



# PELVIC SUPPORT OSTEOTOMY WITH ILIZAROV METHOD;

## OUTCOME OF PELVIC SUPPORT OSTEOTOMY WITH ILIZAROV METHOD IN PATIENTS UNDERGOING GIRDLE STONE PROCEDURE.

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**ABSTRACT... Objectives:** To determine the outcome of pelvic support osteotomy with Ilizarov method in patients undergoing Girdle stone procedure in terms of pain relief and limb length discrepancy. **Study Design:** Descriptive case series. **Setting:** Department of Orthopaedic and Spine Surgery, Ghurki Trust Teaching Hospital/Lahore Medical & Dental College, Lahore. **Duration of Study:** Six months (19-11-09 to 18-05-10) for sample collection and follow up for next one year after the procedure. **Materials and Methods:** Forty five patients having hip joint problems were included. The radiographs would include plain radiographs of the pelvis in neutral and single limb standing position and the femur of involved side to assess the pelvic obliquity. Surgery was performed in the supine position under spinal anesthesia. A proximal femoral osteotomy was performed at the level of ischial tuberosity. The other distal femoral osteotomy was performed to lengthen and adjust the mechanical axis. Both these osteotomies were then stabilized with Ilizarov external fixator. The standard rate of distraction is 1 mm/day for lengthening. **Results:** There were 30 male patients and 15 were female patients with male to female ratio was 2:1. The mean  $\pm$  SD between the ages was  $23.69 \pm 7.80$  years. Among all patients, 43 patients had pain relief and 41 patients of limb length discrepancy. **Conclusion:** By using the Ilizarov technique, we could prevent the valgus effects created by the valgus extension osteotomy while achieving lengthening of the femur through the distal osteotomy in the femur. It is an excellent technique for those patients who are not fit for total hip replacement.

**Key words:** External Fixators, Ilizarov Technique, Girdle Stone Procedure, Bone Lengthening.

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## INTRODUCTION

Hip joint is a ball and socket joint and helps in movement and it is one of the largest weight bearing joint of the body. Septic arthritis of the hip joint results in destruction of the joint.<sup>1</sup> A problematic condition in orthopaedics is post operative infection and it is a challenge both for the patient and operating surgeon. These problems can be treated by complete resection of dead and necrotic bone. After debridement, proper antibiotic therapy is given either intravenous or oral followed by reconstruction.<sup>2,3</sup>

In infected total hip replacement, implant is removed then intravenous antibiotics are administered, afterwards, redo total hip replacement is done.<sup>4,5</sup> In recurrent cases of hip joint infections, excision arthroplasty is the

treatment of choice. Occasionally, arthrodesis of the hip is required for immunocompromised patients and patient having antibiotic resistance.<sup>6,7</sup>

The common signs and symptoms of girdle stone procedure and neonatal hip infection is pain, trendlenburg gait, shortening of limb, and unstable hip.<sup>8,9</sup> The common causes of unstable hip are congenital dysplasia of hip or ignored or maltreated hip dislocation, end result of infective arthritis, avascular necrosis of the head of femur and post polymyelitis paralysis and secondary hip dislocation. There is either loss of bone from proximal femur or limb length discrepancy or both due to unstable hip irrespective of the cause.<sup>10,11</sup>

As most of these patients are young<sup>10</sup>, the treatment options are total hip replacement and

pelvic support osteotomy. The draw backs of total hip replacement in adults are revision arthroplasty, recurrent dislocation of hip joint, total restriction of sit and squat and high cost of implant. Considering these draw backs, the procedure which restores limb length discrepancy, abductor pull and improving trendlenburg gait of the patient is pelvic support osteotomy.

Pelvic support osteotomy described by Ilizarov is a double level osteotomy with the help of Ilizarov external fixator. The level of proximal osteotomy at ischial tuberosity for correction of stability and distal osteotomy at the level of distal femur for correction of mechanical axis.

It has been studied that pain disappeared in 92% of the patient and limb length discrepancy eliminated in all patients (100%).<sup>10,12,13</sup> Considering all the above mentioned benefits, it was decided to conduct a study on pelvic support osteotomy to evaluate the outcome in our population, so that patients can be managed in a better way. The objective of the study was to evaluate the outcome of pelvic support osteotomy with Ilizarov method in patients undergoing girdle stone procedure in terms of pain relief and limb length discrepancy.

