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MANAGEMENT OF UNFAVORABLE SKIN SCARS AND ITS ECONOMIC IMPACT ON PATIENT

Dr. Nilanjana Junior Resident-III, Department of General Surgery, Subharti Medical College, Meerut. University, Meerut.

Dr Sandeep Kansal Professor, Department of General Surgery, Subharti Medical College, Meerut. University, Meerut.

Dr. Sarver Hussain Senior Resident, Department of General Surgery, Subharti Medical College, Meerut. University, Meerut.

ABSTRACT **Background:** Millions of people worldwide are affected by abnormal skin wound repair that results in chronic non-healing wounds, pathological scarring, and fibrosis following severe damage, yet there is currently no effective treatment or therapy for unpleasant scarring. The definition of hypertrophic scars and keloids that is now in use was given to us by Peacock et al. According to their definition, an HTS is defined as an extension of fibrous tissue with severe scarring that stays inside the boundaries of the wound. **Methods:** The present study is a prospective cohort study on management of unfavorable scars and its economic impact on patient.

1. To study the etiology of unfavorable scars based on wound, surgeon and pathological factors.
3. To evaluate various management strategies of unfavorable scars
4. To evaluate its economic impact of unfavorable scars on the individual patients

Results: we observed that 18.51% patients have lost their job during the course of their scar duration and its management. In our study majority of the patients (47.53%) have spent 1-5k INR for their scar management. **Conclusions:** It can be suggested that physicians need to identify different types of skin scars and treat them appropriately. Misdiagnosis and mismanagement of scars can be costly for both the patient and physician.

KEYWORDS : unfavorable scars, Z plsty, SSG, contracture release, economic impact

INTRODUCTION:

Millions of people worldwide are affected by abnormal skin wound repair that results in chronic non-healing wounds, pathological scarring, and fibrosis following severe damage, yet there is currently no effective treatment or therapy for unpleasant scarring. However, because cutaneous wound healing and fibrosis are so well studied, the information gathered can also be used to design treatments for pathological disorders that are similar in many other tissues. [1] Tissue injury repair, which strives to restore tissue integrity, entails intricately Co-ordinated biological processes involving many different cell types, growth factors, cytokines released by those cells, and the surrounding ECM. Scarring preserves the skin's barrier function after an adult skin wound has healed, preventing infection and preventing the body from becoming dehydrated. [2] Normal scars are made of loose fibrous connective tissue that slowly remodels to become stronger during the healing process, but they are nonetheless weaker and less functional than healthy tissue. [1,2] Chronic dermal inflammation and unchecked activity of myofibroblasts, activated connective tissue cells, can cause an aberrant enlargement of the scar, producing a hypertrophic scar or a keloid with an overabundance of ECM proteins.[3] Fibrous tissue outgrowths known as keloids and hypertrophic scars (HTSs) are brought on by a stall in the natural healing of wounds.[4] About 1700 B.C., in the ancient Egyptian text found in the Smith Papyrus records, keloids were first mentioned. [5] A scar contracture is, by definition, the result of a contractile wound-healing process taking place in a scar that has already sufficiently healed and been reepithelialized. [5,6]

A large cross-sectional study suggested that women may be more likely to develop keloids due to systemic variables such the female hormone estrogen.[7] Wound and scar inflammation may be exacerbated by estrogen's vasodilatory effects[8]; in fact, hypertrophic scars and keloids tend to get worse during pregnancy[9] and get better after birth. Hypertension, a systemic condition, may also contribute to the worsening of hypertrophic scars and keloids. [10] Multiple cases of keloid-susceptible families have been described, which supports the idea that genetic elements, such as ethnic [11] and familial genes, play a significant role in the development of keloids. [12] Treatment options range from conservative (intra-lesional steroid injections, surgery) to invasive (depending on the type of scar) (compression therapy, topical silicone gel, brachytherapy, photodynamic therapy).[12, 14, 15] .Treatments seldom entirely remove the scar, even though they may lessen its physical severity. [15] Other skin conditions [16-17] and Burns [18–19] consequences have been studied in great detail, but scars as a distinct entity have received less attention. This might be the case because the medical community generally undervalues the significance of looks to patients. [20] In the developed world alone, over 4 million people experience symptomatic scarring that necessitates management each year. However, these statistics only account for scars caused by trauma (such as burns) and omit the number of scars produced by emergency and elective operations, which will heal to varying degrees. [21]

The current study will be study about management of unfavourable scars and its economic impact among the individual patients.

