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A STUDY OF SCARS WITH RELEVANCE TO DIFFERENT TYPES OF BURIED SUTURES

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ABSTRACT

Scar in whatever part of the body may be, are always considered as stigma. Scarring after surgical procedures have long been difficult problem from functional as well as an aesthetic stand point. Many factors including the choice of suture materials and its placement influence these aims; of particular relevance is the accurate co-optation of dermal edges. A prospective study has been undertaken to assess the profile of scars after suturing of wound of the face with buried sutures of different types. 41 patients in the age group of 3 months to 70 years, who had suturing of wounds of the face either for primary wound or following excision of a lesion, congenital deformity or scar revision, accidental injury to the face were included in the study. Patients with burns and wound associated with facial fractures were excluded from the study. Among the three buried suture materials Polyglactin 910 showed better results in colour matching with surrounding skin. Polyglactin 910 and Chromic catgut suture gave better results in texture results. Polydioxanone (PDS) (11.1%) suture showed maximum number of scar with hypertrophic changes followed by (10%) scars with Chromic catgut suture. In the present study Polyglactin 910 has come out to be the better suture when scars with Polyglactin 910 as buried suture were compared with scars where either Polydioxanone or Chromic Catgut buried sutures were used. The Polyglactin 910 suture gave better match with the surrounding skin and esthetically pleasing scar.

KEYWORDS Polydioxanone (PDS), Polyglactin 910, Chromic Catgut

Introduction:
Scars in whatever part of the body they may be, are always considered as a stigma. Scarring after surgical procedures or injuries have long been difficult problem from functional as well as an aesthetic standpoint. Any surgical intervention will result in a wound in order to get access to and deal with underlying pathology. In this situation the surgeon's task is to minimize the adverse effects of wounds, remove or repair the damaged structures and harness the process of wound healing to restore function. The principle aims of tissue repair are rapid acquisition of strength and minimum tissue damage, with minimum inflammation and a good scar. Many factors including the choice of suture materials and its placement influence these aims; of particular relevance is the accurate co-optation of dermal edges; eversion or inversion leads to sub-optimal healing.[1]

For many years sutures have been used to approximate the skin edges, and also to cut tissues together until the wound has healed sufficient enough as to be sufficient enough as to be self supportive. Throughout antiquity many materials have been used to approximate the skin edges.

At present no single wound closure material fulfils all qualities of an ideal material and therefore there is ongoing search for improved methods and materials. Many surgeons are convinced that the use of different suture affects scar formation and remodelling. In an attempt to get aesthetically pleasing scar surgeon prefer to place into the dermis to minimize tension during wound healing. Surgeons are also stressed to place sutures into dermis and subcutaneous tissue to facilitate their subsequent absorption by inflammation, enzymatic degradation or hydrolysis. If absorbable sutures are placed too superficially they may persist for a prolonged period of time and thus possess an increased tendency to be trans epidermally eliminated from the wound which can compromise the appearance of scar[3,4].Different suturing techniques are also very important in final appearance of scar as different techniques predisposes to tissue ischemia. So the technique adopted while suturing should suit the tissues it's applied, as it affects the final outcome of scar. Wrong technique may predispose to tissue ischemia leading to delayed healing. The technique adopted while suturing depends on the force and direction of tensions on the wound, the thickness of the tissues to be opposed and anatomic considerations.[3,5]

Now a variety of subjective and objective methods of scar assessment has been reviewed, among it includes Vancouver Burn Scar Assessment scale, Beusang E clinical Scar Assessment Scale and many other such objective and subjective scale. Beusang E Clinical Scale Assessment scale has been successfully validated; this has been the advantage of being applicable to wide variety of scars including surgical scars and no blunt trauma.

Aim:A prospective study to assess the profile of scars after suturing of wound of the face with buried sutures of different types.

Material Methods:
41 patients in the age group of 3 months to 70 years, who had suturing of wounds of the face either for primary wound or following excision of a lesion, congenital deformity or scar revision, accidental injury to the face were included in the study. Patients with burns and wound associated with facial fractures were excluded from the study. This prospective study was conducted under the Department of Plastic Surgery of Christian Medical College &Hospital, Ludhiana over a period of one year.

Three types of buried sutures were used in subcutaneous tissue in the present study which included:

- 5 - O Chromic catgut or 4 – O Chromic catgut
- 5 - O Polyglactin 910
- 5 - O Polydioxanone

The skin approximation was done with interrupted sutures either 5-O Nylon or 6-O Nylon. The choice of buried suture and skin suture were left to the discretion of the surgeon. Prior to the application of the suture, the wound site was painted and draped with 10% povidone iodine and spirit. Anaesthesia was given with either Local anaesthesia which included 2% xylocaine with adrenaline or General Anaesthesia where it was indicated. After closure of the wound, steristrips[62] were applied for 5 days and then

removed. The stitches were removed either on the 5th or 6th post operative day as per the surgeons discretion and was recorded.