## MATERIALS AND METHODS

### Study design

Descriptive case series.

### Setting

The study was conducted in Department of Orthopaedic and Spine Surgery, Ghurki Trust Teaching Hospital/Lahore Medical & Dental College, Lahore.

### Study Duration

Six months (19-11-2009 to 18-05-2010) for sample collection and follow up for next one year after the procedure. Mean time for removal of Ilizarov external fixator is 6 months to 9 months.

### Sample size

The calculated sample size was 45 cases, with 7% margin of error, 90% level of confidence taking expected percentage of pain relief with

pelvic support osteotomy with Ilizarov method i.e. 92% and elimination of limb length discrepancy was 100% in patients undergoing girdle stone procedure.

### Sampling technique

Non-probability purposive sampling.

### Sample Selection

Age range 16-45 years

Either sex

### Inclusion Criteria

Arthritis of the hip joint due to infection, degenerative changes and metabolic disturbances on radiographs

Neglected developmental dysplasia of the hip (DDH) on radiographs

Post-traumatic avascular necrosis on radiographs

Fracture dislocation of the hip joint on radiographs

Status previous of girdle stone procedure on radiographs

### Exclusion Criteria

Rheumatoid arthritis (assessed by ESR >20 and positive RA factor)

Ankylosing spondylitis (on X-ray)

Psoriatic arthritis (arthritis accompanied by skin lesion)

### Data Collection

Patients fulfilling the inclusion criteria, admitted through Outpatient Department were included in this study. Written informed consent along with other information like name, age, gender was recorded.

The radiographs was done including plain radiographs of the pelvis in neutral and single limb standing position and radiograph of the femur of involved side to assess the pelvic obliquity and then osteotomy was planned accordingly.

Surgery was performed under spinal anesthesia by two senior orthopaedic surgeons. The level of osteotomy in proximal femur was determined by image intensifier with the hip in maximum adduction. A proximal femoral osteotomy was performed at the level of ischial tuberosity. Three

schanz were inserted into proximal femoral segment and the arch was used to hold the schanz. The distal segment was fixed with one half ring and two full rings and distal osteotomy was done in distal femur.

The distal osteotomy was done in distal femur for lengthening and adjust the mechanical axis of limb. The distraction rate was 1 mm/day for lengthening. It was started during hospital stay and council the patient to continue distraction after discharge. The mechanical axis was also measured during follow up and Ilizarov external fixator was adjusted accordingly. Clinically, pain was measured by the Denis pain scale (P1 considered as pain relief) and elimination of limb length discrepancy (as per operational definition) was measured in centimeters by measuring tape every 4 weeks till 20 weeks. Ilizarov external fixator was removed after 6 months to 9 months. Final evaluation was done after 6 months of removal of Ilizarov external fixator.

**Data Analysis**

The collected data was transferred and analyzed by using SPSS version 11. The quantitative data e.g. age was analyzed by using mean and standard deviation (SD). Variable of quantitative data e.g. gender, pain relief and elimination of limb length discrepancy was assessed by using frequency and percentage. Data was presented separately for pre-operative diagnosis.

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**RESULTS**

The study was conducted in Department of Orthopaedics and Spine Surgery, Ghurki Trust Teaching Hospital Lahore on 45 patients during six months. There were 30 males (66.7%) and 15 females (33.3%). Male to female ratio was 2:1 (Table-I).

Sex	Frequency	Percentage
Male	30	66.7
Female	15	33.3

**Table-I. Distribution of patients according to sex (n = 45)**

Male to female ratio = 2:1

The patients shown in Table-II were divided into three age groups. The first age group patients aged 16-25 years (n = 31) 68.9%, in second age group patients aged 26-35 years (n = 10) 22.2% and in the third age group patients aged 36-45 years (n = 4) 8.9%. The mean±SD between the ages was 23.69±7.80 years.

Age in years	Frequency	Percentage
16 – 25	31	68.9
26 – 35	10	22.2
36 – 45	4	8.9

**Table-II. Distribution of patients according to age (n = 45)**

Mean±SD = 23.69±7.80

Table-III showed the preoperative diagnosis. Preoperative diagnosis of avascular necrosis of femoral head was recorded in 22 patients (48.8%) and status previous Girdlestone in 8 patients (17.7%).

