

Radiological Parameters of Calcaneovalgus Deformity of the Foot

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Abstract

Background Calcaneo valgus deformity is postural deformity of infancy which is characterized by dramatic hyperdorsiflexion of the foot that appears to be plastered up against the anterior surface of the tibia. Planter flexion of the foot is frequently limited as a result of contracture of the anterior ankle and foot structures.

Aim of the work: To asses radiological parameters of calcaenovalgus deformity of the foot in children.

Patients and methods: The patients were children up to 5 years old. The participants were 7 males and 13 females. The affected foot were 10 right sided and 10 left sided.

Results: The present study was designed to asses radiological parameters of calcaenovalgus deformity of the foot in children.

Conclusion The radiological parameters of calcaenovalgus deformity of the foot in children varies widly accodrding it is vevtical talus or oblique talus deformity.

Introduction

Calcaneo valgus deformity is postural deformity of infancy which is characterized by dramatic hyperdorsiflexion of the foot that appears to be plastered up against the anterior surface of the tibia. Planter flexion of the foot is frequently limited as a result of contracture of the anterior ankle and foot structures [1].

Not only is the foot hyperdorsiflexed, but the heel is also frequently in marked valgus, with the forefoot appearing abducted. The calcaneus is palpable in the heel bad and is noted to be dorsiflexed (calcaneus position), This differentiates a calcaneovalgus foot from the more serious pathological vertical talus, where the heel is in equines, giving the foot a rocker-bottom appearance [2].

The incidence of talipes calcaneovalgus is 1 in 1000 live births reported by Wynne Davies. The incidence, like that of congenital dislocation of the hip, is higher in first

born children (because of intrauterine crowding) and girls [6].

Because a calcaneovalgus foot position is either relatively common, the role of the orthopaedist in assessing what may be a normal variant of foot position is to eliminate true pathologic foot conditions (congenital vertical talus), associated tibial anomalies (posteromedial bow of the tibia), and most importantly associated hip dysplasia

Aim of the study

To asses radiological parameters of calcaenovalgus deformity of the foot in children

patients and methods

This study is a clinical study that was included 20 patients.

All patients were recruited from orthopedic outpatient clinic in Sohag University Hospital.

The patients were children up to 5 years old. The participants were 7 males and 13 females. The affected

foot were 10 right sided and 10 left sided

Methodology:

All participants underwent:

- 1- Medical history was taken by the parents.
- 2- Careful general examination, examination to the back and examination of the feet was done.
- 3- Sensory and motor general examination of the patients was done.
- 4- Plain X-ray was done to all participants anteroposterior view to

measure -a- anteroposterior meary's angle , -b- anteroposterior talocalcaneal angle and lateral view in maximum dorsiflexion and maximum planter flexion position to measure -a- lateral meary's angle , -b- calcaneal pitch , -c- talocalcaneal angle at maximum dorsiflexion and maximum planter flextion , -d- tibio-calcaneal angle at maximum dorsiflexion and maximum planter flexion

Results of the study

Age distribution of the study group (in months)

Age	
Mean	12.850
Median	12.000
Std. Deviation	5.622
Minimum	3.00
Maximum	20.00

Age distribution of the study group (in months)

Sex distribution of the study patients

	No	Percent
Male	7	35.0
Female	13	65.0
Total	20	100.0

Sex distribution of the study group.

Side operated

	No	Percent
Right	10	50.0
Left	10	50.0
Total	20	100.0

Side operated AP parameters

	Talocalcaneal angle	Merrys angle
Mean	35.41	30.67
Median	41.00	28.00
Std. Deviation	13.491	17.506
Minimum	7	2
Maximum	56	72

