



## CLINICAL OUTCOME OF SURGICAL DISLOCATION OF HIP AND OSTEOPLASTY FOR FEMOROACETABULAR IMPINGEMENT

### Orthopaedics

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### ABSTRACT

**Background** – Femoro-acetabular impingement causes pain and limitation of movement in the hip. Cam impingement is caused by a mis-shapen femoral head with a reduced femoral head neck offset. Surgical Hip Dislocation was described by Ganz to effectively expose the hip without damaging its blood supply. Pincer impingement is caused by acetabular retroversion and anterior over coverage. Surgical hip dislocation enables 360° visualization of the femoral head and acetabulum. An osteoplasty removes the bump at the femoral head neck junction to recreate the offset for impingement free movement.

**Materials and Methods:** The study was done under the department of orthopedics at SRG hospital Jhalawar (Rajasthan). 15 patient of hip impingement having pain and limitation of range of movements are operated with surgical dislocation of hip and osteoplasty. The follow-up period was 12 to 24 weeks. Functional outcome is assessed by Harris hip score.

**RESULTS** – we achieved goals of treatment in almost all patients. Blood supply of femoral head was maintained in all patients. No trochanteric nonunion is seen. Pain, hip range of movement and harris hip score was significantly improved in all patients.

**CONCLUSION:** Surgical dislocation and osteoplasty of femoral head is an excellent option for Femoro-acetabular impingement of hip without interruption of vascularity of femoral head. Surgical dislocation hip also useful for evaluate any labral tear, synovial biopsy, SCFE. Surgical dislocation of hip reduces pain, improve the hip motion and give good to excellent results and limit disabilities in patients.

### KEYWORDS

surgical dislocation, osteoplasty, cam and pincer FAI, Harris hip score

### INTRODUCTION

Femoro-acetabular impingement (FAI) is the pathophysiological condition of the hip which may increase the risk of hip arthrosis. This is a dynamic condition of the hip, which produces deformity at the femoral head-neck junction, which creates abnormal intra-articular contact areas, causing early acetabular labrum and articular cartilage damage. Damaged acetabular articular cartilage and extensive labrum damages predispose biomechanical changes and reduce hip mobility.

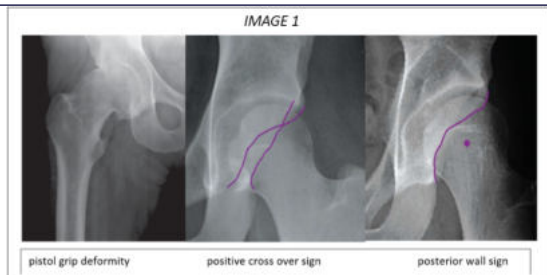
FAI presented in three basic forms based on localization of bone changes: cam, pincer and mixed. Mix FAI is a combination of both cam and pincer type in which morphological changes present on both acetabulum and the femoral head-neck junction. The Cam-type of FAI is described as an aspherical femoral head configuration or cam at the femoral head-neck junction. In 1965, tilt deformity described by Murray that small deformities of the hip from childhood would inevitably lead to osteoarthritis. After that in 1975 Stulberg et al., described pistol grip deformity. Cam-type FAI, pistol grip<sup>1</sup> (*image 1*) or tilt deformity of the femoral head<sup>2</sup> can be seen in SCFE, Perthes disease, AVN Hip and poorly healed femoral neck fractures.

Pincer impingement is a deformity at the acetabulum, 2 major known causes of this condition are either acetabular retroversion or anterior over coverage. Global over coverage may occur in protrusio acetabuli or in coxa profunda and the local overcoverage may occur in the trauma of the acetabuli, retroversio acetabuli and in redirection osteotomies performed in case of deformed pelvis.

When femoral neck impact on the edge of the acetabulum the counter cup lesions<sup>3,4</sup> produce on posterior wall of the acetabulum, that generates a system of levers arm, and produce counter impact of the femoral head on the posterior wall of acetabular cartilage<sup>3,4</sup>.

### Radiographic findings of pincer FAI

1. Positive crossover sign, (*image 1*)
2. Posterior wall sign, (*image 1*)
3. Ischial spine sign



Reverse Periacetabular Osteotomy is a good procedure to correct the underlying deformity that improves hip pain, and range of motion very well. Surgical dislocation of the hip and osteoplasty is an appropriate method to treat FAI. Surgical dislocation and osteoplasty improve hip pain and mobility, as well as prevent arthrosis of hip<sup>5,6</sup>.

