

Comparison between Tourniquet Vs Tumescence Techniques for Contracture Release

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ABSTRACT

Aim: To compare the tourniquet vs tumescence techniques for contracture release in children.

Study design: Randomized controlled trial.

Place and duration of study: Department of Plastic Surgery, Sheikh Zayed Hospital, Rahim Yar Khan during 01-04-2018 to 31-03-2019.

Methods: In this study the cases of both genders age more than 5 years having burn related contractures of the hands lasting more than 1 year were included. Then these cases were divided into two groups. The cases in group A underwent surgery with the help of Tourniquet and those in group B required drug induced tumescence by using epinephrine in a dose of 1:100000 dilutions. These cases were then operated for standard contracture release process and were assessed for mean per operative time and mean pain score.

Results: In this study there were total 60 cases (30 in each group). The mean age in group A and B was 6.97±3.41 vs 7.04±3.31 years (p= 0.78). There were 19 (63.33%) males in group A and 17 (56.67%) males in group B with p= 0.58. Mean operative time in group A and B was 35.97±14.31 vs 32.89±11.73 minutes with p= 0.23. Mean post operative pain was significantly higher in tourniquet group and was 4.47±2.13 vs 2.01±0.89 in Tumescence group with p= 0.01.

Conclusion: Tumescence group is significantly better for contracture release in terms of post operative pain than tourniquet group.

Key words: Contracture, Tourniquet, Tumescence

INTRODUCTION

Burn injuries are amongst the commonest presentations to the plastic surgery units and can result in severe degree of morbidity and function limitation especially in cases with full or partial thickness burns which were not properly treated with grafting. Functional limitations due to contracture can result in great degree of physical, mental, social and psychological stress to one's life¹⁻²

The major signs and symptoms to present include pain, limitations of the movement, unable to perform daily activities, mild to severe disfigurement, cosmetic correction etc. The severity can be categorized and assessed by the range of motions and even in cases with fixture, these are tried to fix at angle to restore a valuable activity³⁻⁴.

Apart from the conservative management a long list of medical and surgical interventions has been tried to keep the viability and to enhance the activity status. These include splints that can be static or dynamic, intraregional steroid injections, hydro therapy, injections of anti histamines, compression and laser therapies and ultimately surgical correction and even cosmetic repair. These all had their own benefits and limitations with variable degree of success⁵⁻⁶.

Surgical correction is considered as the treatment of choice and can replace the scar tissue with more pliable, matching and flexible tissue either from the same patient or from other donor. Regarding peripheral or limb contracture release especially in children can pose a great challenge

as it can be painful, time consuming and need better and safe placement of the graft. For this various techniques have been tried to keep the surgical field devoid of blood to have a better visualization of the underlying neurovascular bundles and out of these tourniquet and tumescence techniques gained popularity in terms of various parameters where later is being preferred in the recent times as it avoids the complications associated with tourniquet and provided better visual field. Epinephrine in diluted form is used for this but still in local population this practice is relatively uncommon and data was lacking. That's why this study was planned to compare its utility with newer technique and the conventional one.⁷⁻⁸

PATIENTS AND METHODS

This randomized controlled trial was conducted at Department of Plastic Surgery, Sheikh Zayed Hospital, Rahim Yar Khan during 01-04-2018 to 31-03-2019. In this study the cases of both genders age more than 5 years having burn related contractures of the hands lasting more than 1 year were included. The cases that had undergone any treatment for this in the last 1 month, or those that had any bleeding disorder or were not fit for surgery were excluded from this study. Then these cases were divided into two groups by sealed opaque envelope method labelled as A or B. The cases in group A underwent surgery with the help of Tourniquet and those in group B required drug induced tumescence by using epinephrine in a dose of 1:100000 dilutions. These cases were then operated for standard contracture release process and were assessed for mean per operative time and mean pain score.

