


# Considerations in Forehead Reduction for Men

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## Abstract

Although frontal prominence is an infrequent benign defect that causes no sequelae, it gives the patient distress due to its unaesthetic visual aspect. Proper surgical recontouring of the forehead can radically change one's appearance. In consequence, different techniques have been proposed for its management and correction. The aim of this study is to describe a surgical algorithm to treat male patients with forehead reduction to soften the “forceful” look. An observational cross-sectional study was conducted at the head and neck surgery ward of a general hospital between 2019 and 2022. We performed 35 forehead reduction operations on male patients. The median age was 29 years (range, 26–32 years). The forehead reduction procedures performed was categorized as follows: 27 anterior table osteotomy and 8 anterior table osteotomy contouring. Median forehead reduction was 2.7 mm (range, 2–3.2 mm). The average medical follow-up for patients was 6 months, with an interval ranging from 4 to 8 months. Surgery of the forehead in properly selected male patients is sufficiently safe that it can be done for entirely aesthetic reasons. The choice of surgical technique depends on the presence or absence of the pneumatized frontal sinus. If the frontal sinus is not pneumatized, an anterior table contouring is performed and if the frontal sinus is pneumatized, an anterior table osteotomy is preferred.

## Keywords

- forehead reduction
- frontal prominence
- surgical technique

The forehead occupies the main portion of one's appearance, containing the upper third of the face.<sup>1</sup> Thus, the size and prominence of the forehead are crucial features in how we are first noticed.<sup>2</sup> Anthropologically, the male forehead often exhibits substantial frontal bossing that may be produced either by a large frontal sinus or by thick supraorbital ridges.<sup>3</sup> In addition, there is more of an acute angle between the forehead and the nose, which is a mostly masculine feature.<sup>3</sup> Although the volume of brow prominence in the male is vastly variable between ethnic groups,<sup>4</sup> it is considered a remnant of the Neanderthal man and its presence is not considered to be aesthetically pleasing.<sup>2</sup>

Although this is an uncommon benign defect that does not cause any limitations, it gives the patient distress due to its unaesthetic appearance.<sup>5</sup> Thus, proper surgical recontouring of the forehead can radically change one's visual aspect.<sup>6</sup> In consequence, different techniques have been proposed for its

management and correction.<sup>7</sup> Safe, effective, and reliable surgical treatment must be reachable to continue with this elective surgery.<sup>8</sup> As such, acquaintance with frontal sinus anatomy is crucial to the accomplishment of these and other related procedures.<sup>9</sup>

The aim of this study is to describe our experience with forehead reduction to soften the “forceful” look in a group of male patients, reviewing the different procedures and surgical techniques used in the treatment of the forehead.

## Methods

An observational cross-sectional study was conducted at the head and neck surgery ward of a general hospital between 2019 and 2022 that treats patients in need of craniofacial surgery. The study population consisted of male patients who received surgery during the period of study with the

diagnosis of frontal prominence based on physical examination and tomographic studies and who attended their postoperative consultation. Patients presenting with a unilateral pneumatized sinus were excluded.

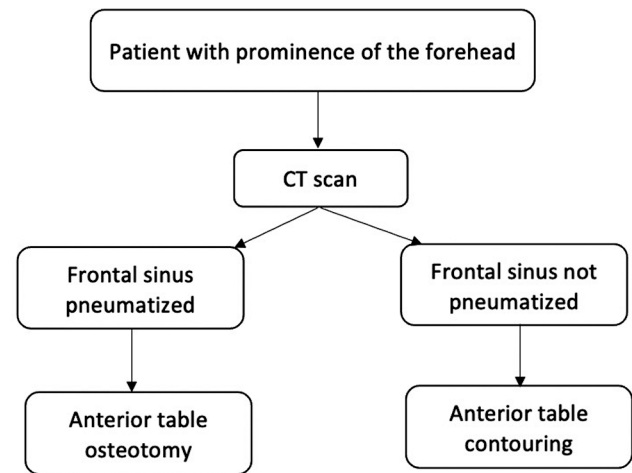
Informed consent was obtained in all the cases before the surgical procedure. Medical records, preoperative, intraoperative, and postoperative photographs were used as a source of information. Collected data were entered into a database in Microsoft Excel 2022, and quality control was performed by double digitization.

### Clinical Evaluation

The face is divided into three parts to make a detailed assessment. In the upper third, we evaluate the fronto-nasal-orbital region, the nasoglabellar angle, the superciliary and supraorbital ridge, the protrusion of the anterior wall of the frontal sinus, the frontomalar suture, the forehead bone shape, the distance between the nasal root and the beginning of the hairline, the hairline shape, the type of hair and skin, and the expressive areas and established wrinkles. After clinical evaluation, a computed tomography (CT) scan is performed in all patients to evaluate the presence or absence of a pneumatized frontal sinus.

