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Outcome of Bony Procedure in Neglected Talipus Equino-Varus Deformity in Children

Dr. Montaser Saifeldeen Fatooh [1*,] Dr. Hashim Ali Ahmed [2], Dr. Mohamed Alhassan Osman Hassan [3], Dr. Aya Elfeel [4], Dr. El Hadi Abdelrahim [5]

1. Assistant Professor of Trauma and Orthopaedic Surgery, Alneelain University – Sudan.

2. Consultant of Orthopaedic Surgery & Deformities Correction, Khartoum Cheshire Home (KCH) – Sudan.

3. Assistant Professor of Trauma and Orthopaedic Surgery, Bashair Teaching Hospital – Sudan.

4. House officer (HO) of Trauma and Orthopaedic Surgery Department, Bashair Teaching Hospital – Sudan

5. Consultant Orthopaedic and Hand Surgery, Dar Al-Elaj Specialized Hospital – Sudan.

Corresponding Author: Dr. Montaser Saifeldeen Fatooh, Assistant Professor of Trauma and Orthopaedic Surgery, Alneelain University – Sudan.

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Abstract

Background: *Idiopathic clubfoot deformities are the most common musculoskeletal congenital abnormalities. Treatment in much of the world has become standardized around the Ponseti technique. There are still several problems to be solved within the topic of clubfoot treatment—among the most challenging is the neglected and relapsed clubfoot. Neglected clubfoot deformity is a major cause of disability in low-income countries. Most children with clubfoot have little access to treatment in these countries, and they are often inadequately treated The consequences of untreated talipes equinovarus (TEV) can lead to adaptive and degenerative changes in the structure of the foot.*

Objectives: *To evaluate the outcome of bony procedure in neglected talipus equinovarus in children in Sudan.*

Materials and Method: *This was a descriptive cross sectional hospital based multi-centers clinical retrospective study. Involved 45 patients (49 feet) neglected talipus equinovarus deformity underwent bony procedure The result in form of complications, patient satisfaction, and functional outcome (AOFAS score was used to assment outcome) were addressed. The Data was analyzed using IMP SPSS version 21.*

Results: *The number of patients was 45(49 feet), with 32 males (71.1%) and 13 females (28.9%). The mean age was 14.7 years. AOFAS score post operative 32 patients excellent score (65.3%), 16 patients good (32.6%), one patient fair score (2.1%) failure, while no patients had poor score. 33 patients (67.3%) were satisfied from the outcome, 15 patients (30,6%) are partially satisfied, while one patient (2 %) were unsatisfied. The most frequent complication was wound dehiscence which occurred in 6 patients (14%).*

Conclusion: *From our study we concluded that Bony procedure using triple fusion and D.evans presents a valuable method in treating instability and deformity that result from neglected TEV which is single one stage and less follow up.*

Abbreviations

TEV	Talipes equin-ovarus
FAO	Foot abduction orthosis
DE	Dilwynn-Evans procedure
CAVE	Cavus Adductus Varus Equinus
AOFAS	American Orthopaedic Foot and Ankle Society

Introduction

Idiopathic clubfoot deformities are the most common musculoskeletal congenital abnormalities. Treatment in much of the world has become standardized around the Ponseti technique. There are still several problems to be solved within the topic of clubfoot treatment—among the most challenging is the neglected and relapsed clubfoot. Neglected clubfoot deformity is a major cause of disability in low-income countries. Most children with clubfoot have little access to treatment in these countries, and they are often inadequately treatedThe consequences of untreated talipesequinovarus **(**TEV**)** can lead to adaptive and degenerative changes in the structure of the foot.Harold Jacob Pieter van Bosse, MDa,

Treatment of the neglected and relapsed clubfoot. **(**PMID:24075134**)**Treatment of the neglected and relapsed clubfoot.

The objective of this study was to retrospectively evaluate the short and long term results of using the bony procedures technique for treatment of children with neglected clubfoot deformity in Sudan .

TEV occurs in approximately 1/1000 live-births, with bilateral deformities in approximately 50%.1 Failure of treatment is the main etiology of residual TEV. 1 Recognition of the residual adult TEV deformity requires the presence of fixed cavus, adductus, varus and equines.1 A dorsal bunion is caused by an imbalance between tibialis anterior and peroneus longus, and is often iatrogenically induced due to over-correction.1 Walling AK. The adult clubfoot **(**congenital pescavus**)**. Foot Ankle Clin 2008;13:307–14, vii. 2 Zide JR, Myerson M. The over corrected clubfoot in the adult: evaluation and management—topical review. Foot Ankle Int 2013;34:1312–18.