In the technique described by Ganz et al.<sup>7</sup>, surgical dislocation of the hip provides excellent 360° visualization of the femoral epiphysis and acetabulum and thus minimizing the risk of AVN, this technique is based on the preservation of the medial femoral circumflex artery pathway.

### AIMS AND OBJECTIVE

The study aims to describe the technique of surgical dislocation of the hip with a trochanteric flip osteotomy by posterior approach and to observe the clinical results of our patients at midterm follow-up.

In an article, Crock's<sup>8</sup> stated that theoretically if we dislocate the human hip joint atraumatically in the early phases of disease, blood supply of the femoral head can be preserved. Its use has been reported in the treatment of various hip pathology: -

- Arthroplasty
- Rheumatoid synovitis
- synovial chondromatosis
- Pigmented villonodular synovitis
- Acetabular labrum repairing
- Treating/grafting surface cartilage problems
- Joint debridement
- resharping of femoral head and top of the femur bone

**METHOD:-**

The study was done under the department of orthopedics from June 2019 to dec 2021 at SRG hospital and medical college Jhalawar, Rajasthan. 15 patient of hip impingement (10 males and 5 females, 8 left and 7 right hip) having pain and limitation of range of movements are operated with surgical dislocation of hip and osteoplasty.

The mean age was 20 years. Out of 15 patients, 7 were aged below 15 years and 5 were above 20 years of age, and the rest in between 15 to 20 years. We followed up these cases up to 12 to 24 weeks. At different follow-up patient was assessed radiologically & clinically. Functional outcome is assessed by Harris hip score.

**The inclusion criteria were:-**

1. several months of groin pain with positive impingement test
2. the presence of clear radiographic & MRI changes

**The exclusion criteria were:-**

1. Patient's age >40 years and unfit patient.
2. Extensive cartilage damage.
3. Anterior hip subluxation.
4. Anterior and posterior cartilage damage (coup-counter coup).

**Preoperative planning:-**

All patients were thoroughly assessed including history recording, physical examination, PAC. Radiographs was taken AP, frog-leg lateral, a cross-table lateral, and a 45-degree modified Dunn view of the hip and MRI were also done in all patients.

**Surgical Techniques:-**

The patient took on the lateral decubitus position, after all, aseptic preparations, a 15 cm longitudinal incision was given, centering over the greater trochanter. After exposure to the greater trochanter, osteotomy was performed, with a maximal thickness of osteotomy about 1.5 cm made with an oscillating saw. The exit of osteotomy should be performed anterior to the most posterior insertion of gluteus medius muscle fiber at its proximal limit. As the osteotomy of the greater trochanteric completed, the gluteus Medius tendon, the long tendon of the gluteus minimus, and the vastus lateralis remain attached to this mobile fragment.

Now Osteotomized trochanter was lifted, further soft tissue release was done, and mobile fragment was retracted anteriorly to facilitate the exposure of the hip capsule. We can Flex, abduct, and externally rotate the hip for further exposure. Now piriformis tendon was identified and entered in between the interval of the piriformis and remnants of gluteus minimus, it improves exposure of the hip capsule. This is a safe interval, which preserves vascularity of the femoral head because the anastomosis between the deep branch of the MFCA and inferior gluteal artery runs deep to the piriformis muscle.

We performed capsulotomy according to side of the hip, for a right hip Z-shaped capsulotomy, and a left hip inverse Z-shaped capsulotomy.

Now round ligament cut with the help of angled scissors. During dislocation, care must be taken to prevent iatrogenic femoral shaft fracture at the time of rotation. The femoral head was then dislocated by abduction, flexion, and external rotation at the hip, now femoral head was pushed posteriorly allowing a 360° visualization of the acetabulum. Now osteoplasty can be performed. Here we can access the acetabulum allowing inspection of the labrum and cartilage defects. The femoral head and neck evaluation and management can be done by adduction of hip. Hemispherical plastic templates can be used to assure proper bone resection. Bone resection (osteoplasty) was done by using a nibbler. we don't prefer to use high speed-burr to prevent thermal necrosis. During osteoplasty, care must be not to osteotomies more than 30% of the thickness of the neck. Intraoperatively after reduction of the hip, anterior and posterior impingement test was also performed, to check the adequacy of excision of cam and to check proper movement of the head against the acetabular labrum. After reduction of hip, capsular closure is very important to prevent further dislocation. The trochanteric fragment is reduced in proper anatomic position, it was fixed with two 4.5 mm cannulated cancellous screws, the screw was directed toward the lesser trochanter. Wound closed in routine manner.