Preoperative Diagnosis	Frequency	Percentage
Avascular necrosis (AVN)	22	48.8
Status previous (S/P) Girdlestone	8	17.7
Neglected fracture neck of femur	4	8.8
Tuberculous arthritis	4	8.8
Fracture dislocation of hip	3	6.6
Osteoarthritis	2	4.4
Ankylosis of hip joint	1	2.2
Developmental dysplasia of hip	1	2.2

**Table-III. Distribution of patients according to preoperative diagnosis (n = 45)**

Distribution of patients according to pain relief and limb length discrepancy was recorded. Among all patients, 43 patients (95.5%) had pain relief and in 41 patients (91.2%), limb length discrepancy was eliminated (Table-IV).

	Frequency	Percentage
Pain relief	43	95.5
Limb length discrepancy	41	91.2

**Table-IV. Distribution of patients according to pain relief and limb length discrepancy (n = 45)**

The complications were observed in 12 patients out of total 45 patients which were knee stiffness in 4 (8.8%) patients, pin tract infection in 4 (8.8%) patients, residual abductor lurch in 3 (6.6%) patients and non-union at proximal osteotomy site in 1 (2.2%) patient (Table-V).

	Frequency	Percentage
Knee Stiffness	4	8.8
Pin tract infection	4	8.8
Residual Abductor Lurch	3	6.6
Non-union at proximal osteotomy site	1	2.2

**Table-V. Distribution of patients according to complications (n = 45)**

**DISCUSSION**

The purpose of Pelvic Support Osteotomy (PSO) is to relieve the pain, limb length discrepancy and trendlenburg’s gait in patients having Girdle Stone procedure due to infective arthritis or developmental dysplasia of the hip. It is a useful procedure in adult patients as in our study, the age range of patients was 16-45 years of age, this result is same as stated by the Koacaoglu et al<sup>11</sup> and Milch<sup>14</sup> that pelvic support osteotomy is especially beneficial in patients over 15 years of age as in younger patients, there is loss of angulation with the growth of bone that may require another surgery at the skeletal maturity.

In pelvic support osteotomy, the proximal femoral osteotomy at level of ischial tuberosity helps to increase range of abduction, support femur at ischial tuberosity, correction of lumbar lordosis and increase the distance of the greater trochanter from the pelvis help to improve the trendlenburg’s gait.<sup>11</sup>

In pelvic support osteotomy, proximal femoral fragment is more horizontal to increase the surface areas between proximal femoral segment and lateral wall of the pelvis. The disadvantage of this procedure is delayed consolidation of bone, prolong duration and poor patient compliance.<sup>12</sup>

Initially, the pelvic support osteotomy was introduced by Hass<sup>15</sup> for instability of hip joint. In early technique, hip stability was achieved with

the help of support between the proximal femoral fragment and pelvis. Later on, subtrochanteric valgus osteotomy was introduced by Milch<sup>14</sup> to improve stability of the hip joint but prevent excessive valgus. Excessive valgus at the osteotomy level lead to impingement of proximal femoral segment against the pelvis. The impingement of the proximal femoral segment decreases adduction and produces pain.

There is controversy about level of pelvic support osteotomy. Some authors suggested a proximal femoral osteotomy with the insertion of the lesser trochanter into the acetabulum, others proposed an osteotomy at a lower level and leaving a longer proximal segment.<sup>14</sup> We preferred the osteotomy at a more distal site as recommended by schanz.<sup>16</sup> The goal about osteotomy level is to produce a good soft tissue interposition between pelvis and proximal femoral segment. With a distal osteotomy, the weight bearing areas occur at the level of ischial tuberosity.

Ilizarov described a double femoral osteotomy, the proximal osteotomy at the level of ischial tuberosity to eliminate hip adduction. The distal femoral osteotomy in distal femur to realign the limb and to correct limb length discrepancy. Hip adduction can be eliminated by over correction with the valgus osteotomy by 15°. This over correction put the limb in a fixed abduction position in relation to the pelvis. To solve this problem, Ilizarov described a distal osteotomy in distal femur for realignment of knee joint.<sup>17,18</sup> Ilizarov also introduced extension of the proximal femoral segment to correct fixed flexion deformity of the hip joint. Hips mechanics improved by these modifications. The valgus alignment of the proximal femoral segments lead the greater trochanter and abductor muscles more laterally to increase the length of abductor lever arm. The valgus alignment of proximal segment produces a fulcrum at medial end. The more distal the proximal femoral osteotomy, the more medial the fulcrum. The result of all these modifications is to improve his abduction mechanism. Correction of limb length discrepancy is important to improve gait. The most common complications in pelvic support osteotomy is knee stiffness and pin tract