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Statistical Analysis: The data was entered and analysed by SPSS-version 23.0. Independent sample t test was used for continuous data and qualitative data was compared by using chi square test and post stratification p value equal or less than 0.05 was considered as significant.

RESULTS

In this study there were total 60 cases (30 in each group). The mean age in group A and B was 6.97 ± 3.41 vs 7.04 ± 3.31 years ($p = 0.78$). Mean duration of contracture was 1.41 ± 0.79 vs 1.53 ± 0.31 years with $p = 0.56$. There were 19(63.33%) males in group A and 17(56.67%) males in group B with $p = 0.58$ as in table I. Mean operative time in group A and B was 35.97 ± 14.31 vs 32.89 ± 11.73 minutes with $p = 0.23$. Mean post operative pain was significantly higher in tourniquet group and was 4.47 ± 2.13 vs 2.01 ± 0.89 in Tumescence group with $p = 0.01$ (table II).

Table I. Study variables (n= 30 in each group)

Treatment group	A(Tourniquet)	B(Tumescence)	P value
Variables	Mean \pm SD	Mean \pm SD	
Age	6.97 ± 3.41	7.04 ± 3.31	0.78
Weight	13.89 ± 3.15	14.37 ± 4.77	0.67
Duration of contracture	1.41 ± 0.79	1.53 ± 0.31	0.56
Gender			
Male	19 (63.33%)	17 (56.67%)	0.58
Female	11 (36.67%)	13 (43.33%)	

Table II. Outcome comparison

Group	A (Tourniquet)	B(Tumescence)	P value
Variables	Mean \pm SD	Mean \pm SD	
Mean operative time	35.97 ± 14.31	32.89 ± 11.73	0.23
Mean postop pain	4.47 ± 2.13	2.01 ± 0.89	0.01

DISCUSSION

Contractures are one of the highly concerned complications in post burn cases especially in cases with peripheral burns i.e. limbs. It can add to mild to severe disability and dependency in such cases and circumstances can be highly stressing. Contracture release in the treatment of choice for this and there has been multiple adjunct treatment options tried to enhance the recover, to decrease the pain and increase the surgeon's convenience and tourniquet and tumescence techniques are amongst the salient ones.⁹⁻¹⁰

In the present study, mean operative time in group A (tourniquet) and B (tumescence) was 35.97 ± 14.31 vs 32.89 ± 11.73 minutes with $p = 0.23$ and mean post operative pain was significantly higher in tourniquet group and was noted as 4.47 ± 2.13 vs 2.01 ± 0.89 in Tumescence group on visual analogue scale with $p = 0.01$. One to one data regarding comparison of these two modalities was scarce. According to a study done by Bashir MM et al on paediatric population, they compared these two modalities and it was seen that mean pain was also significantly higher in Tourniquet group in their study and was assessed on the basis of rescue analgesia requirement which was 6.26 ± 1.9 mg vs. 9.41 ± 2.2 mg; $P \leq 0.001$. They further described that overall graft uptake was also better in tumescence group and was noted in 8.97 ± 3.7 cm as compared to 7.26 ± 2.6 cm in the tourniquet groups with again statically significant p value of 0.001¹¹.

The other studies have shown the beneficial effects of various tourniquet techniques as it can not only reduce the blood flow but also compressed the nerve to decrease the incidence of pain and for this wider size tourniquet is preferred.¹²⁻¹³ They further demonstrated that controlled hypotension can also decrease the risk of pressure needed to keep the vascular area clear¹³.

There was a case report published in 2015 by Prasetyono TO et al where they released a linear hand contracture in 19 year male without tourniquet by using tumescent technique successfully and no major complication was noted.¹⁴ In another study they found very good results regarding the blood less field for surgery by using tumescent technique and was seen that in 29% of the cases there was total blood less field and in 48% of the cases there was minimal bleeding noted and there was not much post operative pain by using 1 per million epinephrine solution for tumescence¹⁵.

CONCLUSION

Tumescence group is significantly better for contracture release in terms of postop pain than tourniquet group.

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