بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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Surgical Management of Tarsal Coalition in Skeletally Immature Patients

Systematic Review
Submitted For Partial Fulfillment of Master Degree
In Orthopedic Surgery

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Yassir Mohamed Kamal

ABSTRACT

Background: Tarsal coalition is an abnormal connection between tarsal bones, which is thought to result from a congenital failure of differentiation in the developing fetal foot [(1)]. In some series, talocalcaneal coalitions account for up to 48% of all tarsal coalition cases this does not appear to be a sex predilection of tarsal coalitions, however calcaneonavicular are the most common type with true incidence has been found 1.2% [(2)]. A tarsal coalition is an aberrant union between two or more tarsal bones and can be classified as osseous (synostosis) or cartilaginous (synchondrosis) or fibrous (syndesmosis). This union may be complete or partial and the joints in the hind foot and mid foot are most commonly affected. The resulting abnormal articulation presents as a noncorrectable flat foot. Usually during adolescence, leading to accelerated degeneration within adjacent joints. An understanding of the condition and presenting symptoms enable the clinician to correctly diagnose and initiate appropriate treatment [(3)]

Patient and methodology: The preliminary search yielded forty-six studies. Screening of the collected abstracts resulted in the selection of thirty-threes of publications eligible for this systematic review included "tarsal coalition", online databases including Pub Med, Medline and Scientific direct. Duplicates was removed, titles reviews, inclusion and abstracts criteria eleven studies were included divided into eight studies according to title and abstracts and three studies to exclusion criteria as following: Eight Studies were included as bar excision, eight studies were included as Calcaneonavicular bar resection, Talocalcaneal coalition and osteotomy in children. Eight of articles discussed in this systematic review, we have selected multiple parameters to compare between their different techniques of surgical treatments and osteotomies which are clinically improved and functionally improved.

Results: This type of study is systematic review of literature. It evaluates and compares between the published results of surgical treatments of tarsal coalition in skeletally immature patients and discuss their benefits.

Conclusion: Bar excision was found to be a superior when used as reconstructive surgery management in patients of tarsal coalition than osteotomy.

List of Contents

List of Figures

List of Tables

Introduction

Tarsal coalition is an abnormal connection between tarsal bones, which is thought to result from a congenital failure of differentiation in the developing fetal foot [(1)].

The incidence of tarsal coalition has been reported from less than 1% to as high as 13%[(2)]. Patients frequently have more than one coalition in the same foot and 50% of patients are bilateral. The most common coalitions involve the talocalcaneal and calcaneonavicular bone [(2)].

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A tarsal coalition is an aberrant union between two or more tarsal bones and can be classified as osseous (synostosis) or cartilaginous (synchondrosis) or fibrous (syndesmosis). This union may be complete or partial and the joints in the hind foot and mid foot are most commonly affected. The resulting abnormal articulation presents as a noncorrectable flat foot. Usually in adolescence, leading to accelerated degeneration within adjacent joints. An understanding of the condition and presenting symptoms

enable the clinician to correctly diagnose and initiate appropriate treatment [3].

Tarsal coalition are mostly asymptomatic, however the hind foot may be in valgus position as ossification progresses with a talocalcaneal coalition, which leads to a painful rigid flatfoot deformity (loss of foot longitudinal arch). Forefoot is in abduction and supination [4].

Radiological X-ray Plain films show findings when there is bony coalition. Calcaneonavicular could be seen in an oblique film show anteater nose sign is diagnostic. While talocalcaneal is best seen on the lateral view, also can find C-sign which is due to complete posterior ring around the talus while beak sign due to impaired subtalar movement, coronal cuts computed tomography (CT) can detect type and location of tarsal coalitions. Also can use of 3-D CT analysis in order to evaluate the morphological characteristics [5, 6].

Management of tarsal coalition is a controversial issue, ranging from Conservative treatment to surgical fusion of hind foot. Indication of Conservative treatment include painless, mobile patients, while indication of surgical treatment are progression flat foot or rigid painful deformity. Surgical correction include excision alone, corrective osteotomy of flat foot, and fusion of the hind foot [7-10].

Aim of the Work

The aim of study to discuss the surgical management of tarsal coalition in skeletally immature patients and compare between types of surgery bar excision, calcaneal osteotomy and subtalar fusion.

Review of Literature

Tarsal coalition is a fibrous, cartilaginous or bony connection of two or more bones in the midfoot or hindfoot. When coalition is ossifying the sub talar motion becomes more limited. Can be unilateral or bilateral and union may be complete or partial [11].

Anatomy and biomechanics:

Bones:

Functionally, skeleton of the foot may be divided into; tarsus, metatarsus and phalanges. Anatomically, is divided into; the hindfoot (talus and calcaneus), midfoot (the navicular, cuboid and the three cuneiforms) and forefoot (the 14 bones of the toes, the five metatarsals, and the medial and lateral sesamoids bones). [12]

Figure (1): Showing X-ray; AntroPosterior view of the foot bones. (13)

Foot ligaments and joints motions:

Ankle joint

Primary ligaments of ankle include: medially the deltoid and calcaneonavicular (spring) ligaments, laterally the anterior and posterior talofibular ligaments,

calcaneofibular ligament, lateral talocalcaneal ligament and syndesmosis components (anterior-inferior tibiofibular, posterior-inferior tibiofibular, transverse tibiofibular and interosseous ligaments. It can be tested clinically by (external rotation test or squeeze test)[14].

Hindfoot:

Consists of articulation between talus and calcaneus bones. It is formed of subtalar joint and transverse tarsal joint.

The subtalar joint have three facets; posterior which is largest facet, middle facet located medially and sits on sustentaculum of calcaneus and anterior facet continuous with the talonavicular joint. It's motions are inversion/ eversion.

Transverse tarsal joint consists of two components; talonavicular joint and calcaneocuboid joint. It's motion allows for stable hindfoot/midfoot for toe-off. It has a role with subtalar joint to control foot flexibility during gait cycle.

Midfoot:

It is the articulation between navicular and cuneiforms bones and consists of articulation between cuboid and fourth, fifth metatarsals, tarsometatarsal joint.