

ABSTRACT

Objective

To evaluate the safety of a modified coronal approach to the upper craniofacial skeleton with dissection deep to the temporalis fascia for enhanced preservation of the frontal branch of the facial nerve.

Study Design

Retrospective medical chart review from January 2008 through December 2013 at a tertiary academic institution. 271 patients undergoing coronal flap approaches to the upper craniofacial skeleton by a single surgeon for a variety of surgical indications were included.

Main Outcome and Measures

Primary outcomes are temporary or permanent weakness of the frontal branch of the facial nerve and incidence of temporal hollowing following surgery. Secondary outcomes include the presence of postoperative hematoma, seroma, infection, scarring, and alopecia.

Results

There were no cases involving either temporary or permanent facial nerve weakness. Hematoma rate of less than 1%, widened scarring in 2.6% of patients, and no cases of clinically significant temporal hollowing encountered during a mean follow-up period of three years.

Conclusions

A modified coronal approach with dissection deep to the temporalis fascia offers a safe and reliable surgical technique for accessing the upper craniofacial skeleton specifically with regards to protecting the frontal branch of the facial nerve.

INTRODUCTION

The coronal flap is a commonly used surgical approach for accessing the upper craniofacial skeleton. Classic descriptions of the surgical technique involve a plane of flap elevation deep to the temporoparietal fascia but superficial to the temporalis fascia in order to avoid injury to the frontal branch of the facial nerve, arguably the most significant risk of this procedure. In using this approach, the literature demonstrates a rate of temporary nerve injury ranging from 2.7% to 15% and permanent paralysis in up to 2% of cases.^{1,2,3,4,5,6}

At our institution the coronal approach is most commonly used for access during forehead contouring as part of a feminizing forehead cranioplasty.⁷ With a goal to improve patient safety and outcomes without introducing additional risks, the senior author (J.H.S.) has developed a modified surgical approach. Specifically, when elevating laterally in the temporal regions, the dissection is performed just deep to the temporalis fascia rather than superficial to this layer in an attempt to minimize the risk of facial nerve injury (Figure 1). This retrospective study reviews the relevant surgical anatomy, operative technique, as well as postoperative outcomes in a series of 271 patients who underwent this modified coronal approach during the past six years.

METHODS AND MATERIALS

Inclusion criteria were adult patients over the age of 15 who underwent a coronal approach for any surgical indication by the senior author (J.H.S.) during the time period from January 2008 to December 2013 at BUMC. 271 patients were included. Primary outcomes of interest were the presence of either temporary or permanent weakness involving the frontal branch of the facial nerve as well as the development of temporal hollowing. Secondary complications noted were the presence of hematoma, seroma, infection, scarring, and alopecia following surgery.

