Comparative study between standard and accelerated ponseti technique in treatment of congenital talipus equinus varus

Hassan Ibrahim Mohammed Elsyed, Naguib Yousef Basha, Mohammed Mahmoud Hegazy, Mohammed Tag Eldin Elemary, Hossam Elsharkawy

Department of Orthopedic Surgery, Faculty of Medicine, Cairo University, Egypt

Email: moharramortho@gmail.com, puresmile499@gmail.com

Abstract

Background: Since the Ponseti method classic protocol requires several castings with weekly adjustments, it is often inconvenient for patient groups living in areas which are far from referral medical centers. other authers hypothesized that faster cast change results in greater compliance from patients with equivalent results, we compared between both methods.

Aim: to compare the end results of standard and accelerated ponseti techniques in treatment of congenital idiopathic talipus equinus varus.

Methods: it was prospective randomized a blinded study, and the randomization was done using the envelope method, the final evalution. Total number of cases is 42 feet (25 cases), divided into 2 groups, Group A (21 feet) (Accelerated) and Group B (21) (Standard), with 30 male feet and 12 female feet ation by Pirani score was done by a blinded external researcher not involved in the study.

Results: According to the time needed till tendoachilis lenghthening,it was different in the two group, the mean in group A was (9 days)while in group B the mean was (21 days),which means more time was spended in correction the deformity in group B but the same result came from the both techniques as the post 1 year score was nearly the same, this means the two techniques gives the same results but in group B it spends more time.technique is better than the standard in time needed for correction and 1 year follow up. Skin ulcers which happened due to tight cast, it happened in one only one case in Group A and treated with removal of the cast for one week and recasting with the same technique, this complication didn't happen in group B. Relapses it occurs in 3 cases in group A and 2cases in group B due to bad compliance and treated as described before.

Conclusions: Accelerated method is safe, effective and can give the same result as the standard method but less time and money consumption and can correct more severe deformities in a less time frame which give better compliance.

Keywords: standard, accelerated, ponseti technique, congenital talipus equinus varus

Introduction

Clubfoot is one of the most common congenital deformities, and it is a complex three-dimensional deformity that has four components; equinus, varus, adductus, and cavus. Per year more than 100,000 babies are born with congenital clubfoot worldwide. In developed countries, eighty percent of cases occur . **(1)**

The treatment of clubfoot has been controversial throughout the last 150 years but all would agree that the initial treatment of clubfoot should be nonoperative. **(2)**

Multiple casting techniques were identified as the French method and the kite method but ultimately most of the feet ended up in surgery with these two methods because more complications observed after

aggressive and inadequate casting treatment include pressure sores, flat-top talus, rocker bottom deformity and residual deformity. **(2)**

Sixty years ago, after thorough analysis of the pathological anatomy and biomechanics of the tarsal joints, clubfoot dissection of stillborn babies and examination of serial histological parts of the fetuses, Ponseti created a new conservative manipulation technique, accompanied by casting applications, which in most cases produced excellent results with minimal to no surgery. **(3)**

Over the past decade, the management of Ponseti has been known as the most successful and least costly clubfoot treatment in the whole world. The goal of clubfoot care is to achieve a healthy, mobile and plantigrade foot. The Ponseti process consists of frequent manipulation and casting of the clubfoot until the foot is rotated externally. **(4)**

The dissemination of the Ponseti process, with the recorded positive short- and long-term outcomes, has led to the universal consensus that this non-operational procedure is the initial clubfoot treatment. Regardless of the procedure employed, the CTEV treatment approach had been strive to achieve a cosmetically and functionally appropriate, painless, plantigrade, pliable foot. **(2)**

Club foot care includes a formal evaluation of the deformed foot prior to and during the treatment process, Foot bracing is crucial for the maintenance of correction of clubfoot deformity after casting using the Ponseti technique. **(5)**

Pirani's proposed scoring system, which has shown very good reliability and reproducibility of interobservers which is quick and easy to implement in various clinical environments. Since the Ponseti method classic protocol requires several castings with weekly adjustments, it is often inconvenient for patient groups living in areas which are far from referral medical centers. **(6-11)** other authers hypothesized that faster cast change results in greater compliance from patients with equivalent results, we compared between both methods.

The aim of this study is to compare the end results of standard and accelerated ponseti techniques in treatment of congenital idiopathic talipus equinus varus.

Subjects and Methods:

The study was used to compare between accelerated and standard ponseti techniques, it was prospective randomized ablinded study, and the randomization was done using the envelope method, the final evaluation by Pirani score was done by ablinded external researcher not involved in the study.

The study started in August 2020; they have all been provided and treated at orthopaedic clinic of Abo-Elrish hospital, Cairo University and El-helal hospital.

Inclusion criteria:

1. Age less than 2months.
2. Isolated congenital idiopathic talipus equinus varus.
3. Parents should provide consent for inclusion in the study.

Exclusion criteria:

1. Other congenital or neurological deformity in the child eg. Arthrogryposis, spina bifida.
2. Relapsed or recurrent clubfoot.

The study performed on 42 feet; 21 feet (12patients) treated by accelerated technique & 21 feet (13 patients) standard technique, 17of our patients had bilateral foot deformity, while 8 had unilateral foot deformity.

Our study is divided in two groups; group A accelerated technique casting twice per week and group B standard technique casting once. Choice of which method occured via envelope method to avoid bias and final Pirani score was done by external investigator. Both groups were done with the same hand.

Cast technique:

1) Manipulation and casting technique

A) Correction of cavus (1st cast)

First, the deformity of the cavus was fixed by placing the forefoot in proper alignment with the hindfoot which only required forefoot supination.

