Femoral acetabular impingement (FAI)-From radiographs to indirect MR arthrogram

Poster No.: C-2516
Congress: ECR 2013
Type: Educational Exhibit
Authors: J. valakada¹, S. Deep¹, S. SHARMA², K. Vijay¹, R. MALHOTRA³; ¹Delhi/IN, ²NEW DELHI, DELHI/IN, ³DELHI, DELHI/IN
Keywords: Arthritides, Arthrography, MR, CT, Conventional radiography, Pelvis, Musculoskeletal system, Musculoskeletal joint
DOI: 10.1594/ecr2013/C-2516

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR’s endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method ist strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys’ fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org
Learning objectives

To elucidate the spectrum of FAI

To evaluate the role of indirect MR arthrogram in evaluation of FAI

Background

FAI syndrome is a relatively newly described entity in musculoskeletal hip imaging. Many of the undiagnosed cases of chronic hip pain have been retrospectively diagnosed to be FAI and so the identification of the entity is important since there are specific management protocols for this entity. The spectrum ranges from the common CAM type variety to the rare PINCER type with the mixed type and secondary types in between. Plain Xrays can suggest some changes in FAI but CT and MR are required for the complete evaluation[2]. The femoral head neck angle can be evaluated in CT and MR[1]. By indirect MR arthrogram technique, the acetabular labrum can be better evaluated for tears. Indirect arthrogram has the advantages of lesser radiation exposure, being nontraumatic and no chance of introducing infection when compared to direct arthrogram[2]. The degree of cartilage loss can also be evaluated.

Imaging findings OR Procedure details

All patients with suspected FAI were subjected to plain xray AP of pelvis and hip. MRI was performed in patients having the Xray findings suggestive of FAI. MR was performed with surface body coils for symptomatic hip from iliac crest to the level of lesser trochanter using 1.5T scanner (Siemen, Avanto, Erlangen, Germany) or 3 Tesla scanner (Philips). Indirect MR arthrogram was performed by injecting contrast iv and patient asked to move the affected limb lightly for 10 minutes before the scan[4]. In addition to the conventional sequences other sequences like MEDIC, 3DSPACE were also used to evaluate the cartilage and ligaments[4].

Three types of FAI are recognized. The first involves an excess of bone along the upper surface of the femoral head: this is known as a Cam deformity, the name is short for camshaft as the form of the femoral head and neck resembles a camshaft. The second is due to an excess of growth of the upper lip of the acetabular cup and is known as the Pincer deformity. The third is a mixture of the preceding two forms. The result of any of these deformities is increased friction between the acetabular cup and femoral head which may result in pain and loss or reduction of hip function.
Plain radiographs are the initial radiological investigation in suspected FAI. Standard conventional radiographic imaging for femoroacetabular impingement includes two radiographs: an anteroposterior pelvic view and an axial cross-table view of the proximal femur. For the anteroposterior pelvic radiograph, the patient is in the supine position with the legs 15° internally rotated to compensate for femoral antetorsion and to provide better visualization of the contour of the lateral femoral head-neck junction.

Cam FAI shows the lateral deformity of the head as the "lateral bump" (fig. 1). There is also increased acetabular coverage determined by the femoral extrusion angle of more than 25%. Pincer FAI shows the relative small femoral head and the acetabular overcoverage seen as the figure of eight appearance of acetabular margins (fig. 7).

NCCT can determine the acetabular coverage and the deformities. Alpha angle is plotted and the angle measuring more than 55 degree signifies enlarged head in cam FAI (fig. 5). The acetabular coverage can be measured and focal overcoverage of acetabulum can be seen in pincer FAI (fig. 6).

MRI is used to determine the labral status. MR Arthrogram can be done to look for the acetabulum, labrum, and ligaments. By indirect MR arthrogram technique, the acetabular labrum can be better evaluated for tears. Indirect arthrogram has the advantages of lesser radiation exposure, being nontraumatic and no chance of introducing infection when compared to direct arthrogram. The degree of cartilage loss can also be evaluated.

In indirect MR arthrography, the contrast is given intravenously and the patient is asked to exercise the joint for about 15 minutes after giving the contrast intravenously. The contrast will extravagate into the joint which was active and reach the joint cavity. If there is any break in cartilage or any tearing ligaments, the contrast will collect in the defect and can be made visible.

MR arthrogram can show the labral tears. In cam FAI, the tears occur mainly in the anterosuperior labrum (fig. 3). In pincer FAI, the tears are common in the posterior labrum (fig. 2).

**Images for this section:**
Fig. 1: 34 yr old male with hip pain for 1 year. Plain radiograph hip showing hump deformity of rt femoral head with mild enlargement of head suggestive of CAM type FAI.
Fig. 7: Plain radiographs showing the acetabular over coverage in the posterior acetabulum
**Fig. 5:** oblique axial ct showing increased alpha angle (more then 55 degree) suggestive of cam FAI
Fig. 6: Oblique axial CT cuts showing posterior acetabular over coverage in CAM FAI
Fig. 3: Indirect arthrogram of a 30 yr old male with enlarged right femoral head with hump deformity showing superolateral labral tear in CAM type FAI
Fig. 2: indirect MR arthrogram of a 39 yr old female with left hip pain showing left acetabular overcoverage suggestive of pincer FAI.
Conclusion

Conventional and indirect MR is instrumental in determining the degree of acetabular over/undercoverage and the degree of tear and the amount of cartilage loss in FAI each of which is important for the clinician in the appropriate management of specific cases.

References


Personal Information