

## **CLINICAL MANAGEMENT OF CLUBFOOT IN THE AMBULATORY SETTING- OUR 2- YEAR EXPERIENCE WITH 20 PATIENTS**

**Ana Haidamac<sup>1</sup>, Daniela Craciun, R. Bandac, and F. Filip<sup>2</sup>**

Department of Medicine and Biological Sciences

University of Suceava, Romania

[<sup>1</sup>anahaidamac@yahoo.com](mailto:anahaidamac@yahoo.com)

[<sup>2</sup>florin.filip@usm.ro](mailto:florin.filip@usm.ro)

**Keywords:** clubfoot, Ponseti method, ambulatory setting

### **ABSTRACT**

Assessment of conservative treatment using the Ponseti method in children with congenital talipes equino- varus (clubfoot), diagnosed and treated as outpatients in the ambulatory clinic of the County Hospital from Suceava, Romania.

Retrospective study over a 2-year time interval (2021-2023) including children with idiopathic clubfoot who were treated in the Pediatric Surgery Ambulatory Clinic. Demographic information, (age, sex), clinical data related to the TEV and detailed information regarding the treatment using the Ponseti method were analyzed. Only cases of idiopathic clubfoot who entirely received their treatment in our clinic were included in the study. 44 children with clubfoot were identified, of which only 20 (16 boys and 4 girls) met the inclusion criteria; 15 patients had bilateral clubfoot and 5 had unilateral clubfoot. The number of corrective cast immobilizations before Achilles' tendon tenotomy was 4 in 2 children, 5 in 16 children, and 6 in 2 children. Patients were evaluated and monitored by means of the Pirani score, applied at the beginning of treatment and before tenotomy. The tenotomy was followed by cast immobilization for 21 days. Dennis Browne orthosis was subsequently applied. Only one patient abandoned the treatment after applying 5 casts, just before tenotomy. In one patient the equinus correction was incomplete. There were no operative or cast-related complications.

The Ponseti method can be performed, with very good results as outpatient treatment. It requires an appropriate trained orthopedic team (orthopedic surgeon, nurse and prosthetic specialist) with experience in carrying out this type of treatment, adequate equipment and compliance from the parents.

**Introduction:** Clubfoot or *talipes equino- varus* (TEV) is the most frequent congenital malformation of the foot. It is characterized by a permanent combination of varus and equinus of the hindfoot, and adduction of the forefoot (1-3). Almost 50% of the cases are bilateral. The main systems of clinical assessment, both before and after treatment, are represented by Dimeglio and Pirani scores.

**Dimeglio score** provides an easy and objective classification system, based on the visual estimation of the equinus deformity, hindfoot varus asd from behind, midfoot rotation, and forefoot adduction. Every component is given a score between 0 and 4 based on the potential to be reduced, to which another 4 point are being added (4).

**Pirani score** is a more recent system developed by Shafique Pirani, a Canadian orthopedic surgeon, specifically designed to evaluate the severity of every component of the clubfoot deformity (5- 6). It proved to be a valuable clinical tool, without including elements of local functional status, radiological pictures or walking status.

The Ponseti method is the standard conservative treatment for patients with TEV, initially designed by Prof. Ignacvio Ponseti in Iowa and then adopted in many pediatric orthopedic centers (7- 10). It is recommended to start the Ponseti tratment as soon as possibly after birth in childen with TEV. It can last up to 4 weeks and includes two main stages:

- Repositioning the foot by serial gentle manipulations, followed by application of 5 or 6 long leg casts for 5- 7 days each. In 95% of cases, a proper reduction of the deformity is being obtained. The next step is represented by a percutaneous tenotomy of the Achille’ s tendon, which is performed after proper correcton of cavus, adduction and varus. It is followed by a 3- week long leg casting;
- Maintaining the reduction after removal of the post- tenotomy cast by using a Dennis- Browne orthosis device. Physical therapy is being administered on a daily basis. When the child begins to walk, orthopedic shoes are prescribed and the patient is regularly followed- up until the age of 10 years.