From virgin to neglected clubfoot, situations are variable and strategies different when surgery is necessary. If conservative treatment is no longer effective, surgery should be considered. Mini-

invasive surgery is a complementary procedure to nonoperative treatment **(**surgery "à la carte"**)**. Conservative treatment reduces but does not eliminate the need for mini-invasive surgical procedures. Resistant clubfeet are those not fully respondent to standard methods of orthopedic treatment. Relapsed clubfeet are those patients with a history of soft-tissue releases followed by a rapid relapse. Neglected clubfeet are those resulting from failure to treat the deformity at birth or in early infancy or to provide adequate treatment during infancy and early childhood. Relapsed and neglected clubfeet are some of the most difficult pediatric orthopedic problems to treat. Every effort should be made to prevent them from occurring.

Problem Statemen

Neglected talipus equinovarus deformity is a serious foot and ankle problem that affects children , TEV occurs in approximately 1/1000 live-births, with bilateral deformities in approximately 50% Failure of treatment is the main aetiology of residual TEV It is sever and potentially threatens the limb and has a great impact on patient's life, health, physical, psychological, social, and financial aspect and extend to affect surrounding society.

Justification

Neglected talipus equinovarus deformity is a problem in Sudan and should be treated properly in order to keep maintenance of a stable plantigrade foot, late presentation is still common in cases of TEV deformity, posteromedial release is by far the standard operation done in younger children but in neglected children soft tissue procedures usually is not enough, the outcome of bony procedure was not assessed in older children. and it is also beneficial for reducing deformities, and thus can decrease rate of complication and financial cost and repeated surgery.

Objectives

- General objective:

1. To evaluate the outcome of bony procedures in neglected talipus equinovarus in children in sudan.

- Specific objectives:

1. To evaluate the outcome of bony procedures by using AOFAS score .
2. To evaluate the outcome of bony procedures in post operative walking
3. To evaluate post operative satisfaction and post operative complication.

Material and Methods:

Study Design

This was a descriptive cross-sectional hospital based multi-centers clinical retrospective study

Study Area

Multicenter including Soba Hospital and cheshire Home. In both of which there are specialized team for pediatric orthopedic surgery.

Study Duration

During the period from April 2017 to December 2018.

Study Population

• Inclusion criteria:

Any patient btw 5-16 years with TEV treated by bony procedures

• Exclusion criteria:

1-Traumatic talipes equinovarus 2- patient with neuropathic

Sample size

45 patients.

Sampling Technique

Total coverage included all patients who underwent bony procedure at Suba Hospital and Cheshire Home.

Data Collection

Data was collected using data sheet designed to satisfy the objectives of the study, check list for AOFAS scale which were collected by the researcher.

Data collection method:

Individual interviewing methods

Data collection instrument:

Questionnaire Hospital records

Data Analysis

Data was analyzed using IMP SPSS version21. Clinical outcome was assessed in the form of achieving stability, movement, rate of complications and patient's satisfaction. Functional outcome in form of change in activity and disability. postoperative AOFAS scales.

Ethical Considerations

A written informed consent will be obtained from adult closest relative of all patients.

Ethical approval obtained from ethical committee of Sudan Medical Specialisation Board.

Ethical approval obtained from ethical committee of soba university hospital and Cheshire hospital.

Results

The total number of patients recruited in this study was (45) patients (49 feet) who underwent bony procedure using triple fusion 29 (64.4%) or dilwynn evans 16 (35.6%) (fiqure3.1)

In this study (71.1%) were males while 13 (28.9%) were females. (Figur3.2).

And the most frequent age group was 5-10 years 25 (55.6%) patients. Mean 11 years. (Table3.1).

We found that the right side was affected in 21 patients (46.7%) while the left side was affected in 19 patients (42.2%). And bilateral in 5 (11.1%) patients (table 3.2)

(Figure 3.3).

30 patients underwent previous intervention in the form of; serial casting 11 (24.4%), PMR 12 patients (26.7%), TAL 3 patients (6.6%), PCT 4 patients (8.9%) and 15 patient (33.3%) had no previous interventions. (Table 3.3). figure (3.4)

And NO remarkable intraoperative complications were reported in any patients. Also 27 patients' parents (60%) noticed deformity at neonatal period, 18 (40%) in first 2 years. (Figure3.5)

And 32(71.1%) of patient came within less than 5 years, 5 (11.1%) of the patients came within 5-10 years and 8 (17.8%) of patient came after 10 years (Figure3.6).

25 patient (55.6%) were operated within 5-10 years of age and 22 (44.4%) of patient after 10 years (Figure3.7).

4 (8.9%) of patient parents went to a bone setter, but happily that 33 (73.3%) of patient went to a doctor and 8 (17.8%) of patient did not do anything (Figure3.7).