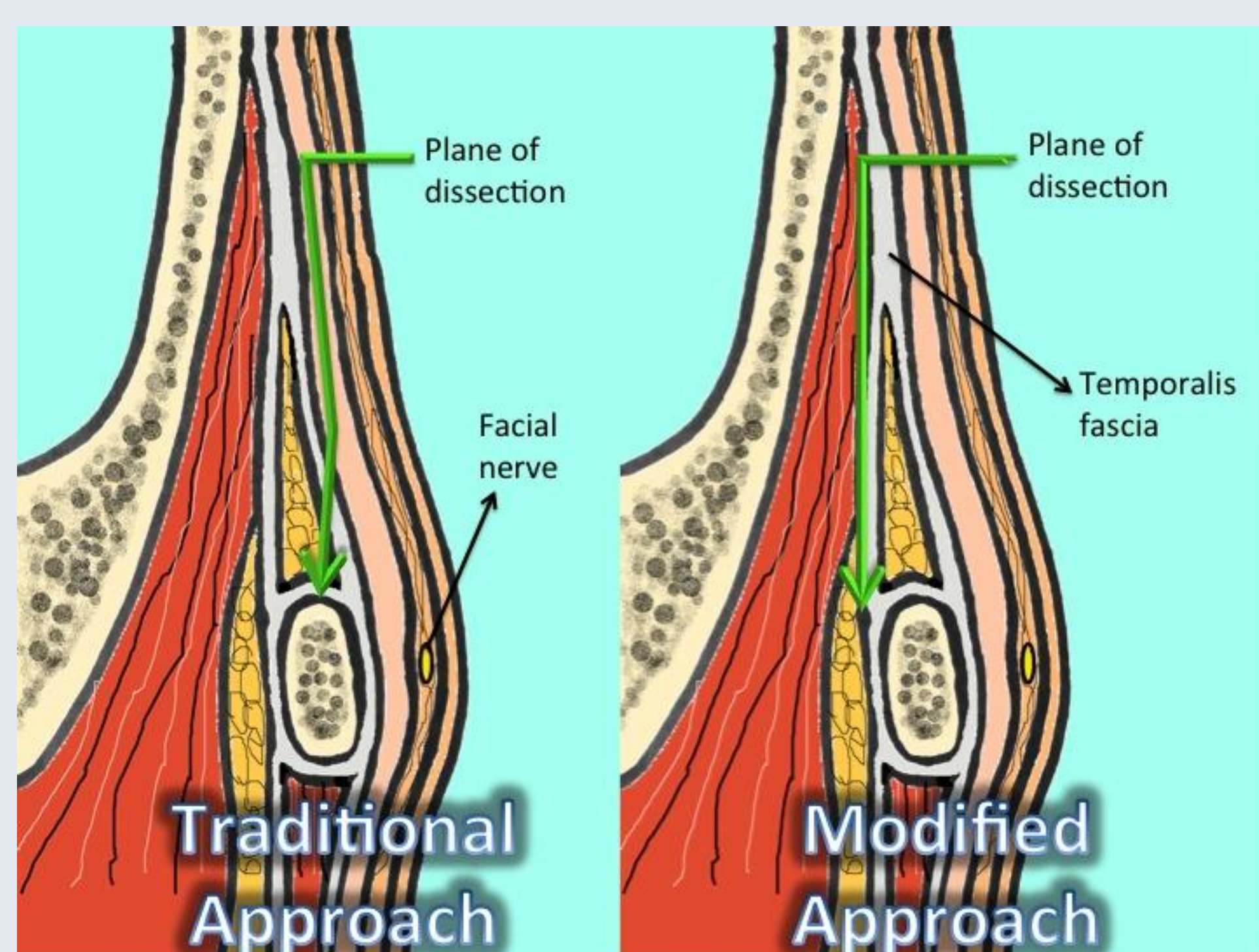


FIGURE 1: Comparison of traditional coronal approach (left) and modified surgical technique with dissection deep to the temporalis fascia (right).

TECHNIQUE

A bicoronal or tricophytic incision is planned. In the midline the incision is carried down through the pericranial layer. In the temporal regions the temporoparietal fascia is transected to enter the underlying loose areolar tissue. Prior to further inferior elevation of the scalp and forehead flap, the temporalis fascia is carefully identified and incised from the superior temporal line in a posterior to anterior trajectory to maximize the hinge effect and subsequent flap release. The temporalis fascia is then elevated off of the underlying temporalis muscle with a freer elevator (Figure 2).

Elevation continues inferiorly in a subperiosteal plane to the supraorbital rims, zygomatic arches, and/or nasoethmoid complex as indicated with identification and preservation of the supraorbital and supratrochlear neurovascular bundles (Figure 3). If direct access to the lateral zygomatic arch is required, it may be necessary to transition back through the deep layer of temporalis fascia to a more superficial plane within the superficial temporal fat pad or to approach the arch from its medial (deep) surface through the overlying fascia. At the conclusion of surgery the temporalis fascia is redraped over the exposed temporalis muscle along with the entire scalp and forehead flap. Closure of the incision is performed in two layers using interrupted absorbable sutures for the deep galea and either nylon or staples for the skin. The hair is thoroughly cleaned and light pressure dressing applied; no drains are used.

