

Surgical opportunity in our clinic for management of postburn flexion contracture of the Elbow in children

Hasime Terziqi 1, О г н я н . х а д ж и й с к и 2, Mentor Alimusaj 2

ABSTRACT

Background

Burn scars can lead to a poor functional and cosmetic outcome as well as possible psychological consequences. The aim of this study is to define the complexity of the treatment of contractures in children's elbows after burns in the Clinic of Plastic Surgery– University Clinic Centre Prishtina. Kosova, during the years 2010-2014

Study desing : *Descriptive cases series*

Place and duration of study: Clinic of Plastic and Reconstructive Surgery Center Prishtina-Kosova between 2010 -2014.

Methods: Patients from age 9 months to 17 years with post- burn elbow contracture where no metabolic derangement were included in the study. After proper assessment and X-ray for the functional impairment the surgical decision was made, depending of the classification of the contracture in Elbow. Skin grafts, local flaps such as advancement flaps, Z-plasties, were used. The patient was called for follow-ups, up to one year after discharge.

Results: 26 patients were included in the study were the ratio between Female : Male is 12:14 (1:1.16). Neglected, 10 degree of extension loss are the most common. Best functional improvement was seen in the age group of 9 months to 5 years. Most of cases >35% was treated at home.

Conclusion: Best results of study were obtained in young children. Our cases, though limited in number(because of age), are consistent with the literature. In general, good or excellent results were seen regardless of technique of release, without any cases with worse postoperative contracture than the preoperative contracture.

Keywords: algorithm, contracture , children, elbow ,functional impruvment , post -burn contracture, surgical technique.

1 INTRODUCTION

The socio-economical status, was an important factor in cultural environment in our country before and especially after the war, for medical care and education. Because of that, in our country we still have. per year, between 250 - 300 patients with burns. From this number 85% are with primary treatment from non professional person: from reginal hospitals, ambulatory treatment and mostly with treatment at home from family. The precentage of burns in children from 0-18 in our clinic is obut 73% from all patients.

We have high incidents of post-burn scars and contracture in children. (3). This fact was the reason that we decide to study one of very important contracture in upper extremity in children which have very big impact with consequence for quality of life. Between 2010 -2014 we had 128 patient with post-burn scar and contracture in upper extremity in children from 0-18 years .

Elbow burn contractures in our clinic is in second place from all contracture in upper extremity, first one is hand contracture. There are more likely to be complicated with heterotopic bone formation, and the surgeon must be aware of this pssibility and macke a plan for operative strategy accordingly. (11) . The parents should be informed and should be asked to wait preferably a year from the time of the burns. However, during this time will be recomand: massage, splinting and regular visits to the physiotherapist, and this treatment must allow the scar to become mature, soft, supple and less vascular before undertaking surgery for contractures [1]. Some surgeons perform both the skin release and heterotopic bone release in one stage, with needs for reoperation in some of patients (12). We used different techniques to manage contracture of burn scars on the elbow, including skin graft, local flaps, V-Y plastic, Z plastic. Linear contracture can be managed with z-plasties, w-plasty, or small wave incision to release linear band in the midline (type Ia). In the case where the patient has linear scar contractures on both

radial and ulnar surfaces, (type Ib). Broadband contracture on one surface are (type IIa), but broadband contractures on both radial and ulnar surface, are (type IIb). Broadband contractures extended to next surfaces are (type III). (type IV) is the contracture involving the entire circumference of the elbow [16]

Materials and Methods:

Clinical Material

Our study presented epidemiological and clinical-analytical study which takes cases of children with elbow contracture in children who needed to be hospitalized current for surgical intervention in the Clinic of Plastic Surgery – University Clinic Center Prishtina, Kosovo, in period between 2010-2015. The burn surface area of the patients which were treated in our clinic ranged from 15% - 50% and it was always deep second degree. Only 12% -15%- of all patients were managed in plastic surgery/burn wards. From which 5% of patients were managed in our clinic with conservative treatment because parents had refused operative treatment for the child. Other patients who are include in our study had non professional treatment for burn care. The surface area of bum ranged between 5% - 15% with complication by infection. They come from regional hospital ranget between 18%- 25% , ambulatory was between 20%-25% and the was treated by family at home > 33%.

