

# Functional Results of Valgus Intertrochanteric Osteotomy in Malunited Intertrochanteric Fractures

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## ABSTRACT

**Objective:** To evaluate the functional results of valgus intertrochanteric osteotomy in the intertrochanteric fractures united in varus malposition.

**Study Design:** Prospective Study

**Place and Duration of Study:** The present study was conducted in Orthopaedic Unit 2 Jinnah Hospital Lahore(Allama Iqbal Medical College ) between Mar 2012 to Sep 2015.

**Material and Methods:** A total 36 patients between 55-65 years of age with female to male ratio 3:1 were included in the study. All the patients were suffering from neglected intertrochanteric fractures that were treated by the local bone setters in the peripheral remote areas of Punjab. The fractures united in the varus position. All the patients were treated by valgus intertrochanteric osteotomy and fixation with Dynamic hip screw with side plate.

**Results:** There were 27female patients and 9 males ( F-M 3:1) All the patients were evaluated according to the Harris hip score ( HHS)preoperatively and postoperatively. Harris hip score improved from below 40 (poor) to 92( excellent) in 30 patients and 85( good) in 6 patients.

**Conclusion:** As far as the varusmalunion of intertrochanteric fracture is concerned. Valgus intertrochanteric osteotomy is an excellent procedure to regain the better functional outcome at the hip joint.

**Key Words:** Valgus intertrochanteric Osteotomy, Dynamic Hip Screw (DHS)

## INTRODUCTION

An intertrochanteric fracture extends between the greater trochanter and the lesser trochanter. The strong abductors (gluteus medius) are attached on the greater trochanter and strong flexors of the hip (iliopsoas) are attached on the lesser trochanter. The abnormal pull leads to the varus positioning of the proximal segment after fracture<sup>1,2,3</sup>.It usuallyoccurs in the old age people with low energy trauma in osteoporotic bones<sup>4</sup>. It is more common in female as compared to male due to more osteoporosis. There are different classification systems to classify these fractures from a stable one to an unstable situation. As the instability increasesit leads to more complications and varus deformity<sup>5,6</sup>.

In developed countries most of the complications are related to the failure of primary treatment<sup>7</sup> but in underdeveloped countries the complications are due to maltreatment and late presentation. This results in shortened, externally rotated and non weight bearing limb. This

increases the overall morbidity and mortality particularly in the old age population.

Valgus intertrochanteric osteotomy is not only indicated in the malunited fractures of intertrochanteric region but also in all the pseudoarthrosis of the fracture neck of femur with viable head, congenital coxavara, as a repositioning osteotomy in such cases where a small part of femoral head has changes of avascular necrosis, to correct a malaligned arthrodesis in varus position and as a part of shortening and lengthening procedure of upto 2.5 cm.<sup>8</sup>

Moreover in the chronic cases of slipped capital femoral epiphysis, Leg Calve Perthes disease and in certain cases of Cerebral Palsy, valgus intertrochanteric osteotomy is a viable option<sup>9</sup>. It not only correct the deformity but also convert the shearing forces into compressive ones, so that fracture is united and also the chance of joint arthrosis is reduced because of change of biomechanics into normal one<sup>10</sup>.

## MATERIAL AND METHODS

The prospective study included 36 patients who presented in the Orthopaedic OPD of Jinnah hospital ( Allamalqbal Medical College Lahore) between Mar 2012 to Sep 2015.

### Inclusion Criteria:

All the patients between 50-65 years of age with old intertrochanteric fractures united in varus malposition.

### Exclusion Criteria:

1. Already operated patients with failure of fixation
2. High risk patients with preexisting comorbidities
3. Any sign of local area infection
4. Inflammatory Arthritis of hip joint

### 5. Osteoarthritis or Osteonecrosis around hip joint

All the patients were investigated especially two orthogonal radiographs were obtained. Preoperative templating was performed on the true AP view. Deformity(varus angle) was calculated by the intersection of two central lines, one through the head and neck of femur and the other through the shaft of the femur fig 1. Preoperatively, the wedge or osteotomy angle ( $c^\circ$ ) was determined as the Pauwel angle ( $a^\circ$ ) minus the postoperative desired angle ( $25^\circ$ - $30^\circ$ ), whereas the pin insertion angle was determined as the implant angle ( $b^\circ$ ) minus the osteotomy angle ( $c^\circ$ ) fig 2. But practically the most important thing is the judgment of the surgeon preoperatively to obtain the best results.

