WOUND HEALING WITH INTERRUPTED AS COMPARED TO CONTINUOUS SKIN SUTURES IN CLUBFEET UNDERGOING POSTEROMEDIAL RELEASE

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ABSTRACT

Objective: Late presenting club feet is a very common and a major problem in our country. Majority of these deformed feet require surgical correction. This study was intended to assess the wound healing comparing the two methods of skin closure of idiopathic club feet undergoing Turco's posteromedial release.

Methods: 31 feet (22 patients) underwent Posteromedial release for late presenting club feet. They were between 1 to 3 years of age at the time of surgery. The study was conducted in Mercy teaching Hospital from 15 May 2013 to 30 July 2015. Wounds were closed in layers, but skin was sutured in interrupted fashion in half of the feet while in continuous manner in the other half. Results of wound healing were compared between the two groups. Wounds were examined on 3rd and 14th post operative days and results were recorded.

Results: There was a statistically significant better and reliable wound healing with interrupted skin closure as compared to skin suturing in continuous fashion.

Conclusion: It is concluded that the skin should be sutured in interrupted fashion in patients undergoing surgery for clubfeet as there is a statistically significant better wound healing and thus surgical outcome as compared to continuous skin closure.

Keywords: Idiopathic club feet, Posteromedial release, Wound healing, Interrupted sutures, Continuous sutures.

INTRODUCTION

Club feet is a common congenital anomaly with an incidence of 1-2/1000 live births[1]. Males are affected twice as common as females, right side is more commonly affected and about 30-50% are bilateral[2]. Parents having a child with idiopathic club foot, the chance of a subsequent child being affected is 10%. Exact etiology is unknown but seems to be multifactorial. Mechanical, environmental and genetics play roles. Club feet run in families, but do not follow the typical Mendelian pattern. Incidence also increases with mechanical factors as oligohydramnios, breech and first born. Most club feet are idiopathic but some are associated with other conditions as spina bifida, myelomeningocele[3] or arthrogyposis[4].

Club foot is diagnosed readily, but other anomalies should be ruled out. The child should be thoroughly examined head to toe to rule out other congenital anomalies and associated conditions. The foot should also be examined in detail. It should also be established whether the deformity is rigid (fixed) or positional (postural) because treatment differs for each type. Main Components of club feet include cavus, forefoot adduction, heel varus and ankle equinus. There is also internal tibial torsion and atrophy of calf muscles. The severity of the deformity is assessed by Pirani Scoring System[5]. Once diagnosed, treatment should be started immediately, ideally within the first week of life, but excellent results have been produced when treatment started as late as 3 months. The initial treatment of club feet is non-operative; the Ponseti[6,7] method of weekly serial casts and the French physiotherapy method[8].

Most club feet in children under 1 year of age can be successfully treated by Ponseti casting, TA tenotomy[9], followed by the Dennis Brown splint[10] with a success rate of over 90%. Ponseti casting is also effective in patients over 1 year of age, but serial Ponseti casting requires early detection and referral to an orthopedic surgeon, extensive counseling, compliant and somewhat educated parents[11]. Also, Ponseti casting is very technical, it has very minute details. Learning and applying these casts require special training and expertise. We are facing these and a number of other problems in our country. So most of the late presenting patients in our country undergo surgical intervention due to various reasons. Some club feet are resistant or rigid which require surgical intervention[12] at an earlier age. Turco first described the posteromedial release for club feet[13]. Modifications of this procedure were described

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later by different authors[14]. Later Cincinnati, McKay, and Modified McKay procedures became popular.

The aim of any procedure is to achieve a plantigrade, mobile, normal foot, with a low rate of recurrence. The choice of operative approach is between the traditional posteromedial release described by Turco and the Cincinati posteromediolateral approach. Turco's posteromedial release is the most common surgical technique used[13]. Supporters of the posteromedial approach describe it as simple and safe, with a smaller learning curve, minimal soft tissue dissection, applicable at any age and deformity and with equally good results.

To achieve the best results operative technique should be very sound. Special care should be given to soft tissues and skin closure. If there is any problem in wound healing, the skin contracts and the deformity recurs. Moreover corrective casts cannot be applied to infected wounds. To date no study has been performed to assess the wound healing after posteromedial release of clubfeet regarding the method of wound closure, although skin closure has been assessed for other procedures[15]. Our aim in this study was to compare the wound healing with continuous and interrupted skin suture after posteromedial release of clubfeet.

MATERIALS AND METHODS

After taking Ethical approval for the study, parents of the patients presenting with club feet were initially counseled in detail by one of the orthopedic consultants regarding weekly Ponseti casting. Those not willing for the weekly casts, operative treatment and its results, post operative protocol and follow up were explained in detail. They were also informed about the ongoing study (research) and a written informed consent was taken.

The patients were examined in detail, Pirani scoring of the feet were calculated and they were examined for any other congenital or acquired disease. Those having acquired club feet were excluded from the study. Patients having Pirani score of less than 5 were also excluded from the study. Also parents of older children (over 1 year) who were convinced for weekly ponseti serial casts were excluded. So patients between 1 and 3 years with isolated idiopathic unilateral or bilateral clubfeet, having Pirani score of more than 5 and not willing for Ponseti castings were included in the study.