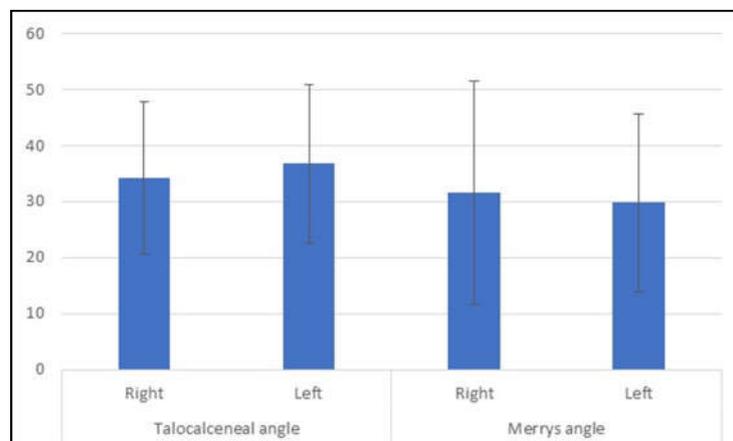
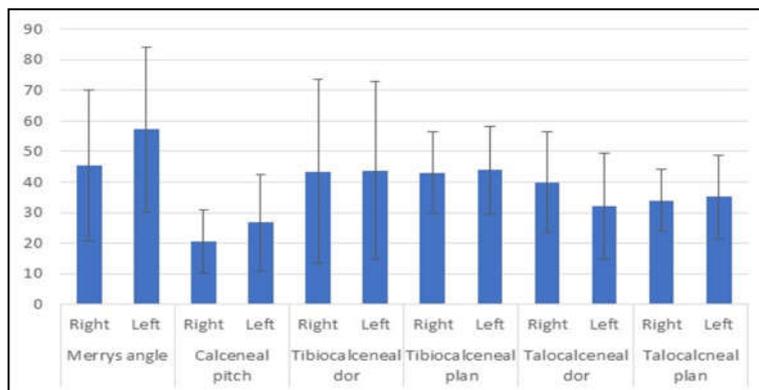
Lateral parameters

	Merrys angle	Calcaneal pitch	Tibio-calcaneal dor	Tibio-calcaneal plan	Talo-calcaneal dor	Talo-calcaneal plan
Mean	51.30	23.65	43.60	43.50	36.05	34.56
Median	57.00	23.00	35.00	44.00	32.00	33.00
SD	26.018	13.355	28.820	13.444	16.866	11.628
Min	7	3	1	19	3	13
Max	89	49	88	62	69	58

Right left comparison

	Side	Mean	SD	T test	P value
Talocalcaneal angle	Right	34.22	13.673	0.375	0.713 (NS)
	Left	36.75	14.089		
Merrys angle	Right	31.56	19.944	0.209	0.837 (NS)
	Left	29.78	15.865		
Merrys angle	Right	45.40	24.820	1.015	0.324 (NS)
	Left	57.20	27.124		
Calceneal pitch	Right	20.50	10.298	1.058	0.304 (NS)
	Left	26.80	15.761		
Tibiocalcaneal dor	Right	43.40	30.093	0.030	0.976 (NS)
	Left	43.80	29.116		
Tibiocalcaneal plan	Right	43.11	13.271	0.119	0.907 (NS)
	Left	43.89	14.409		
Talocalcaneal dor	Right	39.90	16.441	1.022	0.320 (NS)
	Left	32.20	17.242		
Talocalcneal plan	Right	34.00	10.186	0.197	0.846 (NS)
	Left	35.11	13.523		

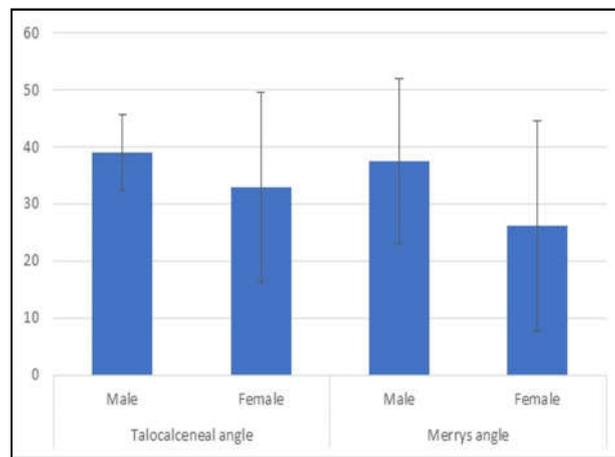
Right left comparison (Talocalcaneal angle & Merrys angle)



