

Long-Term Clinical and Radiographic Results of Posteromedial Lateral Release for Neuromuscular Clubfoot Deformity

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INTRODUCTION:

Clubfoot occurs in up to 50% of patients with spina bifida (SB) and 90% with arthrogryposis (AR). Many of these patients with neuromuscular clubfoot deformity fail conservative casting and require surgery with posteromedial lateral release (PMLR). Limited data exists for the outcomes of PMLR in SB and AR patients.

METHODS:

Retrospective chart review was performed on PMLR in SB and AR patients from January 2007 to June 2022, excluding those with follow-up less than 3 years or incomplete charts. Radiographic measurements were obtained pre- and post-PMLR when available.

RESULTS:

In total, 51 patients with 79 cases of clubfeet treated with PMLR at a tertiary children's hospital were identified. Of those, 35 patients with 54 cases of clubfeet treated with PMLR were analyzed, including 22 patients (29 feet) with SB and 13 patients (25 feet) with AR. Table 1 displays the number of cases, demographics, reoperations, and time to surgery for patients with spina bifida and arthrogryposis. In the SB cohort, 41% of feet required a reoperation at an average of 4.6 years, and 76% of AR feet required reoperation at an average of 4.7 years post-PMLR. Additionally, 21% of SB feet and 8% of AR feet required two or more reoperations. Talcotomy was required post-PMLR in 24% of SB feet and 40% of AR feet at an average of 4.9 and 5.9 years, respectively. Younger age at time of PMLR was associated with significantly increased reoperation rates in AR ($p=0.01$), shown in Figure 1. Level of spinal lesion, history of tethered cord release, and ventriculoperitoneal shunt status were not associated with differences in reoperation rate in patients with SB. Table 2 displays the pre- and post-PMLR angles of five common radiographic measurements for both cohorts of patients. Greater change in calcaneus-5th metatarsal angle after PMLR was associated with a future need for reoperation ($p=0.047$). Greater talo-1st metatarsal angle after PMLR was associated with a future need for reoperations of any kind ($p=0.040$) in SB. Talar head and dome morphology, talocalcaneal angle (lateral and anterior-posterior), and Meary's angle were not associated with reoperations.

DISCUSSION AND CONCLUSION:

While PMLR remains a safe and successful treatment in the short term, many neuromuscular clubfeet will require additional procedures. Younger age and greater preoperative versus postoperative changes in calcaneus-5th metatarsal and post-operative talo-1st metatarsal angles were associated with increased reoperation rate. These results help orthopaedic surgeons counsel families about the long-term prognosis of clubfoot treatment in SB and AR.

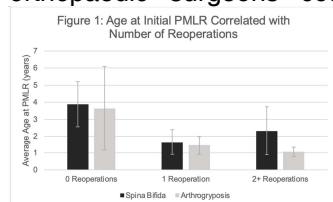


Figure 1: Average age at initial PMLR stratified by condition (spina bifida or arthrogryposis) and number of reoperations. Younger age at initial PMLR was statistically significant for increased reoperations in arthrogryposis ($p=0.011$) but not in spina bifida ($p=0.057$).

Table 1

	Spina Bifida	Arthrogryposis
Number of patients	22	13
Number of feet	29	25
Gender	12F, 10M	4F, 9M
Average age at PMLR (years)	3.4 (1.0-8.7)	2.0 (0.7-6.1)
Feet requiring 1+ reoperation	12	19
Feet requiring 2+ reoperations	6	2
Average time to reoperation (years)	4.6 (1.4-10.2)	4.7 (1.0-7.8)
Feet requiring talcotomy	7	10
Average time to talcotomy (years)	4.9 (3.1-7.2)	5.9 (1.6-9.6)
Average length of follow-up (years)	9.0 (3.4-13.9)	10.7 (4.0-14.2)

Table 1: Number of feet, patients, length of follow-up and gender distribution of patients with spina bifida and arthrogryposis, compared by average age at PMLR, number of reoperations, length of time before first reoperation, number requiring talcotomy, and length of time before talcotomy.

Table 2

Angle	Spina bifida		Arthrogryposis	
	Pre-PMLR	Post-PMLR	Pre-PMLR	Post-PMLR
Talocalcaneal (AP)	33.3±14.8	35.9±14.7	26.5±13.1	30.8±14.6
Talo-1 st MT (AP)	22.3±14.2	16.2±12.3	39.8±23.4	24.1±16.8
Talocalcaneal (lat)	27.9±11.8	28.1±13.6	18.3±11.1	13.0±9.1
Calcaneus-5 th MT (lat)	166.0±9.9	161.2±14.6	125.3±58.6*	168.6±8.1*
Meary's (lat)	18.9±18.2	14.1±10.7	22.4±14.5*	10.7±7.4*

Table 2: Radiographic angles (in degrees) with the average and standard deviation displayed for patients with spina bifida and arthrogryposis before and after PMLR.