



ROLE OF ARTHROGRAPHY IN ASSESSING THE CLOSED REDUCTION IN TREATMENT OF DDH.

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INTRODUCTION

Arthrography is medical imaging technique to evaluate conditions of joints. It can either be done directly or indirectly. Indirect arthrography is a technique in which contrast material is injected into the blood and eventually accumulates into the joint. With direct arthrography, the contrast material is injected directly into the joint.¹ Direct arthrography is the preferred over indirect method because it is better for distending the joint and imaging small internal structures allowing for better evaluation of diseases or conditions of the joint. It is often performed only if a non-arthrographic exam is felt to be lacking in assessing a joint abnormality.¹

There are various ways to carry out direct arthrography. Conventional direct arthrography of a joint is often done under fluoroscopic

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ABSTRACT: Developmental dysplasia of the hip (DDH) is one of the most common musculoskeletal problems in newborns. It occurs in 1 in 1000 live births affecting girls more than boys and more associated with breech presentation and positive family history. **Objectives:** To evaluate the effectiveness of arthrography in assessing the closed reduction of DDH. **Study Design:** Observational. **Setting:** This study was conducted at Allied Hospital, Faisalabad, Pakistan, **Period:** From December 2013 to January 2016 and comprised patients of either gender. **Material & Methods:** DDH was diagnosed with help of clinical examination and radiological investigations. Arthrography was performed and images were taken in different positions of the hip which were evaluated and findings noted. **Results:** Out of 50 hips, 34 had normal looking head of femur while 16 patients had head of femur which was either smaller than normal or of abnormal shape. Shape of acetabulum was found normal in 41 hips. Normal labrum was present in 44, inverted in 4 and everted in 2 patients. Ligamentum teres was found hypertrophic in 6 patients. Normal head coverage was present in 40 while in 10 hips head of femur was lateralized ≥ 4 mm. No external obstruction to reduction was encountered. In 44 cases reduction was concentric and eccentric reduction was noted in 6 patients. **Conclusion:** Arthrography is of special help in assessing the reduction of hip in DDH as it provides information about shape of head of femur, shape of acetabulum, labrum, ligamentum teres, containment of the hip, coverage of head and external obstacles to reduction.

Key words: Arthrography, Closed Reduction, DDH.

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control to guide and evaluate the injection of contrast material directly into the joint cavity. In some cases, ultrasound can also be used to guide the procedure. Alternate methods of direct arthrographic examinations may also use magnetic resonance imaging (MRI) or computed tomography (CT) following contrast material injection into the joint.¹

Imaging with x-rays exposes a part of the body to a small dose of ionizing radiation to produce images of the inside of the body. X-rays are the oldest and most frequently used form of medical imaging.¹

Fluoroscopy makes it practicable to see bones, joints and internal organs in motion. When iodinated contrast medium is injected into the joint, it fills the entire joint and becomes clearly visible

during x-ray evaluation, allowing the radiologist to assess the anatomy and function of the joint. Although the injection is typically monitored by fluoroscopy, the examination also commonly involves taking radiographs for documentation. The images are most often saved and viewed electronically.¹

In congenital dislocation of the hip the degree and the type of displacement are crucial factors, both in planning the treatment and in evaluating the results of treatment. When closed methods succeed in reducing a dislocation of the hip without interposition of soft tissues between the head and acetabulum the result will clearly be different from that obtained when such interposition persists. Arthrography is helpful in making this demarcation.^{2,3}

Patients and Methods

This study was done at Allied Hospital Faisalabad from December 2013 to January 2016.

50 hips in 43 patients were enrolled in this study. All the patients with unilateral or bilateral DDH under the age of 2 years which were clinically relocatable were enrolled in the study. All the patients were admitted in orthopedic ward and investigated for fitness for anesthesia. Diagnosis of DDH was confirmed with clinical examination and radiological investigations.⁴ Then patient was taken to operating room. Under general anesthesia and full aseptic measures⁵, findings of clinical examination were confirmed, patient was draped and adductor tenotomy⁶ was done. Under fluoroscopic guide a 10-cm long 22G lumbar puncture needle⁷ inserted into the hip joint through anterior approach.⁷ Saline was pushed in to confirm the position of the needle and then the diluted radio-opaque dye (3cc)² was injected into the hip joint and images taken in extension, 90-degree flexion 45-degree abduction with external rotation and adduction with internal rotation^{3,5,7} and variables like shape of head of femur, shape of acetabulum, labrum, ligamentum teres, containment of the hip, coverage of head and external obstacles to reduction^{2,5,6,7,8,9} were noted. If hip was concentrically reduced hip spica cast in human position was applied. Xray were taken

for analysis of assessment of reduction. Hip spica cast was changed at 6 weeks and x-rays done to see the stable reduction. Hip spica remained in place for 3-6 months after which it was removed and patients were advised to wear abduction brace^{6,9} and bear weight.

