CLINICAL STUDY

"Different" approach in the operative treatment of congenital clubfoot and its results

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Abstract

Objectives: **This study compared long-term results of the treatment of idiopathic clubfoot at two different University orthopaedic departments.**
Background: **The treatment of clubfoot is still controversial due to different severity and different treatment philosophies.**
Methods: **Authors retrospectively analyzed a group of 273 feet (145 patients) operated on at the Unit of Pediatric orthopaedics, Children University Hospital, Bratislava (group A) and the cohort of 60 feet (33 patients) operated on at the I st University Department of Orthopaedics, Bratislava (group B), between 1993 and 2002 with follow up period from 2 to 11 years (average 72 months). In the group A, McKay procedure was indicated in 3 feet, Carroll operation in 35 feet and 160 feet were operated by Brockmanns posteromedial release and its modifications (cuboid and metatarsal osteotomies). In the group B, McKay procedure was done in 8 feet and 50 feet were operated on by Turco/ Zacepin procedure.**
Results: **Recurrences in both groups due to the insufficient first step operative reduction and mistakes in after treatment were 12 %. Satisfactory results (excellent and good) were achieved in 88 % of cases in both groups.**
Conclusion: **This study shows, that the results of operative treatment of congenital clubfoot from two different departments (using different operative techniques but "a la carte philosophy") were comparable in most of the cases *(Tab. 4, Fig. 3, Ref. 9)*.**
Key words: clubfoot, operative treatment, results.

Clubfoot is a difficult deformity of the foot consisting of four main components:

1. Equinus (in ankle joint)
2. Varus (calcaneal supination)
3. Excavatus/cavus (in the middle foot)
4. Adductus/supinatus (forefoot)

In the early 1970s, Turco (1) attributed this deformity to medial displacement of both navicular and calcaneus around the talus, and his observations during surgery helped to delineate bony deformities in clubfoot. According to Turco, the talus is pushed into equinus by underlying calcaneus and navicular, while the head and neck of the talus are deviated medially. The calcaneus is inverted under the talus. McKay (2) added the three-dimensional aspect of bony deformity of the subtalar complex in clubfoot. According to his description, the relationship of the calcaneus and the talus is characterized by abnormal rotation in the sagittal, coronal, and horizontal planes. As the calcaneus rotates horizontally while pivoting on the interosseous ligament, it

Tab. 1. Distribution of operation regarding groups and sex.

	Group A			Group B		
	female	male	total	female	male	total
Single operations	88	144	232	19	32	51
Multiple operations	13	28	41	3	6	9
Operated feet	101	172	273 (145 p.)	22	38	60 (33 p.)

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Tab. 2. Surgical procedures.

Group	A	B
1. Tendon Achilles lenghtening (TAL)	8	
2. TAL + dorsal capsulotomy	44	2
3. TAL + Postero-medial release, plantar fasciotomy	160	50
4. Posterolateral and medial plantar release (Caroll)	35	
5. McKay operation	3	8
6. Capsulotomy in MTT (Heyman Herndon)	17	
7. Metatarsal osteotomy	51	3
8. Calcaneocuboid resection	21	3
9. Tarsal osteotomy	2	1
10. Calcaneal osteotomy	1	
11. Triple arthrodesis	3	2
12. Another	2	
13. Re-operations	41	9

Tab. 3. Prognostic signs for clubfoot operation (Catterall).

Foot	A	B	C	D	E
1. Calf atrophy	1	1	1	1	0
2. Posterior position of later. malleolus	1	1	1	1	0
3. Pathological skin folds	1	0	0	0	0
4. Curved lateral border	1	0	0	0	0
5. Excavatus/cavus	1	1	0	0	0
6. Fixed equinus	1	1	1	1	1
7. Navicular fixed to medial malleolus	1	1	1	0	0
8. Calcaneus fixed to fibula	1	1	1	1	0
9. No movement in middle foot	1	0	0	0	0
10. Fixed suppination of forefoot	1	0	0	0	0
Points	10	6	5	4	1

Tab. 4. Causes of treatment failure.

