ORIGINAL ARTICLE

Results of High Tibial Osteotomy using A.Z. (Azhar's) Fixators in the Treatment of Medial Compartment Osteoarthritis of Knee Joint

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ABSTRACT

Aim: To evaluate the results of High tibial Osteotomy using A.Z.(Azhar's) Fixator in the treatment of medial compartment Osteoarthritis of the knee joint.

Place and duration of study: The study was conducted initially in the orthopaedic department Mayo hospital Lahore from 1988 to 1993 and then at Allama Iqbal Memorial Teaching Hospital, Sialkot from 1998 to 2010.

Methods: Total 47 patients were selected for the use of AZ fixator after High tibial Osteotomy. The patients were operated initially at Mayo Hospital Lahore and later on at Allama Iqbal Memorial Teaching Hospital Sialkot. All patients were reviewed at AIMTH and were evaluated clinically according to Baily Knee rating scale and radiologically by measuring tibio femoral angle. The follow up range from form 5 years to 14 years with average follow of 7 years. Out of 47 patients operated 28 patients (59.75%) were male and 19 patients (40.42%) were female. The age range between 55 years to 75 years. The results of the patients evaluated by modified Baily Knee rating scale were excellent in 40 patients (85.10%), good 3 patients (6.38%) fair 02 patients (4.25%) and poor in 02 patients (4.25%). 45 patients (95.74%) stated that they were fully satisfied with the result of surgery. The average post-operative angle achieved 8^{o} of valgus. The complications were also noted. Out of 47 patient 05 patients (16.63%) had wound infection out of which pin track infection was present in 03 patients (6.38%) loosening of pin in 02 patients (4.25%). Peroneal Nerve Injury, Pseudarthrosis, delayed union, non union, compartment syndrome, fracture of proximal bone, loss of range of movement was not observed in any patient. There was considerable improvement in 38 patients (80.85%) in range of movement after high tibial osteotomy using A.Z Fixator.

Conclusion: After post operatinve analysis of the patients using AZ fixator in high tibial osteotomy we reach to the conclusion that AZ fixator provide stable fixation and is easy to apply, cost effective, permit early range of movement, allows early weight bearing, promote bony union by giving, compression at osteotomy side, allow correction of post-operative under correction or over correction and also provide stable fixation till solid union is achieved by maintaining the correction upto desired period of time. It also prevent post-operativequadriceps wasting, joint stiffness, old age bed ridden complications like DVT, Pulmonary Embolism etc due to early mobilization. So we recommend that AZ fixator is safe and effective method of fixation as compared to other fixators. It is patient friendly keeping in view low socio economical conditions.

Keywords: Osteoarthritis of knee joint, Azhar's (A.Z) fixators, High Tibial Osteotomy.

INTRODUCTION

Osteoarthritis is one of the oldest diseases known. There is evidence that it was present in DINOSAUR DIPLODOCUS. The arthrosis is the 2^{nd} most common cause of permanent disability as shown in 1978 by American Statistics (Kelsiy, Patides, Bisbee, and White) and if we calculate the loss in terms of money due to loss of working days, it comes out inbillions of dollars.

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The OA research society international (OARSI) have recommended different non-surgical methods like analgics, anti-inflammatory, Viscosupple-mentation, corticosteroid injection, weight reduction, bracing and patient education initially and if the patient is not improved then the surgical option is considered.

The most recent trend is the repair and regeneration of articular cartilage. Bone marrow stimulation technique (micor fracture technique), autograftosteochondral, Plug transplantation (Mosaic Plasty), Allograft Osteochondral Plug Transplantation, Autograft Chondrocyte Transplantation, Periosteal Transplantation, Mesenchymal Stem Cell transplantation and more

recently Gene Therapy is tried in advanced countries. In developing countries where majority of population belongs to lower social economical status, providing such treatment options is not possible. In arthritis patients the expectation of treatment is pain relief, performance of daily living activities and prevention of serious complications.