Exactly locate the head of the talus.
Firstly, the malleoli were palpated with one hand's thumb and index finger while the toes and metatarsals were placed with the other.
Then, slide the thumb and index finger forward to palpate the talus head in front of the mortis ankle.
Stabilize the talus:
The thumb was placed over the head of the talus stabilizing the talus.
And the index finger of the same hand that was stabilizing the talar head was placed behind the lateral malleolus.
Manipulate the foot:
The index finger of the other hand was placed under the first metatarsal and then the first metatarsal was raised to correct the cavus while the steady head of the talus was used as a fulcrum.So, the forefoot was supinated but never pronated
Then knee cast was first placed below and the entire foot was held in equinus and supination and as much abduction as possible while the lateral aspects of the talus head were applied with a mild counter pressure
The cast was applied to the groin after the plaster was hardened, with the knee flexed in 90 degrees

B) Correction of adduction and varus (2nd to 5th casts).

During supination, the foot was abducted, with the thumb held over the talus head. After the 2nd to fifth cast, complete adduction and varus correction was obtained. In very severe cases it needed the 5th cast.
Steps:

I- Exactly locate the head of the talus.

II- Manipulation:

The thumb and index finger of one hand were used to abduct the foot under the balanced talar head in supination and equinus, while counterpressure is applied to the lateral side of the talus head with the thumb of the other.
The heel was not struck, and no pronation was made of the foot. The foot was kidnapped as far as we could without causing the infant's discomfort and the correction was held with gentle pressure for about two to four minutes then released and repeated four to five times. In the following casts the supination was gradually decreased as the inversion of the foot was corrected while it abducts under the talus. The last cast applied for adduct and varus correction obtained a 60–70-degree foot abduction.

The full correction of the adduction and the varus had been be achieved when the following criteria were obtained;

i. Straight lateral border of the foot and ability to abduct the foot from 60 degrees to 70 degrees.
ii. Correction of the heel varus to slight valgus.
iii. Supination correction.
iv. Equinus deformity improvement.

C) Equinus correction:

During casting from 2nd to the 4th or 5th cast adduction and varus were corrected and part of equinus component but this correction of equinus is not enough, necessitating a heel cord tenotomy. In very flexible feet, equinus may be corrected by more casting without need for tenotomy.

D) Cast Application, Molding, and Removal:

The Ponseti casting rules applied in this study;

i. Paris plaster was used, because it is less costly and can be molded more accurately than fiberglass. In some cases, the fiberglass was used to augment the cast post tenotomy. One or two rolled plaster of Paris (10 cm) and one or two rolled bandage of soft cotton (10 cm) for one side according to the size and age of the baby. **(12)**
ii. The infant was allowed to feed before and if possible, during manipulation and casting and the mother was asked to change his diaper.
iii. The cast was changed twice weekly in group A and once weekly in groub B.
iv. The last cast (post tenotomy casting) was removed after three weeks.

Steps to apply for cast:

1. Applying the padding:

Only a thin layer of cast padding was added and then kept knee flexed 90 degree and the toes in the full corrected position during the cast procedure.

2. Applying the cast:

- Two turns of plaster were smoothly applied around the thigh then descending medially toward the medial aspect of the foot.
- Three to four turns of plaster were applied around the foot extended to the toes, little stress was applied.
    - The assistant kept the toes and placed the plaster around his fingers to give the toes ample space.
    - Ascending upward from lateral aspect of foot and wrapping around all leg and thigh**.**

3. Molding the cast:

The force correction with the plaster was stopped and light pressure was used.

- The constant pressure with the thumb over the head of the talus was prevented. The plaster had been molded over the talus head and the heel while keeping the foot in the right position.
- The foot was molded in a dynamic manner; the fingers were constantly moved to avoid excessive pressure on any single site while the plaster was hardening.
- The arch was well formed to avoid flatfoot and rocker-bottom deformation.
- Never touch the calcaneus during handling or casting.

4. Trim the cast:

The plantar portion of the plaster was leaved to support the toes and the cast was trimmed dorsally to the metatarsophalangeal joints, as marked on the cast.

Cast removal:

Every cast was removed in clinic just before applying a new cast. The cast saw was used to remove the cast in a few cases.

E) Tendo Achilles tenotomy (TAL)

The indication of TAL was:

- If the ankle dorsiflexion is less than 15 degrees despite having achieved 60-70 degrees of abduction and neutral or slight valgus heel.
- TAT was not performed unless sufficient abduction and varus correction had been obtained. If the adequacy of abduction was uncertain, another one or two casts were applied to be certain.
- The ability to palpate the calcaneus 'anterior process as it abducts from below the talus.
- Approximately 60 degrees of foot abduction in relation to the tibia frontal plane.

Technique of the tenotomy:

1- Preparing the family:

The families were advised by describing the procedure and explaining that tenotomy is a minor procedure in the operation room.

2- ***Equipment:*** # 15 scalpel blade.

3- Anesthesia:

All cases were done using local anethesia except one case didn’t need tenotomy.

4- The procedure:

The chosen location for tenotomy was about 1.5 cm above the calcaneus with the assistant keeping the foot in full dorsiflexion.

Inserted from the medial side, the tip of the scalpel blade was directed anterior to the tendon. The flat portion of the blade was then placed parallel to the tendon.

The blade was then rotated to guide its sharp edge to the tendon.

Then the blade was rotated a little posteriorly. It has felt a "pop" as the sharp edge releases the tendon. If a "pop" is not heard the tendon was not fully cut.

Usually, additional 15 to 20 degrees of dorsiflexion were obtained following tenotomy.
Endly, paracetamol rectal suppositories were administrated, e.g., cetal sup.

5- Post-tenotomy cast application and removal:

After tenotomy correction of the equinus, the above knee cast was applied with the foot abducted 60 to 70 degrees with respect to the ankle's frontal axis, and dorsiflexion of 15 degrees for 3 weeks (5).
The cast was removed after 3 weeks. Now there were twenty degrees of dorsiflexion available. The foot was ready to brace.

F) Bracing and exercise

Immediately after removal of the last cast, the FERAK brace was added to stabilize the abduction and prevents the clubfoot from receding (5).

Description of FERAK BRACE (5) that we used in our study:

FERAK brace its simply imitates the position of the last cast after tenotomy, it consists of an above-knee brace (with the knee semi-flexed) connected to a foot piece via an L-shaped metal arm. The foot piece can be externally rotated as desired (70° in this study) around the axis of a screw fixing it to the metal arm. The limb was secured in the brace with the use of Velcro straps (5).

