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A prospective comparison of octyl-2-cyanoacrylate and suture in standardized facial wounds

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Abstract. Regarding the cosmetic results of wound closure using tissue adhesives as opposed to sutured wounds, most published studies are performed on children and with non-standardized lacerations, which makes it difficult to transfer the results to facial incisional wounds in adults. There are also conflicting conclusions about the cosmetic results. The purpose of this randomized prospective study was to compare the cosmetic outcomes of wound closure with sutures and octyl-2-cyanoacrylate in standardized facial wounds in adults. To compare very similar facial wounds, the infraorbital cut (lower eyelid incision) was used in 45 patients. The assessment was performed by patients and surgeons blind to the data. Phase-shifting profilometry was used to measure the profile of the scars. No early complications were observed in any group. The wound depth in the tissue adhesive group was significantly greater than in the suture group. There were no differences in the overall cosmetic results among all patients in the two groups. Interestingly, in the younger patients the result of the sutured wounds was superior to that of the adhesive-treated patients. The Dermabond® skin adhesive provides a means of closure of facial surgical wounds without early complications, but adjustment of the edges of the wound and the cosmetic result in younger patients are less successful than with thin sutures.

Keywords: aesthetic outcome; wound closure; skin adhesive; suture.

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The cosmetic result is one key measure in the assessment of operations in the head and neck region. The appearance of facial skin wounds is relevant to the rating by patients and surgeons. If sutures are tied too tightly or left on too long, they may leave permanent suture marks which affect the cosmetic result[17]. Suture removal sometimes causes discomfort because this procedure is often associated with increased patient anxiety as the face is very sensitive.

Cyanoacrylate adhesives were discovered in 1949 and, 10 years later, Coover et al.[3] reported their use in surgical procedures. These adhesives polymerize via an exothermic reaction when coming into contact with a fluid or basic medium, thereby forming a strong bond when applied to skin. For a number of years *N*-butyl-2-cyanoacrylate has been used for

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wound closure[23], but it is less strong and flexible than conventional monofilament sutures[10,24]. For this reason, octyl-2-cyanoacrylates were developed for cutaneous application. This derivative has a longer side chain and forms a stronger and more flexible bond, with a three-dimensional breaking strength four times that of butyl-2-cyanoacrylate[6,12]. Several investigations into the cosmetic results of wound closure have been published in the last few years, but most were performed in children[4,8,18], with the results difficult to transfer to facial wounds in adults, and in many studies the wounds were not standardized for length, localization and shape[11,22]. The results also conflict with regard to the cosmetic results of wound closure with adhesives as opposed to sutures; whereas some authors reported superior results for wound closure with sutures[1,21], other studies demonstrated better or equal cosmetic results with cyanoacrylates[8,22].

A randomized prospective trial was conducted to compare the cosmetic results of wound closure with sutures and octyl-2-cyanoacrylate in standardized facial wounds in adults. A new objective method was used to measure the profile of the scars.

Material and methods

To compare very similar facial wounds of nearly equal length, localization and shape, the infraorbital cut (lower eyelid) was used. Forty-five Caucasian patients with an orbital floor fracture were included in this investigation. Patients were eligible for inclusion in the study if they were of generally good health without significant systemic abnormalities, had the medical indication for a surgical orbital floor reconstruction and provided informed consent. The study report meets the criteria of the local ethics committee. Patients meeting all eligibility requirements were randomized for treatment with either a local application of octyl-2-cyanoacrylate (Dermabond®, Ethicon, Norderstedt, Germany) or standard wound closure (6-0 Ethilon®, Ethicon, Norderstedt, Germany). Wound length was between 2.5 and 3.0 cm. In all cases periost sutures (4-0 Vicryl®, Ethicon, Norderstedt, Germany) were applied to aid in apposing the edges of the wounds. Randomization occurred before surgery either in the test group (octyl-2-cyanoacrylate) or the control group (suture). Dermabond® was applied in two layers with each layer followed by 15-s periods of waiting for polymerization to take place according to the manufacturer's instructions. The adhesive was allowed to peel off on its own after the operation.

Patients were evaluated 10 days after the operation for the presence of complications such as dehiscence or wound infection. Three months after surgery, photographs were taken at standard settings, and patients were asked to rate the cosmetic result as well as the suture or adhesive removal procedure on a visual analogue scale (VAS). The VAS was a 10-cm line, with 0 representing the worst outcome and 10 representing the best possible result. The VAS had already been validated as a useful tool for assessing the

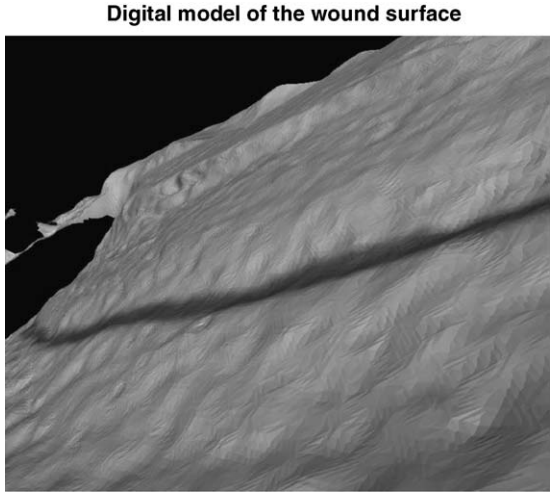

Fig. 1. Computed model of the wound profile. The linear scar is marked with a dark line.

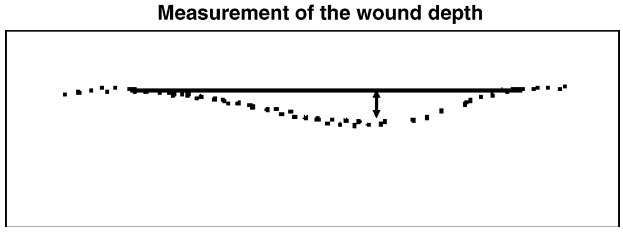

Fig. 2. Computed cross-section of a scar. The distance between the tangential line and the base of the wound is measured.

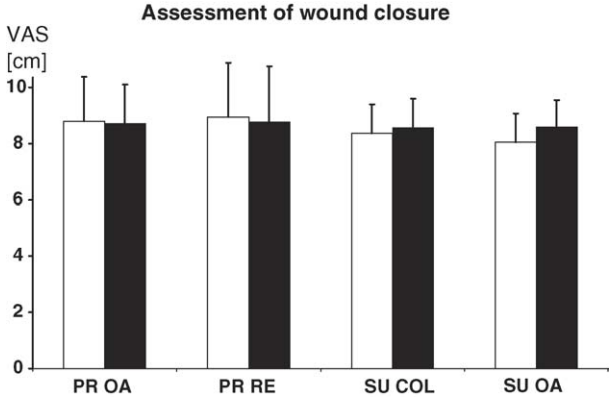

Fig. 3. Assessment of wounds by patients and surgeons blind to the data. The white bars represent the skin adhesive group and the black bars the sutured patients. PR OA = patients' rating of overall cosmetic outcome; PR RE = patients' rating of removal procedure; SU COL = surgeons' rating of colour discrepancies between scar and surrounding skin; SU OA = surgeons' rating of overall cosmetic result. Note that there are no statistically significant differences.