



ORIGINAL ARTICLE

## Z-plasty in post-burn contracture of hand among pediatric patients.

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**ABSTRACT... Objective:** To find out the frequency of hand burn and the effectiveness of Z-plasty in post-burn hand contractures. **Study Design:** Descriptive Cross-sectional study. **Setting:** Department of Pediatric Surgery, Khawaja Muhammad Safdar Medical College, Sialkot. **Period:** January to December 2021. **Material & Methods:** A preformed proforma was used, consisting of 4 parts, the first part including demographic data like age and gender, second part consist of patient's history, consisting of presenting complaint, its duration, past history of any medical or surgical illness or comorbidity. Third part consisted of physical clinical examination of the hand (fingers and palm) while fourth part was for post-operative complications of reconstructive procedure, Z-plasty. The data was analyzed by using Statistical Package for Social Sciences (SPSS) version-20. **Results:** The most commonly affected age group was less than 6 years of majority of them, 53.3%, were male. The most common cause was thermal burns as compared to electrical burns. Among 91.1% of the participants, the right hand was affected more. Majority of the cases (48.9%) reported single finger burn, followed by multiple fingers (31.1%) and very few (20%) were having palm burns. Segregating the single figure, results showed that little finger was affected in 20% of cases No post-operative complications, like skin necrosis, wound dehiscence, hematoma or infection, were noted. **Conclusion:** It can be concluded that post-burn hand contractures and hand deformity was common among children. Z-plasty with/without skin grafting is an ideal surgical management to subside the contracture of hand.

**Key words:** Burns, Contracture, Z-plasty.

### INTRODUCTION

Hand is a very important part of the body, also known as third eye. Minimal injury can lead to functional deformity, affecting the quality of life. Hand contracture usually occur as a result of burn that can impairs the daily routine.<sup>2</sup> In deep burns, the main aim is to resuscitate the patient, increase the chance of patient's survival and skin cover. Usually soon after burn, the contracture develops, because of poor initial management and physician's negligence. Post-burn contracture in hand completely Limits the patient's daily routine activities. Sheridan et.al did a study on 698 children and found that 4.4% of cases develop hand contracture and need surgery instead of regular change of dressing. About 32% of the cases need grafting but later they developed contractures which need follow up surgery.<sup>3</sup>

Severity of post-burn contracture depending upon few factors including location of burn, its depth, timely management and scar care when it is getting mature.<sup>4</sup> Severity of post-burn contracture is graded into 4 grades, the contracture of grade-I and II is treated with empirical therapy while grade-III and IV need reconstructive therapy.<sup>5,6</sup> Beside releasing contractures, surgeon should also follow up the secondary changes related to muscle, tendons, ligaments and joints to functionally improve the patient.<sup>7,8</sup>

It is a major challenge for the surgeon to get patients satisfaction and good functional outcome after the operation. The functional outcome of corrected area depends upon the severity of burn, The area involved and the procedure used for reconstruction and release of contracture. There are multiple procedures which are used to

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correct the post-burn hand deformities including skin grafting, local or regional flap, island flaps, free flaps and Z-plasty, V-Y and Y-V flaps.<sup>9,10</sup> Now a days Z-plasty has become the topic of interest because of its post-operative advantages like 43% shorter duration of healing, minimum wound care and decrease risk of complications.<sup>1</sup> So the current study aimed to find out the frequency of hand burn and the effectiveness of Z-plasty in post-burn hand contractures.

## MATERIAL & METHODS

A descriptive cross-sectional study was conducted at the department of Pediatric surgery, Khawaja Muhammad Safdar Medical College, Sialkot during January to December 2021. The sample size was calculated using the OpenEpi calculator. Study got ethical approval from the concerned institute and the consent was taken from the parents/guardians of study participants. About 45 participants, who underwent Z-plasty for relieving post-burn contractures of hand, were included in the study.

A preformed proforma was used, consisting of 4 parts, the first part including demographic data like age and gender, second part consist of patient's history, consisting of presenting complaint, its duration, past history of any medical or surgical illness or comorbidity. Third part consisted of physical clinical examination of the hand (fingers and palm) while fourth part was for post-operative complications of reconstructive procedure, Z-plasty. The procedure was done under general anesthesia. Patients were advised for regular follow ups including once in a week for two months, after that once in a month for 6 months to rule out the post-operative complications. The data was analyzed by using Statistical Package for Social Sciences (SPSS) version-20. Data was presented as frequency and percentages.

