EVALUATION OF CALCANEAL LENGTHENING OSTEOTOMY IN CP PATIENT WITH PES PLANOVALGUS DEFORMITY

THESIS

Submitted For Partial Fulfillment of MD in Orthopedic

Submitted by

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ABSTRACT

The objective of this study was to evaluate the operative management of pes planovalgus deformity in cerebral palsy (CP) patient by calcaneal lengthening osteotomy described by Evans.

Fifteen children (10 girls and 5 boys) with average age 11 years 6 months (range, 8 years 4 months to 14 years 6 months) with 22 feet with pes planovalgus (PPV) deformity were included in this study. Clinical evaluation was made according to Dogan's scale and graded as perfect, good, fair and poor. Preoperative and postoperative radiological assessment of anteroposterior talo-first metatarsal angle (AP-T1MT), anteroposterior talo-calcaneal angle (AP-TC), laterl Talo-first metatarsal angle (Lat. T1MT), lateral Talo-calcaneal angle (Lat. TC), and lateral Calcaneal pitch angle (Lat. CP) had been done for all feet. All feet were corrected with modification of the calcaneal lengthening osteotomy described by Evans.

Clinical results were perfect in 18 feet (82%), good in 2 feet (9%) and fair in 2 feet (9%). Radiological results showed improvement in 20 feet, while 2 feet showed no improvement. The improvement was significant in Lat. T1MT ($P < 0.001$), AP-T1MT ($P < 0.05$)., AP-TC and Lat. CP ($P < 0.001$, < 0.001 respectively) whereas it was insignificant in Lat. TC ($P > 0.05$).

The results of the present study showed that the procedure reliably relieves pain in PPV foot in CP children and proved effective in addressing all components of the deformity in both hindfoot and forefoot clinically and radiographically.

Key words: Pes planovalgus – Calcaneal osteotomy - Evans.

ACKNOWLEDGEMENT

I would like to express my sincere thanks and deep gratitude to Prof. Dr. Hassan Magdy El-Barbary Professor of Orthopedic Surgery, Cairo University, for his continuous encouragement, valuable advices, and support.

I am especially grateful to Prof. Dr. Ali Mohamed Reda Professor of Orthopedic Surgery, Cairo University, for his sincere guidance and supervision through this work

Gratitude is indebted to Dr. Sherif Galal Lecturer of Orthopedic Surgery, Cairo University, for his sincere help and advice. Sincere thanks and regards are due to all of the staff members, head and colleagues of the Orthopedic Department of Kasr El Aini , Cairo University. The facilities provided, continuous encouragement and outstanding suggestion through this work are greatly appreciated.

LIST OF ABBREVIATIONS

AP.TC	:	AnteroposterorTalocalcaneal Angle
BG	:	Bone graft
CP	:	Cerebral palsy
Lat.T1MT	:	Lateral Talo-First Metatarsal Angle
Lat.TC	:	Lateral Talocalcaneal Angle
NSAID	:	Non-Steroidal Anti-Inflammatory Drugs
PPV	:	Pes planovalgus
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PTT	:	Posterior Tibial Tendon
ROM	:	Range Of Motion
T1MT	:	Talo-First Metatarsal
TAL	:	Tendo-Achillis Lengthening

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INTRODUCTION

Cerebral palsy is a generic term that is used to describe several clinical syndromes whose common feature is abnormality in the control of motor function by the brain that will result in permanent disorders of movement and/or posture(1). Although the CP is non progressive, the resultant musculoskeletal disorders will almost surely be progressive, primarily because of spasticity, weakness, and lack of longitudinal skeletal muscle growth (2). Spastic CP is the most common form of CP (85%) (3).At present, in developed countries, about 2 live born children per 1000 have Cerebral palsy (4).

Pes planus is a term implying the loss of the medial longitudinal arch of the foot. When there is associated valgus deformity of the heel, it's called pes planovalgus . In these patients deformity is characterized by plantar flexion and medial deviation of talus, external rotation of calcaneus in relation to talus, severe subtalar evertion, navicular is shifted laterally and dorsally and forefoot is abducted and supinated in relation to hind foot(5)

In a CP patient with PPV normal dorsiflexion of the ankle is limited in the midstance phase of walking by the effect of contracted achilles tendon and dorsiflexor forces shift upon talonavicular joint .Therefore axial loading and shearing forces center directly under the head of plantar flexed talus(6).

PPV is usually asymptomatic in a CP child. The problem is usually identified when parents are disturbed by the shape of child's foot and notice the problems in wearing shoes or braces and also severe pain occur. The aim of the treatment is to relieve pain, overcome difficulties in shoe and brace wearing and restore the normal alignment of the foot (7).

Initial treatment includes activity modifications and orthoses. Stretching exercises for equinus deformity can be performed under physician or physical therapist supervision. Non steroidal anti-inflammatory medications may be indicated in more severe cases. Comorbidities, such as obesity and proximal limb problems, must be identified and managed, if possible. If there is a positive clinical response and symptoms are resolved, observation and orthoses (when appropriate) are instituted. If clinical response is not satisfactory, reassessment and additional work-ups are indicated. When all nonsurgical treatment options have been exhausted, surgical intervention can be considered (3)

Options for surgical treatment vary from simple soft tissue procedures to calcaneal osteotomy ,subtalar extra-articular arthrodesis, tarsal fusion and triple arthrodesis (6).

Calcaneal lengthening operation was first identified by Evans 1975 and then modified and introduced by Mosca 1995 as an option for pes planovalgus deformities due to various etiologies, instead of triple arthrodesis (7).

The Evans calcaneal osteotomy is currently the premier procedure for lateral column lengthening of the pes planovalgus deformity. It has withstood the test of time, proving itself an effective procedure for the correction of pes planovalgus foot deformity in ambulatory children with CP. Current understanding of the osteotomy has allowed the Evans calcaneal osteotomy to become a useful tool in the correction of the adult and chlidren flexible flatfoot as well (8).

Aim of the work

The aim of this study is evaluation of calcaneal lengthening osteotomy using modified Evans osteotomy technique in CP patients with pes planovalgus deformity**.**

REVIEW OF LITERATURE

Funcutional Anatomy and Motions of the Foot and Ankle

Introduction

The diagnosis and treatment of foot and ankle injuries require knowledge of anatomy, gait, and biomechanics. The human foot combines mechanical complexity and structural strength. The ankle serves as foundation, shock absorber, and propulsion engine. The foot can sustain enormous pressure (several tons over the course of a one-mile run) and provides flexibility and resiliency (9)

Ankle Joint

The ankle-joint is a ginglymus, or hinge-joint. The structures entering into its formation are the lower end of the tibia and its malleolus, the malleolus of the fibula, and the transverse ligament, which together form a mortise for the reception of the upper convex surface of the talus and its medial and lateral facets (figure 1).

Movements when the body is in the erect position, the foot is at right angles to the leg. The movements of the joint are those of dorsiflexion and extension; dorsiflexion consists in the approximation of the dorsum of the foot to the front of the leg, while in extension the heel is drawn up and the toes pointed downward. The range of movement varies in different individuals from about 50° to 90°. The transverse axis about which movement takes place is slightly oblique. The malleoli tightly embrace the talus in all positions of the joint, so that any slight degree of side-to-side movement