Methods:

The present study is a prospective cohort study on management of unfavorable scars and its economic impact on patient.

1. To study the etiology of unfavorable scars based on wound, surgeon and pathological factors.
3. To evaluate various management strategies of unfavorable scars
4. To evaluate its economic impact of unfavorable scars on the individual patients

RESULT:

The purpose of this prospective cohort study was to evaluate the etiology, various management strategies and associated costs of unpleasant scars among patients presenting to the surgery OPD or being transferred from other clinics to our institute **Chhatrapati Shivaji Subharti Hospital** during the period from July 2020 to July 2022. Scars were evaluated by taking pictures at the beginning and conclusion of the study and by touching them to check for pain and uniformity. The scar was measured using a Vernier's calliper, and the treatment's efficacy was evaluated using the Vancouver Scar Scale (VSS) and the Patient and Observer Scar Assessment Scale (POSAS). *(Table no-1, 2)*

Table No1: Patient and Observer Scar Assessment Scale (POSAS)

	Observer component										
Normal skin	1	2	3	4	5	6	7	8	9	10	Worst scar imaginable
Vascularization											
Pigmentation											⎫Hypo ⎬Mix ⎭Hyper
Thickness											
Relief											
Pliability											
	Patient component										
No, no complaints	1	2	3	4	5	6	7	8	9	10	Yes, worst imaginable
Is the scarpainful?											
Is the scaritching?											
No, as normal skin	1	2	3	4	5	6	7	8	9	10	Yes, very different
Is the color of the scar different?											
Is the scarmore stiff?											
Is the thickness of the scar different?											
Is the scar irregular?											

Table No-2 The Vancouver Scar Scale (VSS)

Scar characteristic		Score
Vascularity	Normal	0
	Pink	1
	Red	2
	Purple	3
Pigmentation	Normal	0
	Hypopigmentation	1
	Hyperpigmentation	2
Pliability	Normal	0
	Supple	1
	Yielding	2
	Firm	3
	Ropes	4
	Contracture	5
Height	Flat	0
	<2 mm	1
	2-5 mm	2
	>5 mm	3
Total score		13

Visual Analog Scale for Scars (VASS) and the Patient-Owned Scar Assessment Scale (POSAS) are widely used around the world, as shown by a review conducted by ***Bae SH et AL, 2014***. More than 70% of the studies the authors looked at used the POSAS, making it the most widely used assessment tool. [22] In current prospective cohort study, 40.12% are between the ages of 22 and 31. Patients' median ages were Patients had a mean age of 26.67 13.82. Our results were consistent with ***Kamin and colleagues (1964)[23], and Ketchum and colleagues (1974)[24]***

With a male to female ratio of 1:0.73, 55 male patients (55% of the total) and 45 female patients (45% of the total) make up the current series. Total male to female ratio in ***Belie O et al*** study was 1:1.2.[25], with a slight female preponderance. This result was comparable to what ***Udo-Afah*** found in Calabar, where the male-to-female ratio was 1:1.1.[26]

The majority of patients in this study (37.5%) had keloids as their primary scar type. *(Table no3)*

Table No-3 Showing Scars Type And Percentage Of Scar In Current Study

Type of Scar	Count	%
CONTRACTURE	29	17.90%
HYPERTROPHIC SCAR	13	8.02%
IMMATURE SCAR	27	16.67%
KELOID	62	37.65%
MATURE SCAR	31	19.14%
Grand Total	162	

Ramakrishna KM et al., who have been treating keloids for 8 years, report seeing 1000 patients in south india. Skin colour, genetic variation, and environmental factors may all contribute to the increased dispersion across the globe. [27]

We found that 30.86 percent of our patients had post-burn scars, with traumatic scars making up the next highest percentage at 29.63 percent *(Table no-4)*. Consistent with the findings of A ***Goel and shiravastav P***, we found that external factors, such as burn injury and trauma, are a common aetiology for scar formation.[28]

Table No-4 Showing Scars Etiology And Percentage In Current Study

ETIOLOGY	CONTRACTURE	HYPERTROPHIC SCAR	IMMATURE SCAR	KELOID	MATURE SCAR	Grad Total	%
ACNE			5		2	7	4.32%
CONGENITAL	2			3		5	3.09%
EAR PIERCING		1		4		5	3.70%
H/O SURGERY	1		2	3	4	10	6.17%
NASAL PIERCING			5	2	2	9	5.56%
POST BURN	21	3	5	12	9	50	30.86%
SPONTANEOUS	3		2	17	5	27	16.67%
TRAUMA	2	9	8	21	9	49	30.25%
Grand Total	29	13	27	62	31	162	