## RESULTS

The most commonly affected age group was less than 6 years of age that is about 57.8% of study participants. Majority of them, 53.3%, were male while 46.7% was female. The most common cause was thermal burns as compare to electrical burns. Among 91.1% of the participants, the right

hand was affected as shown in Table-I. Majority of the cases (48.9%) reported single finger burn, followed by multiple fingers (31.1%) and very few (20%) were having palm burns. Segregating the single figure, results showed that little finger was affected in 20% of cases followed by index finger, middle finger and thumb with 15.6%, 8.9% and 4.4% respectively while no case was found with affected ring finger as shown in Figure-1. No post-operative complications, like skin necrosis, wound dehiscence, hematoma or infection, were noted.

Variables	n=45 (%)
Age (years)	
≤6	26 (57.8%)
6-12	19 (42.2%)
Gender	
Male	24 (53.3%)
Female	21 (46.7%)
Hand affected	
Right	41 (91.1%)
Left	4 (8.9%)

Table-I. Characteristics of study participants

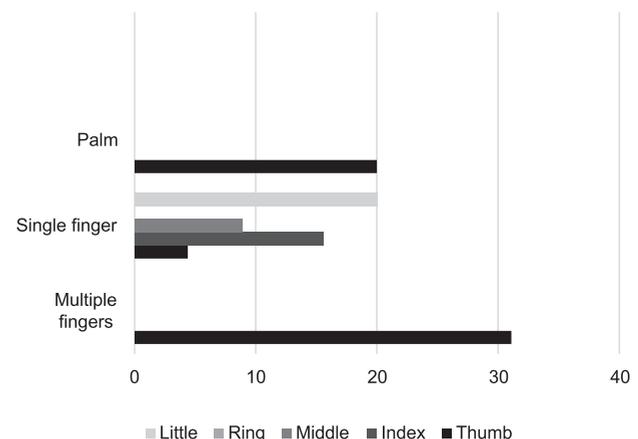


Figure-1. Area involved and segregation among single figure

## DISCUSSION

The hand accounts for 5% of total body surface area and in 80% of the burn cases, hands are involved.<sup>11</sup> Hand burn can affect 57% of the quality of life and if it is the dominant one then the person becomes dependent.<sup>12</sup> Current study reported that in majority of cases, right hand

burn was more than the left hand because of its dominance. In most of the cases (48.9%) single finger was commonly affected, out of which the little finger had the highest incidence of burn (20%) because of its flexed position as compared to other fingers. Little finger is easy to burn because of its exposure in protective posture of hand and is usually affected by circumferential type of burn.<sup>13,14</sup> In current study very few of the cases of palmar burn was reported as there is additional protective layers of palmar fascia and fibrous septa to protect neurovascular bundles and almost no case of deformity or contracture was noted because of protective layers, good blood supply and rapid healing property of palm.<sup>15,16</sup>

Development of hand contracture is a very common complication after deep burn although initial physiotherapy and later surgical options are also available now a days.<sup>17</sup> Post-burn contractures are common and severe in developing countries. It can affect the quality of life as it reduced the patient's daily activities. It bothers more if the affected hand is the dominant one, so the reconstructive surgeries are needed to improve the hand function.<sup>18</sup> There are various techniques to cure the hand contractures, among them Z-plasty is the most beneficial and reliable technique with good functional and aesthetic outcome. Few of the researchers reported optimum results in mild and moderate cases with Z-plasty.<sup>14</sup> It has also been reported that Z-plasty minimize the duration of healing, less patient's post-operative care in comparison to skin grafting. Gelberman et.al. noted that there was rapid healing and minimize the duration up to 43%.<sup>19</sup> Current study found a very good clinical outcome of Z-plasty as no post-operative complications, like skin necrosis, wound dehiscence, hematoma or infection, were noted.

## CONCLUSION

It can be concluded that post-burn hand contractures and hand deformity was common among children. Z-plasty with/without skin grafting is an ideal surgical management to subside the contracture of hand.

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### AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Abid Hussain	Data collection.	
2	Zahid Iqbal Bhatti	Study design & Idea.	
3	Munwar Ali Siyal	Write first draft of the manuscript.	
4	Muhammad Kashif	Statistical Analysis.	
5	Nasima Iqbal	Literature review.	
6	Syeda Amber Zaidi	Final draft and drafting.	