1(2.2%) of patient the father were illiterate, 8 (17.8%) khalowa, 17(37.8%) basic level, 12(26.7%) secondary level and 7(15.6%) university level (Figure 3.).

7 (14.3%) of patient the mother were illiterate, 3 (6.1%) khalowa, (26.5%) basic level, (24.5%) secondary level and (28.6%) university level (Figure 3.).

15 (33.3%) of the patient were low economic status and 30 (66.7%) of patient are moderate economic status (Figure 3.8)

As post operative result of walking 40 (88.9%) of patient start walking in the first three month while 5 (11.1%) of patient need more than three months. (Table number 3.9)

according to weight bearing 18 of the patients **(**40%**)** start partial weight bearing, while 27 patients **(**60%**)** start full weight bearing. **(**Table 3.10**)**.

Regarding post-operative complications 33 patients had no complications **(**73.3%**)**, while 12 **(**26.6%**)** developed complication. **(**Figure3.11**)**.

The most frequent was wound dehiscence which occurred in 6 patients **(**13.3%**)**, followed by restriction of movement in 4 patients **(**8.9%**)** and soft tissue infection in 2 patients **(**4.4%**)**

(Figure.3.12**)**.

About the patient satisfaction, 36 of them **(**80%**)** were satisfied while 9**(**20.%**)** **(**Figure 3.14**)**

The American Orthopaedic Foot and Ankle Society **(**AOFAS**)**.post operative AOFA scale was excellent in 32 patient **(**65.3%**)**, 16 patients were good **(**32.6%**)**, 1 patient fair **(**2.1%**)**failure, while no patients had poor score. – 33 patients **(**67.3%**)** were satisfied, 15 patients **(**30,6%**)** are partial satisfied, while 1 patient **(**2%**)** were unsatisfied. **(**Table Figure 3.15**)**.