Brace application &exercise Protocol:

- For the first 3 months after removal of the last cast, the brace should be worn full time (23 hours).
- Afterwards, the child would wear the brace at night for at least 12 hours at night time and 2 to 4 hours at day time, up to the age of 3 to 4 years **(12)**.
- During the time of brace removal parents should do exercise in form of stretching for tndoachilis and the medial soft tissue by fixation of the foot with one hand on rigid table and flex the knee with the other hand and external rotation for the foot. **(13)**

Compliance to bracing:

- Compliance with bracing is described as success in adhering to the previously mentioned brace application protocol.
- Non-compliance with bracing is characterized as failure to adhere to the previously mentioned brace application protocol.

The patients have been categorized into two groups:

b. Compliant group.
c. Non-Compliant group.

G) The follow up program

After applying the brace, the child was followed up on the following suggested schedule;

A) Weekly in the 1st month after applying the brace (to troubleshoot compliance issues).
B) Monthly in the 2nd and 3rd months after applying the brace (to validate compliance instructions).
C) Every month in the 3rd month after applying the brace up to 1 year of age.
D) Every 6 months until 2 years of age (to monitor compliance and check for relapses)

Diagnosis of the relapse:

1- Early relapses in infants demonstrated loss of foot abduction and/or loss of dorsiflexion correction and/or metatarsal adduction recurrence.
2- Relapses in child (dynamic supination) may be identified using child walking test.

- As the child walked toward the interviewer, forefoot supination (overacting tibialis anterior muscle) was detected.
- The heel varus was detected as the child walked away from the examinator.
- The seated child should be tested for motion range and passive dorsiflexion impairment of the ankle.

***3) The relapse management protocol**

Remanipulations and casting:

One to three casts were reapplied at the first indication of relapse to extend the foot out and restore correction; this recasting was similar to the initial Ponseti casting used at infancy. In addition to casting, TAL was needed if equinus was relapse. The bracing system was begun again once the foot is corrected with the casts.

Statistical analysis

Microsoft excel 2013 was used for data entry and the statistical package for social science (SPSS) version 22 (SPSS, Armonk, New York: International Business Machines Corporation) was used for data analysis. Simple descriptive statistics (arithmetic mean and standard deviation) used for summary of quantitative data and frequencies used for qualitative data. Bivariate relationship was displayed in cross tabulations and Comparison of proportions was performed using the chi-square test or fisher exact whenever appropriate. T-independent test was used to compare normally distributed quantitative data. The level of significance was set at probability (P) value <0.05.

Based on evidence from previous similar studies and by considering the average number of casts in standard and accelerated ponseti technique group in treatment of congenital talipus equinus varus as a primary outcome. Epi-calc 2000 was used to calculate the sample size of this case control study. Assuming 80% power, 0.05 level of significance, 5.23 mean in standard group, 4.72 mean in accelerated group with a standard deviation of 0.57, Sample size will be = 38 feet (19 in each group). Considering drop-outs rate of 10%, therefore the final sample size will be 42 feet (21 in each group).

Results

Table (1): The sex distribution among the studied patients was 12 female feet (28.57%) and 30 male feet (71.42%).

Sex	Number of feet	Percentage
Male	**30**	**71.42**
Female	**12**	**28.57**

The age of studied patients ranged from 1 to 60 days with a mean of 24.76 days.

Table (2) show distribution of patients according to their age at presentation.

Table (2): Distribution of patients (feet) according to age.

Age group	Number of feet	Percentage
Up to 1 month	**35**	**83,3 %**
Over 1 month to 2 months	**7**	**16.6 %**

Information taken from our patients 'parents showed no previous trial of treatment, no family history of club foot.

17 cases were bilateraly presented and 8 were unilateral with 20 feet were Rt and 22 were Lt. These are summed up in table (3).

Table (3): Unilaterallity and Rt or Lt distribution.

Unilaterallity and Rt or Lt	Number of patient	Percentage
Unilateral	8 from 25(p)	32 %
Bilateral	17 from 25(p)	68 %
Rt feet	20from 42(f)	47,61 %
Lt feet	22from 42(f)	52.38%

Pirani score at initial presentation range from 2 to 5.5 as table (4)

Table (4): The Pirani score at initial presentation.

No of feet at initial presentation	Score
2	2
2	2.5
8	3
9	3.5
8	4
2	4.5
9	5
2	5.5
42	Total

Table (5): The demographic characteristics and clinical data in all 42 patients are shown in the following tables & figures:

		Count	Column N %
Group	Group A (accelerated)	21	50.0%
	Group B (standard)	21	50.0%
	Total	42	100.0%
Side	Right	20	47.6%
	Left	22	52.4%
	Total	42	100.0%
Sex	Male	30	71.4%
	Female	12	28.6%
	Total	42	100.0%
Compliance	Good	37	88.1%
	Bad	5	11.9%
	Total	42	100.0%
Relapse	Yes	5	11.9%
	No	37	88.1%
	Total	42	100.0%
Anomalies	Yes	4	9.5%
	No	38	90.5%
	Total	42	100.0%
complications	skin ulcer& tight cast removed for one weak then recasting	1	2.38%
	we do TAL before mid foot correction then casting in fully correction	2	15.4%

This table showed all 42 feet devided into 2 groups 1st group (accelerated) (N=21).2nd group (standard) (N=21), from all 42 feet 20 feet right sided and 22 left sided, male (n=30) female (n=12), according to compliance 37 feet were in good compliance and only 5 feet were bad in compliance. Regarding the relapse, it happened in only 5 feet (11.9%) from all feet, regarding to patients presented with anomalies we found 4 feet with associated cardiac anomalies.

All cases needed tenotomy except for only 2 feet (4.7%), skin ulcer& tight cast which removed for one weak then recasting in only 1 feet, in 2 feet which were resistant for adduction correction even after 5th cast and we did TAL before mid foot correction then casting in fully correction.