**Rehabilitation After Surgical Hip Dislocation:-**

Passive range of movement was initiated immediately with the use of a

continuous passive motion machine for 4 weeks to decrease the risk of hip joint arthrosis. The patients are touch weight-bearing for the first 4 weeks, Full weight bearing was allowed at 6 weeks. Hip flexion is limited to 90°. Muscle weakness may persist for 3 months after surgery so abductor and quadriceps rehabilitation continued till full recovery.

**Complications Associated with Surgical Hip Dislocation**

Surgical hip dislocation is a safe procedure having very less complication. Potential complications include:-

- Infection
- heterotopic ossification (HO),
- AVN hip,
- trochanteric non-union in trochanteric flip osteotomy
- Neck and shaft of femur fracture,
- thromboembolic disease,
- Nerve injury in posterior approach to hip.

The most common complication of surgical dislocation was infection and heterotopic ossification. Mild heterotopic ossification did not require treatment.

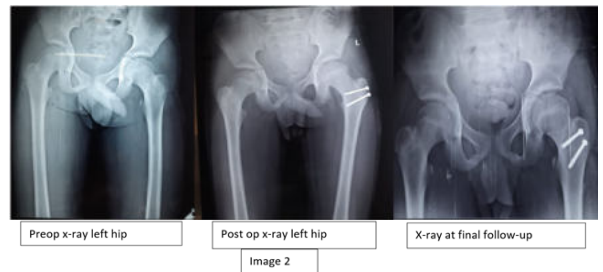
**RESULTS**

The average operating time from skin incision to trochanteric fixation was 55 minutes. The mean blood loss was 280 ml. The trochanteric osteotomy healed within 6-8 weeks. We found no evidence of avascular necrosis in any case. There have been no postoperative infections and trochanteric nonunion.

Labrum lesions were located in the anterior or anterosuperior region of the acetabulum. CAM at femoral head-neck junction was resected, damaged part of the labrum edge was osteotomized and labrum was refixed. In pincer-type FAI patients, we noticed softening, hyperemia, and fissuration of the acetabular articular cartilage. In these patients' chondral lesions occurred in two places: one, in the impact area of acetabulum labrum and the counter-cup acetabular cartilage lesions, in the posteroinferior acetabular region.

In CAM type of FAI CAM deformity was located anterior and mostly, superior part. The radiological and clinical outcome measured.

**Radiological outcome (image 2)**



**Clinical outcome:-**

we noted improvement in flexion, adduction and internal rotation of the hip joint and the groin pain significantly reduced in nearly all the patients. (images 3)

**Image 3, clinical outcome**



We clinically evaluated results in operated patients with FAI, hip

internal rotation improved up to 25-35 degree which was preoperatively 0-20 degree. Hip flexion improved up to 90-100 degree, preoperatively which was 80-100-degree, groin pain improved in near all patients, impingement test was positive in all patients preoperatively, which became negative intraoperative and at final follow-up.

Mean Harris hip score (adjusted to total score of 100) was preoperative 68, postoperative improved up to 91 at average 15 month follow up.

**Table 1, n= number of patients.**

PARAMETERS	PREOPERATIVE	POSTOPERATIVE
HIP INTERNAL ROTATION °	0-20°	25°-35°
HIP FLEXION°	60°-80°	80°-100°
GROIN PAIN (n)	14	1
POSITIVE IMPINGEMENT TEST(n)	14	0

#### DISCUSSION:-

In the study by Kumar and Aggarwal<sup>9</sup>, they showed radiological changes in 50 symptomatic patients. Malhotra *et al.*<sup>10</sup> have shown comparable results with the western literature in the measurement of alpha and beta angles and the offset ratio. However, there are few published reports from India related to the treatment of FAI.

In the study by Madhuri *et al.*<sup>11</sup> they operated eight for osteoplasty for various indications with a short follow-up.

Surgical dislocation can be done through an anterior, lateral, or posterior approach, it depends on the surgeon's preference and detailed knowledge of vascular anatomy. Epstein<sup>12</sup> performed primary open reduction for traumatic dislocations by the posterior approach. After incising the short external rotators, and releasing the gluteus Medius muscle at the greater trochanter if needed, he reported an incidence of AVN hip 5.3%, in comparison to 18% with the anterior approach. According to Epstein, we should avoid anterior approach, since ligation of the ascending branch of the lateral circumflex artery risks further decrease in remaining blood supply to the femoral head<sup>12</sup>.

