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## How common it is? How often we miss it????

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### Abstract

**Background:** Coxa profunda or deep acetabular socket is a variant of cam type of femoroacetabular impingement (FAI). It is a common radiographic finding in patients with painful hip which is often missed. The diagnosis of this condition plays a vital role in the approach towards the treatment and functional outcome of the treatment. The purpose of this study is to determine the prevalence of coxa profunda.

**Materials and Methods:** In this study a total of 117 pelvis with bilateral radiographs out of which 77 patients with positive radiographic findings for coxa profunda are analysed retrospectively. The study was done at R.L. Jalappa Hospital and Research Centre, Tamaka. Kolar. Patients with positive radiographic findings are called and taken thorough history and examination done to know whether patients are symptomatic or not.

**Results:** Among 117 patient radiographs taken for the study 77 patients are diagnosed with coxa profunda. The results were analysed on clinical findings like positive stress test for pincer type of femoroacetabular index and also parameters like medialization of floor of fossa acetabuli, increase in lateral centre edge angle (CE), decrease in acetabular index (tonni's angle), decrease in femoral head extrusion index, femoral acetabular over coverage are taken into consideration for the diagnosis of this condition.

**Conclusion:** Coxa profunda is a common variation of pincer type of femoroacetabular impingement which is often missed.

**Keywords:** Coxa Profunda, Pelvis radiograph, Ilio ischial line

### 1. Introduction

Femoro acetabular impingement is the presence of aberrant morphology involving the proximal femur or and the acetabulum resulting in the abnormal contact between them, leading to the development of lesion in the labrum and the adjacent acetabular cartilage [1]. The early and chondral lesions continue to progress and result in degenerative changes. It presents as femoral sided (cam), acetabular sided (pincer), or in combination [2]. Adequate knowledge and identification and hip pathomechanics is important as this may alter the diagnosis and management of the condition.

Cam type of impingement is caused by an aspherical head or decreased head neck offset, increase internal shear stress with acetabular stress within the acetabulum as the hip is flexed and internally rotated. It is of two types 1) Presence of osseous bump (pistol grip deformity, antero posterior deformity) 2) Coxa vara [3].

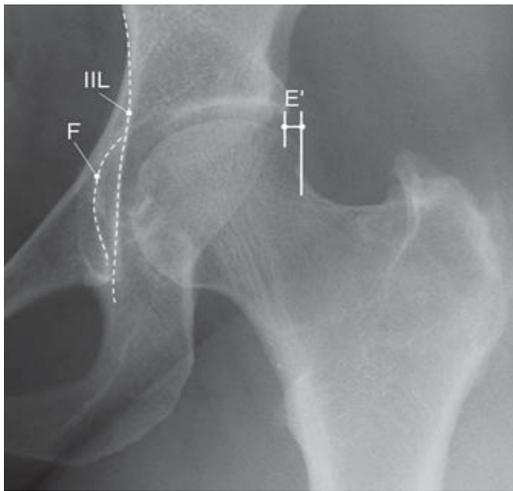
Pincer type of femoroacetabular impingement is characterized by repetitive impaction type of injury between the prominent acetabular rim and femoral head neck region<sup>4</sup>. It is of general and focal types. Coxa profunda and protrusio acetabuli are two general types.

Coxa profunda is defined as being present when the floor of acetabular fossa touches or medial to the ilioischial line [5, 6]. This condition differs from protrusion acetabuli where the femoral head projects medial to ilioischial line. Thus a hip with coxa profunda is classically defined as "deep hip" or "deep socket" [2].

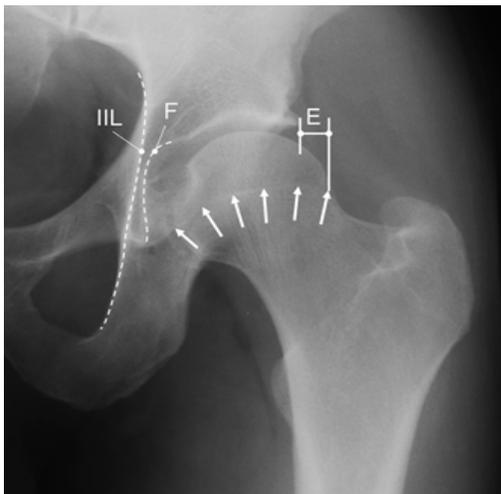
This condition is most commonest cause for painful hip which is often missed clinically and missed on radiograph. It is one of the cause for osteoarthritis hip and in most of the cases where this condition is missed is diagnosed as osteoarthritis hip [7-11].