The cosmetic appearance assessment of the scar was done based on Beusang E scale7 (as proforma attached) which included visual assessment of appearance scars on the basis of colour, distortion, texture, matte/shine (presence or absence of redness) and contour. The scores were given accordingly. In assessment of colour of the scars, score of 1 was given if colour of the scar perfectly matched the surrounding skin, score of 2 was given for slight mismatch, score of 3 for obvious mismatch, and score 4 was given for gross mismatch.

In assessment of the texture of the scars,score of 1 was given when texture of the scar matched normal skin,score of 2 was given when the scar was just palpable, score of 3 was given if the scar had firm feel, score of 4 was given for the scar with hard feel. In assessment of the contour of the scars, score of 1 was given for scars flushed with normal skin, score of 2 was given for scar slightly raised or indented, score of 3 was given for hypertrophic scar, and score of 4 was given for keloid. In assessment of distortion of the scars, score of 1 was given when there was no distortion of the scar, score of 2 was given for mild distortion, score of 3 was given for moderate distortion, score of 4 was given for severe distortion of the scar.

In assessment of scars, the look of the scar was noted. Scar with matte look was given score1 and scars with shine (redness) was given score 2.The assessment of the appearance of the scar was done on 14th post operative day followed by assessment of scars at 3months and then 9months. Any discharge from the wound site was also noted. Statistical analysis was done using ANOVA and Chi-Square test.

Results:

Table: 1
COLOUR AT 14TH DAY OF 1ST MONTH

Colour At 14th Day Of 1st Month	BURIED SUTURE		
	Catgut	PDS	Polyglactin
Perfect	2(15.4%)	0(.0%)	0(.0%)
Slight mismatch	6(46.2%)	10(83.3%)	12(75.0%)
Obvious Mismatch	4(30.8%)	2(16.7%)	4(25.0%)
Gross mismatch	1(7.7%)	0(.0%)	0(.0%)

p value =.210

Table:2
COLOUR AT 28TH DAY OF 3RD MONTH

Colour At 28th Day Of 3rd Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Perfect	1(7.7%)	1(8.3%)	2(12.5%)
Slight Mismatch	10(76.9%)	9(75.0%)	13(81.2%)
Obvious Mismatch	2(15.4%)	1(8.3%)	1(6.2%)
Gross Mismatch	0(.0%)	1(8.3%)	0(.0%)

p value =.769

Table:3
COLOUR AT 9TH MONTH

Colour at 9th Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Perfect	0(.0%)	1(11.1%)	7(53.8%)
Slight Mismatch	7(87.5%)	7(77.8%)	6(46.2%)
Obvious Mismatch	1(12.5%)	0(.0%)	0(.0%)
Gross Mismatch	0(.0%)	1(11.1%)	0(.0%)

Table:4
CONTOUR ON 14TH DAY OF 1ST MONTH

Contour On 14th Day of 1st Month	BURIED		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Flush With Normal Skin	6(46.2%)	4(33.3%)	9(56.2%)
Slightly Raised	7(53.8%)	8(66.7%)	7(43.8%)

p value =.485

Table:5
CONTOUR ON 28TH DAY OF 3RD MONTH

Contour On 28th Day of 3rd Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Flush With Normal Skin	7(53.8%)	6(50%)	10(62.5%)
Slightly Raised	6(46.2%)	5(41.7%)	6(37.5%)
Hypertrophic	0(.0%)	1(8.3%)	0(.0%)

p value =.600

Table:6
CONTOUR AT 9TH MONTH

Contour At 9th Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Flush With Normal Skin	7(77.8%)	7(77.8%)	9(69.2%)
Slightly Raised	2(22.2%)	1(11.1%)	4(30.8%)
Hypertrophic	0(.0%)	1(11.1%)	0(.0%)

p value =.489

Table:7
DISTORTION ON 14th DAY OF 1ST MONTH

Distortion on 14th Day of 1st Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
None	5(38.5%)	4(33.3%)	6(37.5%)
Mild	5(38.5%)	8(66.7%)	9(56.2%)
Moderate	3(23.1%)	0(.0%)	1(6.2%)

p value =.314

Table:8
DISTORTION ON 28TH DAY OF 3RD MONTH

Distortion on 28th Day of 3rd Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
None	4(30.8%)	5(41.7%)	6(37.5%)
Mild	6(46.2%)	5(41.7%)	7(43.8%)
Moderate	3(23.1%)	1(8.3%)	3(18.8%)
Severe	0(.0%)	1(8.3%)	0(.0%)