Table (6): Relation output

		Group						**P value**
		Group A (accelerated)		**Group B (standard)**		**Total**		
		N	**%**	**N**	**%**	**N**	**%**	
Side	Right	11	55.0%	9	45.0%	20	100.0%	0.537
	Left	10	45.5%	12	54.5%	22	100.0%	
Sex	Male	17	56.7%	13	43.3%	30	100.0%	0.172
	Female	4	33.3%	8	66.7%	12	100.0%	
Compliance	Good	18	48.6%	19	51.4%	37	100.0%	1.000
	Bad	3	60.0%	2	40.0%	5	100.0%	
Relapse	Yes	3	60.0%	2	40.0%	5	100.0%	1.000
	No	18	48.6%	19	51.4%	37	100.0%	
Anomalies	Yes	2	9.5%	0	0.0%	2	100.0%	0.488
	No	19	90.5%	21	100%	40	100.0%	
complications	skin ulcer& tight cast removed for one weak then recasting	1	4.76%	0	0.0%	0	00.0%	
	we do TAL before mid-foot correction then casting in fully correction	2	9.52%	0	0.0%	0	00.0%	

This table showed all 42 feet devided into 2 groups,group A (accelerated) (N=21),group B (standard) (N=21),from all 42 feet 20 feet right sided (group A =11,Group B =9) and 22 left sided (Group A =10,Group B=12), male (n=30)(Group A =17,Group B =13), female (n=12)(Group A =4, Group B=8), according to compliance 37 feet were in good compliance(group A =18,Group B =19) and only 5 feet were bad in compliance (Group A=3, Group B=2).regarding the relapse, it happened in only 5 feet (11.9%) (Group A=3, Group B =2), regarding to patients presented with anomalies we found 4 feet with accociated anomalies (group A=2, group B=2), regarding Relapse happened in 3 feet of Group A and happened in only 2 feet in Group B, according to special cases management we recorded early relapse treated by recasting one time for 3days then brace applied again then relapse after 3m.tal and cast again only in one foot (7.7%) in group A.

All feet needed tenotomy except for only 2 feet and both feet were in group B, and we found only two feet relapsed after one month treated by recasting then relapsed again in equinus after 3months treated by tenotomy, relapsed equinus after 2m treated by recasting in only 2 feet in group B, skin ulcer& tight cast removed for one weak then recasting in only 1 foot in group A only, and we did TAL before mid foot correction then casting in fully correction in 2 feet in group A.

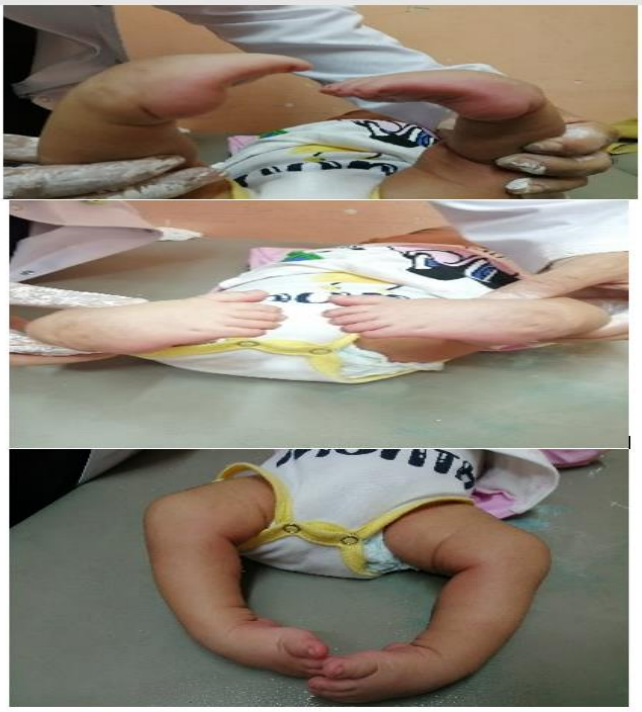
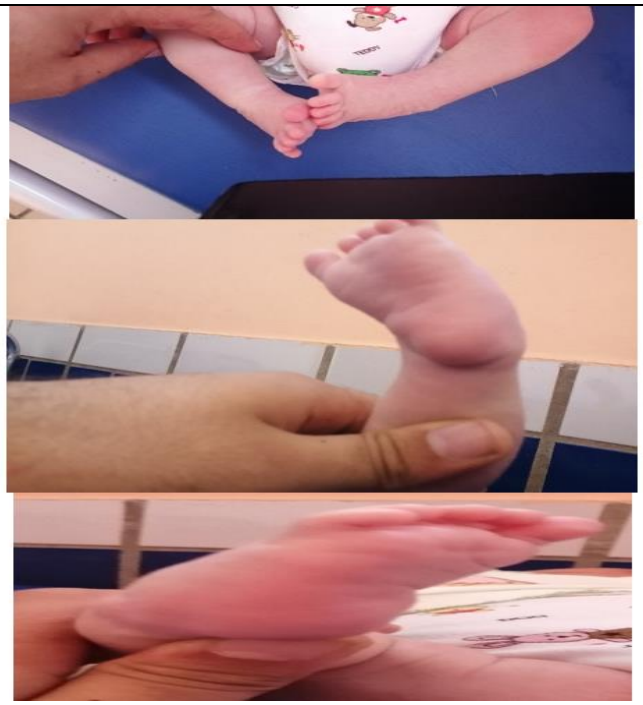
Table (7): Group A (accelerated) and Group B (standard)

