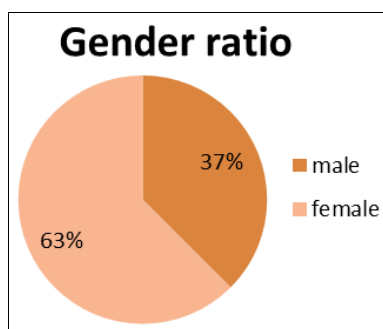


Fig 1: Gender ration

Aims and Objective

The effect of TBW with 2 cortical screws in cases of uni-compartmental O.A. Knee joint 32 cases were studied. The outcome of this technique and results were evaluated.

Inclusion criteria

People with degenerative disease of knee (osteoarthritis) between the age of 45 to 65 years.

- 1) Who are walking independently or with one stick.
- 2) Who accepted "repairing" the joint than "replacing".

Male and Female patients between 55-70 years age having Medial compartmental osteoarthritis presenting with Pain.

Patients with Knee Flexion upto 90° with full extension possible.

Patients able to squat and sit cross legged.

Exclusion criteria

Non walkers due to generalised arthropathies or medical morbidities.

Flexion deformity of knee more than 10 degrees or range of motion less than 90 degrees.

Active rheumatoid arthritis or active infection.

Grossly symptomatic lateral compartment involvement.

More than 1 cm lateral subluxation of tibia as judged by standing AP x-rays of both knees.

Grossly advanced arthritis or tricompartment arthritis.

Observation

Operative Procedure

In Supine position, the proximal aspect of tibia was approached through Lateral inverted L shaped incision.

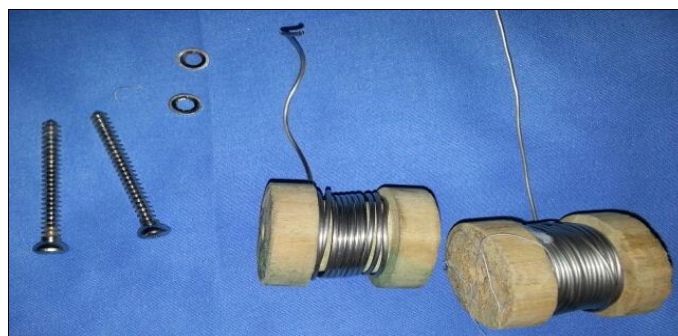


Fig 2: Cortical Screw 4.5, SS Wire, Washer

Surgical procedure

Lateral wedge osteotomy done 1.5 cm distal to joint margin to avoid fracture of tibial plateau intraoperatively. Height of wedge is taken dependent on varus angle calculated from x-rays, for each degree 1 mm height of wedge is taken. 2 cortical screws fixed distal to osteotomy site. 1st screw 2.5 cm distal to osteotomy site. 2nd screw 2.5 cm distal to proximal screw.

An 18G Stainless Steel wire is passed around Gurdy's tubercle. Wires are configured in a figure of eight and tightened around the screw with washers and screws are tightened into tibial shaft. As the wires are tightened, lateral wedge osteotomy is closed. Wound is closed in layers over suction drain. Mobilization is started as soon as the patient can start tolerating the pain in bed and after 3 weeks patient is allowed to weight bear after application of long knee brace and with the help of walker.

Patient was encouraged to flex the knee, when, because of the TBW principle compression occurs at the osteotomy site and after 8 weeks patient is encouraged to walk full weight bearing without the help of walker. Success rates of 88% at 10 years and 83% at 9 years are reported after HTO for medial compartment arthritis in the literature. Current prosthetic knee arthroplasty techniques have provided successful results in over 93% of patients at 10 years.

The role of osteotomy has decreased in the face of these outstanding results from joint replacement. Prosthetic arthroplasty requires activity modification to protect the implant. The implant also has a finite life span and may require repeated surgery to replace failed devices.

Realignment osteotomy particularly in rural setup it is an economically cost effective surgery without altering the patient's life style

Observation by Japanese Orthopaedic association scoring was done, according to following points: –

Pain while walking

Pain while descending and ascending stairs

Range of motion

Joint effusion

22 cases were Excellent

8 cases were good.

One case of failure, an iatrogenic intra condylar fracture of Tibia, and another secondary haematoma under the suture line, aspirated and complete healing was achieved.

Patients had good range of motion

Were able to squat and sit cross legged comfortably.



Fig 3: B/L knee with severe varus deformity



Fig 4: x-ray b/l knee OA knee rt >lt



Fig 5: Exposure with osteotomy of proximal tibia

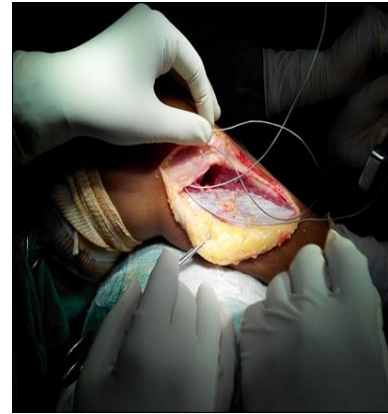


Fig 6: SS wire passed from TFL



Fig 7: Tension band wiring to cortical screw



Fig 8: Tension band wiring with closing osteotomy side



Fig 9: pre operation x-ray b/l knee



Fig 10: Post Operative x-ray knee with implant in situ with opening of medial jt line



Fig 11: Post operative flexion of knee



Fig 12: Cross leg sitting after operation



Fig 13: Walking with brace on post-operative days

Arthroplasty (may be upto 10-15 years) in patients with Medial compartmental osteoarthritis.

It is a cost effective technique with use of minimum hardware and early post operative mobilization in patients who cannot afford Knee Arthroplasty in a Rural set up.

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Conclusion

With a sample size of 32 cases, the following conclusion was derived –

HTO by Closed lateral wedge osteotomy and fixation with cortical screw and SS wire provides a good alternative to unicompartmental knee Arthroplasty and even Total knee