Between July 2013 and December 2014, 31 feet (22 patients) 19 male feet, 12 female feet fulfilled the inclusion criteria and underwent one stage posteromedial release in our institution by a single Orthopedic Surgeon with Pediatric Orthopedics experience. Turco's posteromedial approach was used in all patients, in which the Achiles tendon and the medial three tendons (tibialis posterior, Flexor digitorum longus and Flexor hallucis longus) were lengthened by Z plasty. The neurovascular bundle secured. Capsulotomies of the ankle and subtalar joints posteriorly and the talonavicular joint medially were performed. Plantar fascia released and Abductor hallucis was divided and the foot was assessed on the operative table. The end point was full correction of Cavus, Varus, Adduction (upto 70° Abduction) and Equinus (upto 20° Dorsiflexion). The surgical site was irrigated, Tourniquet was released at the end of procedure and hemostasis secured. The wound was closed with an absorbable 3/0 suture either in continuous or in interrupted fashion. A non-adherent dressing was applied and a backslab was given in corrected position i.e. 20^0 dorsiflexion and 70^0 abduction/external rotation. Post operative analgesia, antibiotics were given and limb was kept elevated for at least 48 hours. The patients were regularly assessed for all possible post operative complications especially compartment syndrome. Backslab was removed after 72 hours, wound closely observed under sedation in aseptic conditions for any complications (dehiscence, infection, necrotic margins) and results noted. Wound healing was scored according to direct visual examination. Scores of 1 to 4 were given. The final corrected cast was applied and the patients were sent home. The patients were reviewed after 2 weeks to check the wound and cast status. Finally at 10-12 weeks for cast removal.

RESULTS

Over the 18 months time period, 31 feet (22 patients) fulfilled the criteria and gave consents to take part in the study. These 31 feet were randomized into two groups, Group A (16 feet) in whom the skin was sutured in interrupted fashion while skin closure of the patients in Group B (15 feet) was in continuous manner. Two patients lost follow-up i.e. did not come for visit on the 14th day and were excluded from the study.

Of the 31 feet, 19 were that of males while 12 feet were of female patients. Right side was involved in 8 patients, 5 patients had only left side involved while in 9 patients the deformity was bilateral.

The mean age of the patients at the time of surgery was 2.1 years SD 0.7 (range 1 to 3 years), for those whose wound was sutured in interrupted fashion mean age was 2.2 years, while mean age was 2 years whose skin was sutured in continuous manner.

The mean Pirani score of the patients at the time of surgery was 6.7 SD 0.9 (range 5 to 8), for those whose wound was sutured in interrupted fashion it was 6.8, while mean Pirani score was 6.5 whose skin was sutured in continuous manner.

Wound healing was much better when the skin was sutured in interrupted fashion, as shown in table 1. Wounds healing was excellent in 68.8% feet, in 25% of feet the wound healing was good while healing was fair in 6.2% of feet. No wound healed poorly in this group.

Patients in whom wound was sutured in continuous fashion only 46.7% of them had excellent wound

Table 1. Counts and percentages of wound healing scores in the two types of sutures

Suture type	Wound Healing Scores				Total
	1	2	3	4	
Interrupted Sutures	11 (68.8%)	4 (25.0%)	1 (6.2%)	0 (0.0%)	16
Continuous Sutures	7 (46.7%)	5 (33.3%)	2 (13.3%)	1 (6.6%)	15

healing, 33.3% of them had good healing, wound healing was fair in 13.3% of patients and poor in another 6.6% of patients.

So, there is a difference between wound healing of clubfeet undergoing surgery in whom the wounds are sutured in continuous or interrupted fashion. There was no difference in the wound healing between right and left feet nor was there any difference between males and females wound healing.

DISCUSSION

When considering improvements in surgical technique and faster rehabilitation following surgery, serious attention should be given to soft-tissue handling, especially the method of wound closure. Complications associated with skin closure such as delayed healing, wound dehiscence and infection may prolong recovery and hamper rehabilitation, resulting in increased morbidity, delayed discharge from hospital, increased costs, reduced patient satisfaction and increased complications. This also increases the treatment time and causes soft-tissues to contract, which leads to stiffness of the feet.

Proper wound closure promotes rapid healing of the skin with an acceptable scar, early rehabilitation and minimize complications. The advantage of continuous skin suturing is its quick application, thus decreasing the operating and tourniquet times. The theoretical disadvantage of skin closure with continuous sutures is the disruption of blood supply to the margin of skin resulting in necrosis of the skin margins causing delayed healing, wound dehiscence and infection.

The skin of the posterior and medial side of the clubfoot is overstretched when it is acutely corrected in patient undergoing surgery, wound complications are thus common. Some authors recommend applying a cast in under-correction and later (after 2 weeks) change the cast to fully correct the deformity, but this requires general anesthesia.

In our study, with interrupted skin closure normal healing was 93.8% (excellent 68.8% and good 25%), while 80% (excellent 46.7% and good 33.3%)of the wounds healed normally in continuous skin closure fashion. Our results are comparable to the results of a study performed by Saeid Tabatabaei[16] et al in which mild wound margin necrosis occurred in 8% of the patients while extensive wound necrosis occurred in 8% of the patients and resulted in necrosis of the medial side of the foot.

Karakurt et al[17] in his study of 40 clubfeet reported 18.5% of skin necrosis and a 78% of soft tissue swelling with Turco Posteromedial release, but they did not mention the type of wound closure. These results are comparable to the feet in which skin was sutured in continuous fashion.

In another study by Kaewpornsawan et al[18] in a study found 6% soft tissue infection, but again the method of wound closure was not described.

It is evident that wound healing is a major problem in almost all the studies published regarding surgical treatment of clubfeet and till date no study had been performed to compare the wound healing according to the type of skin closure. Our study had some limitations, the sample size is small and the Pirani score range of the feet was high. We hope these limitations will be addressed in future studies.

CONCLUSION

It is therefore highly recommended that the skin should be sutured in interrupted fashion in patients undergoing surgery for clubfeet as there is better wound healing and thus surgical outcome as compared to continuous skin closure.

No benefit has been or will be received from any party or commercial organization for this study. There is no conflict of interest for this study.

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