PRESENT PHILOSOPHY IN MANAGEMENT OF PERTHES' DISEASE

Thesis

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By

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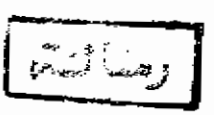

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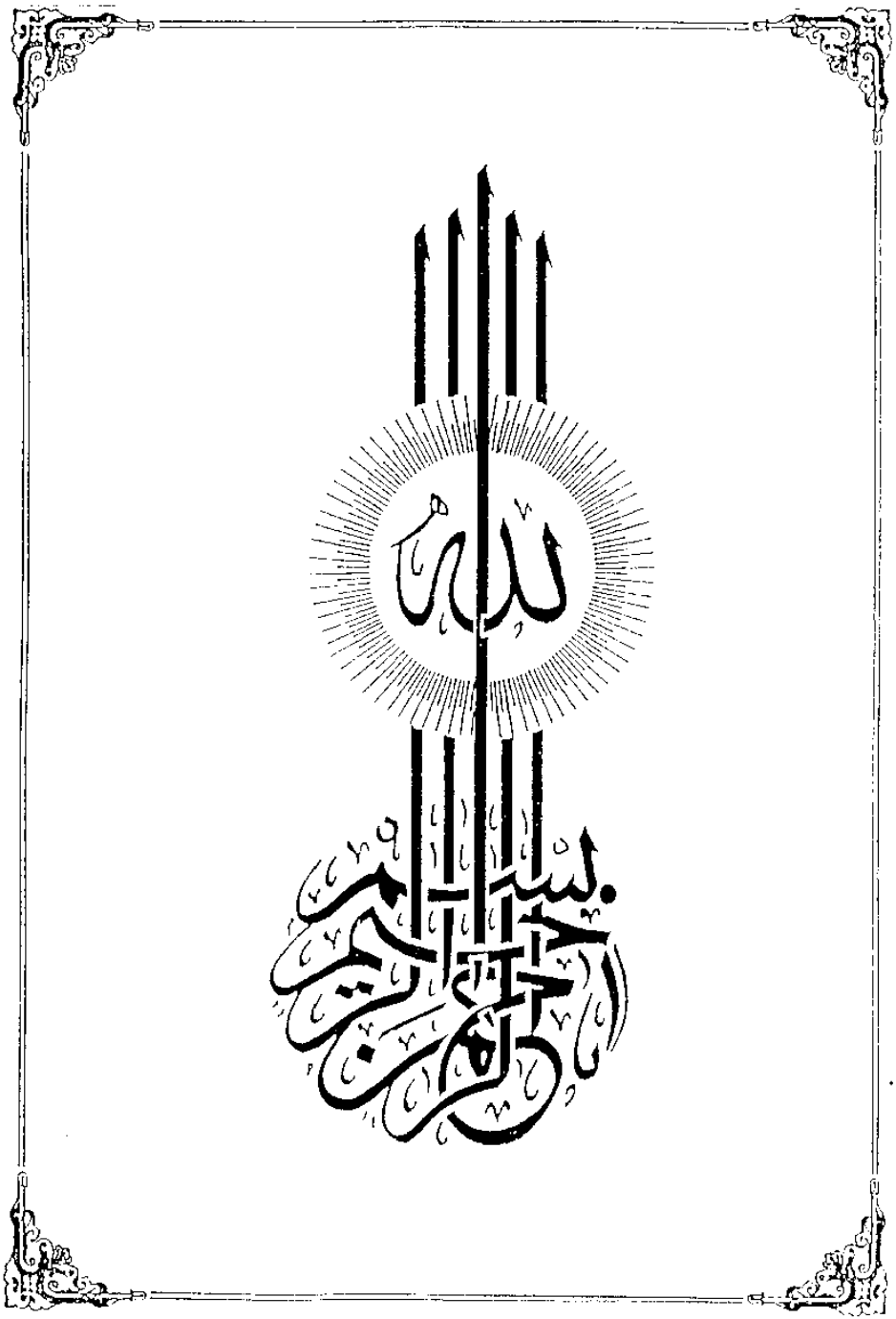

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THE AIM OF THIS THESIS

The aim of this work is to make a review of the extensive literature based on clinical research done mostly over the last two decades.

Landmarks on this long route were started by the study of the natural history of this disease, analysis of big series of long and short-term follow up , and conceptions of containment and sphericity of the femoral head.

This review should help to participate in the formulation of a philosophy in the treatment of this disease enlighting surgeons about the case to be selected for active definitive treatment - whether surgical or non surgical - and the case to be left alone just under observation.

DEFINITION AND NOMENCLATURE

Legg-Calvé-Perthes' disease is the name given to a self limiting condition of the hip in children. It is characterized pathologically by avascular necrosis of the ossification center of the femoral capital epiphysis which is ultimately resorbed and replaced by new bone, resulting in a variable degree of deformity and restricted motion of the joint (Turek, 1977).