Group	A	B
Late onset of op. treatment	4	
Insufficient first operation	12	3
Insufficient after treatment (casting, rehabilitation)	17	4
Another reason (infection)	8	2

slips beneath the head and neck of the talus anterior to the ankle joint and the calcaneal tuberosity moves toward the fibular malleolus posteriorly. Thus the proximity of the calcaneus to the fibula is primarily caused by horizontal rotation of the talocalcaneal joint rather than equinus alone. The heel appears to be in varus because the calcaneus rotates through the talocalcaneal joint in a coronal plane as well as horizontally. The talonavicular joint is in an extreme position of inversion as the navicular moves around the head of the talus. The cuboid is displaced medially on the calcaneus.

The aim of the treatment is to achieve and maintain reduction in the talo-calcaneo-navicular joint. In the era of Ponsetti (3), conservative treatment method – Tachdjians motto "Operative treatment of clubfoot compared to powerfull casting seems to be more conservative" (4) becomes controversial.

Therefore we tried to retrospectively analyze two groups of patients operated on at two different orthopaedic departments between 1993 and 2002. We evaluated sex, type of deformity, type of operation and tried to compare these two group regarding postoperative results, reccurences and mistakes in after treatment.

Patients and methods

Between 1993 and 2002 a group of 273 club feet (145 patients) was operated on at the Unit of Pediatric Orthopaedics, Children University Hospital, Bratislava (group A) and the group of 60 club feet (33 patients) was operated on at the Ist University Department of Orthopaedics, Bratislava (group B). Distribution of operations regarding operations and sex is shown in Table 1 and types of surgical procedures are shown in Table 2.

We accepted Caterall (5) prognostic criteria in the indication of surgical procedure (Table 3).

Clubfoot Type A needs a complete plantar, medial, lateral and posterior release operation (McKay or Carroll, 6). We have found 38 feet type A in group A and 8 feet in group B.

Clubfoot Type B needs a plantar, medial and posterior release (Turco or Brockmanns operations or its modifications). We have found 160 feet in group A and 50 feet in group B.

Clubfoot Type C needs a plantar and medial release. We have found no such patient.

Clubfoot Type D needs a posterior release and a release of calcaneofibular and talofibular posterior ligament. In group A, we have found 44 feet and in group B, 2 feet.

In clubfoot Type E – conservative treatment is sufficient. We haven't included these patients in the study.

Results

The results were divided into categories: good (fair) and bad.

Good (fair): the patient was able to walk comfortably with-

Fig. 1. Child with bilateral talipes equinovarus operated on in the 4th and 5th months of life by Carrolls technique. Picture shown after removal of the cast from the right leg.