	Group	N	Mean	Std. Deviation	P value
Age in days	Group A (accelerated)	21	25.00	15.707	0.910
	Group B (standard)	21	24.52	10.944	
Initial score	Group A (accelerated)	21	4.167	.8563	0.024
	Group B (standard)	21	3.524	.9148	
Pre.tal score	Group A (accelerated)	21	1.262	.9568	0.014
	Group B (standard)	21	.690	.3345	
No. of casts	Group A (accelerated)	21	3.14	.854	0.573
	Group B (standard)	21	3.00	.775	
Time needed till tendoachilis lengthening in days	Group A (accelerated)	21	9.43	2.561	<0.001
	Group B (standard)	21	21.00	5.422	
Post TAL score	Group A (accelerated)	21	.00	.000a	
	Group B (standard)	21	.00	.000a	
Post at 6 months	Group A (accelerated)	21	.024	.1091	0.121
	Group B (standard)	21	.143	.3218	
Post at 1 year	Group A (accelerated)	21	.143	.2803	0.659
	Group B (standard)	21	.190	.4024	

According to the table, the mean age of presentation was (25 days) in group A and (24.52) days in group B with P Value (0.910) which is not significant, and the mean Initial score was (4.167) in group A and (3.524) in group B with P value (0.024) which is significant, according to Pre TAL-Score the mean score in group A was (1.262) and in group B (0.690) with P value (0.014) which is significant.