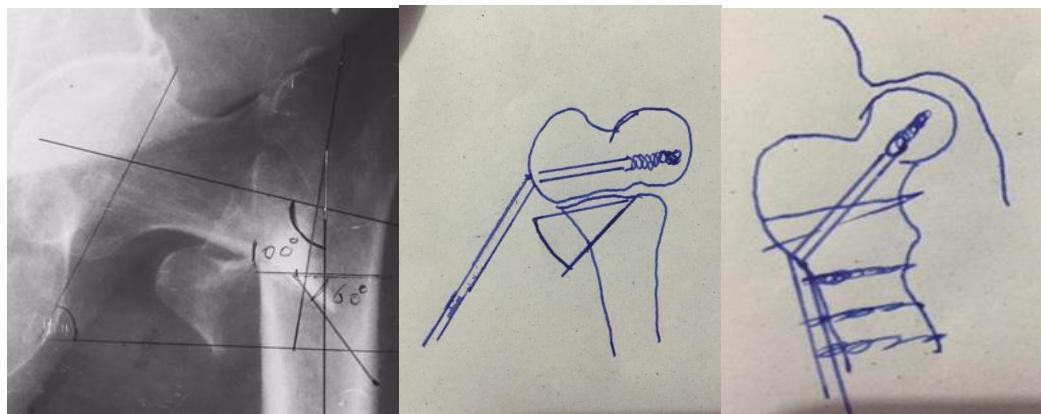


Fig 1:

(a)

(b)

(c):

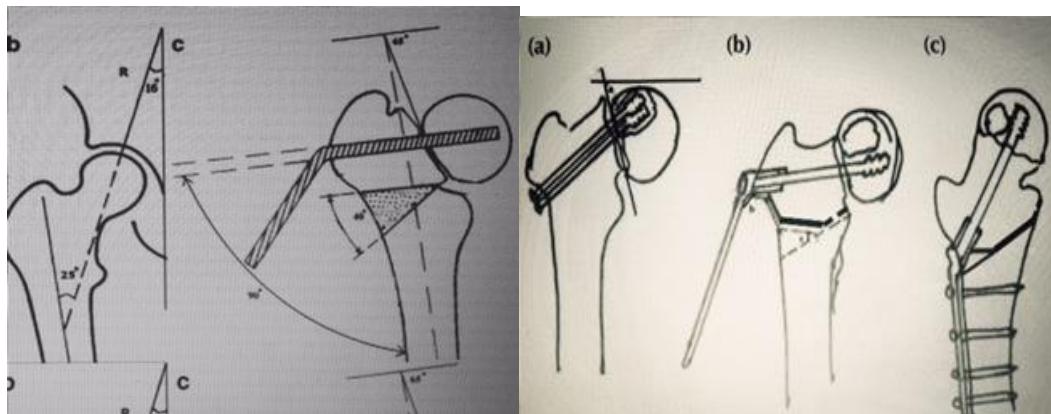


Fig. 2 (a) (b): Wedge or osteotomy angle ( $c^\circ$ ) = the Pauwel angle ( $a^\circ$ ) - postoperative desired angle ( $25^\circ$ - $30^\circ$ ) pin insertion angle = the implant angle ( $b^\circ$ ) - osteotomy angle ( $c^\circ$ )