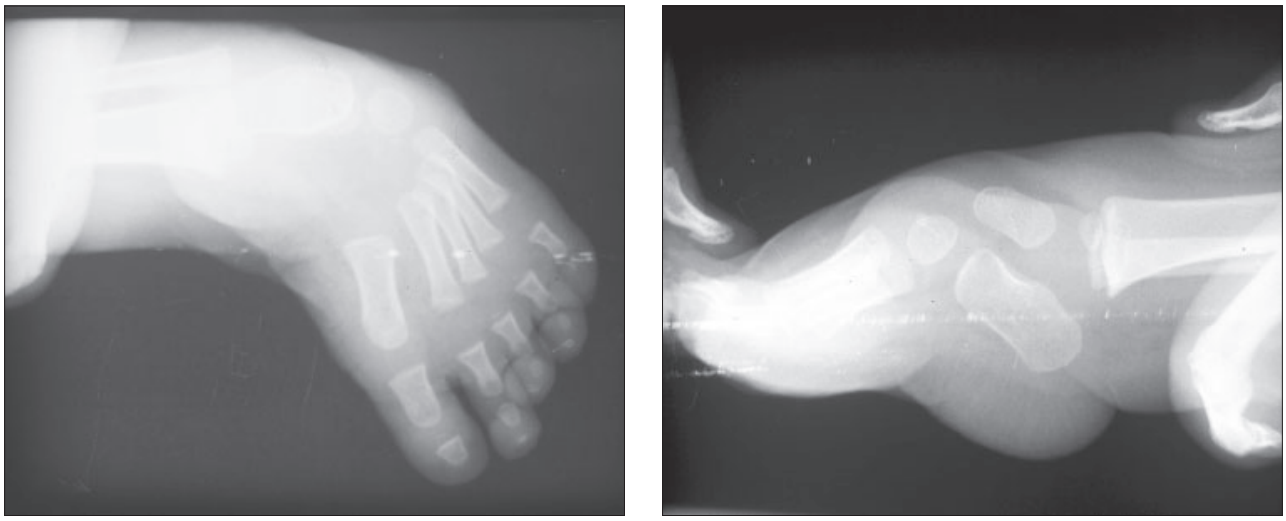

Fig. 2 a, b. AP and lateral X-ray before the operation on the left side.

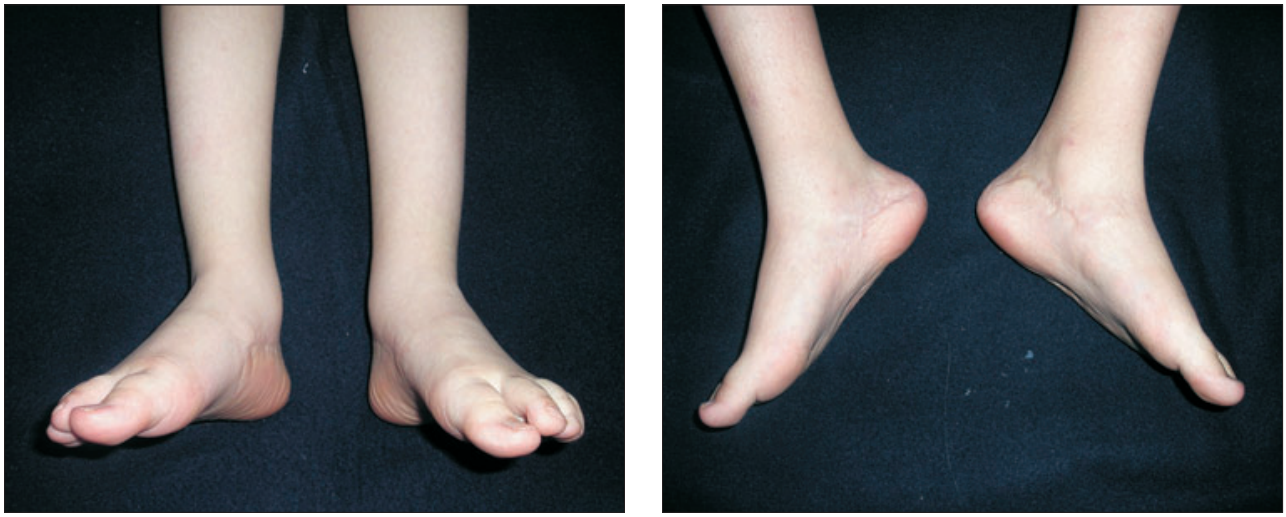

Fig. 3 a, b The same patient 7 years after the bilateral operations

out restriction using shoes. The foot was normally shaped. Radiologically, the deformity was well corrected.

Bad: Overcorrection or recurrence of the deformity occured. Walking was not possible without complaints.

Follow up period was in both groups 2–11 years. In the group A, the residual deformity and/or pain was presented in 41 feet (12 % of cases with bad results). In group B, residual deformity and/or pain was present in 9 feet (12 % of cases with bad results). The causes of treatment failure (Table 4) were mostly insufficient first operation and insufficient after treatment.