According to the number of castings needed till TAL, the mean No in group A was (3.14) and (3) in group B with P value (0.573) which is not significant.

Regarding the Time needed till tendoachilis lengthening in days, the mean time was (9.43) days in group A and (21) days in Group B with P Value (<0.001) which is highly significant difference.we found the immediate post tenotomy score equal in both groups which is zero,while the post score at 6 months was (0.024) in group A and (0.143) in Group B with P Value (0.121) which is not significant.and the score at 1 year follow up was (0.143) in group A and (0.190) in group B with P value 0.659) which is not significant.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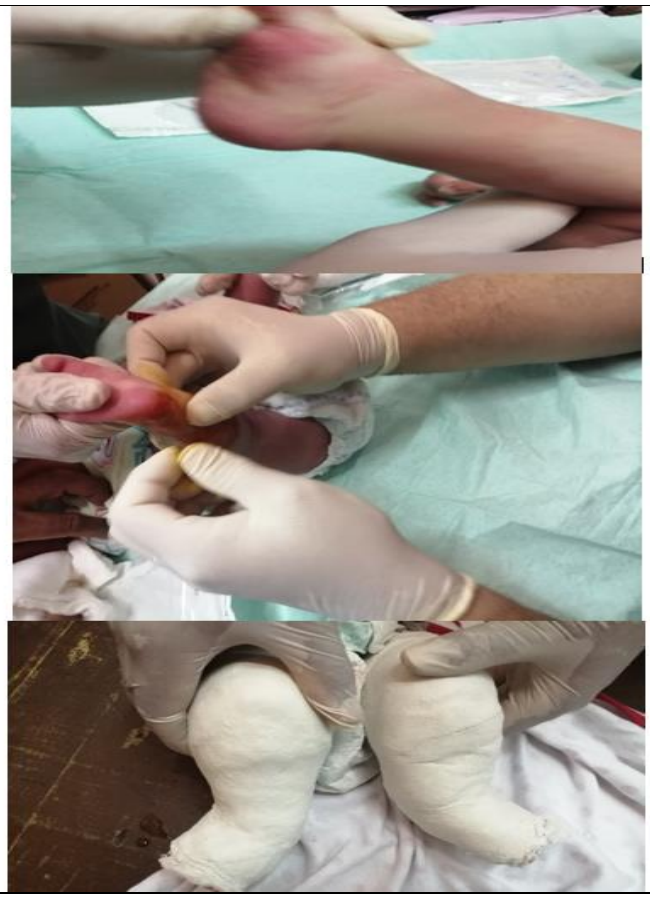
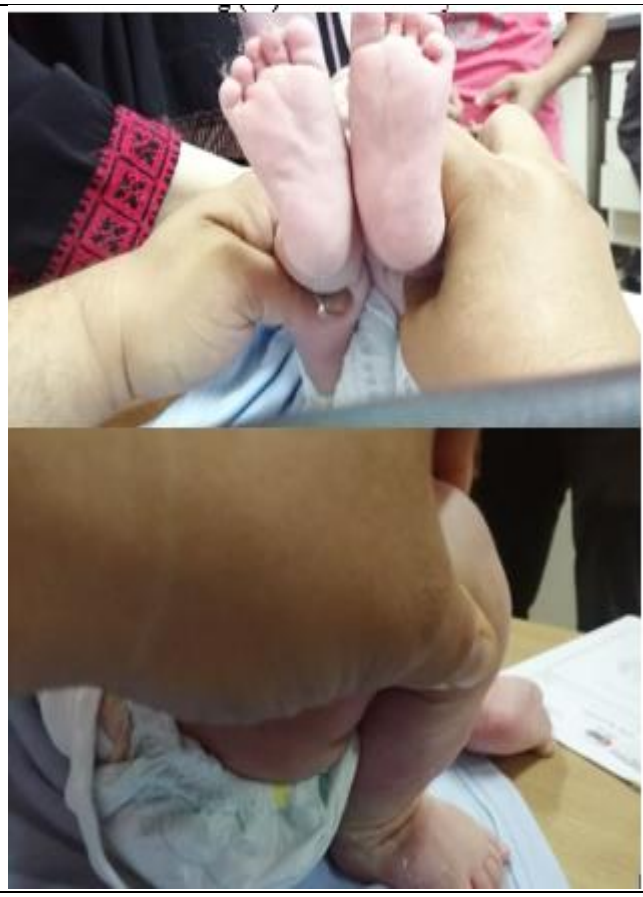
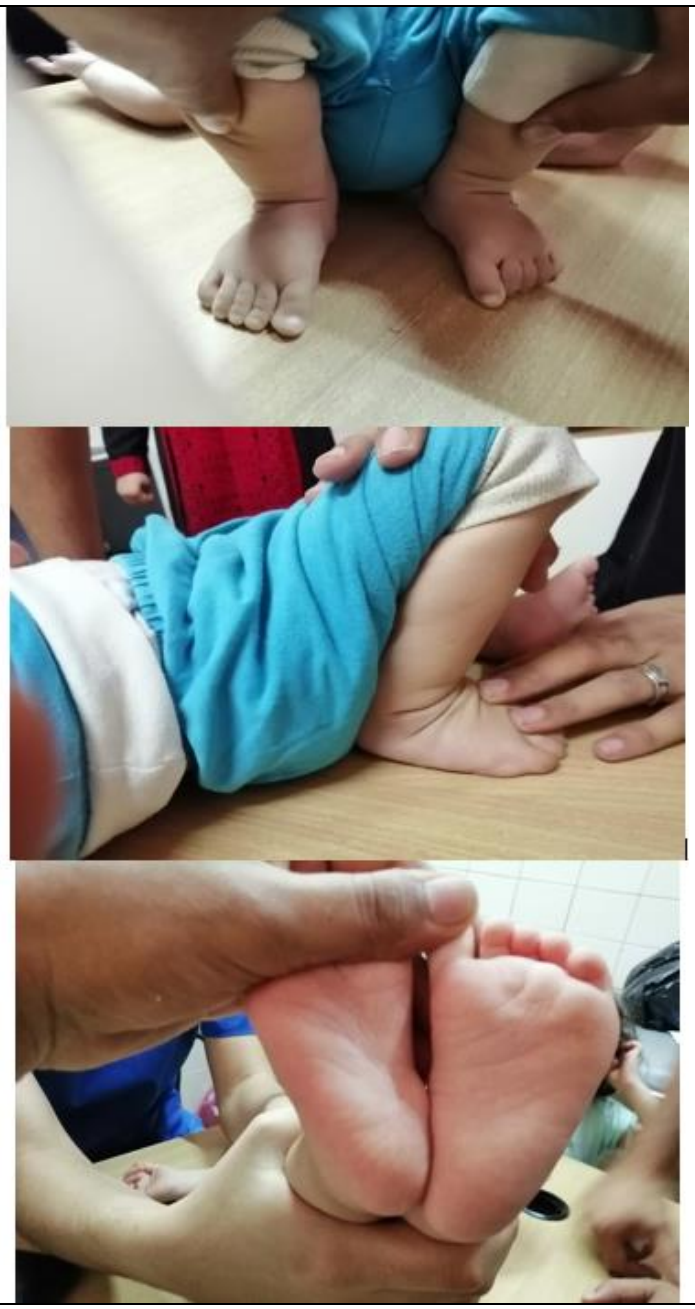
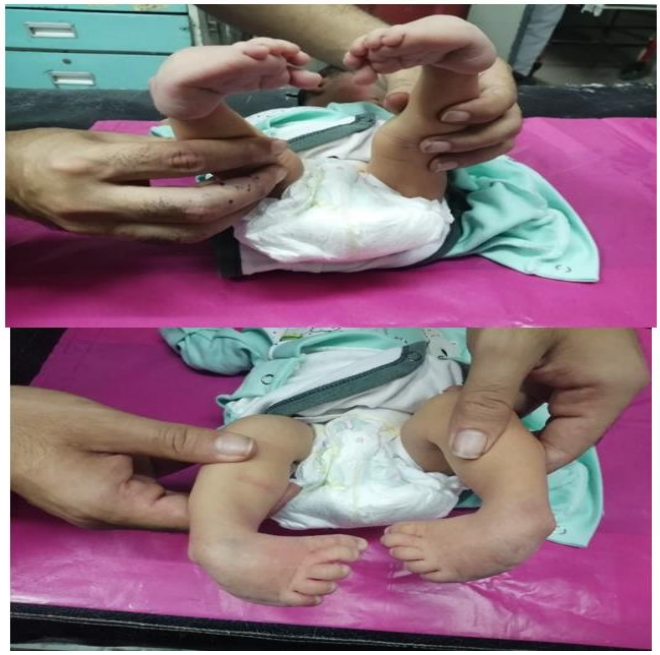
	
