Surgical Management of Acetabular Dysplasia in Adolescents with Neglected DDH

A Systematic Review

For Partial Fulfillment Of Master Degree In Orthopedic Surgery

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Ziad Khaled Abdallah

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List of Abbreviations

Abb.	Full term
ACEA	Anterior center-edge angle
AI	Acetabular index
DDH	Developmental dysplasia of the hip
HHS	Harris Hip Score
LCEA	Lateral center edge angle
LFCN	Lateral femoral cutaneous nerve
OA	Osteoarthritis
OCDS	Osteochondral defects
PAO	Periacetabular osteotomy
RAO	Rotational acetabular osteotomies
TD	Teardrop
THA	Hip arthroplasties
TPO	Triple Pelvic Osteotomy
VCA	Vertical-center-anterior

INTRODUCTION

Developmental dysplasia of the hip (DDH) is a developmental disorder of hip joint resulting in sublaxation or dislocation of the hip secondary to many causes which may be mechanical factors & capsular laxity[1,2]. DDH is the cause of osteoarthritis in 20%- 40% of patients presented with hip osteoarthritis (OA).

Young adults with neglected DDH or late presentation of DDH developed hip acetabular dysplasia which presented by chronic disability, pain and diminished function and lead to early secondary osteoarthritis [3].

Hip dysplasia is unstable ball & socket which characterized by shallow acetabulum, degeneration of hyaline articular cartilage due to tear in acetabulum labrum and narrowing of joint space. [4]

The optimal treatment of acetabular dysplasia which is presented in adolescence age remains controversial. There are different surgical techniques in management of adolescent acetabular dysplasia which may depends on different factors rather than age, such as degree of sublaxation or dislocation, presence of labral tears, excessive femoral anteversion or deformity and development of arthritis in hip joint. [5]

This systematic review discuss those surgical techniques and compare between them in the age of adolescence and young adults before development of OA in order to delay

occurrence of OA and the need to arthroplasty, and to determine the best outcome with the least complications. [4,5]

There are different surgical procedures to manage acetabular dysplasia in adolescents include Periacetabular osteotomy (PAO), Rotational acetabular osteotomies (RAO), pericapsular (pemberton osteotomy), spherical (Wagner osteotomy), salter innominate osteotomy, double innominate osteotomy and triple innominate osteotomies (tonnis) & hip salvage procedures (chiari & shelf). [6]

AIM OF THE WORK

The aim of this study to discuss different techniques of surgical management of adolescent acetabular dysplasia and compare between them as regard post-operative pain, clinical & radiological improvement of femoral head coverage,complications (infection, femoral and sciatic nerve palsies), early post-operative rehabilitation.

Periacetabular osteotomy (PAO), Rotational acetabular osteotomies, pericapsular (pemberton osteotomy), spherical (Wagner osteotomy), salter innominate osteotomy, double innominate osteotomy and triple innominate osteotomies (tonnis), hip salvage procedures (chiari & shelf) all are different techniques of pelvic osteotomies for management of adolescent acetabular dysplasia.

Combined hip arthroscopy and osteotomy approach had been evolved as it potentially improve the post-operative clinical function especially in patients with labral tears. To achieve the aim of this study, we formulated the following research questions:

A. What are the types of osteotomies done in periadolescent age?

B. What are the differences between them regarding clinical improvement, radiologically, postoperative complications and outcome?

C. Does arthroscopy combined to PAO add improvement to clinical outcome of the patients?

REVIEW OF LITERATURE

Anatomy of the hip joint:

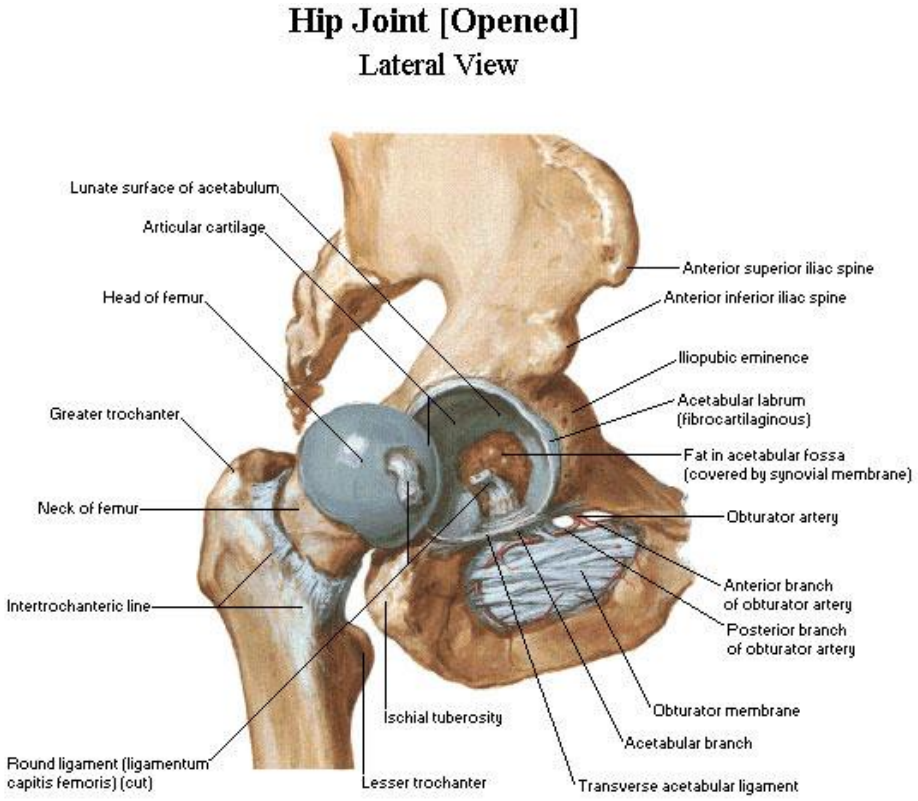

Figure (1): Anatomy of hip joint. (8)

The hip joint is diarthrodial (ball & socket) constrained joint between head of the femur and acetabulum which gave the hip joint its congruity. The Acetabulum is a deep, circular socket formed on the outer edge of the pelvis formed by the junction of three bones: ilium, ischium and pubis, A fibrocartilagenous lining called the labrum is attached to the

acetabulum and further increases the depth of the socket and give more stability. [6]

Acetabulum is supported by two columns of bone, described by as an inverted Y as shown in figure (2).

The anterior column is composed of the bone of the iliac crest, the iliac spines, the anterior half of the acetabulum and the pubis.

The posterior column is the ischium, the ischial spine, the posterior half of the acetabulum, the dense of bone forming the sciatic notch. [6,7]

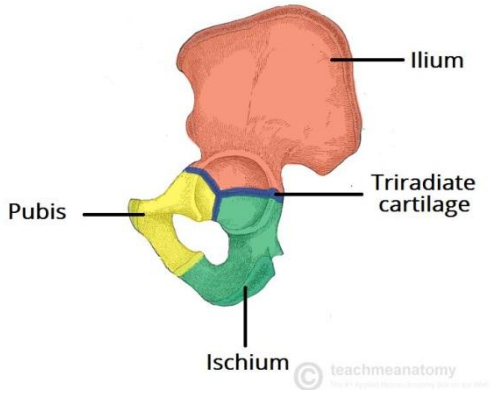

Figure (2): Showing ossification of triradiate cartilage. [9]

Proximal femur part of hip joint:

It is made up of femoral head covered by articular cartilage, femoral neck which connects head to the shaft in the region between greater and lesser trochanters of femur, synovial membrane incorporates the femoral head, the anterior

neck and only proximal part of posterior neck. The narrow neck gives stability of the joint during wide arc of movement.

Normally the femoral head is anteverted over acetabulum reaching 45 degree since birth and decreases to reach 15 degree at puberty as shown in figure (3). [8,9]

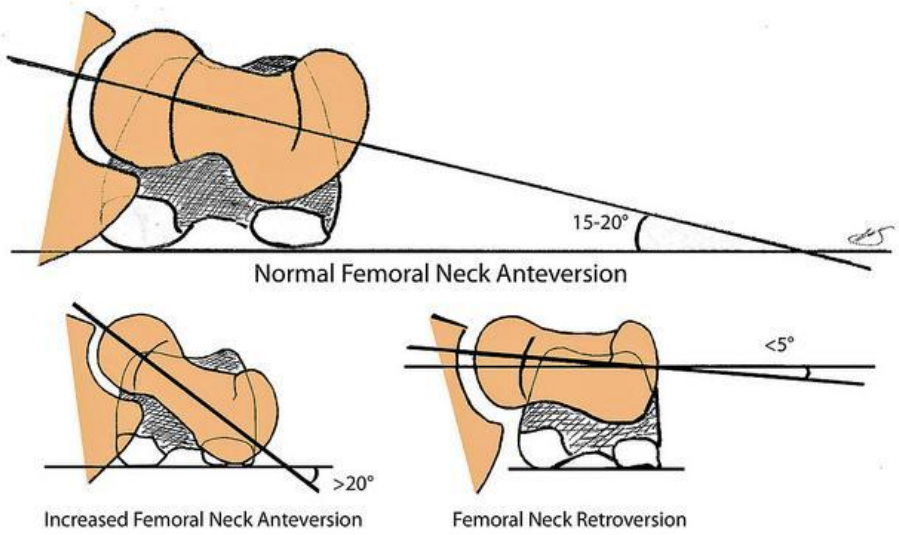

Figure (3): Showing anteversion and retroversion of femoral neck. [5]

Neck shaft angle begins at birth 146 and reaches 130 degree (+/- 7 degrees) at puberty.

Acetabulum is always facing forward, with an anteversion of 7 degree in newborn, increasing with age reaching about 17 degree in adults. [5]