Mean		11.0227
Median		11
Std. Deviation		3.2813
Minimum		5
Maximum		17

Table Number 3.1 shows the gender age average of patient

Father educational level

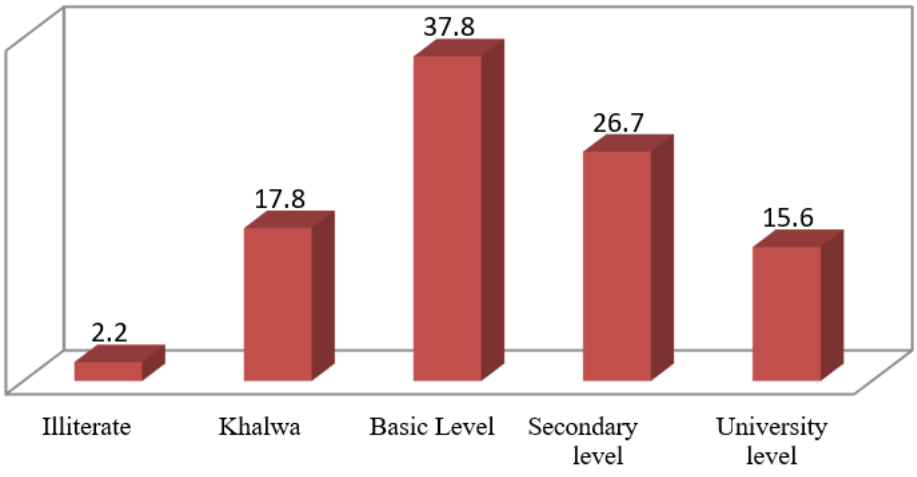

Figure Number 3.1 Shows the father level of education

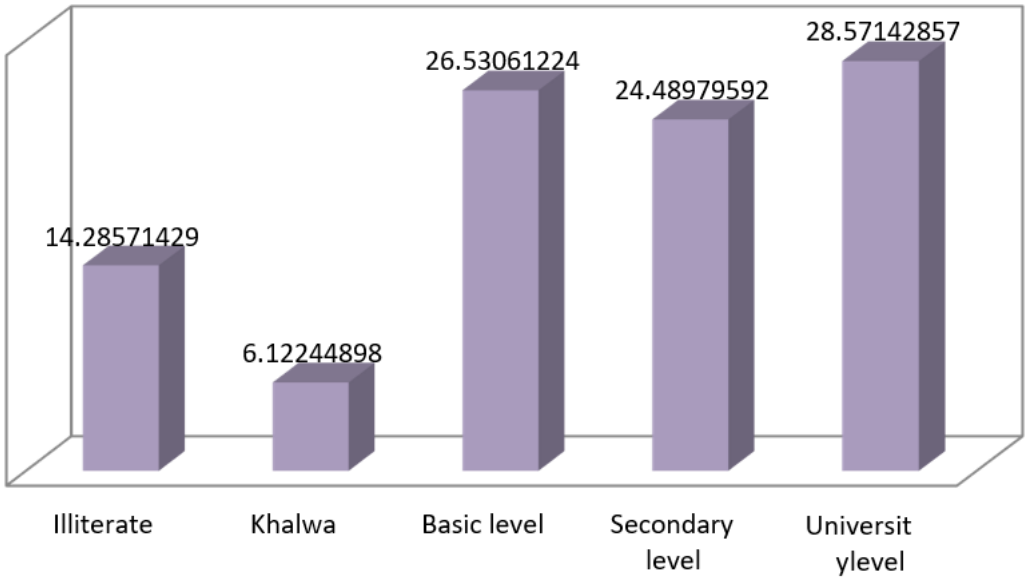

Figure number 3.2 shows the mother level of education

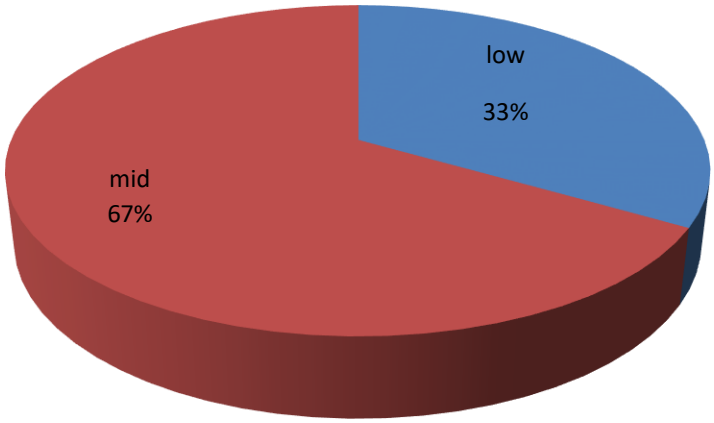

Figure number 3.3 shows the economics level

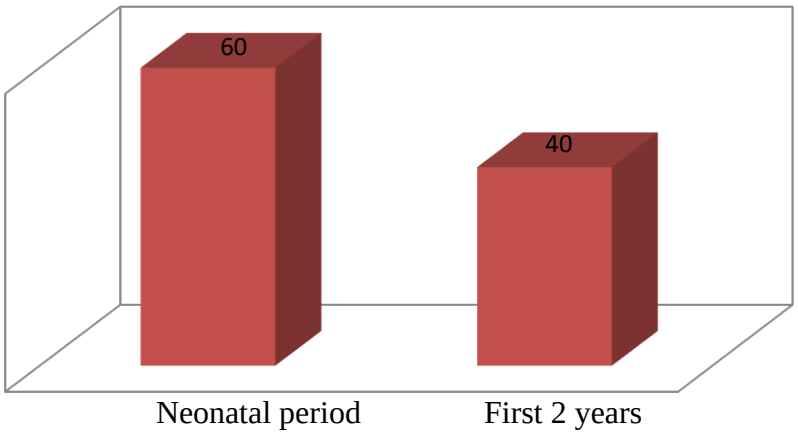

Figure number 3.4 Shows the time of noticing deformity

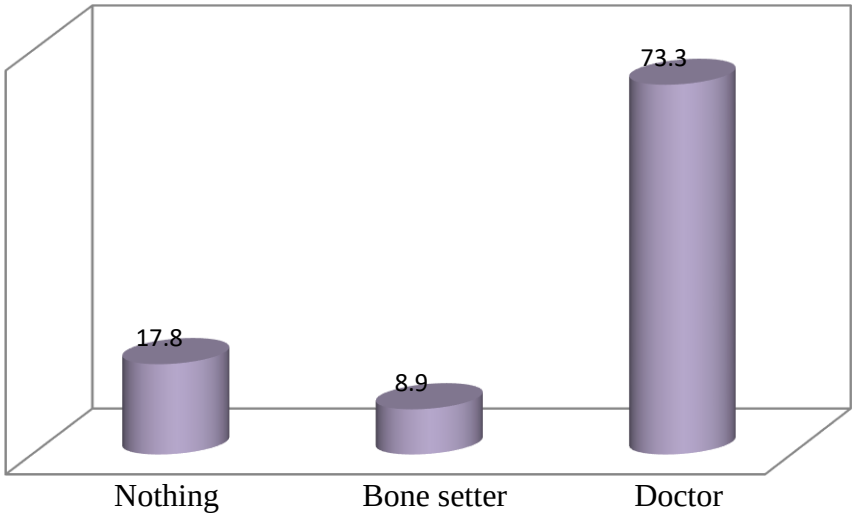

Figure number 3.5 Shows the Patient Parents Attitude Toward the Disease

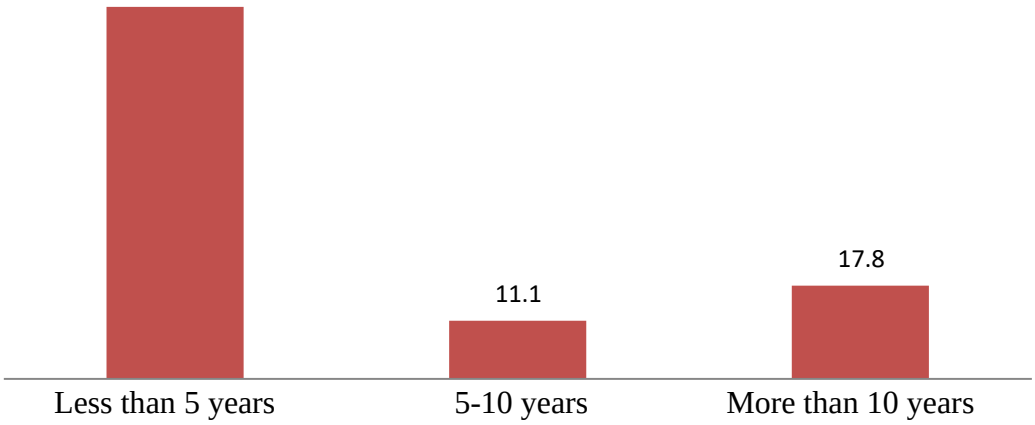