Tenotomy	**6months follow up**



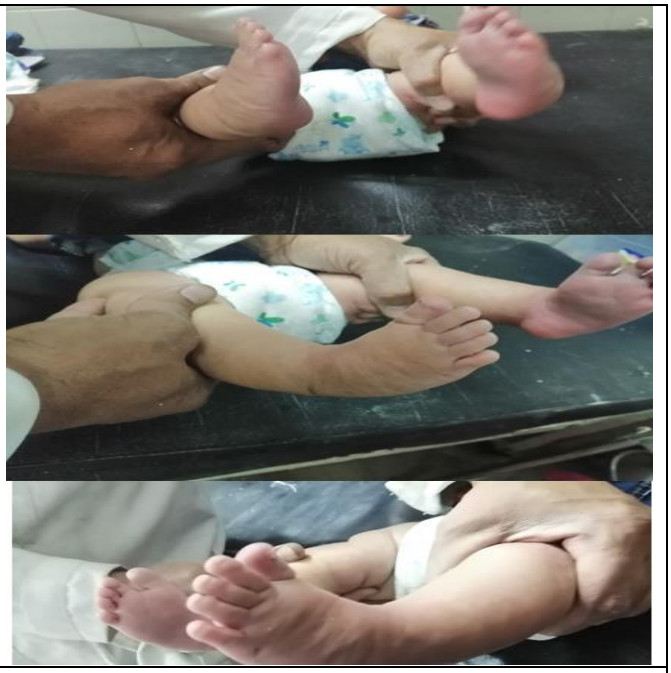
1year follow up

Accelerated group

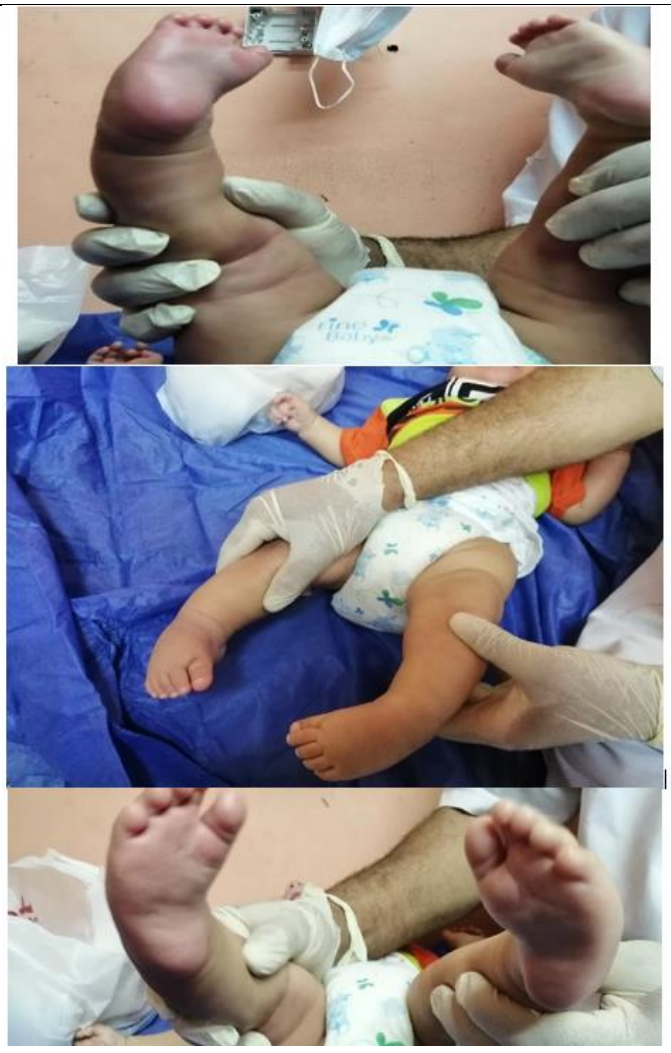
Figure 1: Male patient 1month , Initial pirani score was 3.5. Pirani score post tenotomy was 0



1st visit

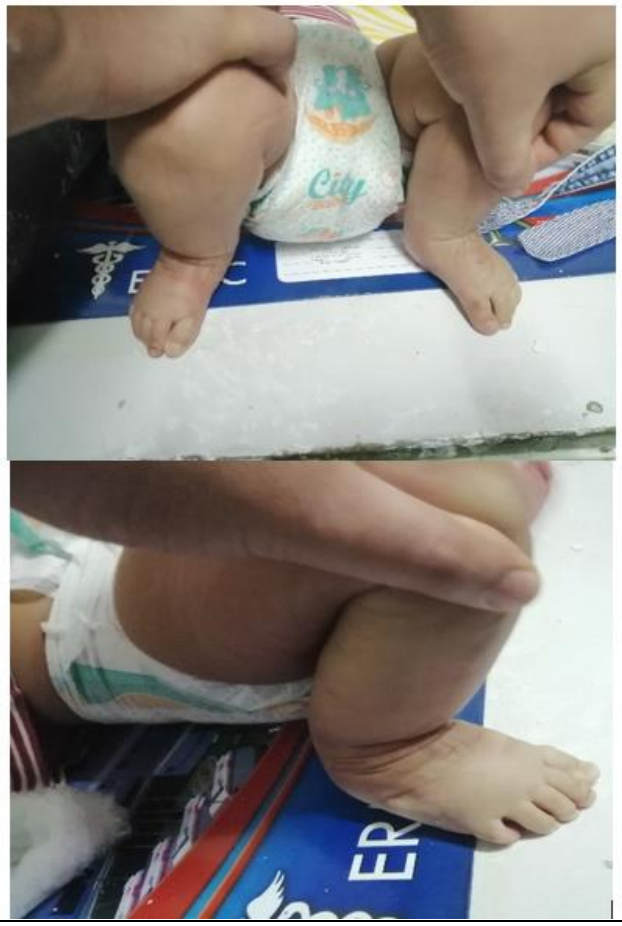


2nd cast



3rd cast

6months follow up



1year follow up

Group B Standard Technique

Figure 2: Male 1month , Bilateral deformity, Initial pirani score was 3.5, Pirani score post tenotomy was 0

Discussion

Clubfoot is one of the most common congenital deformities, and it is a complex three-dimensional deformity. Per year more than 100,000 babies are born with congenital clubfoot worldwide, many casting techniques have been described like the French method (physiotherapy), and Kite's method, but the reported success rates are only 15-50%, in those two methods, both ended up in surgery, due to more complications were noticed after over aggressive and improper casting; those complications as pressure sores, flattop talus, rocker bottom deformity, and residual deformity. ***(12, 14)***

In the last decades, the most successful conservative treatment for clubfoot was developed in late 1940s by Ponseti, which depends on clear understanding of the functional and pathological anatomy of clubfoot and the biomechanics of the foot and ankle, especially the kinematic coupling of the subtalar joint motions. With Ponseti technique of manipulation and plaster-cast treatments, joint release operations were done only in the very few resisting severe cases,the golden rule during manipulation with Ponseti method is that the forefoot never to be pronated, nor should the heel be touched, that comprises the hallmark of a successful strategy of treatment ***(15,16,17,18)***.

Recently there are many puplished series in more accelerated technique in one week only, cast changed daily eg. **Ahmad et al *(19)***. **Elgohary et al (20)**84.4 **Morcuende et al (4)** in our study we compare between accelerated 3days interval and standard techniques.

The casts were always removed just before the new ones were applied, this maintained the correction of the foot that was obtained in the removed cast, decreased the development of edema, and decreased the average number of casts needed for the correction. **(21)**

The plaster of Paris cast was the material that was used in our study, because most authors recommend it (**12, 16, 22,).** In our study, tendo Achilles tenotomy (TAL) was performed in all cases under local anesthesia. **(12)**

All TAL in this study was done through a small stab incision. Size #15 scalpel blade was used to do the tenotomy through a stab wound on the medial side of the tendo Achilles as the original Ponseti method. **(1)**

FERAK brace is essential to maintain the foot in the same degree of abduction as it was after removal of the last plaster cast **(5)**. In this study, noncompliance was defined as anything less than full-time brace (remved only one hour a day) use for the first three months, followed by 14 to 16 hours for the next 3-4 years during the time of brace removal parents should do exercise in form of stretching for tndoachilis by fixation of foot with one hand on rigid table and flex the knee with the other hand and external rotation for the foot. **(13)**

The aim of this work is to compare between accelerated and standard techniques to clarify is there statistical and clinical significance difference between both methods.

