

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

THESIS

Submitted For Partial Fulfillment of MD in Orthopedic

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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), lateral 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.

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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
PPV	: Pes planovalgus
PTT	: Posterior Tibial Tendon
ROM	: Range Of Motion
T1MT	: Talo-First Metatarsal
TAL	: Tendo-Achillis Lengthening

LIST OF FIGURES

Figures	Page
Fig. 1: Ligaments of the medial aspect of the foot.	9
Fig. 2: Oblique section of left intertarsal and tarsometatarsal articulations, showing the synovial cavities	9
Fig. 3: The joints in the foot with major functional significance during walking (black areas) Ligaments of the medial aspect of the foot.	10
Fig. 4: Skeleton of medial aspect of foot..	10
Fig. 5: Skeleton of lateral aspect of foot.)	10
Fig. 6: Windlass mechanism.	11
Fig. 7: Initial contact posture of the ankle and alignment of the vector.	13
Fig. 8: Loading response, subtalar action	14
Fig. 9: Midtarsal joint reactions. Talonavicular and calcaneal cuboid joint axes (dotted lines) parallel with subtalar valgus. The joint axes converge with subtalar varus .	15
Fig. 10: Metatarsophalangeal joint motion during stance. Shaded toe indicates area of motion .	15
Fig. 11: Hyperpronation of the Foot	22
Fig. 12: Testing the tight tendo-Achilles	28
Fig. 13: Local examination	28
Fig. 14: Hindfoot valgus is corrected by tip toe standing in PPV feet	29
Fig. 15: Forefoot supination is unmasked with correction of the hindfoot valgus	29
Fig. 16: Lateral and AP weight bearing views of the foot	31
Fig. 17: Anteroposterior talus-first metatarsal angle	34
Fig. 18: Anteroposterior talus-calcaneal angle	34
Fig. 19: Lateral talus-first metatarsal angle	34
Fig. 20: Lateral talus-calcaneal angle	35

Figures	Page
Fig. 21: Calcaneal pitch angle	35
Fig. 22: Towel-gathering exercise and Towel-stretch exercise	39
Fig. 23: The UCBL orthosis, used in the treatment of PPV foot	41
Fig. 24: Soft molded insert with arch support and medial heel "wedge" to invert the hindfoot	41
Fig. 25: Modified Evans osteotomy	50
Fig. 26: Bone graft in the osteotomy site, which produces realignment of the midtarsal joint	50
Fig. 27: Skin incision	51
Fig. 28: Peroneal tendon demonstration	51
Fig. 29: Osteotomy complete and calcaneocuboid joint is pinned	51
Fig. 30: Graft impacted in position and fixed with a Kwire	52
Fig. 31: Percutaneous lengthening of the tendo-Achilles	52
Fig. 32: Wound closure by absorbable sutures	52
Fig. 33: Weight bearing position: one patient showing flattening of the medial longitudinal arch	63
Fig. 34: Heel valgus and the flattened medial longitudinal arch were correctable with standing on tip toes	63
Fig. 35: A2mm smooth K-wire is inserted retrograde passing through the cuboid and stop at the osteotomy site	68
Fig. 36: 2mm Kwires are advanced through the graft and proximal cal. fragment.	69
Fig. 37: Dorsal view of a PPV foot. There is abduction at the talonavicular joint. The oblique line of the osteotomy on the dorsal surface of the calcaneus	72
Fig. 38: Dorsal view showing correction of all components of the deformity with the trapezoid-shaped graft in place	72
Fig. 39: Preoperative Clinically (Case Report 1)	100
Fig. 40: Preoperative Radiologically (Case Report 1)	100
Fig. 41: Post-operative left foot clinically (Case Report 1)	101
Fig. 42: Post-operative left foot radiologically (Case Report 1)	102