Figure Number 3.6 shows the time when patient sought medical intervention

Affected side

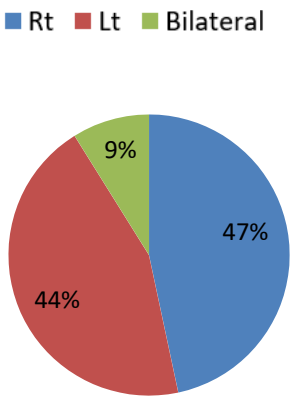

Figure number 3.7 Shows the affected side

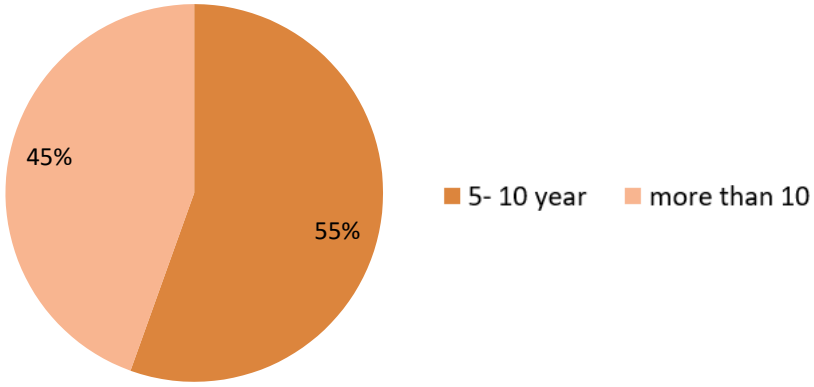

Figure number 3.8 Shows the Patient age when was performed surgery

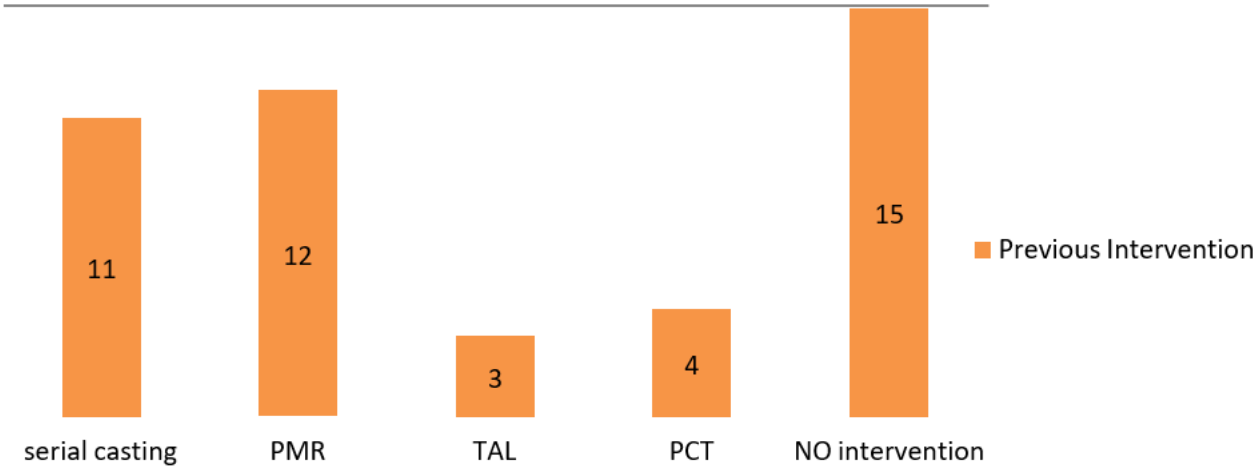

Figure Number 3.9 shows the patient previous intervention

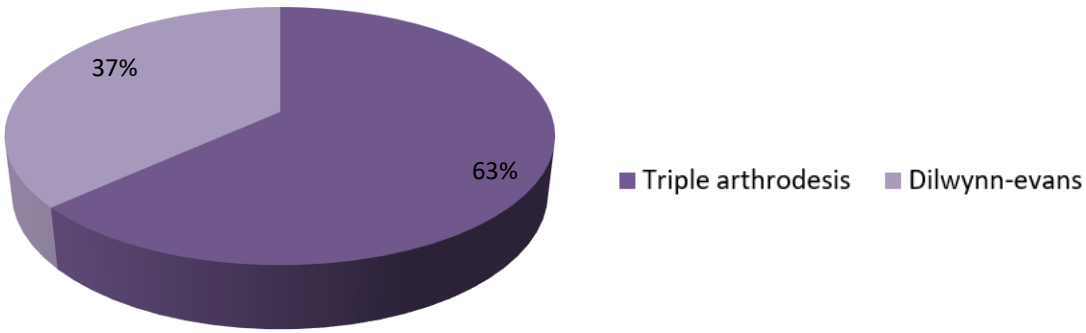

Figure number 3.10 Shows the type of operation

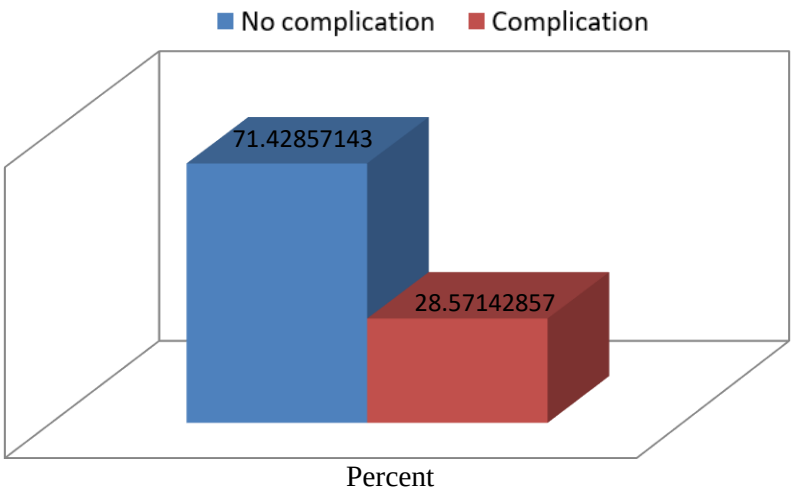

Figure number 3.11 Shows the Operation Complication

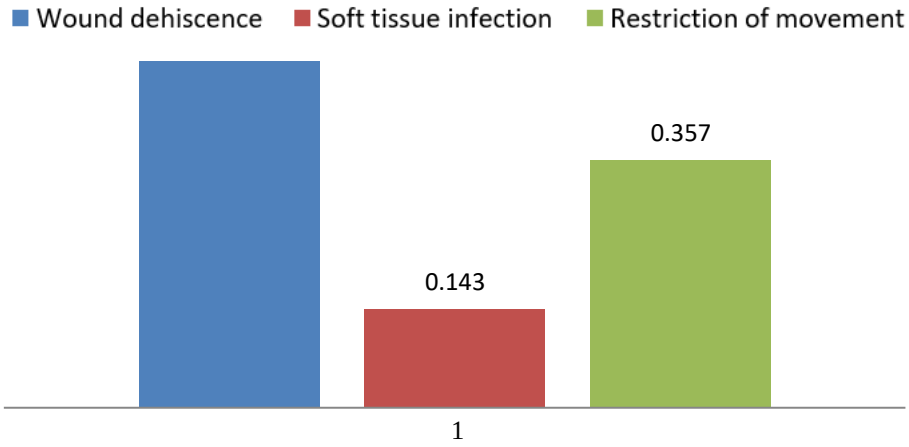

Figure number 3.12 Shows the type of complication

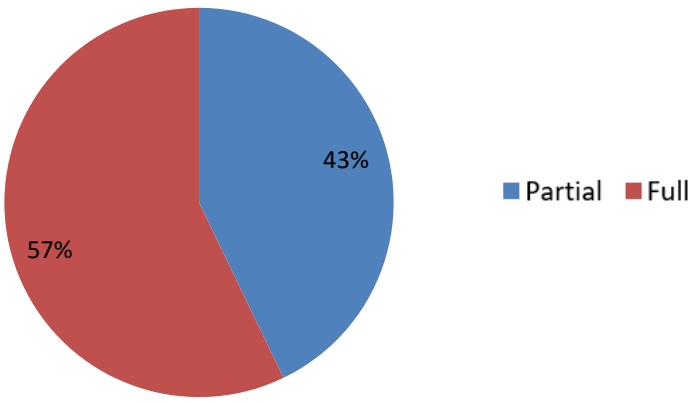

