Management of Slipped Capital Femoral Epiphysis using Surgical Dislocation Technique

Essay submitted for partial fulfillment of Master

Degree in Orthopaedic surgery

By

Ahmed Hamdi Ahmed Ali

M.B.B.Ch Ain Shams University 2010

Under Supervision of

Prof. Dr. / Hesham Ahmed Fahmy

Prof. of Orthopaedic Surgery Faculty of Medicine

Ain Shams University

Dr. / Zeiad Mohamed Zakaria

Lecturer of Orthopaedic Surgery Faculty of Medicine

Ain Shams University

Faculty of Medicine

Ain Shams University

2015

بسم الله الرحمن الرحيم

"قالوا سبحانك لا علم
لنا إلا ما علمتنا إنك
أنت العليم الحكيم"

صدق الله العظيم

سورة البقرة آية ٣٢

ACKNOWLEDGEMENT

I wish to express my sincere gratitude and profound thanks to ***Prof. Dr. Hesham Ahmed Fahmy***, Professor of Orthopedics, Faculty of Medicine, Ain Shams University, for his kind supervision, time, effort and indispensable remarks throughout this work.

I would like to offer my appreciation and thanks to ***Dr. Zeiad Mohamed Zakaria*** for his guidance, help and encouragement throughout the progress of the work.

Lastly, but not the least, I would like to thank all my family members for their kind advice and support.

Ahmed Hamdi Ahmed Ali

LIST OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

SCFE	**:**	Slipped Capital Femoral Epiphysis
AVN	**:**	Avascular Necrosis
MFCA	**:**	Medial Femoral Circumflex Artery
GH	**:**	Growth Hormone
ASIS	**:**	anterior superior iliac spine
AIIS	**:**	anterior inferior iliac spine
FAI	**:**	Femeroacetabular Impingement
BMI	**:**	Body Mass Index
Ig M	**:**	serum immunoglobulins M
IGF-1	**:**	Insulin growth factor-1

INTRODUCTION

Slipped capital femoral epiphysis (SCFE) is the most common disorder of the hip in young adolescents. This disorder involves the progressive displacement of the proximal femur through the open growth plate. [1]

In most children with SCFE, the precise etiology is unknown. Regardless of the underlying etiology. Conditions that weaken the physis include endocrine abnormalities, systemic disease (such as renal osteodystrophy), and previous radiation therapy in the region of the proximal femur (Atypical SCFE). [2]

SCFE is classified as pre-slip, acute, chronic and acute on chronic. [3] or classified as stable and unstable based on the stability.[4] Kallio classification depends on the presence or absence of a hip effusion by ultrasound images, [5] It is also classified as mild, moderate and severe based on epiphyseal shaft angle. [6]

Patients with slipped capital femoral epiphysis usually have weak hip abductors and the affected leg may appear shorter. When range of motion is performed, pain may not be elicited until the extreme ranges are reached. Walking will usually result in knee

pain. Most signs of slipped capital femoral epiphysis evolve slowly over many months. [7]

A good history and physical examination should be considered for all newly diagnosed cases of SCFE to elicit who are with high risk. [8] Delayed diagnosis is with increased slip severity. [9]

The goals of treatment in SCFE are early detection and prevention of further slipping, and avoidance of complications. Although attention is often focused on the affected hip, care of the unaffected hip (either through careful observation or through prophylactic treatment) cannot be forsaken. [10] Treatment is virtually always surgical. [1]

Complications of SCFE may occur immediately or later. The late complications include Osteoarthritis (OA), Avascular necrosis (AVN) and chondrolysis. [11]

Ganz surgical hip dislocation is useful in the management of severe hip diseases, providing an unobstructed view of the femoral head and acetabulum. [12]

Most pediatric hip diseases are treated by extra-articular procedures, such as soft tissue release, proximal femoral osteotomy, or pelvic osteotomy. However, sometimes a direct

approach to the femoral head or acetabulum is indicated in serious conditions or residual stages in which further remodeling cannot be expected. The surgical hip dislocation approach proposed by Ganz et al. is very useful in such cases. This approach enables preservation of the femoral head blood supply and allows for a direct approach to the intra-articular lesion as well as the underlying pathology. (13)