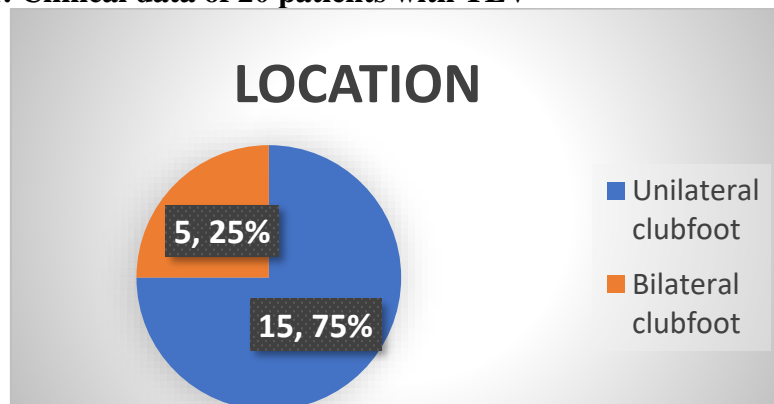
The Ponseti method was introduced in Romania in 2008 and suces rates of up to 90% have been obtained in dedicated centers. It has virtually replaced the classic treatment method, which consisted of several surgical procedures followed by casting for a few months. However, the use of this method on a regular basis requires dedicated medical staff and appropriate training in the Ponseti method. Only a few (mostly university – based) hospitals are using this method on a regular basis.

**Material and method:** We performed a retrospective study of clubfoot (TEV) cases treated according to the Ponseti method in the Ambulatory Clinic of the Pediatric Surgery and Orthopedics Department of our hospital (County Hospital, Suceava, Romania) over a 2- year’ interval (between May 2021 and April 2023, respectively). The study was approved by the Ethical Committee of the Hospital (Decision # 19/ February 6, 2023). Informed consent was obtained from the parents in every case at the beginning of the study. Inclusion criteria: newborns and infants with idiopathic TEV treated by Ponseti method from their first presentation. Data of interest included: sex, location (uni- or bilateral TEV), Pirani score at the beginning and at the end of casting (before Achille’ s tenotomy), number of long leg casts used before the tenotomy.

The Ponseti method consisted of serial manipulations followed by long- leg casting for 5- 7 days; percutaneous Achille’ s tendon tenotomy after 4- 6 casting episodes, depending on the local response. The tenotomy was performed in the ambulatory clinic using local anesthesia and a percutaneous sterile technique. It was followed by surgical wound dressing and long- leg casting for 21 days. Afterwards, the patients were placed in a Dennis- Browne orthosis until the age of walking (around 1 year old).

**Results:** A number of 44 patients with TEV were identified, of which only 20 satisfied the inclusion criteria and were included in the study (Table 1). The other 24 patients were excluded because of different reasons, such as: non- standard conservative treatment, patients who started their treatment in another hospitals, relapse cases, symptomatic (neurological) TEV cases, incomplete TEV (positional) cases, patients older than 2 years, etc. Of the 20 cases, 16 (80%) were boys and 4 (20%) were girls.

**Table 1: Clinical data of 20 patients with TEV**



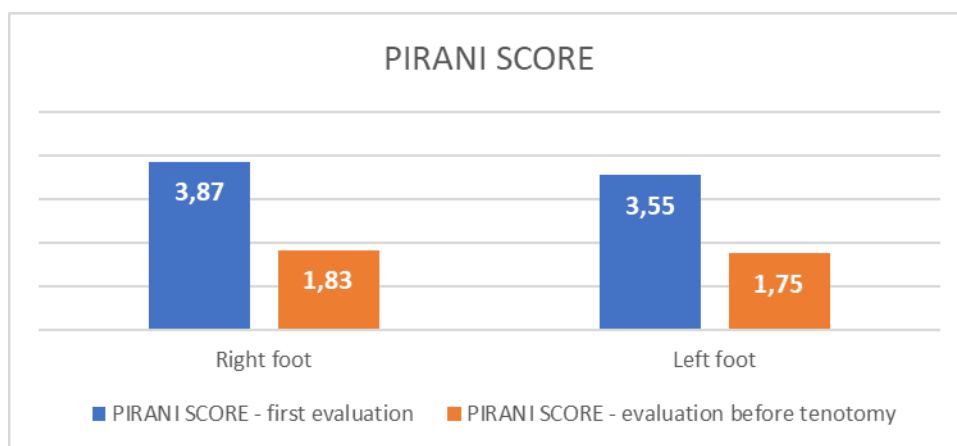
**Fig. 1: Incidence of uni- and bilateral TEV cases**

Fifteen (75%) were bilateral, and 5 (25%) were unilateral TEV cases. (Fig. 1). Interestingly, all unilateral cases were recorded in boys and were located on the left foot. The mean number of manipulations performed before the tenotomy was 5, but 2 cases required only 4 manipulations, 2 cases required 6 manipulations, and the rest of 16 cases- 5 manipulations (Fig. 2).