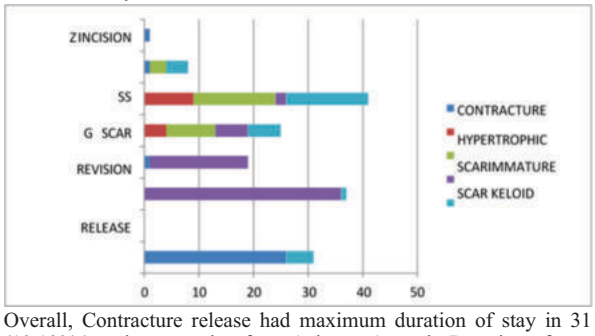
Our research confirms that burn victims will inevitably experience some form of scarring after their ordeal. Scarring is an inevitable part of the healing process for anyone who has suffered a burn, except in the case of very minor ones. Severity of burns is proportional to the size and depth of the resulting scars. A healed burn patient may have healed naturally through epithelialization of remnants and contraction of wound margins, through split-skin grafting after early excision, or over granulating raw areas following spontaneous eschar separation. All of these situations involve an immature scar that requires intervention to mature in a desirable direction. [28]

Scar revision was used on 25.31 percent of patients, followed by Inj.Triamcinolone at 22.84 percent, contracture release at 19.14 percent, and pain management at 15.43 percent.

For hypertrophic scars, treatment should begin one month after surgery, and involve injections of 0.1 ml of low-dose (5-10 mg/ml) triamcinolone acetonide into the scar's bulkiest area every three weeks for a total of six injections. This treatment helps to flatten the scar but does not reduce its width. Though studies have shown monotherapy with intralesional triamcinolone to be 50-100% effective, these studies lacked standardised controls and objective measures of scar outcome. [29,30]

We found that in the scar management process, 67.90% of patients had no hospital stays at all.Three patients (1.85%) in our study had hospital stays of 2 weeks to 1 month; one patient had contracture release, and the other 2 patients had SSG. *(Table no-5)*

Table No-5 Graph Showing Scars Type And Its Management In Current Study



Overall, Contracture release had maximum duration of stay in 31 (19.13%) patients ranging from 1 day to 1month. Duration of stay ranged from 1 week to 2 weeks for 12 (7.41%) patients, 1 week to 7 Days for 37 (22.84%), and 2 weeks to 1 month for 1 (1.85%) patient. *(Table no-7)*

Table No-6 Graph Showings Type Of Management And Duration Of Stay In Current Study

Management	1 -2 WEEK	1-7 DAYS	2 WEEKS - 1 MONTH	ZERO	Grand Total
CONTRACTURE RELEASE	11	19	1		31
INJ TRIAMCINOLONE				37	37
KELOID EXCISION		1		18	19
PAIN MANAGEMENT				25	25
SCAR REVISION		11		30	41
SSG	1	5	2		8
Z INCISION		1			1
Total	12	37	3	110	162
Percentage	7.41%	22.84%	1.85%	67.90%	

Kong w et 2021 reported that the average length of stay in the hospital for various scar management techniques in China ranged from 8.99 ± 14.63 to 19.49 ± 30.59 days, which is consistent with our findings. The location of a scar also plays a major role in the number of complications it causes. Hospitalization and extensive rehabilitation are more likely to be necessary in more functional regions because they are more prone to injury and movement. However, there is a dearth of studies examining how different parts of the body interact with scars and other comorbidities. [31]

Overall, 93 patients (56.41%) in our study experienced no adverse events. Inj.Triamcinolone was linked to the highest rate of complications (12.34%), followed by pain management (11.72%).

Partial recovery and scarring were the most common issues, affecting 10.50% of patients each.

Patients diagnosed with keloid (36 patients) had the highest prevalence of scars, followed by scars in general (19patients). Consequences of intra-lesional triamcinolone, including hypopigmentation, atrophy, telangiectasia, delayed wound healing, and scar widening in 63% of patients, were reported by ***Marguire HC., Jr. in 1956*** [32] ***and Manuskiatti W. in 2002*** [30]***.***

We found that the mean Vancouver scar scale score before and after treatment with contracture release, intramuscular triamcinolone, keloid excision, scar revision, subcision, pain management, or a Z incision was significantly different for all scar types. ($p<0.05$). *(Table no-7)*

Table No7-scar, Its Management And Relationship Between Their Pre And Post-operative Assessment (vancouver)