The hip joint can be surgically dislocated using other approaches. However, the Ganz method of surgical hip dislocation has several advantages. As the abductor is detached by trochanter flip osteotomy, rigid fixation of this flip fragment by screws restores immediate stability and allows for early mobilization of the patient. Moreover, by replacing this fragment to a point other than the osteotomy site, a trochanter transfer effect can be achieved if necessary. When flexion-valgization osteotomy is performed for SCFE patients, hip abductor alignment with the femoral shaft can be maintained by replacing the flip osteotomy fragment aligned with the distal fragment rather than the proximal one. (12)

AIM OF THE ESSAY

The purpose of this study is to review the different methods of diagnosis and treatment of slipped capital femoral epiphysis emphasizing on surgical dislocation as a line of surgical treatment.

BLOOD SUPPLY OF THE FEMORAL HEAD

The capsule of the hip is attached anteriorly at the intertrocanteric line, but posteriorly, the lateral half of the femoral neck is extra-capsular. [14]

Vascular anatomy of the upper femur:

-It comes from 3 groups (fig.1).[15]

1-The extra capsular arterial ring:

It's formed posteriorly by a large branch of the medial femoral circumflex artery, and anteriorly by branches of the lateral femoral circumflex artery, the superior and inferior gluteal arteries also have minor contribution to this ring.[15]

2-The ascending cervical branches (Intra-osseous):

They are raised from extracapsular ring anteriorly, they penetrate the capsule of the hip joint at the intertrochanteric line, and posteriorly, they pass beneath the orbicular fibers of the capsule. They pass upward under the synovial reflections and fibers prolongation of the capsule toward the articular cartilage that demarcates the femoral head from its neck. These arteries are

known as retinacular arteries. The proximity of these arteries to bone put them at risk for injury in any fracture of femoral neck. [16]

The ascending cervical arteries can be divided into four groups (anterior, medial, posterior and lateral) based on their relationship to femoral neck. On these four groups, the lateral group provides most important blood supply to the femoral head. At the margin of the articular cartilage on the surface of the femoral neck the four groups of the ascending cervical arteries form second ring which termed subsynovial intra-articular ring which can be complete or incomplete, depending on anatomical variation.[16]

As the superficial cervical arteries pass over the neck, they send many small branches into the metaphysis of the femoral neck. The metaphysis is also supplied by the extra-capsular arterial ring. In adults the epiphyseal and metaphyseal blood vessels make anastomosis with each other intraosseously after closure of the epiphysis.[16]

3-Ligamentum teres artery:

The ligamentum teres artery is a branch of the obturator artery or medial femoral circumflex artery. Although the vessels of the ligamentum teres supply vascularity to the femoral head they were often inadequate to assume the major nourishment of the femoral head after a displaced fracture. There is anastomosis between vessels in ligamentum teres and other arteries of the head and neck.[15]

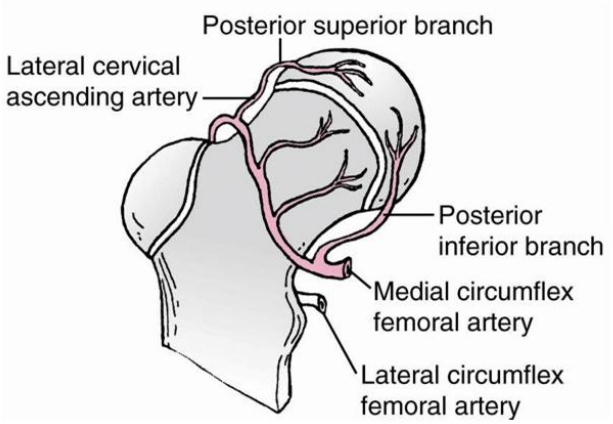

Fig. (1): Arterial Supply of the proximal femur. The capital femoral epipgysis and physis are supplied by the medial circumflex artery through two retinacular systems: the posterosuperior and posteroinferior. The lateral circumflex artery supplies the greater trochanter and the lateral portion of the proximal femoral physis and a small area of the anteromedial metaphysis.[15]