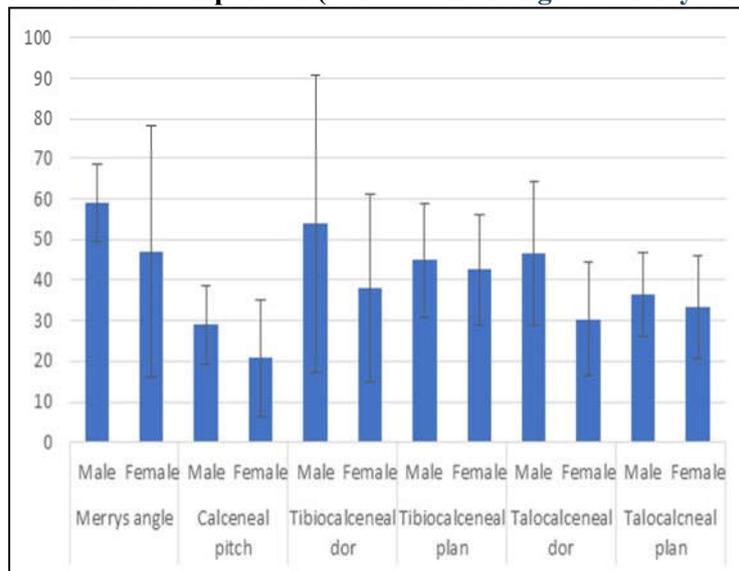
Right left comparison for all parameters

Male female comparison

	Sex	Mean	SD	T test	P value
Talocalcaneal angle	Male	39.00	6.608	0.913	0.376 (NS)
	Female	32.90	16.656		
Merrys angle	Male	37.57	14.536	1.369	0.190 (NS)
	Female	26.27	18.429		
Merrys angle	Male	59.00	9.487	0.970	0.345 (NS)
	Female	47.15	31.203		
Calceneal pitch	Male	29.00	9.678	1.342	0.196 (NS)
	Female	20.77	14.487		
Tibiocalcaneal dor	Male	54.00	36.905	1.198	0.247 (NS)
	Female	38.00	23.173		
Tibiocalcaneal plan	Male	45.00	14.048	0.368	0.718 (NS)
	Female	42.55	13.648		
Talocalcaneal dor	Male	46.57	17.596	2.257	0.037 (S)
	Female	30.38	14.009		
Talocalcneal plan	Male	36.57	10.261	0.575	0.573 (NS)
	Female	33.27	12.729		



male to female comparison (Talocalcaneal angle & Merrys angle)



male to female comparison for all parameters

Discussion

The incidence of talipes calcaneovalgus is 1 in 1000 live births reported by Wynne Davies. The incidence, like that of congenital dislocation of the hip, is higher in first born children (because of intrauterine crowding) and girls [6].

Because a calcaneovalgus foot position is either relatively common, the role of the orthopaedist in assessing what may be a normal variant of foot position is to eliminate true pathologic foot conditions (congenital vertical talus), associated tibial anomalies (posteromedial bow of the tibia), and most importantly associated hip dysplasia

Congenital vertical talus, also known as congenital convexpes valgus, is an uncommon foot deformity that is present at birth and has an estimated incidence of 1 in 10,000. It is characterized by a fixed dorsal dislocation of the navicular on the talar head and neck resulting in a rigid flatfoot deformity.

It occurs as an isolated deformity (idiopathic) in approximately half of all cases and is associated with neuromuscular and genetic disorders in the remaining cases. Fifty percent of children have bilateral involvement and there is no sex predilection.

The shoes often show abnormal wear and pain often develops in early adolescence. Since the heel does not touch the ground, the patients have poor push-off and are forced to weightbear on the talar head, which develops painful callosities

According to the normal values the dorsoplantar talocalcaneal angle is 15 to 40 degrees and the normal meary's angle is Zero, the normal calcaneal pitch is 20 to 30 degrees, the normal tibio-calcaneal angle is 60 to 90 in maximum dorsiflexion and the normal

talocalcaneal angle is 25 to 45 degrees in maximum dorsiflexion.

Conclusion

In case of congenital oblique talus the ranges varied according to the severity of the deformity, the dorsiplantar talocalcaneal angle varies from 34-42°, the dorsoplantar meary's angle from 2-24°, the lateral meary's angle from 7-58°, the calcaneal pitch angle from 3-28°, the tibio-calcaneal angle on maximum dorsiflexion from 9-46°, the tibio-calcaneal angle on maximum planter flexion from 4-53°, the talocalcaneal angle on maximum dorsiflexion from 3-56° and the talocalcaneal angle on maximum planterflexion from 13-41°. In case of congenital vertical talus ranges varied also according to the severity of the deformity, the dorsiplantar talocalcaneal angle varies from 7-55°, the dorsoplantar meary's angle from 28-72°, the lateral meary's angle from 32-89°, the calcaneal pitch angle from 7-49°, the tibio-calcaneal angle on maximum dorsiflexion from 5-29°, the tibio-calcaneal angle on maximum planter flexion from 19-56°, the talocalcaneal angle on maximum dorsiflexion from 20-35°, the talocalcaneal angle on maximum planterflexion from 22-34°.

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