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**Fig 1: Normal**



**Fig 2: Coxa Profunda**

**Materials and Methods**

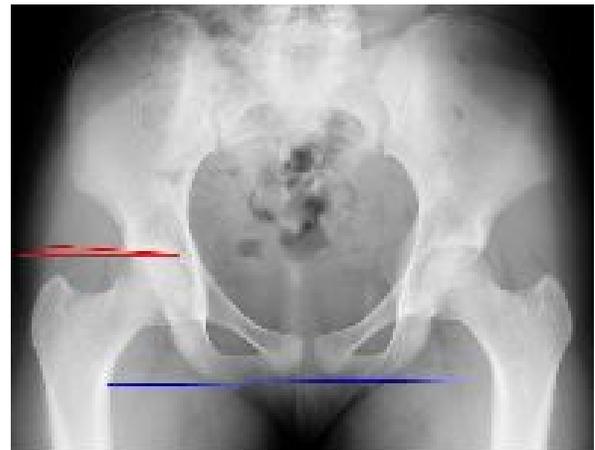
This is a retrospective cross-sectional study done at R.L. Jalappa Hospital and Research Centre, Tamaka, Kolar between January 2016 to July 2016. The inclusion criteria includes all radiographs with positive coxa profunda findings. The exclusion criteria includes radiographs with negative findings. All patients have been subjected to a standard questionnaire based on validated hip outcome score [12], clinical examination.

**Results**

In the cohort of 117 patients 77(65%) patients are diagnosed to have coxa profunda. Among these 77 patients in 55(72%) patients have the acetabular fossa touching the ilioischial line and in 22(28%) patients it is medial to ilioischial line. It was bilateral in 10 patients. It is 50 females and 27 male patients. The prevalence of coxa profunda is more in females than compared to males and more common in young active adolescent individuals. The parameters like increased lateral centre edge angle (LCE), decrease in acetabular index (tonni's angle), decrease in femoral head extrusion index, increased femoral acetabular over coverage are noticed in the radiographs.

A total of 77 patients have been called to the outpatient department and analysed retrospectively. Out of which 77 patients are diagnosed as coxa profunda radiologically. In 58 (75%) patients the symptoms of painful hip still persists even

after treatment with analgesics and anti-inflammatory drugs. The other 19(25%) patients are symptomless as their pain is subsided using analgesics and anti-inflammatory drugs. In all the 77 patients the impingement stress test are positive for pincer FAI.



**Fig 3: Acetabular Index**



**Fig 4: LCE Angle**

In 15 patients the lateral centre edge angle is more than 40° and acetabular index is near 0°. These patients are severely symptomatic and also complains of restriction of hip mobility even before the symptoms appear. In all these patients presented with groin pain and on examination, positive impingement stress test for coxa profunda i.e pain on extension and external rotation of hip.

**Discussion**

Coxa profunda is often used to diagnose pincer FAI. Radiographically, coxa profunda is the finding of acetabular fossa medial to ilioischial line. However the relative position of the acetabular fossa to the pelvis may not be indicative of acetabular coverage. We therefore determined the prevalence of coxa profunda and evaluated associations between coxa profunda and other radiographic parameters of acetabular coverage commonly used to diagnose pincer FAI.

Anterior posterior radiograph of pelvis is an important diagnostic tool for coxa profunda. The antero-posterior pelvic radiograph are performed with patient in supine position, 15° of internal rotation of lower extremities according to the standardized protocol [5]. The radiograph tube is at a distance of

120cm. The X ray beam is perpendicular to the X ray table and centered midway between superior border of pubic symphysis and anterior superior iliac spines. Patient age and sex are recorded. A common pitfall that occurs is a formation of a pseudo-deep acetabulum which can be produced on an AP radiograph that is centered over the hip, so one should take precise care of the radiograph technique.