Figure number 3.13 shows the weight bearing

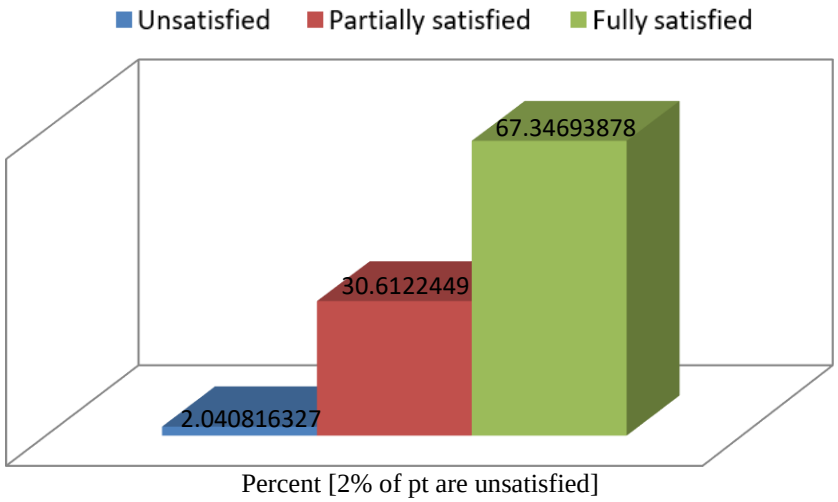

Figure number 3.14 Shows the satisfaction of the patient:

AOFAS

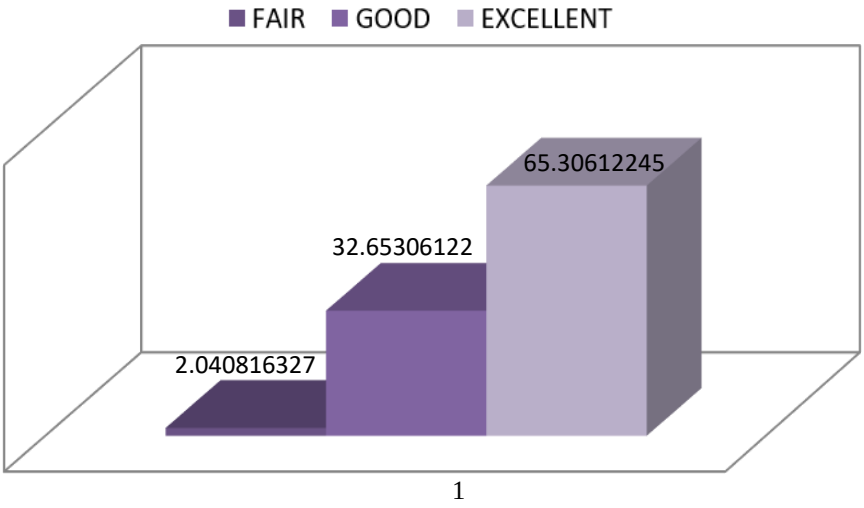

Figure number 3.15 Shows the AOFAS of Patient

Discussion

In this study, 45 patients **(**49 feet**)** with neglected TEV underwent bony procedure using triple arthro or D evans. most of them were males 32**(**71.1%**)** while 13 **(**28.9%**)** were females. The number of male is higher than females in our study compared with Evan D Relapsed clubfoot **(**15**)** in which number of patients were 27 **(**60%**)** of them were males and 18 **(**40%**)** of them were females.

Our patients mean age is 11 years, so we did not used MRI in our patients comparison to study of Downey D, Drennan J, Gareta J **(**13**)** was used to image the feet of 10 infants with congenital talipes equinovarus, the primary deformity appears to be localized to a medical deviation of the talar neck and head, with an accompanying internal rotation of the calcaneus relative to the talar body.

More than half of these patients (55.6%) were operated within 5-10 years of age and 22 (44.4%) of patient after 10 years with mean age 11 year. This was different from Evan D study Relapsed clubfoot (15) in which the average age was 17 years. That is because of the delay in presentation in Evans D (15).

