Weightbearing Radiography vs Weightbearing Computed Tomography in the Evaluation of Cavovarus Charcot-Marie-Tooth Deformity: 2D or Not 2D, that is the Question?

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INTRODUCTION: The use of weight bearing computed topography (WBCT) in the preoperative evaluation of Charcot-Marie-Tooth (CMT) patients has increased in recent years. Not all surgeons or patients have access to this technology. This study sought to compare preoperative deformity measurements in CMT feet between weight bearing radiographs (WBR), manual WBCT measurement, and automated WBCT measurement.

METHODS: A retrospective review of CMT patients who underwent surgical management with a single surgeon and had both preoperative WBR and WBCT was performed. Lateral talus-first metatarsal angle, calcaneal pitch, anteroposterior (AP) talus-first metatarsal angle, and talonavicular coverage angle were measured on WBR, manually on WBCT, and using automated three-dimensional WBCT software.

RESULTS:

38 feet in 34 patients were included. There was no significant difference in measurement of deformity between WBR and manual WBCT (p>0.05). A significantly lower talonavicular coverage angle was noted on automated WBCT than WBR (p=0.044). There was no significant difference in other measurements between WBR and manual WBCT (p>0.05). Measured forefoot adduction was less with automated than manual WBCT (talus-first metatarsal p=0.026, talonavicular coverage angle p=0.005). There was no significant difference in other measurements between manual and automated WBCT (p>0.05).

DISCUSSION AND CONCLUSION: Measurement of deformity in CMT feet were similar between WBR and manual WBCT. Automated WBCT was shown to measure less forefoot adduction, which is of unclear significance. Surgeons and patients without access to WBCT should rest assured that currently, WBR are sufficient for preoperative evaluation of deformity.

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Table 1 - Lat	able 1 – Lateral Talus-First Metatarsal Angle					Table 2 - Calcaneal Pitch						Table 3 – AP T	Table 3 - AP Talus-First Metatarsal Angle							Table 4 - Talonavicular Coverage Angle					
	WBR	Manual WBCT	Automated WBCT		n-value		WBR	Manual WBCT	Automated WBCT		p-value		WBR	Manual WBCT	Automated WBCT		p-value		WBR	Manual WBCT	Automated WBCT		p-val		
Mean +/, SD				WBR vs mercoal		Mean +/- SD				WBR vs manual		Mean #/- SD				WBR vs manual		Mean +/- SD				WBR vs manual			
(degrees)	6.8 ± 16.7	8.9 ± 26.0	7.0 ± 20.4	WBCT	0.667	(degrees)	21.7 ± 10.8	18.5 ± 12.5	20.0 ± 17.3	WBCT	0.246	(degrees)	28.6 ± 16.7	35.0 ± 18.7	26.1 ± 14.9	WBCT	0.120	(degrees)	20.2 ± 12.9	22.0 ± 11.6	14.4 ± 11.3	WBCT	0.51		
95% CI				WBR vs automated		95% CI				WBR vs automated		95% CI				WBR vs automated		95% CI				WBR vs automated			
(degrees)	1.5-12.1	0.6-17.2	0.4-13.4	WBCT	0.971	(degrees)	18.2-20.2	14.5-22.5	14.3-25.6	WBCT	0.612	(degrees)	23.6-34.0	29.0-41.0	21.3-31	WBCT	0.509	(degrees)	16.1-24.3	18.3-25.7	10.7-18.1	WBCT	0.04		
Range				Manual WBCT ys		Range				Manual WBCT vs		Ranne				Marmal WBCT ys		Range				Manual WBCT vs			
(degrees)	-58-35	-92-61	-55-56	automated WBCT	0.708	(degrees)	-18-44	-28-39	-13-84	automated WBCT	0.680	(degrees)	-5-66	0.74	1-61	automated WBCT	0.026	(degrees)	-3-55	0-47	0-46	automated WBCT	0.00		
Abbreviations: WBR – weightbearing radiograph, WBCT, weightbearing computed tomography * - significance set at an alpha level of 0.05						Abbreviations: WBR - weightbearing radiograph, WBCT, weightbearing computed tomography * - significance set at an alpha level of 0.05						Abbreviations: * * - significance	Abbreviations: WBR – weightbearing radiograph, WBCT, weightbearing computed tomography * - significance set at an alpha level of 0.05						Abbreviations: WBR – weightbearing radiograph, WBCT, weightbearing computed tomog * - significance set at an alpha level of 0.05						