Population in study

In our study are 26 patients from age 9 months to 17 years, avarage age is 11 years, both sexes were 14(53.84%) Male and 12 (46.16%) Female, with post-burn scar and contracture in upper extemity and without metabolic derangements were included in the study. Restriction in range of motion and classified according classification depending on the loss of joint extension. (Richard SJ 2007

Table.No.1. Elbow joint PBC were classified depending

Pacient characteristi	Number of patients	
	26	and %
Neglected, when there is less than 10 degrees		
of extension loss	14	53.84%
Mild, when 11–49 degrees of extension loss		
	8	30.77%
Moderate, when there is 50–89 degrees of		
extension loss	3	11.54
Severe when greater than 90 degrees of		
extension loss exis	1	3.85%

2 Elbow contracture depending the loss of extension in less than 10 degrees are neglected 14 patients 53.84%, in mild with loss of 11-49 degree were 8 (30.77%) patients , in moderat with loss of 50-89 degree was 3(11.54%) patient and severe when greater than 90 degree o extension loss exis one patient or 3.85% . All of patient were operated bye clasification with Lokal flaps (Z-plasti, V-Y lokal advansment flaps) were was 23(88.85%) patient, and with skin graft in 3(11.54%) patient .

3 Methods

Diagnostic

Functional impairment was assessed properly by checking the range of movement across the joint. X-rays were ordered to see if the joint is also involved in the contracture or not. After proper assessment and x-rays, surgical procedure and probable outcome of the surgery was explained to the parents and proper informed consent was taken.

Data collection;

Patients were assessed by: Age, Gender. Type post-burn scar, contractures , their localization, surgical technique and post-operative monitoring.

Therefore, a questionnaire was developed with the following typical data;

Coautor . Огњан. Хаджийскиin Sofija, Bulgaria (This information is optional; change it according to your need.)..mail: **on the loss of joint extension .**

Name, surname, gender, age. The contracture according localisation
- Elbow .The operativ techniques results

Preoperative assessment

Must include a history, physical exam and airway exam. Contracture in upper extremity can be in complexity with neck in that case the risk for operation may be higher .

Parents are informed, written consent were obtained from all cases preoperatively.

■ Preoperatively broad spectrum antibiotic was given IV 2 h before surgery.

➤State of exit and ambulatory monitoring after release - were based on data from clinical and ambulatory car

Follow up of the patiente was continued between six month and one year, monthly regarding the viability of flaps and healing of the repaired area.

Physiotherapy was considered as an option in management of cases preoperatively and postoperatively according to each case.

Paciente were examined for any complication of healing * infection, necrosis, wound dehiscence, hypertrophic scar ore contracture *

Analises of data :Includes patients with elbow contracture without operation. And patiente with elbow contracture after operation operation

Operative methods

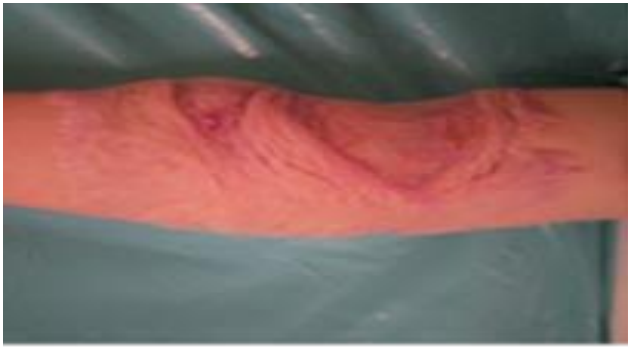
Burn contractures, especially severe ones, have a tendency to recur, especially in a growing child. In that cases the surgery is best treatment to reduce this tendency. Before attempting release, we must inform parents for surgery treatment they should wait, preferably a year from the time of the burn, until we can decide for best time of surgery depends of situation.

Skin grafting.

The incision to release contracture is usually fish mouth and should be done along the axis at the point of maximum tension with complete release and resulting defect will coverage with skin graft (STSG,FTSG). Sometimes in combination with lokal flaps. Skin graft with Zplasti, V-Y advansment flap, postoperative recomandation is splinting. This method in elbow represent with 3(11.53%)Figure 1

Figure 1. Elbow contracture with hypertrophic scar , with wrist contracture treated with

Skin graft (FTSG, STSG with local flap) .