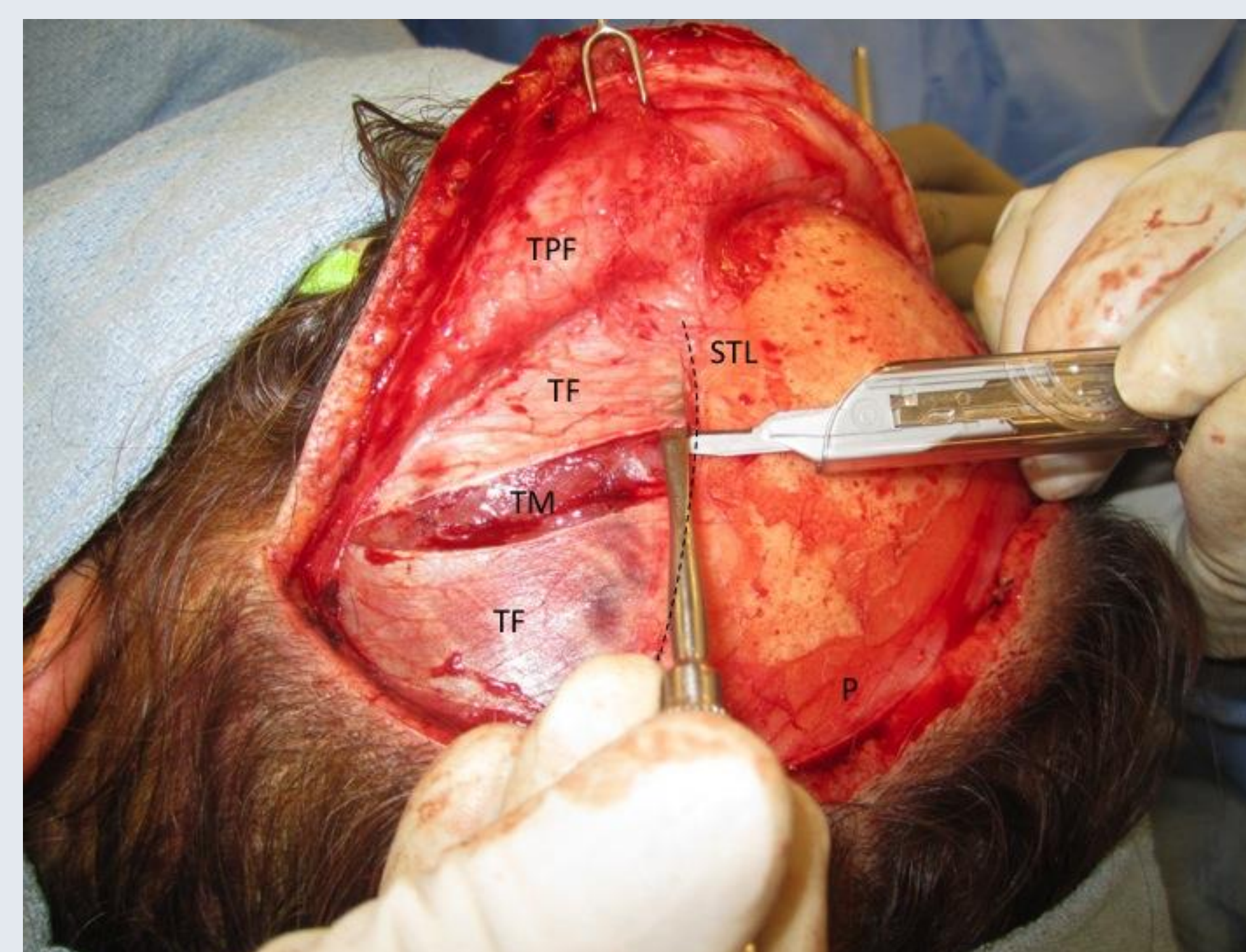


FIGURE 2: Elevation of temporalis fascia from underlying muscle by releasing periosteal attachments at the superior temporal line. TPF=temporoparietal fascia. TF=temporalis fascia. TM=temporalis muscle. STL=superior temporal line. P=periosteum.