The parameters like increased lateral centre edge angle (LCE), decrease in acetabular index (Tonni's angle), decrease in femoral head extrusion index, increased femoral acetabular over coverage are noticed in the radiographs.

The LCE angle was formed by a vertical line referenced off the pelvis and the line connecting the femoral head centre with lateral edge of acetabular sourcil [13]. An LCE angle of greater than  $40^\circ$  indicated over coverage or pincer FAI, while LCE angle less than  $25^\circ$  indicated acetabular undercoverage [14]. The acetabular index is formed by a horizontal line referenced off the pelvis and the line connecting the medial point of sclerotic zone with lateral edge of sourcil [13]. The acetabular index between  $0^\circ$ - $10^\circ$  was considered normal, while the index less than  $0^\circ$  indicated pincer impingement and an index greater than  $10^\circ$  indicated acetabular dysplasia [5]. The acetabular retroversion and focal acetabular coverage evaluated using two qualitative measurements the crossover and posterior wall signs. The crossover sign was positive when the posterior wall of the acetabulum crossed the anterior wall, signifying acetabular retroversion, relative anterior over coverage, or posterior undercoverage [15, 16]. The posterior wall sign was positive when the posterior wall was medial to the center of femoral head, indicating posterior acetabular deficiency.

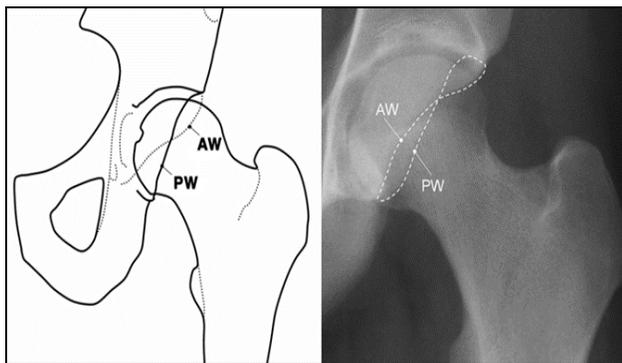


Fig 5: Cross over Sign

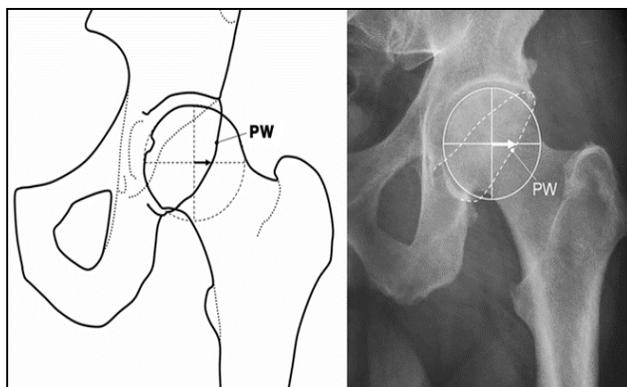


Fig 6: Prominent Posterior Wall

In a study done they found the presence of acetabular line crossing the ilioischial line i.e coxa profunda was to be strongly associated with sex, as it was seen 71% females when as compared to 19% males. It is also found more common in

individuals less than forty years compared with older individuals [17]. Additionally the prevalence of coxa profunda in females has shown to be approximately 50% in one large study [18].

In our study we found a prevalence of 75% in females and 25% in males. Only 18% of our cohort was aged above 45 years. In any of our cases femoro acetabular impingement is not diagnosed priorly.

The prevalence of coxa profunda in groups of patients with symptomatic femoro acetabular impingement has reported to range from 14% to 58% [2, 19, 25]. In our current study about 58(75%) patients diagnosed to have coxa profunda presented with symptomatic femoro acetabular impingement. The rest 25% patients with coxa profunda are asymptomatic but nevertheless that some of these patients could have structural hip disease (femoro acetabular impingement or acetabular dysplasia) with an atypical clinical presentation.

Similarly we found that coxa profunda consistently coexist with crossover sign and posterior wall sign in most of the patients. This shows that deep set acetabulum is often associated with greater posterior acetabular coverage.

In conclusion, coxa profunda is defined by fossa medial to ilioischial line is a common radiographic finding which is often missed. So careful assessment of the patient by thorough clinical and radio graphical analysis helps in diagnosing the condition and will give better an outcome of treatment.

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