Hip Arthroscopy in Perthes' Disease: A Systematic Review of Literature and Meta-analysis

Submitted for Partial Fulfillment of Master Degree in Orthopaedic Surgery

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2018

Acknowledgment

First and foremost, I feel always indebted to ALLAH, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to ***Prof. Dr. Khaled Mohamed Emara,*** *Professor of Orthopaedic Surgery - Faculty of Medicine- Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to ***Dr. Hesham Mohamed Kamal,*** *Lecturer of Orthopaedic Surgery, Faculty of Medicine, Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

Last but not least, I would like to express my hearty thanks to all my family for their support till this work was completed.

Michael Amir Khairy Kozman

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List of Abbreviations

Abb.	Full term
AHI	Acetabular-head index
LCP	Legg Calve perthes
mHHS	Modified Harris hip score
OCD	Osteochondritis dissecans
ROM	Range of motion

INTRODUCTION

Legg-Calvé-Perthes disease (LCP) is an idiopathic necrosis of the femoral head. The exact etiology of Perthes disease is not yet known. However, the vascular etiology is strongly supported[1,2]. Age of onset range between five and seven years[3]. The first formal description of the disease occurred nearly simultaneously in 1909 and 1910 by Legg in Boston, Calve´ in France, and Perthes in Germany, all of whom postulated different disease etiologies. Legg presented a series of limping patients with flattened femoral heads, which he believed were due to trauma. In contrast, Calve´ reported on 10 patients with noninflammatory hip pain and a flattened femoral head that he felt was due to abnormal osteogenesis. Finally, Perthes reported on 6 patients with hip pain that he felt was due to an inflammatory condition

Perthes disease is a common hip condition with different racial and regional incidence worldwide that may terminally end in hip osteoarthritis and severe hip degenerative changes[4,5].

Treatment of Perthes disease is highly controversial. Treatment options differ according to many variables e.g. (age, stage and classification of the disease……). Conservative treatment and containment therapy is highly advisable in young children[6]. Femoral and acetabular osteotomies aiming restoration of joint congruity is important in late stages[7]. Hip

arthroscopy had become a standard procedure in treatment of varieties of hip conditions[8]. Hip arthroscopy can be used to treat osteocondritis dessicans, impingement and chondral flaps with Legg-Calvé-Perthes (LCP)[9, 11].

Reviewing of literature is conducted to scope on the exact role of hip arthroscopy in management of Perthes disease and its associated hip conditions and to determine the future of hip arthroscopy in the management of Perthes disease.

Aim of the Work

Aim of work is to scope on different roles of hip arthroscopy in the management of Legg-Calvé-Perthes disease (LCP) and its associated hip conditions and sequlae.

REVIEW OF LITERATURE

Legg-Calvé-Perthes (LCP) is an idiopathic disease in which the main feature is necrosis of the growing femoral head, results in progressive deformity of femoral head and resultant deformity of the acetabulum. The exact etiology of Perthes disease is not yet known. However, the vascular etiology is strongly supported [1,2]. Age of onset range between five and seven. The disease is bilateral in 10-20% of patients. When both hips are involved, they are usually affected successively, not simultaneously. A family history is present in 5-6% of patients [3]. Perthes disease is a common hip condition with different racial and regional incidence worldwide that may terminally end in hip osteoarthritis and severe hip degenerative changes [4,5]. Race is an important determinant of perthes disease with East Asians being least affected and caucasians are most affected[58]. Latitude is also an important predictor of disease even after adjustment for race in which each 10 degrees increase in latitude is associated with an increase in incidence[58]. Hip pain and other mechanical symptoms after perthes disease may occur because of loose bodies, labral tears, sublaxation, incongruence, femoral head deformity and femoroacetabular impingement.

The bone necrosis is assumed to be the main pathology that follows the vascular changes which are of no exact etiology which in turn trigger changes in the soft tissue of the

hip joint which include synovitis, articular cartilage hypertrophy and hypertrophy of the ligamentum teres. Caterall et al. [18] stated that the etiology of Legg Calve Perthes disease also includes some constitutional factors e.g.: genetic predisposition, environmental factors or combination of both in embryonic life. These soft tissue changes and muscle spasm cause the femoral head extrusion out of the acetabulum. Stresses of weight-bearing and muscular contraction pass across the acetabular margin onto the extruded part of the avascular femoral head [19,20]. Unlike normal healthy bone, the avascular bone is not capable of withstanding these physiological stresses and the trabeculae collapse; this results in irreversible femoral head deformation. Extrusion appears to be a prime factor that predisposes to femoral head deformation; the greater the extrusion, the greater femoral head deformation. Early intervention to prevent head collapse is advised to be as early as possible before fragmentation and early regeneration stage if more than 20% of the width of the epiphysis extrudes outside the acetabulum irreversible femoral head deformation is almost inevitable [21].

The evolution of Perthes disease can be clearly identified on plain radiographs. In 1922, Waldenstrom described 4 chronologic radiographic stages of LCP which are the stages of avascular necrosis (stage I), fragmentation (stage II), and regeneration (Stages III) before the healing stage (Stage IV). The stages of avascular necrosis, fragmentation, and