In a study by Trueta and Harrison<sup>13</sup> he reported that there is no blood supply to the femoral epiphysis from the lateral circumflex femoral artery.

In a study by Swiontkowski *et al.*<sup>14</sup> for the treatment for Pipkin fractures, compared the anterior and posterior approaches and found that there is no interruption of blood supply of the femoral head by anterior approach. With this anterior approach, they estimated a shorter operating time, no iatrogenic avascular necrosis, less estimated blood loss, and better exposure of the femoral head but may increase the incidence of heterotopic ossification.

Traumatic dislocation causes injury to the nutrient vessels which is extraosseous, and probably extracapsular. The incidence of AVN hip in traumatic posterior dislocations are higher than anterior dislocations<sup>12,15</sup>.

We described Surgical dislocation to hip which is an anterior dislocation using low-grade controlled trauma for a few hours of time which is less than critical time for dislocation. Here all rotators are left intact which protects the MFCA.

Although some investigators had described role of arthroscopy of hip, showing good results in the management of intra-articular pathologies such as labral tears, loose bodies and early osteoarthritis, but the technique is somehow difficult and have long learning curve.

#### CONCLUSION:-

In this article, we presented surgical dislocation of hip for FAI, this technique allows excellent visualization of the femoral head (almost 360°) and provides complete access to the acetabulum, without damage to vascularity of femoral head. we believe this method to be an excellent therapeutic method in the treatment of patients with all types of femoro-acetabular impingement. Utilization of this method can solve all bone and soft tissue problems in patients with femoro-acetabular impingement aimed to prevent early osteoarthritis of the hip. This study indicates that osteoplasty using the technique of controlled surgical hip dislocation is a good option to treat FAI with very few complications.

#### REFERENCES

- Harris WH. Etiology of osteoarthritis of the hip. *Clin Orthop Relat Res* 1986; 213: 20–33.
- Murray RO. The aetiology of primary osteoarthritis of the hip. *Br J Radiol* 1965; 38(455): 810–24.
- Ganz R, Parvizi J, Beck M, Leunig M, Notzli H, Siebenrock KA. Femoroacetabular impingement: a cause for osteoarthritis of the hip. *Clin Orthop Relat Res* 2003; 417: 112–20.
- Siebenrock KA, Schoeniger R, Ganz R. Anterior femoroacetabular impingement due to acetabular retroversion. Treatment with periacetabular osteotomy. *J Bone Joint Surg Am* 2003; 85-A(2): 278–86.
- Bedi A, Kelly BT. Femoroacetabular impingement. *J Bone Joint Surg Am*. 2013; 95(1): 82–92.
18. Leunig M, Beaulé PE, Ganz R. The concept of femoroacetabular impingement: current status and future perspectives. *Clin Orthop Relat Res*. 2009;467(3):616–22
- Ganz R, Gill TJ, Gautier E, Ganz K, Krügel N, Berlemann U. Surgical dislocation of the adult hip a technique with full access to the femoral head and acetabulum without the risk of avascular necrosis. *J Bone Joint Surg Br*. 2001;83(8):1119–24
- Crock HV. An atlas of vascular anatomy of the skeleton and spinal cord. London: Martin Dunitz Ltd, 1996
- Kumar R, Aggarwal A. Femoroacetabular impingement and risk factors: A study of 50 cases. *Orthop Surg*. 2011;3:236–41.
- Malhotra R, Kannan A, Kancherla R, Khatri D, Kumar V. Femoral head-neck offset in the Indian population: A CT based study. *Indian J Orthop*. 2012;46:212–5.
- Madhuri V, Dutt V, Samuel K, Gahukamble AD. Intra-operative femoral head vascularity assessment: An innovative and simple technique. *Indian J Orthop*. 2011;45:231–5.
- Epstein HC. Traumatic dislocations of the hip. *Clin Orthop* 1973;92:116-42
- Trueta J, Harrison MHN. The normal vascular anatomy of the femoral head in adult man. *J Bone Joint Surg [Br]* 1953;35-B:442-61.
- Swiontkowski MF, Thorpe M, Seiler JG, Hansen ST. Operative management of displaced femoral head fractures: case matched comparison of anterior versus posterior approaches for Pipkin I and Pipkin II fractures. *J Orthop Trauma* 1992;6:437-42.
- Jaskulka RA, Fischer G, Fenzl G. Dislocation and fracture dislocation of the hip. *J Bone Joint Surg [Br]* 1991;73-B:465-9.