Under spinal anaesthesia, the patient was put in the supine position upon the traction table . After drapping an incision was made on the lateral aspect of the trochanteric region. Proximal part of

the femur and the trochanteric area were exposed. With the help of fluoroscopic guidance on AP and lateral view, guide wire was introduced at the proposed site. With the help of

dynamic hip screw (DHS) triple reamer, entry portal was made. Appropriate sized dynamic hip screw was introduced. Side plate and barrel was imposed upon the DHS and approximate valgus angle was judged by the lateral distance and angle of plate from the shaft of femur (fig 2b). Oblique closing wedge valgus osteotomy just distal to the entry site of DHS was performed.Umdersized laterally based wedge removed.If more wedge is required than nibble the bone from lateral side. Valgization of the neck was achieved by closing the osteotomy and placement of the side plate with shaft of femur. Traction was loosened before the application of assembly screw and plate fixation Plate was fixed to the bone with 4.5 mm cortical screws..Position of the DHS was again checked under image intensifier with AP and lateral views. Wound was closed in 2 layers with suction drain inside

Patients were followed up for 2 weeks when stitches were removed, than monthly interval for 3 months,than at 6th month , 9th month and after 12 months. Patients were advised isometric exercises of Quadriceps, hamstrings and abductors for the first 2 months with gentle range of motion.Patients were given supplemental calcium. Vitamin D, and bisphosphonates postoperatively They were kept non weight bearing but ambulated with the help of crutches. They were allowed partial weight bearing after 8 weeks that was gradually converted to full weight bearing in the next one and half months.

Patients were observed for fracture hematoma, infection, signs of delayed union,non union and implant failure.Improvement was judged according to the Harris Hip Score.

## RESULTS

A total of 36 patients were included in the study. Among them 27 patients (75%) were female and 9 patients(25%) were male with (F-M3:1). The patients aged between 50-65 years (mean 60 years). The patients presented between 8 weeks to 4 months (mean 3 months) post injury. All patients belonged to low middle socioeconomic class and came from the remote areas. They seeked treatment from local bone setters.The fractures were malunited in varus position. There were 23 malunion on the right side(63%) and 13(36%) on the left side.

The neck shaft angle was reduced between 85°-100°(avg- 95° ).The deformity and varus angle was calculated on the true AP view .

**Table 1:**

Harris hip Score <sup>12</sup>	
Pain	44
Function	47
Range of motion	5
Absence of Deformity	4
Total	100

Grading of Harris Hip Score

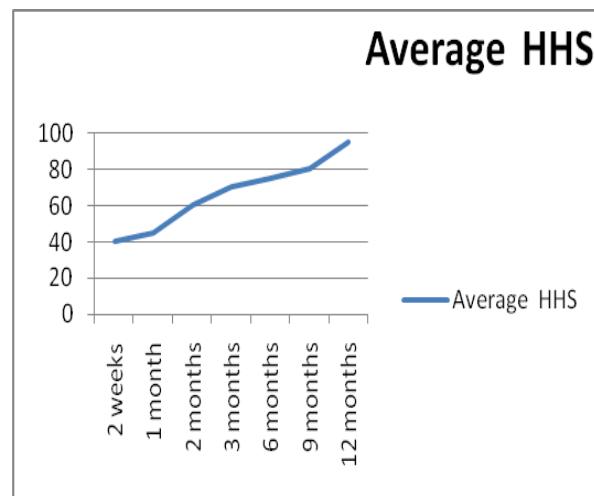
Poor < 70 Fair 70-79 Good 80-89 Excellent 90-100

**Table 2:**

Harris hip Score	
Postoperative Time Interval	Average HHS
2 weeks	40
1 m	45
2 m	60
3 m	70
6 m	75
9 m	80
12 m	92

Average Neck Shaft Angle 132°

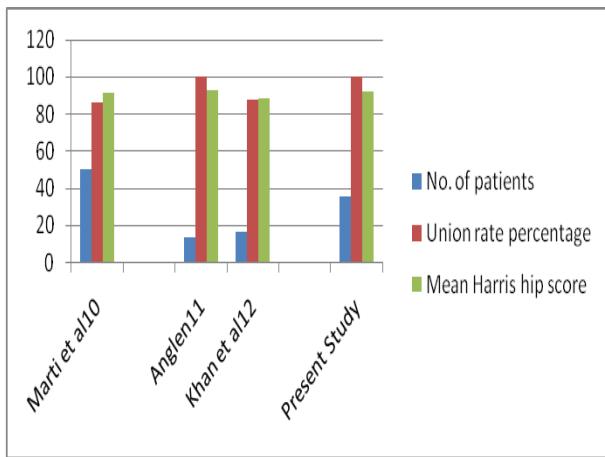
Average increase in the Limb Length 2 cm



