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Is frosting effective? The role of retention sutures in posttraumatic orbital reconstruction surgery

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Summary *Background:* Plastic surgeons, otolaryngologists, and maxillofacial surgeons routinely perform periorbital fracture fixation in the setting of acute trauma. One of the most common complications of periorbital surgery continues to be lower-lid retraction. The Frost suture has been widely adopted as one of the methods of reducing the frequency of this complication, although there are no compelling data on its efficacy.
Materials and methods: A retrospective chart review was performed on trauma patients who had undergone periorbital fracture fixation by one of three reconstructive surgeons at a single facility. A total of 96 patients met the inclusion criteria and were stratified into two groups: those who had received a Frost suture postoperatively and those who had not. The occurrence of retraction was recorded, and statistical analysis was performed controlling for gender and age.
Results: The incidence of lid retraction in the Frost suture group was 12%, in comparison to 7% in the control group, but this difference was not statistically significant. The Frost suture, when placed, remained for 3.72 days on average. Univariate and multivariate logistic regression showed that the complication rate was not affected by age or gender. Within the Frost suture group, the result was not affected by the number of days the suture was left in place.
Conclusion: The placement of a Frost suture in the setting of periorbital surgery, while often routine, lacks strong empirical evidence. This traditional practice involves consistent and specialized follow-up, impedes adequate clinical evaluation in the immediate postoperative period, and leads to considerable patient discomfort without proven therapeutic gain.

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Introduction

Periorbital surgery usually requires a lower-lid incision. A transcutaneous approach is generally favored for proper exposure, especially in the setting of multiple or complex fractures. Division of the anterior lamellar structures often leads to cicatricial adhesions, which can then lead to postoperative complications. One of the most common complications of periorbital surgery is lower-lid retraction, which is often a consequence of corneal exposure and cosmetic deformity. While there is no proven method of avoiding this complication in periorbital surgery, the Frost suture has long been widely used as a preventive measure.

First described in 1934, the Frost suture consists of suspending the lower-lid tarsal plate to the eyebrow to keep the lid stretched and prevent retraction. The original description of this mechanism involves passing the suture through the upper lid as well and tethering it to the brow for a period of 4 days.[1] Later descriptions include varying forms of bumpers that protect the brow skin from damage,[2] applying the technique to suspension of the cheek,[3] and the use of suture anchors in facial soft-tissue repositioning.[4] Frost sutures have also been used in cosmetic eyelid surgery, although the duration of treatment in these cases is generally limited to only 24 h.[5]

While the use of Frost sutures is widespread and the technique continues to be taught to young surgeons today, there is no compelling empirical evidence of its efficacy. Descriptions of the technique are limited to outdated textbooks and a sparing number of journal articles, and there is no accepted standard of application. There is also no standard number of days for which the suture is recommended to be left in, which allows for wide interpretation of the technique and a large amount of variation based on surgeon preference and patient follow-up scheduling.[6] In addition, anecdotal evidence from experienced surgeons performing reconstructive surgery suggests that the Frost suture is not effective in reducing the occurrence of retraction; therefore, it has fallen out of favor for many seasoned practitioners.

This study reports on the occurrence of lid retraction in trauma patients undergoing periorbital surgery, some of whom received a postoperative Frost suture and some who did not. The goal of this study was to empirically determine the efficacy of the technique and offer evidence-based recommendations for best practices in this setting.

Materials and methods

Institutional review board (IRB) approval was obtained from a single institution. Inclusion criteria were determined and patients with maxillofacial polytrauma who underwent periorbital fracture fixation with one of three surgeons at that facility over a 3-year period between 2011 and 2014 were included. These patients suffered orbital floor fractures, in conjunction with zygomatico-maxillary injuries. A total of 96 patients met inclusion criteria, being over 18 years of age and undergoing surgical management within 1 week of their injuries. Patients with a history of prior periorbital injury or surgery, history of wound healing or scar-related complications, patient with preexisting ophthalmologic problems, and those lost to follow-up were excluded. Retrospective data for age, gender, use of a Frost suture, duration of suture, and lid retraction were collected. Patients were followed for 6 months on average.

All patients underwent fracture fixation with a transcutaneous, infraciliary approach. The Frost suture when placed was fashioned using 2/0 silk suture. The suture was fixed to the brow with the use of a petroleum-impregnated gauze bumper, then used to suspend the lower lid at the two-thirds point of the tarsus toward its lateral edge (Figure 1). Tension was adjusted to ensure appropriate suspension without strangulation of the tissues. Tension was also adjusted to allow for mechanical elevation of the upper lid in order to assess vision postoperatively. The decision of using the Frost suture largely depended on the surgeon's habit, which changed over the course of the collection period for two of the practitioners.

For the purposes of this study, lid retraction was defined as any grossly noticeable or symptomatic downward displacement of the lid leading to decreased tissue pliability, patient discomfort, scleral show, or corneal irritation. In these cases, lid retraction was also defined as of a severity requiring therapeutic intervention for resolution. The presence of the complication was evident in all relevant patients within the first 2 postoperative months. Interventions included eyelid taping and daily massage. When indicated, patients were referred for ophthalmology evaluation, and wetting drops were prescribed during the

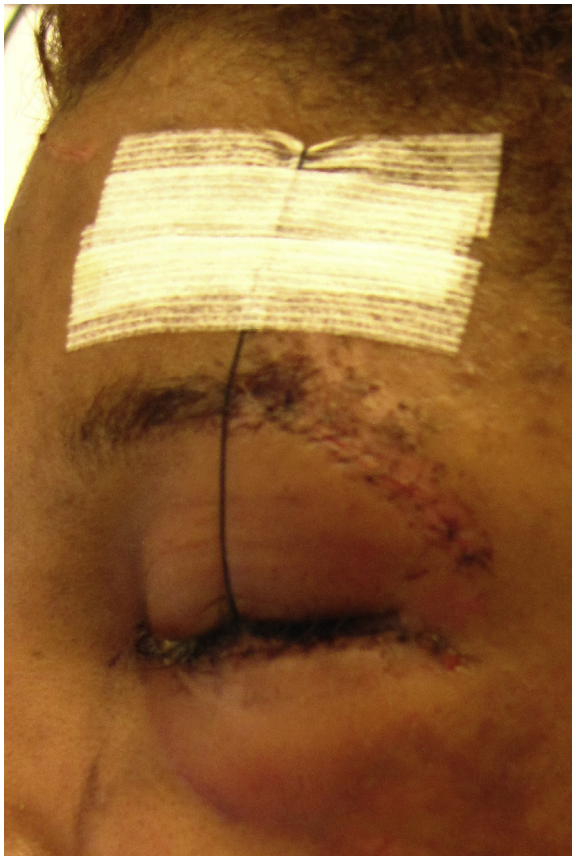

Figure 1 Frost suture in place postoperative day 1.