

# Pincer Impingement



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## KEYWORDS

- Pincer impingement • Femoroacetabular impingement • Hip arthroscopy
- Subspine impingement • Os acetabuli

## KEY POINTS

- Pincer impingement occurs when pathologic contact occurs between the overhanging acetabular rim and the femoral neck.
- Several morphologic variations may predispose to a pincer-type impingement mechanism.
- Successful surgery depends on a careful preoperative examination and analysis of the imaging.

## INTRODUCTION

Abnormal acetabular morphologies have been recognized as a structural problem for decades. The term pincer impingement was defined in 2003 as “the result of linear contact between the acetabular rim and the femoral head-neck junction.”<sup>1</sup> It is a subset of femoroacetabular impingement (FAI). In the ensuing decade, substantial research has been published on pincer impingement, but there remains significant controversy surrounding the diagnosis and treatment of this disorder and its associated conditions.

This article details the modern understanding of the morphology, diagnosis, and arthroscopic treatment of pincer-type femoral acetabular impingement. Many of the current controversies (listed in **Table 1**) are addressed through a review of all the currently available literature.

## ACETABULAR ANATOMY

The ilium, ischium, and pubic bones come together at the triradiate cartilage, which, in addition to the acetabular cartilage, forms the acetabulum. Initially, this complex is made up largely of hyaline cartilage, which undergoes progressive ossification.<sup>2–4</sup> The overall shape of the acetabular complex is not thought to change appreciably as this ossification occurs.<sup>3,5</sup> Fusion occurs between 13 and 18 years of age, and,

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<b>Table 1</b>	
<b>Current controversies in pincer impingement</b>	
Diagnosis	What is the evidence supporting the most widely used radiographic markers of pincer impingement?
Surgical Indications	What is the best treatment option for global acetabular retroversion? What is the current role of prophylactic surgery?
Technique	What are the best methods of intraoperative evaluation of acetabuloplasty? Labral considerations during acetabuloplasty?
Associated Conditions	What is the role of subspine impingement? What is the best treatment method for associated os acetabuli?

once complete, the bony socket is augmented by a layer of articular cartilage and the acetabular labrum.<sup>2-5</sup>

In addition to the architecture of the acetabulum, the orientation within the body plays a pivotal role in normal hip mechanics. The average anteversion of the acetabulum is 19° with a range of approximately 10° to 30°; however, any variation of the orientation of the pelvis within the body must be taken into consideration when determining this angle.<sup>6-12</sup> The reported normal values for acetabular inclination range from 30° to 50° with an average of approximately 39°.<sup>10,13</sup>

## DEFINITION AND PATHOMECHANICS

Pincer impingement is the abnormal contact between the acetabular rim and the femur caused by acetabular overcoverage.<sup>1</sup> The overcoverage of the acetabulum can further be defined as focal, global, or true retroversion of the acetabulum.<sup>14</sup> Global overcoverage is predominantly caused by coxa protrusio or coxa profunda. In distinction, focal rim lesions, or cephalad retroversion of the acetabulum, results in a repetitive impaction pattern injury of a normal femoral neck against an abnormal area of acetabular overcoverage. In all cases of pincer impingement, the repetitive abutment of the femoral head-neck junction on the abnormal acetabular rim leads to compression and intrasubstance tearing of the anterosuperior labrum. This condition can lead to calcification of the labrum and further impingement.

In contrast with cam impingement, there is typically less chondral delamination present with isolated pincer impingement. However, with continued abutment, a posteroinferior contrecoup pattern of cartilage loss of the femoral head and acetabulum occurs.<sup>15,16</sup> In clinical practice, isolated pincer impingement is rare, and the FAI is almost always caused by coexisting cam and pincer structural abnormalities.

## DIAGNOSIS

The clinical signs and symptoms as well as the physical examination findings of pincer impingement are often sensitive, but not specific. Common presenting complaints can include stiffness, pain, or limited range of motion, and typical examination findings can include a positive impingement sign, or other provocative range-of-motion tests.<sup>17</sup> When the diagnosis is suspected, radiographic imaging is indicated. A systematic approach should be implemented when evaluating and ordering both plain films and advanced imaging. It is important to confirm that the radiograph is properly centered over the pelvis, and that there is no abnormal tilt.

Many radiographic measurements have been proposed to diagnose pincer impingement (Table 2). Many of these measures were developed to analyze acetabular

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