Management	Type of scar	Mean vancouver scale baseline	Mean vancouver scale Follow up	Mean change	P value Paired T test
Contracture Release	contracture	10.03±1.67	5.42±1.57	4.6±1.61	0.002*
	Mature scar	10±1.08	4.6±0.48	5.4±0.8	0.003*
INJ TRIAMCINOLONE	Keloid	7.61±1.33	4.69±2.01	2.91±1.84	0.001*
	Mature Scar	8	6	2	-
Keloid Excision	Keloid	9.11±1.40	4.94±1.88	4.16±2.08	0.004*
	Contracture	10	5	5	-
Pain Management	Keloid	7±1.41	6.5±1.5	0.5±0.76	0.36
	Hypertropic scar	6.5±1.11	6.25±1.08	0.25±0.43	0.75
	Immature scar	6.13±1.35	4.46±1.25	1.66±1.34	0.002*
Scar Excision	Immature Scar	7.71±1.41	4.07±1.25	3.64±1.14	0.0045*
	Hypertropic scar	9.22±0.81	4.88±2.02	4.33±2	0.001*
	Keloid	9.5±0.5	5.5±2.5	4±2	0.004*
SSG	Mature Scar	7.85±1.88	5.28±0.88	2.57±1.38	0.001*
	Contracture	5	4	1	0.88
Z incision	Contracture	12	4	8	-

However, we did not find any significant difference between pre- and post-treatment mean Vancouver pain scale scores when treating Keloid and hypertropic scar pain or contracture pain with SSG. ($p>0.05$).

All scar types treated with contracture release, intramuscular triamcinolone injection, excision of keloid tissue, revision of an existing scar, subepithelial sulcular grafting (MSG) of a mature scar, pain management of a mature scar, or a Z incision showed statistically significant improvements in the patient scar assessment score at both the baseline and follow-up periods. ($p<0.05$).

The significant results obtained for keloid management could be due to the fact that we haven't assess the patients for longer term hence recurrence rate could not be observed. Also intra-marginal surgical (core) excision keloid were performed in our study which aids in preventing stimulation of additional collagen synthesis .Another reason which could potentiate our findings is the location of keloids in our study which are majorly located in non- pressure zone (earlobes).

The vast majority of patients (47.53%) in our study reported spending between 1 and 5 thousand INR on scar management. Twenty-three percent of our patients spent more than 20,000 INR. To correct the contracture, we used the contracture release method, which accounted for 14.20% of the total cost. *(Table no-8)*

Table No-8. Type Of Scar, Its Management And Economic Impact

Scar & its management	10K -15 K	1-5 K	1-5 K	LESS THAN 10 K	MORE THAN 20 K	Grand Total	Grand Total
CONTRACTURE	5			2	22	29	17.90 %
CONTRACTURE RELEASE	5			2	19	26	16.05 %
KELOID EXCISION					1	1	0.62%
SSG					1	1	0.62%
Z INCISION					1	1	0.62%
HYPERTROPHIC SCAR			8	4	1	13	8.02%
PAIN MANAGEMENT			3		1	4	2.47%
SCAR REVISION			5	4		9	5.56%
IMMATURE SCAR			20	3	4	27	16.67 %
PAIN MANAGEMENT			9			9	5.56%
SCAR REVISION			11	3	1	15	9.26%
SSG					3	3	1.85%
KELOID		2	32	27		61	37.65 %
INJ TRIAMCINOLONE		3	16	17		35	22.60 %
KELOID EXCISION			11	7		18	11.11 %
PAIN MANAGEMENT			4	2		6	3.70%
SCAR REVISION			1	1		2	1.23%
MATURE SCAR	1		17	7	6	31	19.14 %
CONTRACTURE RELEASE				1	4	5	3.09%
INJ TRIAMCINOLONE				1		1	0.62%
PAIN MANAGEMENT			6			6	3.70%
SCAR REVISION			10	5		15	9.26%
SSG	1		1		2	4	2.47%

CONCLUSION

It can be concluded from our study that keloid and hypertropic scar were the most commonly occurring types of scar. We also noted that, they vary from normal skin scars to distinct types of abnormal scars, such as hypertrophic, keloids or disfiguring contractures. The etiological factors responsible for these scars were mainly burn injury and trauma. These scars were mainly managed by scar excision or by Inj. Triamcinolone showing good follow up results.In our study majority of the patients have spent 1-5000 INR for their scar management. Maximum amount spent was more than 20,000 INR by 20.37% of our patients. Out of which 14.20% was spent for contracture correction using contracture release method.

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