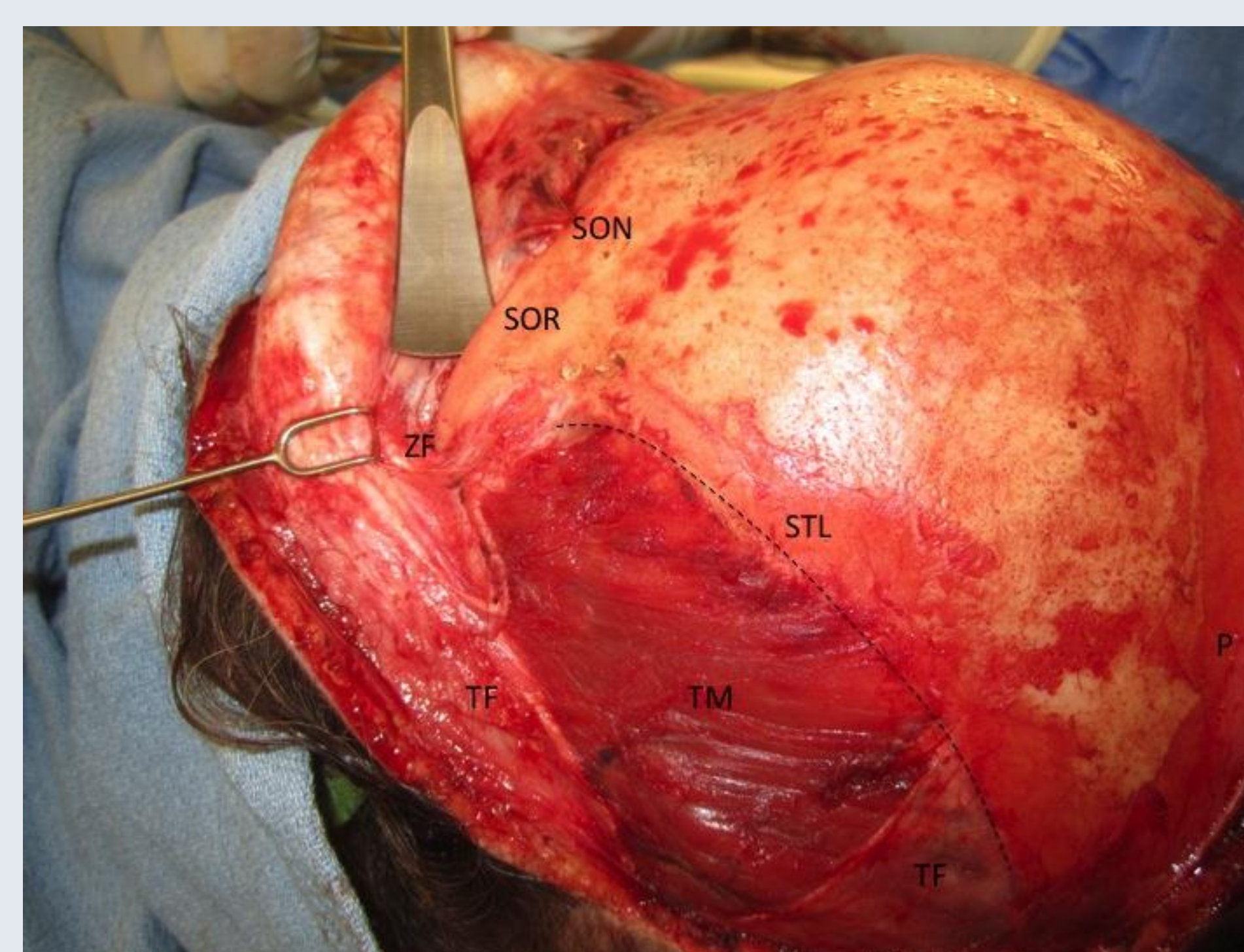


FIGURE 3: Complete elevation of coronal flap with exposure of superior orbital rims and zygomaticofrontal suture. SON=supraorbital nerve. SOR=superior orbital rim. ZF=zygomaticofrontal suture. TF=temporalis fascia. TM=temporalis muscle. STL=superior temporal line. P=periosteum.

RESULTS

Complication	Prevalence – n (%)
Scarring	7 (2.6)
Hematoma	2 (0.7)
Alopecia	1 (0.4)
Facial Nerve Injury	0 (0)
Infection	0 (0)
Seroma	0 (0)
Temporal Hollowing	0 (0)
Overall	10 (3.7)

Table 1. Postoperative complications resulting from modified coronal approach

DISCUSSION

Traditional descriptions of the coronal approach involve a plane of dissection deep to the temporoparietal fascia within the underlying loose areolar tissue to avoid injury to the frontal branch of the facial nerve.⁸ With the nerve coursing just on the undersurface of the temporoparietal fascia, excessive retraction or wayward dissection in a slightly more superficial plane may risk either temporary or permanent injury to the facial nerve as has been reported in prior series. In contrast, this modified surgical approach involves a deeper plane of dissection between the temporalis fascia and muscle in an attempt to further minimize the rate of nerve injury. Rationally and anatomically, this provides an extra layer of fascia between the plane of dissection and the plane of the frontal branch of the facial nerve. Our data shows that this technique is very safe with no temporary or permanent facial nerve injury, which is less than the reported rate of injury using the traditional technique.

CONCLUSIONS

A modified coronal approach with dissection deep to the temporalis fascia offers unparalleled safety and is a reliable surgical technique for accessing the upper craniofacial skeleton.

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