This technique was done in 17 (65.38%) patients elbows. Preoperative marking was done. Z-plasties .

This technique was done in 17 (65.38%) patient in Elbow. Preoperative marking was done. The design depends on balanced opposed Z-plasties along the line of contracture. Where with flaps elevation and transposition were done to coverage released contracture. This flaps It was done to release linear scar with good tissues along side. And with high risk of partial necrosis of part if both flaps are not comprised of mostly healthy normal tissue.. Z-plasties can be single or multiple. Figure

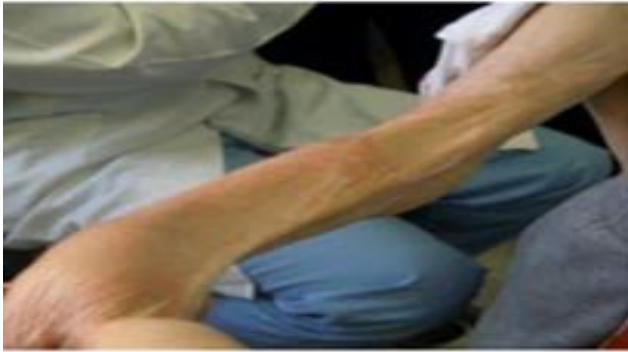


Figure 2. Elbow contracture treated with five "Z" plasty.

a)preop, b)post op, c) 5month later



Local flaps .

The operation can be performed in general anesthesia for children under 15 years old and for older than 15 years , local or regional anesthesia is preferred. Scar tissue does not grow proportionately as we age, resulting in visible contractures and areas prone to recurrent scar formation. Z-plasty or multiple Z-plasties, W-plasty, V-Y-plasty, local distance flaps and skin grafts are frequently used. The flaps should include all subcutaneous fat.

Z plasties .



Figure 3. Elbow contracture with keloid treated with keloid excision and local V-Y flap

a)preoperation , b)post operation, c) 7 month late result

Total of 26 patients were included in the study, out of which males and were females. Their age ranged from 9 months to 17 years with the mean age of 11 years with elbow contracture .

In our Clinic were treated 3 (12-15%)of patients,with TBSA ranged between 15-50%, from 9month untill 17 years, including all causes burning. **With green** color are all patients which are treated from medical non professional persons for burn. From Regional Hospitals were 6 (18-25%) of the patients with TBSA ranged between 10-15% from 3 years to 17years. Ambulatory treatment was 7 (20-27%) of patients, with TBSA <10% from 7years to 17 years old, including burn causes: scald, Flame and Contact. **With blue** color are patients who were treated at home by family (neglected patients), were 10 (>33%) of the patients are with TBSA <10% and include all of the ages. Always it was deep second degree, sometimes complicated by infection and including burn causes Scald and Flme .Table 2.

V-Y plasty.

This technique was done in 6(23.07%)patient in elbow. This is suitable for those burns with a narrow band of contracture with healthy skin on either side. Usually multiple V-Y plasties are needed, and interposing healthy skin between burned segments can be very successful. . This technique will not be recommended when there is a wide area of thickened burned skin across a joint.

Post-operative care

Postoperative broad spectrum antibiotic was given for all cases for one week. Adequat pain control may be necessary. Long term splinting and physical therapy were the rule in cases treated by skin grafting, in ankle.Follow up visits were done after 3 days, 1 week, 2 weeks, 1 month, 3 months and 6 months to monitor the progress. Postoperative photographs were taken on follow up visits.

Statistical research methods.

Data were subjected to statistical analysis using various descriptive statistics. The measurements were recorded in degrees and Statistical significance was set with a p-value 0.05.

RESULTS

Table.No.2: Epidemiological data and places where patients are treated in the acute phase of burn.