High Tibial Osteotomy is the surgery in which the bones are cut and realigned. The concept behind the surgery is to unload the diseased compartment as it changes the alignment of weight bearing axis from disease part to healthier part of the knee joint. By unloading the damaged part osteotomy releases pain, improve the daily functional activities and also slow down the deterioration of joint and also regenerates the articular cartilage. Since the introduction of High Tibial Osteotomy there are different type of osteotomy described in literature like wedge above or below the tibial tubercle, open or closed wedge, dome shaped, inverted V, Juded type, transposition of tibialtuberosity etc. Similarly different methods of fixation have been described in the literature for high tibial osteotomy. Unilateral fixator provide limited stability with challenge in maintaining precise correction and does not permit full weight bearing to the patient. Charleny Fixator although provide fixation stability but cannot correct the over correction or under correction post operatively. Illizarov's fixator although provides multi planner correction but again is an expensive bulky device and is not much patient friendly. Similarly Tylor-Spatial Frame (Smith and Nephew) external fixator is also very expensive. So keeping in view the expectations in mind we develop, manufacture and apply A.Z (Azhar's) Fixator in the treatment of medial Compartment Osteoarthritis of the Knee Joint after laterally based closing wedge osteotomy in order to assess the results[1,7,8,11,12,13].

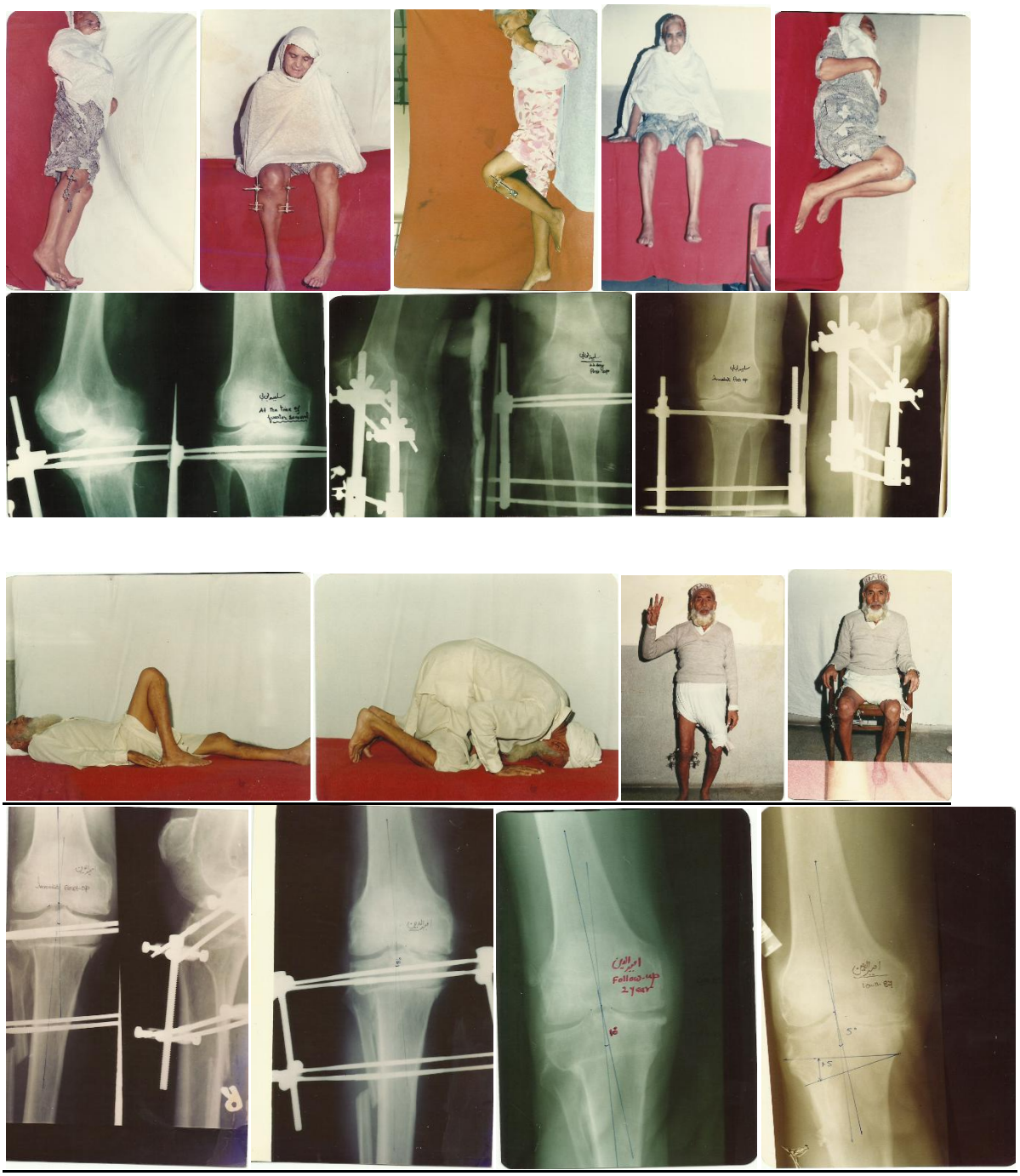
MATERIAL AND METHOD

We studied the results of High Tibial Osteotomy using A.Z External Fixator in 47 operated patients between 1988 to 1993 at Mayo Hospital Lahore and 1998 to 2010 at AIMTH, Sialkot. Out of 47 patients operated 28 patients (59.57%) were male and 19 patients (40.42%) were female the age range 55 to 72 years with an average age of 57 years. The inclusion criteria were active patients, good range of movement, stable ligament, less joint deterioration with only medial compartment osteoarthritis of knee joint and medically fit to tolerate the procedure with no cardiac or severe medical problem. The exclusion criteria was patients having lateral compartment osteoarthritis of the knee joint, severe patelofemoralarthritis, valgus knee, femoral deformity, over weight, and those who were not willing or unable to manage external fixator. All patient were evaluated clinically and radiologically both pre and post operatively. The preoperative assessment was made according to modified Baily Knee rating scale with respect to intensity of pain, stability of joint, giving away, difficulty in walking, stair climbing, use of walking aid, rising from chair, range of movement, extension