Previous intervention was present in 30 patients, inform of: serial casting (24.4%), PMR (26.7%), TAL (6.6%), PCT (8.9%). There were 15 patients (33.3%) had no previous interventions and not even casted at all. In comparison to study done by Evan D Relapsed clubfoot (15) 12 patients had previous intervention, 12 inform of serial casting and manipulation, all of them showed no or minimum improvement. Post operative we had 40 patients (88.9%) started walking in the first three month while (11.1%) patient need more than three months. All of them were walking without support and no limitation of daily activity in comparison with Schaefer D, Hefti F study (22) in which they had two patient unable to walk 100 m. this due to a stable fixation in our patients.

A triple arthrodesis was the most used procedure in our study, 29 patient (64.4%) comparison to study of Knupp M, Schuh R, Stufkens SA (34) had 30 patients underwent correction with a modified double arthrodesis (preserving the calcaneocuboidal joint). we had same result regarding a stable, plantigrade foot.

We had 33 patients (67.3%) were satisfied from the outcome, 15 patients (30,6%) were partial satisfied and 1 patient (2 %) was unsatisfied which had fair score, we supposed this is due to the patient had bilateral deformity. Comparison to study of Evan D Relapsed clubfoot (15) satisfaction in (68 %) while unsatisfaction in (32 %) this is may be due to delayed presentation in Evans D (15) .

We had an excellent score in 32 patient (65.3%), 16 patients were good (32.6%), 1 patient was fair score (2.1%), while no patients get poor score Comparison to study of Hoffmann A, Constine R, McBride G (17) stated that excellent result were obtained in 29.1%, good result in 49.2%, fair result in 18.3%, and poor result in 3.4%. In and comparison to study of Anderson DA, Schoenecker PL excellent, eight (40%) good, three (15%) fair, and one (5%) poor outcome. That is because of the correction in both studies in one plan.

In our study we have no reoperated for residual deformity after operative repair comparison to study of Tarraf YN, Carroll NC (17) in 125 children with 159 clubfeet persistent deformities present in 95% of the feet and that these deformities resulted from under correction at the time of primary operation. Although not then apparent, the persistent deformities became more evident with growth, and additional treatment became necessary.

Regarding post-operative complications 33 patients had no complications **(**73.3%**)**, while 12 of them **(**26.6%**)** developed complication, The most frequent complication was wound dehiscence in6 patients **(**13.3%**)**. That is followed by restriction of movement in 4 patients **(**8.9%**)** and soft tissue infection in 2 patient **(**4.4%**)** no other complications occurred comparison to study of Gordon JE, Luhmann SJ, Dobbs MB, Szymanski DA, Rich MM, Anderson DJ, et al**(**22**)** one patient was developed a wound infection after two weeks, which was successfully treated with antibiotics and soft-tissue surgery and comparison to study of Anderson DA, Schoenecker PL**(**22**)** There was no major complication. we justified our complication in poor awareness of patient's parents to deal with surgical wound and environmental factor.

In our study, all patients with idiopathic club feet were free of pain, even those patients who were partially satisfied or unsatisfied that is similar to Schaefer D, Hefti F study **(**22**)**

passive motion machine was not used in treatment of our patients in comparison to study of Dimeglio A, Bonnet F, Mazeau P, De Rosa V. Orthopaedic**(**5**)** that's because we don't have it in our hospital.

Regarding non-surgical management we have one patient unsatisfied with fair AOFAS score comparison to study of Lourenco AF, Morcuende JA **(**7**)** Correction of neglected idiopathic club foot by the Ponseti method in 24 feet The mean age was 3.9.

7 feet had recurrent equines which required a second tenotomy. Failure was observed in 8 feet

Also, in other study Oxford. Ponseti IV. Congenital clubfoot: Fundamental for Treatment.: Oxford University **(**11**)** the maximum age is 8 years used ponseti in 157 patients with congenital idiopathic clubfoot **(**256 clubfeet**)** there was a relatively high incidence clubfoot relapse **(**56%**)**

Full correction of severe equinovarus foot deformities is frequently lost at the end of surgical release when the surgeon closes the skin incision. In our study there is no wound problem regarding correction lost comparison to study of Ferlic RJ, Breed AL, Mann DC, Cherney JJ**(**8**)** had 31 feet whose medial skin incisions were left open **(**typically 10 mm**)** to heal by secondary intention, one foot required split-thickness skin grafting at 3 weeks postoperatively to achieve wound coverage. There were no infections as we have **(**except wound dehiscence and 2 patient developed soft tissue infection**)**.

Conclusion

- Bony procedure using triple fusion and D.evans presents a valuable method in treating instability and deformity that result from neglected TEV.
- It is a good method when the usage of soft tissue procedurrs had limitations in corection.
- It can result in satisfactory clinical outcome and improvement in functional score, like AOFAS ankle hind foot scale.
- Most of the complications were minor that doesn't necessitate major operation.

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