Figures	Page
Fig. 43: Preoperative both Foot Clinically (Case Report 2&3)	106
Fig. 44: Preoperative right Foot Radiologically (Case Report 2&3)	106
Fig. 45: Post-operative right foot clinically (Case Report 2&3)	106
Fig. 46: Post-operative right foot radiologically (Case Report 2&3)	107
Fig. 47: Pre-operative Left Foot Radiologically (Case Report 2&3)	107
Fig. 48: Post-operative left Foot clinically (Case Report 2&3)	107
Fig. 49: Postoperative left foot Radiologically (Case Report 2&3)	108
Fig. 50: Postoperative both feet clinically	108
Fig. 51: Pre-operative right Foot Clinically	112
Fig. 52: Pre-operative left foot clinically	112
Fig. 53: Postoperative Right Foot clinically.	113
Fig. 54: Postoperative Left Foot clinically.	113
Fig. 55: Preoperative X-ray Right and Left feet (Case Report 5&6)	114
Fig. 56: Postoperative X-ray Left foot (Case Report 4&5)	115
Fig. 57: Postoperative X-ray right Foot	115
Fig. 58: Postoperative X-ray both foot	116
Fig. 59: Preoperative X-ray left foot	118
Fig. 60: Preoperative left foot clinically	118
Fig. 61: Postoperative left foot clinically	119
Fig. 62: Postoperative left foot X-ray	120
Fig. 63: Postoperative left foot clinically	120

LIST OF TABLES

Tables	Page
Table 1: Differential Diagnosis	37
Table 2: Distribution of the PPVfoot cases according to sex	56
Table 3: Distribution of the PPVfoot cases according to operation side	58
Table 4: Distribution of the sex of PPVfoot cases according to operation side	59
Table 5: Clinical evaluation scale	62
Table 6: Pre-operative (AP T1MT) antero-posterior talo-first metatarsal angle	64
Table 7: Pre-operative (AP. TC) antero-posteriorl talo-calcaneal angle	64
Table 8: Pre-operative (Lat.T1MT) lateral, talo-first metatarsal angle	65
Table 9: Pre-operative (Lat.TC) lateral talo- calcaneal angle	65
Table 10: Pre-operative (Lat.CP) lateral calcaneal pitch angle	65
Table 11: Distribution of the PPVfoot cases according to operative procedures	71
Table 12: Post-operative clinical evaluation scale for all feet	75
Table 13: Weight-bearing antero-posterior talo-first metatarsal angle	77
Table 14: Weight-bearing antero-posterior talo-calcaneal angle	78
Table 15: Weight-bearing lateral, talo-firat metatarsal angle	78
Table 16: Weight-bearing lateral talo-calcaneal angle	79
Table 17: Weight-bearing lateral calcaneal pitch angle	79
Table 18: Radiological and Clinical Results of the Patients	81
Table 19: Pre and Postoperative Angles Measurement of Left Foot	101
Table 20: Pre and Postoperative Angles Measurement of Right Foot	104
Table 21: Pre and Postoperative Angles Measurement of Left Foot	105

Tables	Page
Table 22: Pre and Postoperative Angles Measurement of Left Foot	110
Table 23: Pre and Postoperative Angles Measurement of Right Foot	111
Table 24: Pre and postoperative Angles Measurement of Left foot	119

LIST OF GRAPHS

Graphs	Page
Graph 1: Distribution of the PPV foot Cases According to Sex	56
Graph 2: Distribution of the Age of PPV foot Cases According to Sex	57
Graph 3: Distribution of the PPV foot Cases According to Operation Side	58
Graph 4: Distribution of the Age of PPV foot cases according to operation side	59
Graph 5: Distribution of the PPV foot cases according to operative procedures	71
Graph 6: Post-operative Clinical results	76

LIST OF CONTENTS

	Page
INTRODUCTION	1
REVIEW OF THE LITERATURE	4
• Functional Anatomy and Motion of foot and Ankle	4
• Pathology of PPV Foot	17
• Diagnosis of PPV Foot	25
• Treatment of PPV Foot	38
MATERIALS AND METHODS	55
RESULTS	74
• Clinical Results	74
• Radiological Results	77
DISCUSSION	82
CONCLUSION	97
CASE PRESENTATION	98
SUMMARY	121
REFERENCES	122
ARABIC SUMMARY	

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 eversion, 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 children 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

Functional 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