p value =.745

Table: 9
DISTORTION AFTER 9 MONTH

Distortion after 9 Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
None	3(33.3%)	4(44.4%)	8(61.5%)
Mild	6(66.7%)	4(44.4%)	5(38.5%)
Severe	0(.0%)	1(11.1%)	0(.0%)

p value =.370

Table: 10
MATTE/SHINE AT 14TH DAY OF 1STMONTH

Matte/Shine At 14th Day of 1st Month	BURIED		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Matte	7(53.8%)	6(50%)	8(50%)
Shine	6(46.2%)	6(50%)	8(50%)

p value =.974

Table: 11
MATTE/SHINE AT 28THDAY OF 3RD MONTH

Matte/Shine At 28th Day of 3rd Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Matte	6(46.2%)	6(50%)	8(50%)
Shine	7(53.8%)	6(50%)	8(50%)

p value =.974

Table: 12
MATTE/SHINE AT 9TH MONTH

Matte/Shine At 9th Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Matte	7(77.8%)	5(55.6%)	11(84.6%)
Shine	2(22.2%)	4(44.4%)	2(15.4%)

p value =.297

Table: 13
TEXTURE ON 14TH DAY OF 1ST MONTH

Texture on 14th Day of 1st Month	BURIED SUTURE		
	Catgut (%)	PDS (%)	Polyglactin (%)
Normal	6(46.2%)	6(50%)	10(62.5%)
Just palpable	6(46.2%)	6(50%)	6(37.5%)
Firm	1(7.7%)	0(.0%)	0(.0%)

p value =.588

Table: 14
TEXTURE ON 28TH DAY OF 3RD MONTH

Texture on 28th Day of 3rd Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Normal	9(69.2%)	7(58.3%)	11(68.8%)
Just palpable	4(30.8%)	4(33.3%)	5(31.2%)
Firm	0(.0%)	1(8.3%)	0(.0%)

p value =.631

Table: 15
TEXTURE AT 9TH MONTH

Texture at 9th Month	BURIED SUTURE		
	Catgut n(%)	PDS n(%)	Polyglactin n(%)
Normal	9(100%)	7(77.8%)	12(92.3%)
Just palpable	0(.0%)	1(11.1%)	1(7.7%)
Firm	0(.0%)	1(11.1%)	0(.0%)

p value =.461

Discussion

The study was conducted in 41 patients admitted under the Department of Plastic Surgery, Christian medical College Ludhiana for a period of one year.

The Polyglactin suture was used as buried suture in 16 patients as per the discretion of the surgeon. The colour of scar, texture, contour, distortion, matte/shine (absence or presence of redness) look was studied up till 9 month. In our study, colour of the scars sutured with buried Polyglactin 910 suture gave perfect match with surrounding skin colour in 53.8% of patient at 9 months. In the follow up period from 5th POD onward, the colour of the scar improved from obvious mismatch to perfect match. None of the scars sutured with Polyglactin showed gross mismatch in colour in comparison to surrounding skin. None of wound showed any discharge from the wound site, nor any stitch abscess. 84.6% of the scars had matte look, scars had flushed with normal skin contour in 69.2% and 61.5% of scars had no scar distortion. Polyglactin 910 buried suture showed hypertrophic scar in 6.7% cases in the follow up period. 92.3% of the scars with Polyglactin as buried suture showed normal texture.Our finding is in contrast to the study done by Ulrich et al (2000) who in their study evaluated whether the intradermal buried vertical mattress suture can be safely used without additional skin suturing. In their study scar was skin coloured in 42.3%, reddish in 43.6%, hyperpigmented in 2% and hypopigmented in 12.1%. There was significantly higher frequency of hypertrophic scarring and keloid in scars sutured with Polyglactin (31%) than in scars sutured with Polydioxanone (8%)[31]. In the study done by Breuninger et al (1993) a significantly higher percentage of hypertrophic scarring was found when Polyglactin was used in their study.[29]

On the other hand in the study Z. Busic et al (2003) no difference in colour, width or elevation between the part of the scar where plain catgut was used in comparison with part of the scar where Polyglactin 910 was used. All scars were cosmetically acceptable hardly visible, aplanated and below 1mm width. They did their study on sheep as sheep's skin was found very similar to human skin.[16] In study done by Guyuron B et al (1996), scar spread (distortion) was seen in 15.7% and scar hypertrophy in 7.89% of surgical incision sutured with Polyglactin suture[35]