Nr.crt.	Pacient	Sex	Bilateral Unilateral	Număr imobilizări ghipsate	Scor Pirani preluare în studiu		Scor Pirani înainte tenotomie	
					Picior drept	Picior stâng	Picior drept	Picior stâng
1	P.I.	M	U	5	0	3,5	0	2
2	P.R.	M	B	5	4	4	1,5	1,5
3	L.I.N.	M	B	5	4	4,5	1,5	2,5
4	N.C.	M	U	5	0	4,5	0	2,5
5	A.B.C.	F	B	5	3,5	3,5	1,5	1,5
6	R.M.	F	B	5	4	3,5	2	1,5
7	C.F.V.	M	B	5	3,5	3	1,5	1,5
8	M.D.P.	M	B	5	4,5	4,5	2,5	2,5
9	G.S.T.	M	U	5	0	4	0	2
10	B.A.I.	M	U	4	0	2	0	1
11	O.A.	M	B	5	3,5	3,5	1,5	1,5
12	C.M.	F	B	5	3,5	3	1,5	1,5
13	R.R.	F	B	6	4,5	4,5	2,5	2,5
14	S.F.	M	B	5	4	4	2	2
15	I.R.D.	M	B	6	3,5	3,5	1,5	1,5
16	H.V.	M	B	5	3,5	3	1,5	1,5
17	V.I.	M	B	4	3	3	1	1
18	G.B.	M	U	5	0	3,5	0	1,5
19	A.E.	M	B	5	4,5	4,5	2,5	2,5
20	F.I.	M	B	5	4,5	1,5	3	1
M.A.				5,00	3,87	3,55	1,83	1,75
STDEV				0,46	1,77	0,83	0,94	0,53
C.V.				0,09	0,46	0,23	0,51	0,30

**Fig. 2: Number of patients with 4, 5 or 6 manipulations before tenotomy**

As mentioned above, the Pirani score was determined for every patient and every foot at the beginning of the treatment and before the Achilles tenotomy. The mean values of Pirani scores are presented in Fig. 3- there was a significant improvement of Pirani score (1.83 vs 3.87 for the right foot, and 1.75 vs 3.55 for the left foot, respectively).



**Fig. 3: Pirani score at the beginning and the end of manipulations – right and left foot, respectively.**

There were no cutaneous, vascular or neurological complications. One patient had an incomplete correction of his equinus deformity, and will probably need a redo tenotomy in the future. varus deformity In one case, the patents refused the tenotomy after a fair reduction had been obtained after 5 casting sessions.

**Case report:** male newborn, G1P1, birthweight = 2,800 gr, Apgar score = 8 and 9 and 1 and 5 minutes, respectively. Positive family history – the father had bilateral

clubfoot, had not received Ponseti treatment. The child presented in the clinic with bilateral clubfoot with initial Pirani scores of 2 (left side) and 4.5 (right side). The first cast was applied when the patient was still in the hospital, he was then followed on a regular basis in the clinic. Another 3 casts were applied before performing the Acille's tenotomy as an outpatient. The Pirani scores before tenotomy were 0.5 (left side) and 2 (right side), respectively. A long-leg cast was applied for 3 weeks, followed by a Dennis-Browne device (Fig. 4- a, b, c, and d).



d)



**Fig. 4- Clinical case with bilateral clubfoot (a- initial presentation; b- percutaneous Achille's tenotomy; c- long-leg cast; d- Dennis Browne device)**

The patient is followed on a regular basis in the clinic (Fig. 5).



**Fig. 5: - Clinical case- follow-up appearance**

**Discussion:** The clubfoot is a challenging disease, but it can provide excellent results if properly treated. Using a multidisciplinary approach is the key for obtaining good results. The medical team includes several members: neonatologist, pediatric surgeon or orthopedic surgeon familiarized with the Ponseti method, PT (Physical Therapy) specialist, pediatric nurse, technician or orthotic specialist. Immediate and unrestricted access to specific medical devices

and supplies is critical. We were able to develop an ambulatory (outpatient) treatment program for children with clubfoot based on proper training of the medical team and regular schedule of children with clubfoot in the clinic (every Wednesday), in order to get continuity of care.

We have also found how important is the compliance of the parents during the treatment protocol. Educating and counseling the parents on Ponseti method has multiple advantages, in order to identify treatment failure or early relapse. It is also important to prevent the parents to abandon the treatment, since it can take between 5 and 10 years until the clubfoot is considered cured. The parents must be made aware that the treatment must continue at home for many years, including the use of orthotic devices (shoes and splints), regular PT sessions and periodical follow-up visits with the orthopedic surgeon in the clinic.

The PT specialist is a key member of the medical team. His goal is to obtain and maintain an appropriate correction of the deformity at different stages of the treatment protocol. His role is very important during the long-term follow-up of these patients, when PT is essential in keeping the foot flexible and painless and supervising the daily activities of the child.

**Conclusions:** Our study demonstrates that the Ponseti method can be safely implemented in our department. We were able to obtain good results by setting up a well-trained and dedicated medical team. Proper medical supplies and a dedicated weekly schedule for children with clubfoot are also required.

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