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Improved outcomes of scar revision with the use of polydioxanone suture in comparison to polyglactin 910: A randomized controlled trial

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Summary Scars have multiple cosmetic and functional sequelae, and revision surgeries are an attempt to ameliorate these effects. Reduction of spread of the revised scar is one of the main objectives of revision procedures. Provision of prolonged dermal support to wound can theoretically reduce spread of the scar. We carried out a randomized controlled trial and objectively evaluated the impact of two commonly used absorbable sutures, Polyglactin 910 and Polydioxanone, on scar spread and quality. Sixty patients with post-traumatic scars of 1 year in duration were enrolled in the study and randomly divided into two groups of 30 each. After recording the demographic data and baseline scar characteristics, revision of the scar was carried out by elliptical excision and primary suturing. In Group 1, Polyglactin 910 6-0 suture (Vicryl, Ethicon, Johnson and Johnson Ltd., India) was used for dermal suturing, whereas, in Group 2, Polydioxanone 6-0 suture (PDS II, Ethicon, Johnson and Johnson Ltd., India) was used. The scar spread in terms of scar width, and scar quality with Vancouver Scar Scale (VSS) was evaluated at 1, 3 and 4 months postoperatively. The two groups were well matched for demographics and baseline scar characteristics. On follow-up, the mean scar width in Group 1 was significantly more than that in Group 2. VSS score was significantly lower in Group 2 at the third and fourth month follow up, signifying better scar quality. Suture extrusion was noticed in 3 cases in Group 1.

The work has not been presented earlier in any conference.

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Compared to Polyglactin 910, Polydioxanone sutures, when used for intradermal suturing in revision of facial scars, result in a significantly decreased scar spread and better scar quality.

Introduction

Scars have multiple cosmetic and functional sequelae, but more importantly, they have a lasting impact on the psychological and social well-being of an individual.[1] Facial scars are linked to a high level of self-consciousness and anxiety, and therefore, a large number of patients seek removal of these scars.[2] Various surgical approaches for revising a scar include fusiform elliptical excision, serial excision, Z-plasty, W-plasty and geometric broken line closure.[3-5] After a facial scar revision, the epidermal sutures are usually removed early to prevent formation of visible suture marks. Thereafter, underlying dermal sutures support the revised scar to resist the tensile forces. Therefore, the type of suture material used for dermal closure has a definitive bearing on the eventual scar spread.

Precise subdermal approximation with an absorbable suture material that provides prolonged support to the wound has been found to reduce scar spread.[6,7] This protracted support should ideally be continued until the scar gains adequate strength to resist the shearing forces acting on it. Studies that have compared the effect of different suture materials on scar spread and quality have shown discordant results. Several reports reveal significant benefit with the use of delayed absorbable over rapidly absorbable sutures.[6-8] At the same time, numerous research papers do not prove the superiority of one suture material over the other.[9,10]

Polyglactin 910 (Vicryl, Ethicon, Johnson and Johnson Ltd., India) is synthetic, absorbable, braided and one of the most commonly used suture for dermal suturing.[11] It is composed of a copolymer made from 90% glycolide and 10% L-lactide. Sixty-five percent of its strength is retained at 2 weeks, 40% at 3 weeks, and 25% at 4 weeks, and the suture is completely absorbed by hydrolysis in 56–72 days.[12] It thus supports the wound healing effectively for around 3 weeks by which time there is approximately 20% gain in the wound tensile strength. On the other hand, Polydioxanone (PDS II, Ethicon, Johnson and Johnson Ltd., India), is a monofilament absorbable suture material composed of a polyester, poly (p-dioxanone). It retains 70% of its strength at 2 weeks, 40% at 4 weeks, and 35% at 6 weeks and is completely absorbed by hydrolysis within 180 to 230 days.[13,14]

This study aimed to compare the scar spread with the use of Polyglactin 910 versus PDS sutures in patients undergoing facial scar revision and to evaluate and compare the quality of the final scar.

Materials and methods

After obtaining clearance from Institutional Ethics Committee, this prospective randomized controlled trial was conducted at a tertiary care center over a period of 18 months. The trial was registered with the Clinical Trials Registry-India (CTRI) (CTRI/2017/01/007659). Sixty patients aged 18–60 years, with one or more post-traumatic facial scars of more than 1 year in duration that required scar revision were included in the trial. Patients having scars with width more than 1 cm, those with hypertrophic scars or keloids, and those with known history of bleeding, collagen or elastin disorder were excluded from the trial. A written informed consent was obtained from all the enrolled patients.

The envelope method was used to randomly allocate all the patients to either Group 1 or Group 2. Demographic details, duration of scar, scar sub-site, width and Vancouver Scar Scale (VSS) score were documented for all patients. Elliptical excision was carried out for all scars under local anesthesia by a single surgeon in all cases. The cut edges were undermined to facilitate primary closure, and hemostasis was achieved. In Group 1 ($n = 30$), coated Polyglactin 910 6-0 suture (Vicryl, Ethicon, Johnson and Johnson Ltd., India) was used for interrupted dermal-subdermal closure of the defect. In Group 2 ($n = 30$), Polydioxanone 6-0 suture (PDS II, Ethicon, Johnson and Johnson Ltd., India) was used is the same way. In both the groups, Nylon 6-0 (Ethilon, Ethicon, Johnson and Johnson Ltd., India) simple interrupted sutures were used to close the skin followed by application of adhesive tapes. The skin sutures were removed on the 5th postoperative day. As maximum scar spread is known to occur in the initial months, patients were followed-up at 1 month, 3 months and 4 months postoperatively for scar assessment. At each visit, an assessor blinded to the type of suture material used, measured the scar width using a digital Vernier caliper with a least count of 0.01 mm, and calculated the VSS score. Patients were assessed for complications like suture extrusion, infection, skin bruising, bleeding and wound dehiscence. Preoperative and postoperative photograph at 4 months were taken for patient record (Figure 1, 2).

Sample size was calculated based on previous studies, and the required number of subjects in each group was calculated to be a minimum of 26. All data were entered into MS Excel sheet and subsequently analyzed with the help of computer software (SPSS statistical software, version 21.0, for Microsoft Windows, SPSS Inc. Chiacgo, IL). All values are expressed as mean plus/minus standard deviation (mean $\pm$SD), median, interquartile (25%–75%) or percentage as appropriate. Discrete variables were compared by the Chi-square test or Fisher's exact test, and continuous variables with independent sample t-test (for parametric data) or Mann-Whitney U test (for nonparametric data). Statistical significance was attributed to p-value of lower than or equal to 0.05.