lag and quadriceps wasting, the radiological assessment was made radiologically by measuring tibio femoral angle pre operatively and size of the wedge was determined preoperatively. The post operatively tibio femoral angle was assessed during every visit at 4, 6, 8 and 12 week initially and then after every 6 month post operatively. The fibular osteotomy was performed at different sites, proximal 1/3rd in 03 patients, middle 1/3rd in 40 patients, and no fibular osteotomy was performed in five patients. In all patients tibialosteotomy site was fixed with A.Z fixators.

RESULTS

Out of 47 patients operated result were rated excellent in 40 patients (85.10%) good in 03 patients (6.38%) fair in 02 patients (4.25%) and poor in 02 patients (4.25%) according to modified Baily Knee rating scale. Majority of the patients started walking independently in immediate post-operative period as soon as the pain settled and were able to perform daily living activities before the removal of external fixators. There was considerable improvement with respect to intensity of pain (10%-95%), difficulty in walking distance more than 100 yards (20%-95%), rising from chair (100%), extension lag improvement (30%-80%). The fibular osteotomy was done at proximal 1/3rd in 03 patients and middle 1/3rd in 40 patients; no fibular osteotomy was done in 5 patients. The extensor halluces longus motor branch can be seaward in fibular osteotomy but in our series no nerve palsy was observed. All osteotomies heals satisfactory. We agree with the report of Kirgis A, Alberechth that the lowest risk area is 40 to 68 mm and 160 mm distal to fibular head[(2, 4, 5).]

During follow up only one complication, infection in 5 patients (10.60%) out of 47 was noted. Out of which 3 patients (6.38%) have wound infection, and loosening of pin in 02 patients (4.25%) whereas peroneal nerve palsy, Pseud-arthrosis, delayed union, non union, loss of correction, compartment syndrome, fracture of proximal bone, loss of range of movements, wasting of quadriceps muscles, bed sore, DVT, Pulmonary embolism were not observed in our series.



DISCUSSION

The correct choice of Osteosynthsis is very important. The implant should have sufficient stability, resistance to deforming forces, maintain the mechanical axis and should have ability to over or under correct post operatively. There are only few biomechanical studies that have been published but the most reliable and absolute system is still controversial[2,17].

AgnesKirchner, et All compared four different plates, short Spacer plates, Short Spacer Plates with multi directional Screws. Long Spacer plates with multi directional screws, long medial tibial plates with locking screws. He concluded that rigid long plate fixation system with angled locking screws gives good results (02).