"Pseudo-coxalgia" was the name given by Calvé (1910) with no explanation. "Osteochondritis deformans" was the term Perthes gave, but it looks inappropriate as evidence of inflamation is lacking. Flattening of the femoral head was after the term given by Waldenström (1922) "Ccxa plana". On blaming the vascular supply (Trueta, 1957), the term "Upper femoral anemic epiphysitis" was given. Gessing that the condition is secondary to stress fracture in the ossific nucleus was the reason for the name "Legg's fracture" given by Caffey (1968).

Legg-Calvé-Prethes' disease is the name used by most recent literature.

HISTORICAL BACKGROUND

The disease was first described by Waldenström of Stokholm who mistakenly ascribed it to the tuberculosis in 1909.

In 1910, Legg, Calvé, and Perthes independently described this disorder. Legg of Boston, described a small group of cases of a mild hip disease with the characteristic radiologic appearance. He suggested that a previous trauma altered the vascular supply in the upper femoral end. Calvé of Breck, published a paper containing a detailed consideration of ten cases suffering from the same condition. Perthes of Tubingen, published about an obscure hip disorder which proved to be identical with those of Legg and Calvé.

During the ensuing fifty years this entity was the subject of a plethora of theoretical speculations but a paucity of scientific investigations.

It was generally accepted with no scientific evidence that avascular necrosis of the femoral head caused the bone to become soft leading to collapse and deformity. This was the reason for weight-relief management in the first five decades. Little was given to the psychological and physical development of the child.

Fortunately, during the subsequent two decades scientific investigations shed considerable light on this disease.

BLOOD SUPPLY OF THE FEMORAL HEAD

The arteries of the femoral head have been studied by several investigators as Trueta (1957), Crock (1967), chung (1976), and others. The most appropriate description of these vessels was based on three plane analysis and proposed by Crock. He described the arteries of the proximal end of the femur in three groups:

1. Extra capsular arterial ring formed by medial and lateral circumflex femoral arteries.
2. The ascending cervical branches of the extra capsular ring.
3. The arteries of the round ligament.

Trueta (1957) provided five different patterns of arterial supply to the growing femoral head. However, more recently it was found that the arterial pattern described by Crock is established at birth and propably persists throughout life. The apparent changes in the arterial supply occurring with age are due to enlargement of the head and neck, advance of the bone

metaphysis superiorly, and progressive enlargement of the ossification center (Chung, 1976).

Extra capsular arterial ring: (Fig. 1)

This is formed by the medial and lateral circumflex femoral arteries. it surrounds the base of the femoral neck. The medial circumflex femoral artery constitutes the medial, posterior, and lateral parts of this ring. While the lateral circumflex femoral artery comprises the anterior portion. Occasionaly the ring is completed by anastomosis of both circumflex arteries.

Ascending cervical arteries:- (Fig. 1).

Four groups of ascending cervical arteries are present. The medial, posterior, and lateral groups arise from the medial circumflex femoral artery. On the other hand the anterior group arise from the lateral circumflex femoral artery. These vessels traverse the capsule along its femoral attachment. The numerous epiphyseal and metaphyseal branches of the lateral ascending cervical artery supply the great volume of the femoral head and neck. But all these branches arise from a single stem which crosses the capsule at the posterior trochanteric fossa. The interval

between the trochanter and the neck is extremely narrow in children less than 8 years old. This may constitute a possible site for vascular compression.

After traversing the capsule, the ascending cervical arteries pass beneath the synovium and branch to supply the metaphysis and epiphysis. The epiphyseal branches cross the epiphyseal plate on the surface of the head neck junction.

Fewer arteries are present on the anterior and medial surfaces of the mid neck in white children between 3-10 years of age than in white and black children from zero to 2 years old (Chung, 1976). This confirms Trueta's observation of the importance of his "lateral epiphyseal arteries" (lateral ascending cervical artery) in three to ten years old white children.

Subsynovial intra-articular ring:- (Fig.2)

The four ascending cervical arterial groups form a subsynovial anastomotic ring on the neck surface at the margin of the articular cartilage. This ring

could be complete or incomplete. The incomplete ring is more common in males than in females (Chung, 1976).

Arterial supply of the capital femoral epiphysis:

1) **Ascending cervical arteries:**

Before the appearance of the secondary center of ossification, epiphyseal branches of the ascending cervical arteries penetrate the cartilage of the head and terminate in sinusoidal expansions. The epiphyseal branches of the lateral ascending cervical artery supply the great volume of the femoral head. (Fig. 2).

In some specimens studied by three plane analysis, multiple ossification centers were seen. Each of these centers was supplied by a separate artery. It is suspected that the boundaries separating the arterial supply to each center may explain the partial femoral head necrosis in Perthes' disease (Chung, 1976).

The epiphyseal plate is an absolute barrier to blood flow between epiphysis and metaphysis. However, the epiphyseal and metaphyseal branches of the ascending cervical arteries supply both areas. Therefore, there