RESULTS

Out of 50 hips, 34 had normal looking head of femur while 16 patients had head of femur which was either smaller than normal or of abnormal shape. Shape of acetabulum was found normal in 41 hips. Normal labrum was present in 44, inverted in 4 and everted in 2 patients. Ligamentum teres was found hypertrophic in 6 patients. Normal head coverage was present in 40 while in 10 hips head of femur was lateralized ≥ 4 mm. No external obstruction to reduction was encountered. In 44 cases reduction was concentric and eccentric reduction was noted in 6 patients.



Figure-1. Pre-op radiograph of DDH



Figure-2. Arthrogram after closed reduction



Figure-3. Post-op radiograph showing concentric reduction

DISCUSSION

Plain radiographs can only show the osseous relationship of the abnormal joint while producing no information about the soft tissue structures and their position like the cartilaginous head of femur, fibrocartilaginous labrum and the capsule. Arthrography, by defining these transradiant structures allows the more explicit assessment to be made of type and the degree of displacement. Arthrography is also helpful in determining the cause of failure or redislocation if it occurs and further planning of the treatment.^{2,3,5,7}

Arthrography is helpful in diagnosing “(1) whether mild dysplasia is present, (2) whether the femoral head is subluxated or dislocated, (3) whether manipulative reduction has been or can be successful, (4) to what extent any soft structures within the acetabulum may obstruct with complete reduction of the dislocation, (5) the condition and position of the acetabular labrum (the limbus), and (6) whether the acetabulum and femoral head are developing normally during treatment”^{2,5,10}

Arthrography can be done by any methods described in the literature i.e.⁸

- 1) Anterior approach
- 2) Superior approach
- 3) Medial approach

The choice of methods depends on the operating surgeon to which he is more used to or has the expertise of.³ A lumbar puncture needle is used to carry out the procedure. After the needle has

pierced the capsule, sterile water or saline is injected. If the needle is in the joint the water or saline flows freely. When the needle is correctly placed, 1 to 3 milliliters of diluted radio-opaque dye is injected. Injecting too much of the dye can distend the joint, obscure the free edge of limbus or obscuring the slight filling defects.^{8,11}

Radiographic images are taken with hip in neutral rotation, full internal rotation and external rotation with abduction. Any of the slight irregularities in the outline indicate abnormality if shown in the images taken in two or more positions.^{5,8}

The images with hip in internal rotation outlines the relationship of joint structures with anteversion corrected. Images with hip in external rotation and abduction show the best position for reduction and any abnormality or inconsistency in these images specifies soft tissue interposition even if the head appears to lie in the acetabulum.

In the arthrograph of the normal hip the labrum is outlined by the passage of the contrast medium into the space between the capsule and the lateral surface of the labrum. The outline of the joint is smooth and there is no persistent pooling of the contrast medium nor any filling defect.^{5,7,8}

On the basis of arthrograms of the abnormal hips, the displacement can be of three types depending on the degree of displacement.⁸

- 1) Primary instability
- 2) Partial displacement or subluxation
- 3) Complete displacement or dislocation which may be tight or loose.

Another important factor in assessing the quality of reduction is how much stable is the reduction which can be assessed manually by determining the safe zone of Ramsay as wide, moderate or narrow safe zone.^{2,6,9}

Difficulties and Complications

A few restraints were encountered during the procedure. If the stilette was left in while introducing, the needle did not choke and when entered into the joint, it may lodge into soft tissues either placed normally or abnormally. It was

manifested by the obstruction to the free flow of saline. Then the needle was placed to have a free flow of saline. There was no case of joint irritation, infection or stiffness.

CONCLUSION

Arthrography is of remarkable help in assessing the reduction of hip in DDH as it provides information about shape of head of femur, shape of acetabulum, labrum, ligamentum teres, containment of the hip, coverage of head and external barrier to reduction.

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