Miniaciet all (1989) has also developed a fixation system which is a modification of Weber Method using an AO semitubular plate with five holes, three

of them externally to the bone folded such as to allow the placement of two screws providing the system stability. Paccolaet all (1990) evaluated the semitubular plates and observed that frequent complications occurred in proximal layer of wound between the osteotomy and insertion of plates in proximal portions that leads to progressive loss of surgical correction. Another observation was the bone is incorporated into the semitubularplates holes which make it difficult to remove later on[8,9,10,17].

Spahn et al in his study of biomechanical investigation of four different fixation devices, conventional plates, angled stable plates with or without spacer, concluded that spacer implant have superior properties and angled stable plates may prevent fractures of lateral cortex. Sloffel K., Stathowiak G, et al compared the biomechanical properties of Puddu plate (Arthrex Naples, FL USA) and Tomofix Plates (Synthes, Solothurn, Switzerland). He concluded that bone plates give immediate stability but with lateral hinge fracture. The Tomifix plates showed better stability while Puddu Plates require additional fixation[14,15,18].

Zhim et Al compared the biomechanical stability of Puddu Plate, Athrex Naples USA and Hoffman external fixator (striker, Howmedica, Osteonic, Rutherford, USA) and concluded that plate fixation was superior in maintaining correction. So the results of different studies were inconclusive, the internal fixator prevents the surgeon to make post-operative alteration if required, prevent early weight bearing, require cost immobilization and another surgical procedure for hardware removal[17,18,20].

Various types of external fixator systems have been used for high tibial osteotomy having advantage and disadvantages to each other. The unilateral fixator provides limited stability with challenge in maintaining the precise correction but does not permit early full weight bearing to the patients. The Charnley Fixator although provides good initial stability but it has no ability to correct the mechanical axis post operatively and results in poor results. The reported complications with Charnley fixator are Pin track infection, non union, delayed union, peroneal nerve palsy and it also required cast immobilization after removal of fixator. 9% of cases failed to achieve valgus correction with the use of Charnley External Fixator as reported by Causeroet all. Illizarov fixator is widely used due to its advantages of multi planner stability and versatility to correct deformity at any plain. However this device is bulky, difficult to apply, expensive and not patient friendly. Although Illizarov fixator have shown excellent result having only routine complication but surgeon expertise with time to time decision of correcting the deformity alongwith bulky hardware is also an important issue[2,3,4,8,15].

So keeping in view advantages and disadvantages of different fixation devices a new fixation system (A.Z Fixator) is designed which is economical, safe, easy to apply, patient friendly and gives respectable results. The A.Z external fixator has advantages of providing stable fixation of osteotomy till union is achieved. Thus allowing early mobilization, early full weight bearing and early return to daily living activities. The AZ fixator has also the ability to correct the mechanical axis precisely post operatively as required. The problem encountered with AZ fixator is minor and can be overcome by its careful use. The advantages of AZ fixator with respect to different angles are clear. Therefore we strongly recommend the use of AZ fixator in the treatment of Medial Compartment Osteoarthritis of the knee joint in high tibial osteotomy[17,18,19,20].

CONCLUSION AND RECOMMENDATION

1. It is very cost effective.
2. We can correct post operatively over correction or under correction by applying compression on one side and relieving it from the other side hence have ability to achieve post operative mechanical axis correction.
3. It promote union by applying compression hence chance of nonunion or delayed union are negligible.
4. It has sufficient strength to allow early weight bearing and implant failure is not an issue.
5. It also maintain post-operative correction rigidly and there is no chance of loss of correction at osteotomy site.
6. It also allows early range of movement exercise therefore there is no chance of knee stiffness.
7. In case of minor deformity we do not even need to perform fibular osteotomy.
8. Patient become independent early and period of hospitalization is reduced.
9. We can keep an eye on post operative quadriceps strength and patient cooperation regarding the range of movement exercise which is not possible with staples, plates and cast immobilization.
10. It does not disturb the outcome of future total knee replacement.
11. Therefore we strongly recommend the use of AZHAR's (A.Z) Fixator in the treatment of Medial Compartment osteoarthritis of the knee joint in high tibial osteotomy.

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