Management of Hip Dislocation in Spastic Cerebral Palsy Patients

Essay

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By

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قَالُوا سُبْحَانَكَ
لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا
إِنَّكَ أَنتَ
الْعَلِيمُ الْحَكِيمُ
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First thanks to ALLAH to whom I relate any success in achieving any work in my life.

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Mohammed El Ashmawy

علاج خلع الورك في مرضى الشلل الدماغي التشنجي

رسالة

توطئة للحصول على درجة الماجستير فى جراحة العظام

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List of Abbreviations

AI	**Acetabular index**
ASIS	Anterior superior iliac spine
BT	Botulinum toxin
CP	Cerebral palsy
FMS	Functional mobility scale
GMFCS	Gross motor function classification system
GMFCS-ER	Gross motor function classification system expanded and revised
MP	Migration percentage
NSA	Neck shaft angle
PSIS	Posterior superior iliac spine
ROM	Range of motion
SDR	Selective dorsal rhizotomy
SEMLS	Single event multilevel surgery
SHD	Spastic hip dysplasia
VDRO	Varus derotation osteotomy

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INTRODUCTION

Cerebral palsy is a non progressive central nervous system affection usually associated with difficult births which was first described in 1862[(1)]. Cerebral palsy was known as Little's disease for decades. The term cerebral palsy originated in 1893[(2)].

CP is an "umbrella term"covering a wide variety of clinical conditions that meet 4 criteria:

- Presence of a disorder of movement or posture
- Secondary to a cerebral abnormality
- Arising early in development
- By the time movement impairment exists, the cerebral abnormality is static[(3)].

There is no test, genetic, metabolic, immunologic, or otherwise, that demonstrates the existence or absence of CP because there is no specified cause, cerebral pathology, or even type of motor impairment-only that motor impairment exists resulting from non progressive cerebral pathology acquired early in life. It is not a single disease. Even as a clinical description these criteria fail in several aspects to achieve the precision required of a definition[(4)].

The 4 criteria cannot be addressed until (a) motor development can be clearly recognized as being normal or

disordered, and (b) the possibility of progressive cerebral disease can be excluded. Signs suggesting disordered motor control may be recognized very early in life, but accurate prediction has only been confirmed by trained observers in the small proportion of persons with CP born very preterm[(3)].

The Gross Motor Function Classification Score (GMFCS) categorizes youths and children with cerebral palsy. This system classifies patients into 5 levels based on self-initiated motor function:

- **Level I:** walks without limitation
- **Level II:** walks with limitations
- **Level III:** walks using a hand-held mobility device
- **Level IV:** self-mobility with limitations; may use power device
- **Level V:** transported in manual wheelchair [(5)].

Equinus and hip displacement are the two most common musculoskeletal deformities found in children with cerebral palsy[(6)].

In patients with severe cerebral palsy, hip displacement is often diagnosed late as a result of the silent nature of the displacement, communication difficulties, and the increasedattention paid to other important issues such as feeding difficulties and seizure management[(6)].

Identifying the subset of patients with an increased risk of hip displacement is essential in planning surveillance programs and early intervention[6].

Screening program for early detection of hip dislocation is very important for good intervention time .the main goal of treatment is to improve efficiency of gait or to improve postural problems and pain to ensureaccepted life and good hygenic measures .treatment starting from control of muscle tone up to femoral and pelvic osteotomies to ensure normal placement of femoral head and prevent further dislocation [4].

Changes that affect muscle tone lead to imbalance between hip flexors and extensor, increased tone in hip flexors and adductors cause femoral head to start migration till full dislocation .it is important to know that these patients usually have normal hip at birth and the problem of dislocation start gradually with progression of the problem. Normal development of both femoral head and acetablum are greatly affected [6].

Diagnosis of hip dislocation in cerebral palsy depends on history and clinical assessment including muscle tone, ROM, bone deformity, examination of hip and knee, scoliosis.[7]

Radiological assessment including plain x-ray: anteroposterior plain x-ray of pelvis is very important to assess degree of MP of femoral head in relation to acetablum[7]

CT is used mainly to assess the direction of hip dislocation especially 3D reconstruction form.[7]

The hip treatment is then divided into three categories prevention, reconstruction, palliative. **The first** is prevention, which depend manily on managing the cause of dislocation including adductor lengthening considered the first line of preventive treamen. The high-risk period for the development of hip subluxation is from the ages of 2 to 6 years[7]. Other historical lines of preventive measures are iliopsoas transfer, adductor transfer etc. [8].

The second is reconstruction, The goal of reconstruction is to leave children with an anatomically normal hip joint, with normal posture and normal range of motion, in which the treatment is primarily directed at reducing the femoral head into the appropriate place in the acetabulum, followed by reconstruction of the acetabulum to correct its bony deformity.[7].

The third is palliative, in which the goals of treatment are to do a resection procedure of the severely deformed joint to remove the source of pain and/or improve the function or range of motion[7].

Aim of the Essay

The aim of this essay is to review the literature regarding hip pathology in cerebral palsy, as well as, the management of hip dislocation in spastic cerebral palsy patients.

Chapter (1):

HIP PATHOLOGY IN CP

The hip joint is the largest joint in the body and is the joint that causes the most problems both from a functional perspective and at the level of walking, sitting, and lying in children with cerebral palsy (CP). Hips in children with CP are normal at birth, and the problems develop slowly as the children grow and deform under the influence of abnormal forces caused by hypertonia. A second group of children with CP do not actually develop deformity; however, the infantile shape of their proximal femur does not resolve because there is not enough normal force present. After addressing the concerns of equinus contractures in children with CP, hip problems are the next main area of interest to orthopaedists treating these children.[9]

Spastic Hips:

Hip problems in children with CP first need to be divided by children's type of tone into either spastic children or those children who are hypotonic. The spastic group should also include children with movement disorders such as athetosis and dystonia. The hypertonic hips can be subdivided further by the direction of the dysplasia or the abnormal force into posterosuperior, anterior, inferior and, additionally, by several contracture patterns that may be independent of or concurrent with dysplastic hips. These contracture patterns include

windblown hips and hyperabducted hips. The hypotonic hips in children with CP are a little more diffuse and are harder to further categorize.[9]

Posterosuperior Hip dislocation:

The most common dysplastic hip problems in children with hypertonia or spasticity are posterosuperior hip subluxation, dislocation, or dysplasia.[10] These problems comprise the typical spastic hip dysplasia (SHD), which is discussed in most of the literature. Based on an extensive review by Cooke,in which attention was paid to the specific pattern of dislocation, 91% to 92% of spastic children with hip subluxation or dislocation have this typical posterosuperior pattern.[10]

Etiology& Primary pathology:

The etiology of spastic hip disease has been worked out fairly clearly both through clinical review and, more importantly, through modeling.[11,12] The concept of an abnormal force caused by adductor muscles was first suggested in a paper by Keats [13] and was the basis upon which he advocated doing adductor lengthening to prevent the spastic hip at risk from dislocating. Since that time, there have been many other clinical studies in which different primary etiologies for spastic hip disease were presented. These etiologies include femoral neck valgus as a primary cause [14,15],and in one study, the femoral valgus was believed to be the direct cause of the