International Journal of Medical Science and Clinical Invention 9(2): 5945-5948, 2022
DOI:10.18535/ijmsci/v9i02.01
https://valleyinternational.net/index.php/ijmsci

Research Article,

Comparison of Blade and Needle Tenotomy for Treatment of Residual Equinus in Idiopathic Clubfoot

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Abstract:

Background: Tenotomy for residual equinus is commonly required in the management of idiopathic club. The need to reduce complication and cost has pushed the advancement from mini open to needle tenotomy. This is even more pertinent in low- and middle-income country where clubfoot is more common. The study compared the outcome of needle and blade tenotomy for management of idiopathic club foot.

Patients and Methods: it is a prospective randomized study of patients requiring tenotomy for residual equinus from July 2015 to June 2020 at a tertiary orthopedic center.

Results:Atenotomy rate of 60 percent was noted. Thirty-one patients with forty-three feet were include in the study. The mean follow up was 27.1 months. There was no significant difference in the outcome of equinus correction. Three patients had relapse of deformity (two in the blade group and one in the needle group). All were resolved by further manipulation and casting.

Conclusion: Needle tenotomy offers similar outcome to blade tenotomy. It is less expensive and more acceptable to those scared of the surgical blade.

Key words: Clubfoot, Blade, Needle, Tenotomy

Introduction:

Idiopathic clubfoot is one of the most common problems in pediatrics orthopaedics.[1,2]there is nearly universal agreement that the initial treatment of idiopathic clubfoot should be nonoperative.[3]Ponseti method of clubfoot correction has become the gold standard in clubfoot manangement[4]. There is usually a need for a form of surgery for the residual rigidequinus. TendoAchillestenotomy rate of 79% was originally reported by Ponseti.[5]Higher tenotomy rate ranging from 86% to 93% were subsequently reported.[6,7]The management of the equinus deformity has evolved from extensive surgery to mini open procedure and percutaneous tenotomy procedure after serial casting. This may depend on the age at presentation.

The need to resolve the residual equinus with less complicationhas led to the drive from mini open surgery to blade tenotomyand needletenotomy.Mickowitz et al [8] first described the needle tenotomy, there have been subsequent reports of the procedure.[9-12]Some complications have been reported with blade tenotomy in literature. Studies comparing blade and needle percutaneous tenotomy techniques are sparse.[13]
This study aims to compare the outcome of the use of both procedures with regards to adequacy of correction and equally identify any associated complication with each procedure.

Materials and methods:

The study is a prospective randomized study of the outcome of two methods ofPercutaneoustenotomy: blade and needle tenotomycarried out at City Clinics, Enugu, Nigeria.All consecutive patients with idiopathic clubfoot requiring tenotomy with mid foot Pirani score of zerowere included in the study from July 2015 to June 2020. The minimum follow up was 12 months.Patients whose parents did not consent to the procedure, patients who were above one[1] year, patients already walking, those that have had previous surgery/ nonoperative treatment, non-consenting of parent(s)and syndromic club foot were excluded.

Both procedures were done under local anesthesia with local infiltration 0.2ml of2% plain zylocaine as an aseptic procedure with 25G needle for injection. Size 16 G needle was used with entrance from the medial border of the tendoachilles with hip abducted, knee in 90 degrees flexion and foot dorsiflexed until resistance was met. Cutting with the beveled needle tip with grating feeling and sudden loss of resistance and pop sound signifies adequacy of tenotomy. Procedures were carried out as described by Mickowitz[8].Size 11 blade was utilized for the blade group in place of needle.All procedureswere carried out by one surgeon in the clinic. All post tenotomy cast were on for 3weeks and bracing continued as described by Ponseti.Ability to dorsiflexed beyond 10 degrees of plantigradeposition post procedure, excessive bleeding, neurovascular injury, skin teetering,pseudo aneurysm and wound infection were assessed for both groups. Data analysis was done with IBM SPSS Statistics 25. Fisher exact test of independence was used to assess difference in proportion.

Fig 1: The Profiles of needle and blade utilized for tenotomy

Results:

Thirty-one patients (60%) out of the fifty-two patients presenting during the period had percutaneoustenotomy. There were 17 males and 14 females the male: female ratio was 1.2: 1. The mean age at tenotomy was 5. 1months.The mean follow up was 27.1 months.All patients who had tenotomy successfully achieved passive dorsiflexion prior to casting. Two patients in the blade group and one patient from the needle tenotomy group relapsed owing to noncompliance with the abduction brace. The relapse was treated with further manipulation and cast application.Three patients had pressure sore following cast application. There was no recorded complication relating directly the tenotomy procedure. The demographic data and complication data areas illustrated in table 1 and 2 respectively.

Table 1: Demographic Profile of Patients

variable	Number/ mean	Frequency/ range
Sex	Male 17 female 14	54.8% 45.2%
Mean age at Tenotomy	20.4weeks	8 - 44 weeks
Limb involvement	Unilateral 19 Bilateral 12	61.3% 38.7%
Follow up	27.1 months	12- 60months

Table 2: Complications of Percutaneous tenotomy and cast application

Variable	Group/ number	Frequency
Wound infection	Blade 0 Needle 0	0 0
Neurovascular compromise	Blade 0 Needle 0	0 0
Scar teetering	Blade 0 Needle 0	0 0
pseudo aneurysm	Blade 0 Needle 0	0 0
relapse	Blade 2 Needle 1	4.7% 2.3%
Excessive bleeding	Blade 0 Needle 0	0 0
Pressure sore	Blade 1 Needle 2	2.3% 4.7%

Discussion:

Non operative management of club foot by Ponseti technique has gained acceptability. Serial casting has been the mainstay of clubfoot management in our center. The rate of tenotomy for rigid equinusin the study was 60% post manipulation. This is slightly less than 66.4%reported by Anisi et al.[14]The lower rate of tenotomy may have been due to the non-inclusion of patients older thanone (I) year and those already walking. This is however higher than a reported tenotomy rate of26.6%.[15]this may be explained by their reported reluctance for routine tenotomyand preference to application of few more cast to correct the equinus.

There is no clinical difference in adequacy of correction between the group with needle over the blade tenotomy for residual equinus.All patients had visible clinical correction and the pop sound of complete tenotomy. This is similar tothe study in literature comparing both methods[13]. Two of the patients in blade tenotomy and one patient in the needle tenotomy had a relapse within twelve weeks. The threeincidencesof relapse were as a result of the noncompliance with abduction brace. This has been widely reported as a dominant reason for relapse by many studies.[6,13,15-18] The treatment for any relapse was by further manipulation and casting leading to subsequent resolution. This further confirms adequacy of tenotomy and such treatment has been effectively applied in some cases of relapse post tenotomy.[5,18] There was no record of complication like wound infection, neurovascular injury or pseudo aneurysm. This is similar to the finding in the same study comparing both procedures.[13] Neurovascular injury [19] and pseudoaneurysm[20] have however been remoted as a complication of blade tenotomy and must be borne in mind during the procedure.

Conclusion:

There is no significant difference between blade and needle tenotomy in our series. The needle tenotomyhowever may be more acceptable to parents especially in low- and middle-income country because it may be cheaper and more appealing to those averse to the surgical blade. The needle is equally more available.The Limitation may be the low sample size andsurgery in patient younger than one year. The Procedure equally need to be done by more surgeons beside specialists to compare reproducibility hence the need for collaborative study.

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