Our study suggests that there is no significant difference between standard and accelerated techniques in treatment of idiopathic talipus equino varus except in total time needed for correction.

The total number of cases is 25 patients (24 feet), divided into 2 groups, Group A (21 feet) (Accelerated) while **Ahmed et al *(19)*** was 11 patients (26 feet), **Xu et al *(2)*** was 26 patients (42 feet), **Elgohary et al *(20)*.** was 21 patients (32 feet) and Group B (21) (Standard), with 30 male feet and 12 female feet, choice between both groups was done through envelope method to avoid bias each parent choose closed envelope to determine to which group will be attatced and final Pirani score was determined by ablind external investigator not involved in the study .

According to the Deformed side in Group A (Accelerated), 11 feet right sided and 10 feet left sided. And in group B (Standard) 9 feet right sided and 12 feet left sided.out of all cases 17of our patients had bilateral foot deformity, while 8 had unilateral foot deformity.

The average follow up was 15 months, with longest follow up time 18 months and shortest follow up time was 12 months.

The average of age of all patients varies from 1-60 days with mean age is 24 days.

Regarding non compliance &relapse In group A (Accelerated), ***3 feet*** out of all cases were in bad compliance (14.2%) while in **Xu etal *(2)*** was 10% **Elgohary et al(20)** was 15.6%,**Ahmed et al*(19)*** was 12.5% , ***1st case (case no 9)*** was sudanian patient with bad communication and careless for her baby and didn't follow the instructions which lead to early relapse of equinus and adductus deformities after only 2 months which treated early with recasting one time for 3 days then FERAK brace was applied, then missed follow up for 3 months and came relapsed again with rigid equinus which treated early with TAL and recasting again for 2 weeks which came with good follow up and good result.

2nd and 3rd cases no (15&16) were in the same Patient who had Bilateral deformity, and proceeded in bad compliance which came with early relapse of equinus after 2 months and treated with tenotomy & recasting under GA in dorsiflexed ankle for 2 weeks then the patient follow the instructions and exercises and wear the brace which came with good result and corrected deformities

Regarding noncompliance & relapse in group B

Only 2 feet out of all cases were in bad compliance, and the 2 feet were in the same patient (9.5%) (feet no 26,27), **Mercunde et al*(26)*** was 10.2%, **Noam et al*(23)*** was 23% which is higher than our study,the relapsed cases didn't wear the brace at all and didn't follow the instructions, then came with relapsed in equinus bilateral feet after only 1 month post correction treated by casting in dorsiflexion ankle for two weeks then the feet were fully corrected but the mother was so carless about her baby she came relapsed again after three months treated by tenotomy and casting for two weeks then FERAK brace.

Regarding Pirani score

According to Pirani score, divided into 5 stages in our study (intial score, pre-TAL, post TAL, post 6 months, post 1 yr)

According to the (Initial Pirani score) in group A (accelerated) was (4.167) while in group B (Standard) was (3.524) which means that the deformity in group a was more severe than group b which is not intended but

noticed, while the P value was (0.024) which is significant difference and according to the (Pre TAL) score which was (1.262) in group A and 0.690 in group B with P value (0.014) which was insignificant difference.

According to the (Post TAL) score, it was the same in two groups (0.00) with no difference which is the same results in Xu et al, Mercunde et al Ahmed et al.

According to the follow up after 6 months and 1 year the scores was in 6 months follow up (0.024) in group A and (0.143) in group B with P value (0.121) which was non-significant difference, and after 1 year follow up the score was (0.143) in group A and (0.190) in group B with p value (0.659) which was non-significant difference,relapse percentage was11.9 which was nearly similar results in comparison to **xu et al(2)** study and also other accelerated protocols and results better than ponseti method **(2, 6, 18,23, 24 , 25)** mentioned in next table .

.

The study	The relapse percentage
Ponseti (1963)	56%
Laaveg S.J 1980	47%
Noam , 2006	23%
Herzenberg, 2006	18%
Charles et al 2007	11%
XU,2011	10%
Our study	11.9%

According to the time needed till tendoachilis lenghthening

It was different in the two group, the mean in group A was (9 days)while in group B the mean was (21 days), **Elgohary et al(20)** was18.13 ± 3.02 days,Xu et al (2) was 20.61 days , **Morcuende et al(34)** was 16 days and **Ahmed et al (19)** was 7 days ,which means more time was spended in correcting the deformity in group B but the same result came from the both techniques as the post 1 year score was nearly the same, this means the two techniques gives the same results but in group B it spends more time, but according to the quality it differs as the pre score was higher in group A than group B but In less time it gave the same result which means the quality of the accelerated technique is better than the standard in time needed for correction and 1 year follow up. And we can use this method for correction in patients who came from far distance as it is less time and money consumption and nearly the same result, which came in agree with xu etal 2011(2).

According the number of casts needed till tendoachillis tenotomy, in group A the mean No was (3.14) and in group B was (3.00) which is non-significant difference as the P value was (0.573) which is less than other recently published studies as in **Elgohary et al (20)** was 5.16 ± 0.72 casts, **Xu et al (2)** was 5.04 casts, **Morcuende et al (26)** was 4.2 cast.

Regarding to complications

1- Pressure sore

Happened due to tight cast, it happened in one only one case in Group A and treated with removal of the cast for one week and recasting with the same technique, this complication didn't happen in group B.

2- relapse

It happened in 3cases in accelerated group and 2cases in standard group and treated as previously described.

According to the type of brace

We used (FERAK) brace after removal of the last cast after tenotomy while other authors used (DENNIS BROWN -BAR) and came with the same results.

Conclusion:

Accelerated method is safe, effective and can give the same result as the standard method but less time and money consumption and can correct more severe deformities in a less time frame which give better compliance &our study confirm the results of XU, et al.

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