infection. In our study pin tract infection occurs in patients which is comparable with Emara et al.<sup>12</sup> Recurrent pin tract infection was treated by antibiotics. In our study knee stiffness occur in patients and mean loss of knee flexion was 20° to 30° which is comparable with Kocaoglu et al.<sup>11</sup> who have reported loss of knee flexion about 24° and Rozbruch et al.<sup>19</sup> who have reported a loss of knee flexion about 10°.

Pelvic support osteotomy with Ilizarov Technique is a good option for patient undergoing girdle stone procedure. It is also a good technique in patients who are not good candidate for total hip replacement because of recurrent chances of infection and due to poor bone and muscle quality.

## CONCLUSION

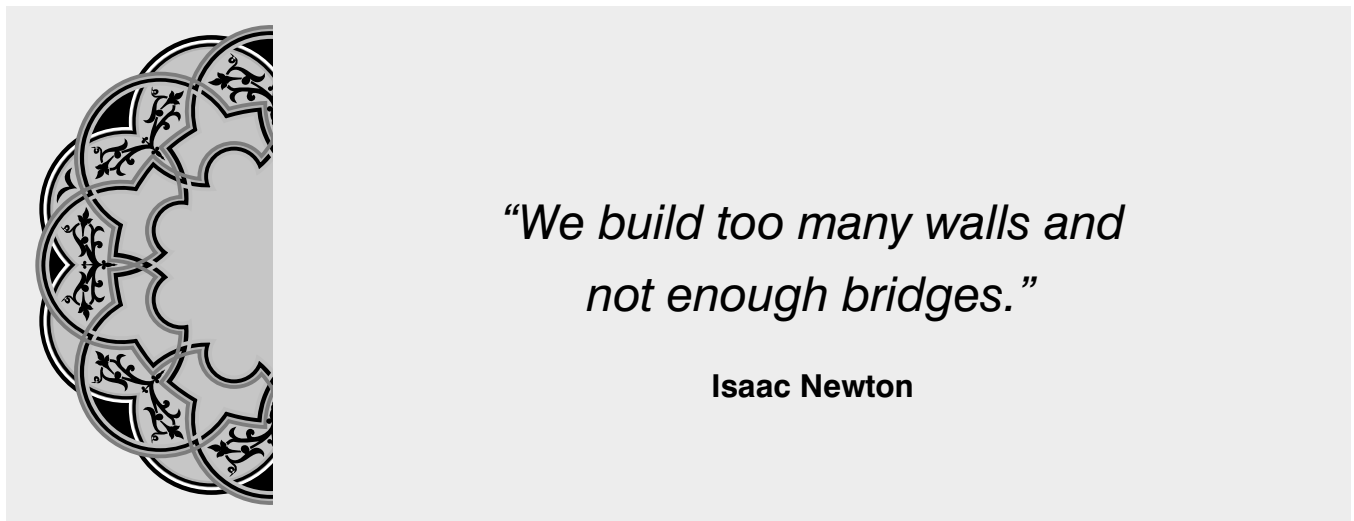
Pelvic support osteotomy is a good treatment option for patients undergoing girdle stone procedure due to infective arthritis of the hip, neglected developmental dysplasia of hip and post traumatic avascular necrosis of the hip joint. Pelvic support osteotomy helps in improvement of gait, posture and walking ability. It is a procedure of choice for those patients who are not fit for total hip replacement. The preoperative planning involves a careful clinical and radiological assessment as well as other treatment options. The plan of surgery is on the basis of information taken from clinical examination and X-ray evaluation, these will provide the information about: (a) the level of the proximal osteotomy; (b) the amount of valgus, derotation and degree of extension at the level of proximal osteotomy; (c) the level of the distal osteotomy, and (d) the amount of varus and how much lengthening is required at the distal osteotomy.

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**AUTHORSHIP AND CONTRIBUTION DECLARATION**

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2	Sajjad Iqbal	Data collection	
3	Iqra Fayyaz	Statistical Analysis	
4	Amer Aziz	Guidence in writing the introduction & designing of the project	