PLACES IN:	NO.OF PATIEN %	AGE	TBSA %	ETIOLOGY OF BURN
PLASTIC SURGERY CLINIC	3 (12-15%)	9MONTH-17YEAR	15%-50%	SCALD AND FLAME ELECTRICE CONTACT CHEMICAL
REGINAL HOSPITALS	6 (18-25%)	3 YEAR-17 YEAR	10%-15%	SCALD FLAME CONTACT
AMBULATORY TREATMENT	7 (20.27%)	7 YEAR-17 YEAR	<10%	SCALD FLAME CONTACT
TREATMENT AT HOME	10 (>33%)	ALL AGE	<10%	SCALD FLAME

of extension loss 3
Severe when greater than 90 degrees
of extension loss exis 1

Places where patients are treated in the acute phase of burn.

Plastic surgery Clinic 3
Reginal Hospitals 6
Ambulatory treatment 7
Treatment at home 10
Hospital stay (means) 5days

In our study we explain what different types of procedures we used for the coverage after release of elbow contracture. Split graft was used in elbow represent with 3(20.83%) patients. Using " Z" technique was done in 17 (65.38%) in Elbow. This technique V-Y was done in 6(23.07%)patients. Table no.4.

Table. 4. Different reconstructive procedures used in Elbow contracture

SITE OF CON-TRACTURE	PATIENTS No	PROCEDURES PERFORMED	PATIENT + PERCENTAGE
ELBOW CON-TRACTURES	26	Z-PLASTY	17 65.40%
		V-Y ADVANCEMENT FLAP	6 23.07%
		RELEASE AND SPLIT THICKNESS SKIN GRAFT	3 11.53

Highlighted are the complications which we observed after surgery. We observed that whatever procedure we use for coverage, complication rate is more or less the same. Table 5.

Table.No 3. Demographic details of patients with

Elbow contracture included in the study

Patient characte	Number of patients
Number of patients	26
Femail :Mail ratio	12:14(1:1.16)
Age range	9month -17 years
Mean age	11 years

Elbow joint PBC were classified

depending on the loss of joint extension

Neglected, when there is less than 10 degrees of extension loss 14
Mild, when 11-49 degrees of extension loss 8
Moderate, when there is 50-89 degrees

Table No.5. Complications in different procedures used for release

and coverage

COMPLICATIONS	PROCEDURES USED FOR RECONSTRUCTION				
	STSG	FTSG	LOCAL FLAPS	Z-PLASTY	V-YFLAP VANCEMENT
INFECTION			1		-
DONOR,SITE HE- MATOMA IN FLAP CASES	_1		-		-
PARTIAL FLAP NECROSIS IN FLAP CASES	-	-		1	
FORMATION OF CONTRACTURE AFTER SURGERY	1			-	1

In Table 6. We show the relation of age with the improvement of functional impairment after surgery and it clearly shows that functional improvement is better in younger children. We assess the aesthetic sense of the coverage on the basis of color and anatomy. We divided the aesthetic outcome of surgery into three categories based on colour i.e. similar color as the surrounding or excellent, color is nearly same to the normal surrounding areas i.e. good and no similarity of the colors i.e. poor. 63% cases have excellent results, 28% were good and 9% were poor. We also assessed that to what extent we were able to normalize the anatomy. 73% cases have regained the normal anatomy but in 27% cases we were unable to restore normal anatomy due to joint stiffness.

TableNo.6. Functional assessment after one year of reconstruction with respect to age

Site of contracture	Move-ments usto assess function	Age Groups		
		9 months to 5 years	5 years to 11 years	11 to 17 year

Elbow contrac- ture	Flexion Exten- sion	All patients have normal movements	1-2 out of 4-5 pa- tients have lim- ited move- ments	Only one patient in this age group and has re- stricted move- ments
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Discution