Discussion

The treatment of clubfoot is still controversial due to different severity and different treatment philosophies. The Ponsetti conservative method serves the best results when it starts early and is performed by a well trained pediatric orthopaedic surgeon (sometimes using percutaneous heel cord tenotomy to improve the results of the “conservative approach”).

We agree with Karski (7) and Napiontek (8), that there is no universal surgical technique suitable for different types of clubfoot. Assortment of the primary operative technique starts with the simplest one such as posterior release and ends with the most sophisticated such as the complete subtalar release. The proper selection is the key to the success and has to be done on the base of clinical and radiological parameters before the operation. The “a la carte” choice is often performed not before, but during the surgical procedure. We summarize our indications for the operative approach into four groups.

1) Posterior release. Indication is a persisting equinus of the hindfoot or both the hindfoot and forefoot. On AP and lateral

radiographs, normal talocalcaneal angle is visible. But we have to be careful in assessing iatrogenic rocker bottom deformity after the conservative treatment. In these cases, the posterior release should be combined with the dorsal release of the calcaneocuboid and talonavicular joint.

2) Posteromedial release. The indications for this procedure are: hindfoot equinus and varus and passively corrected medial spin. Radiographic indications are following: diminished talocalcaneal angle on AP (less than 20 degree) and on lateral radiographs (less than 35 degrees)

3) Posteromedial – lateral release (partial subtalar release). Clinical and radiological indications for these techniques are almost the same as for the posteromedial release. The difference concerns not corrigible medial spin. Its presence before surgery, as well as lack of intraoperative correction, are indications for additional lateral release.

4) Complete subtalar release. Clinical indication for this technique is primarily stiff varus and medial spin deformity. Radiographic indications are the same as for posteromedial-lateral or partial subtalar release. We recommended McKay operation to be delayed until the child is 6–12 months. Treatment should ideally be completed at the time the child is ready to walk.

Supplementary techniques could be extended to the correction of the forefoot adduction. If the metatarsal first ray angle is lower than 70 degree, it is indicated for correction. In older children, opening wedge osteotomy of the medial cuneiform is preferred.

Conclusion

Recurrences in both groups due to the insufficient first step operative reduction and mistakes in after treatment were present in 12 % of patients. Satisfactory results were achieved in 88 % of our cases in both groups due to Bensahels (9) “a la carte approach”. From our point of view it is a mistake to adapt all feet to a particular operation. But there are some facts that should be kept in mind before surgery is performed. Walking and weight bearing on an uncorrected clubfoot increases the deformity. Using any operation, the joints that are released become more rigid than before. Undercorrection leads to relapse. Overcorrection leads to severe foot problems during adolescence (without the possibility to repair). The first operation should be the last one.

References

1. Turco VJ. Resistant congenital clubfoot: one-stage posteromedial release with internal fixation. J Bone Joint Surg 1979; 61-A: 80—85.

2. McKay DW. New concept of and approach to clubfoot treatment. II. Correction of clubfoot. J Pediatr Orthop 1983; 3: 10.

3. Ponseti IV. Treatment of congenital clubfoot. J Bone Joint Surg 1992; 74-A: 448.

4. Tachdjian MO. Pediatric Orthopaedics. Philadelphia; WB Saunders, 1990: 3372 o.

5. Catterall A. A method of assessment of the clubfoot deformity. Clin Orthop Relat Res 1991; 264: 48—53.

6. Carroll NC. Congenital clubfoot: pathoanatomy and treatment. AAOS Instr Course Lect 1987; 36: 117.

7. Karski T, Wósko I. Experience in the conservative treatment of congenital clubfoot in newborns and infants. J Pediat Orthop 1989; 9: 134.

8. Napiontek M. Clinical and radiological appearance of congenital talipes equinovarus after successfull nonoperastive treatment. J Pediat Orthop 1996; 16: 67—72.

9. Bensahel H, Catterall A, Dimeglio A. Practical applications in idiopathic clubfoot: a retrospective multicentric study in EPOS. J Pediat Orthop 1990; 10: 186.

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