In 13 patients PDS suture was used as buried suture in our study and regular follow was done uptill 9 months. 11% of the scars showed perfect colour match with the surrounding skin and 11.1% of the scars showed gross mismatch. 77.8% of the total scars showed contour flushed with normal skin. Percentage of hypertrophic scars in wounds sutured with PDS as buried suture were 11.1% in our study. At 9 months 44.4% of scars of the total wounds sutured with PDS had no distortion, severe distortion was seen in 11.1% scars at 9 months, 77.8% of the scars at 7th, 8th and 9th month were found flushed with normal skin, 8.3% both at 5 months and 4 months; 10% at 6 months .55.6% of scars at 9 months had matt look, with 70% scars having matte look at 6 month; 75% matte look at 4 months. 77.8% of the scars with PDS as buried suture had normal texture. And 11.1% of the scars had firm feel. In comparison to Ulrich et al (2000)[31] study, our study had more hypertrophic scars (11.1%) with PDS.[33] none of the wounds sutured with PDS showed discharge / or stitch abscess. In a study done by Sanz et al (1988)[50] and Bhargava et al (2013[58] PDS elicited minimal inflammatory response when compared Polyglactin, Chromic catgut and Polydioxanone. However Guyuron B et al (1996)[35] when compared Polydioxanone and Polyglactin 910 suture in their study found statistically no significant difference in the quality of the scars in relation to erythema, induration(texture), scar spread(distortion) and hypertrophic changes.

In the present study wounds in 12 patients were sutured with Chromic catgut as buried suture. The colour of the scar sutured with catgut buried suture showed slight mismatch in comparison to surrounding skin in 87.5% at 9 month and 88.9% at 8 months and 90% at 7 months. Perfect match of colour with surrounding skin was found in 7.7% at 3 months only. Matte look of scars were seen in 77.8% of chromic catgut sutured scars at 9 months, 66.7% scars in 8months, and 70%scars at 7month, 66.7% scars in 8 month, and 70% scars at 7 month; with matte look only in 53.8% of scars at 1 month.77.8% of scars sutured with Chromic catgut as buried suture were found flushed with the normal skin at 8th and 9th month, with 80% at 7 month. None of the scar showed hypertrophic changes. 3 of the 12 patients had stitch abscess constituting 25%.At 9month 100% 0f the scars sutured with

Chromic catgut as buried suture had normal texture.

At 9 months mild distortion was seen in 66.7% in scars and 33.3% of scars had no distortion at 9th and 8th months. During the follow up period it was found that from 1st month to 9 months scars sutured with Chromic catgut improved as there was no distortion once scar matured.

Observation in present study is comparable to study done by Wainstein et al (1997)[63] in which comparison of different suture material was done on pyeloplasty in rabbits. They noted that the most marked inflammatory reaction was produced by chromic catgut. Varma et al(1981)[56] also reported intense inflammatory reaction in tissues where plain catgut / chromic catgut was used. Sanz et al(1988)50 also compared tissue reaction in response to different sutures and found Polyglactin and Chromic catgut giving intense reaction when wounds sutured with these sutures. However in contrast to the present study Van Winkle et al(1975)[59] did study comparing six suture material used as subcuticular closure of abdominal incisions in dogs and reported that catgut both plain and chromic produced only mild cellular reaction. Helen et al (2004)[42] compared catgut suture with non absorbable suture Nylon and concluded catgut absorbable suture in repair of traumatic laceration in children an acceptable alternative to non absorbable suture. No difference was found in the rates of infection and dehiscence between the two groups.In contrast to our study Start et al (1989)[40] however reported no complication with wound closed with Chromic catgut subcuticular continuous sutures. Seven scars (10.9%) of 349 patients were considered ugly 21(32.8%) fair and 37(57.8%) very good.[43] However Yatlink et al(2003)[54] had comparable results as in the present study, in their study Polyglactin produced mildest tissue reaction in comparison to chromic catgut group.

Conclusion:

Among the three buried suture materials Polyglactin 910 showed better results in colour matching with surrounding skin, (P value <0.0001), which was statistically significant.

Polyglactin 910 and Chromic catgut suture gave better results in texture results. The value were statistically significant (P <0.0001). Polydioxanone (PDS) (11.1%) suture showed maximum number of scar with hypertrophic changes followed by 10%scars with Chromic catgut suture. Discharge from the wound site was noted in three patients, all the three had Chromic catgut as buried suture. In our study comparison of different buried sutures in relation to the outcome of the appearance of scar, showed polyglactin 910 to be best suture when compared with other sutures in relation to appearance of scar. The statistical value significant (P<0.0001).

There are different suture materials available with different physical and biological properties; in the present study Polyglactin 910 has come out to be the better suture when scars with Polyglactin 910 as buried suture was compared with scars where either Polydioxanone or Chromic Catgut buried sutures were used. The Polyglactin 910 suture gave better match with the surrounding skin and esthetically pleasing scar.

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