Post burn scars can severely disrupt quality of life and cause physical and psychological deformities such as joint contracture and hipertrophic scars, especially post burn contracture in upper extremity in children.(1,2). A study conducted by Gupta RK shows that patients with severe post-burn contractures must be treated by the surgeon who has mastered a range of flaps within a setting where physiotherapy expertise are available (3,6). The chosen method should be the simplest method according to the standard principles of the reconstructive ladder.(14,15) Study of Stern PJ et all shows types of release included skin grafts, Z plastic, local flaps (with or without graft), and deep releases. (4,5,7) Askar I conducted a study and shows that double reverse V-Y flap is easy to use when tension across contracture line is too great to use any local flap(8,10,13). Size, shape, condition of joint and type of contracture are the important points to be kept in mind while deciding about the technique because all the methods have comparable results (9,11).. The classification of elbow contractures depends on the loss of extension. In Less than 10 degree of extension loss id negleded were 14 patient, 11-49 degree of loss extensionloss is mild with 8 patient, 50-89 degree of extension loss is moderate with tree patients, and greater than 90 degrees of extension loss is severe with one patient in elbow. Development of contracture agains after surgery is seen in one – two cases and upon investigation it is revealed that attendants and patient were negligible towards physiotherapy. Functional outcome of the surgery depends on the age of patient and joint mobility and laxity. It is clear that maximum functional improvement is achieved in all cases in age group of 9 months to 5 years of age and in children with less than 50 percent third-degree total body surface area burns. Even in the age group of 5 years to 11 years the results are good although 1-2 cases have limited range of movements but the patient was able to do his daily routine. But in age group of 11 to 17 years one patients have restricted movements and it's because of joint stiffness. It is also observed that maximum normal anatomical correction is obtained when joint is not stiff or involved with the contracture. Color difference of the coverage with surrounding is always difficult to finish as the result shows that only 63% cases have excellent color match and 18 percent cases have poor color match with the surrounding but the people usually get happy if they achieve good functional outcome. In generally, good or excellent results were seen regardless of

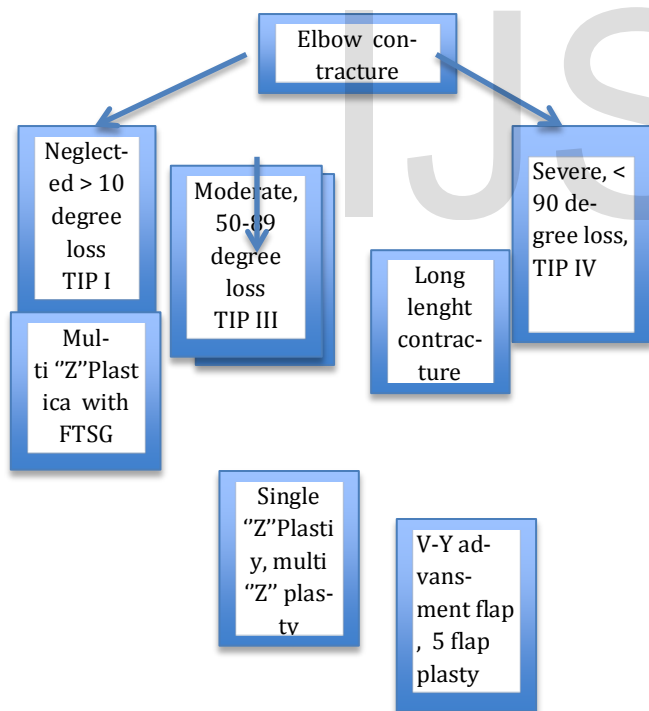
Lateral arm fasciocutaneous flap

Good result

technique of release, without any cases with worse postoperative contracture than the preoperative contracture (12). It is also observed that maximum normal anatomical correction is obtained when joint is not stiff or involved with the contracture. And with this study we can say, competency in plastic surgery implies a special combination of basic knowledge, Surgical judgment, technical expertise, ethics, and interpersonal skills in order to achieve satisfactory patient relationships and resolution.

Conclusion : Our cases, though limited in number(because of age), are consistent with the literature. This evidence has implications for how we think about the impact of contractures on patient's function. In general, good or excellent results were seen regardless of technique of release, without any cases with worse postoperative contracture than the preoperative contracture.

Algorithm of Elbow contracture



The classification of elbow contracture depends on the loss of extension. In Tip-I with less than 10 degree loss extension are negligible patients. With short and long length contracture. Relieved with different "Z"plasty or advancement flap. In Tip -II with 11-49 degree are patients with mild loss of extension. For correction of contracture in Tip II and III were used Multi"Z"plasty in combination with FTSG. In Severe or Tip IV were used Lateral arm fasciocutaneous flap with application of splint for two or three weeks.

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