**Table 3:** Comparison of Different Studies with the Present Study

Study	No. of patients	Union rate percentage	Mean Harris hip score
Marti et al <sup>13</sup>	50	86	91
Anglen <sup>14</sup>	13	100	93
Khan et al <sup>15</sup>	16	87.5	88
Present Study	36	100	92

The results were evaluated according to Harris Hip Score Table 1, that improved with the passage of time. Thirty patients showed excellent score (92) and six patients showed good(85) results after one year of follow up. Harris hip score showed dramatic improvement after 3-4 months post operatively that was the time when patient started full bearing weight and ambulated completely.table 2.



Limb lengthdiscrepancy improved on an average of 2 cm gain in length with correction of external rotation and abduction deformity.Only one patient showed superficial wound infection that was settled with intravenous and oral antibiotics. All the osteotomies healed uneventfully.There was no delayed union or implant failure like loosening of side plates and screw cut out. Comparison of different studies with the present one showed that the results are comparable even in the complicated and latelypresented cases table 3.

## DISCUSSION

As already discussed that the primary malunion at the intertrochanteric regions are uncommonin the developed countries and most of them results in the form of treatment failure. In our country many patients don't seek proper treatment in the hospitals but rather treated by local bone setters. There are various methods described in the literature for the intertrochanteric osteotomies at the proper place between the greater trochanter and the lesser trochanter. These methods work well in the nonunion ofthebasicervical fractures of neck of femur.All the measurements and preoperative templating were performed upon the malunitedbasicervical fractures in other studiesBut the patients who presented afterprimary non union

of the intertrochanteric fractures particularly with high comminution at the posteromedial sideoffer a great problem. Because there is no proper remaining area that will demarcate the intertrochanteric boundries. So after placing the DHS, osteotomy is done just below the entry site of screw.

Inorder to reduce the size of wedge to be removed, an oblique osteotomy is performed<sup>16</sup>. The wedge is kept undersized so that when the plate is pressed with the shaft of femur , adequate compression is achieved at the osteotomy site. The additional advantage of the oblique osteotomy and undersized wedge resultsin more gain in the limb length due to less amount of wedge removal.Instead of the valgization angle, this is the thickness of the wedge that determine the gain in the limb length<sup>17</sup>.The tensile forces are converted into compressive forces when the valgus angle is achieved by the closure of the wedge and placement of plate with the shaft of femur. This result in improved and normal biomechanics at the hip joint preventing future arthrosis<sup>18</sup>.

Different implants are used for the fixation of the osteotomy including the fixed angled devices but we have used 135°Dynamic Hip Screw with side plate. The screw has better purchase in the neck of femur The fixed angled devices like angled blade and plate are more demanding procedures and there are more chances of displacement of osteotomy site<sup>19,20</sup>. The contraindications for valgization intertrochanteric osteotomy are already mentioned in the exclusion criteria. The present study showed better results as far as the facilities and rehabilitation is concerned in our setup.

The chronic degenerative changes develop in the hip joint in the old malunited intertrochanteric fractures<sup>21</sup>, so that it is important to notice such changes in the radiograph preoperatively. Every attempt should be made to operate such patients as soon as possible so that good results can be achieved.

## CONCLUSION

Malunitedintertrochanteric fractures are challenging problems for Orthopaedic surgeons. These fractures should be treated as soon as possible ideally primarily at the the time of injury because complication rate is increased. However valgization osteotomy at the intertrochanteric regionfixed with 135°Dynamic hip screw with side plate is the most appropriate solution and less costly procedure to correct the deformity, gain in

the length and to ambulate the patients. It showed comparable functional results with limited resources.

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