### Surgical Technique

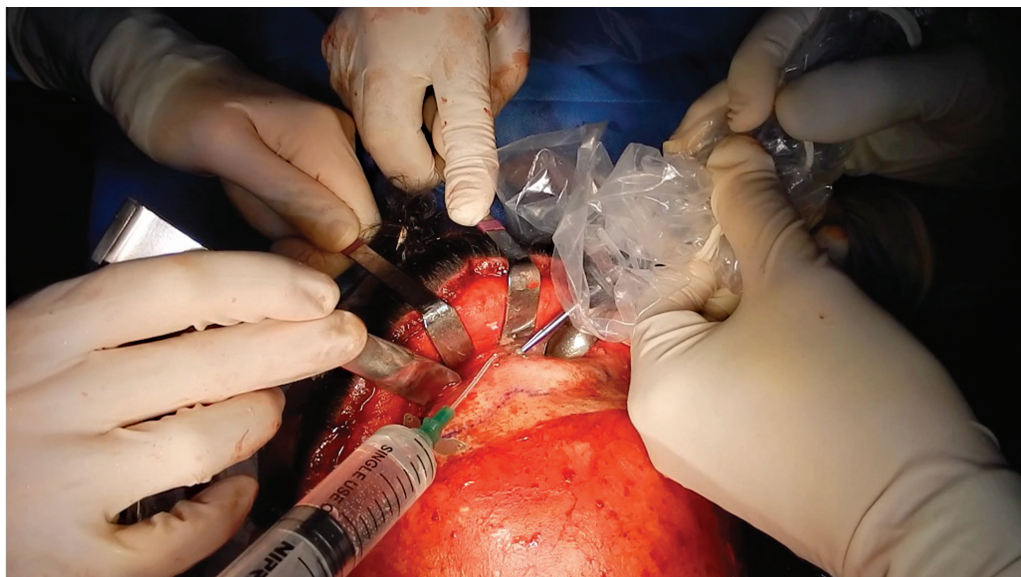
We perform a coronal incision and raise the flap in a subgaleal plane to approximately 4 centimeters above the supraorbital rim. Sideways, the soft tissue is elevated superficial to the superficial layer of the deep temporal fascia to prevent damage to the frontal branch of the facial nerve.<sup>8</sup> Four centimeters superior to the supraorbital rim, the dissection plane is changed to a subperiosteal plane. Then, the superior orbital rim is exposed laterally and inferiorly outside the zygomaticofrontal suture. Medially, the exposure is completed inferior to the nasofrontal suture. Caution is taken to free the supraorbital neurovascular package from the bony foramen.<sup>8</sup>



**Fig. 1** Algorithm for the management of forehead prominence: If the frontal sinus is not pneumatized, we perform an anterior table contouring, whereas if it is pneumatized, we perform an anterior table osteotomy.

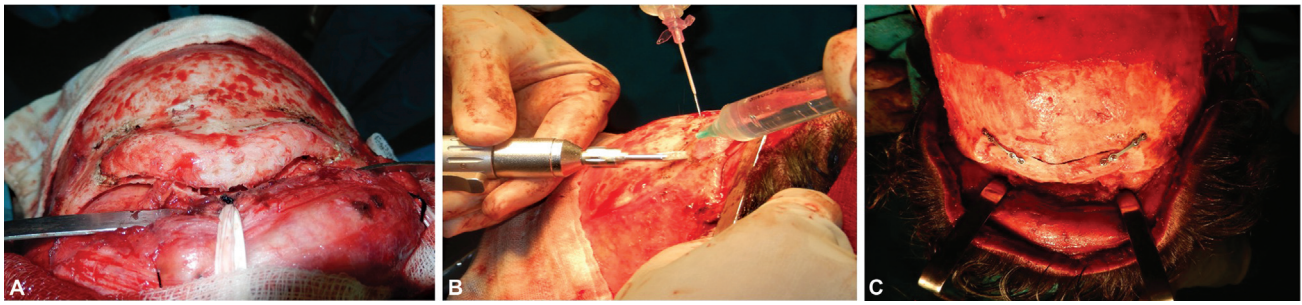
Our choice of surgical technique depends on the presence or absence of a pneumatized frontal sinus, according to the findings of the CT scan (► **Fig. 1**). If the frontal sinus is not pneumatized, we perform an anterior table contouring as follows: after dissection and osseous exposure, we must identify the region of thinnest bone in the anterior table, as this will be our limit for contouring.<sup>8</sup> Then, we complete the thinning and contouring using a surgical burr of the ipsilateral side before contouring the contralateral side. A surgical burr of approximately 3 millimeters is performed, to improve the orbital frame without risking the integrity of the thinner side (► **Fig. 2**).

Conversely, if the frontal sinus is pneumatized, we perform an anterior table osteotomy as follows: after exposure, the frontal sinus is demarcated using an osteographer. Then, a reciprocating saw is used to make the osteotomy at an oblique angle (45 degrees) to avoid damage to the posterior



**Fig. 2** Anterior table contouring: this surgical technique is used in cases of absence of pneumatization of the frontal sinus.





**Fig. 3** Anterior table osteotomy: this surgical technique is used in cases of presence of pneumatization of the frontal sinus.

table of the frontal sinus.<sup>8</sup> The osteotomy continues around the border of the marked frontal sinus. The sinus mucosa is preserved, and no attempt at disturbing the nasofrontal outflow tract is made. Once the anterior table is removed, the bone is thinned and shaped in its lateral portion with a burr, as appropriate. Usually, there is a midline septum in the posterior region that can be removed. This septum and the bone's thickness are the limiting factors for the anterior table positioning. Then, the anterior table is replaced onto the cranium and the surrounding bone is burred to achieve the desired contour. Posteriorly, the anterior table is plated with low-profile plates (►Fig. 3).

After anterior table osteotomy or anterior table contouring is made, we irrigate the surgical field and hemostasis is achieved. A flat drain is placed in the subgaleal space. The scalp is closed with absorbable suture to approximate the galea, and the skin is closed with nonabsorbable suture. Finally, a compressive dressing is applied. The subgaleal drain is removed on postoperative day 1, and the compressive dressing is replaced. This dressing is kept until at least postoperative day 3.

## Results

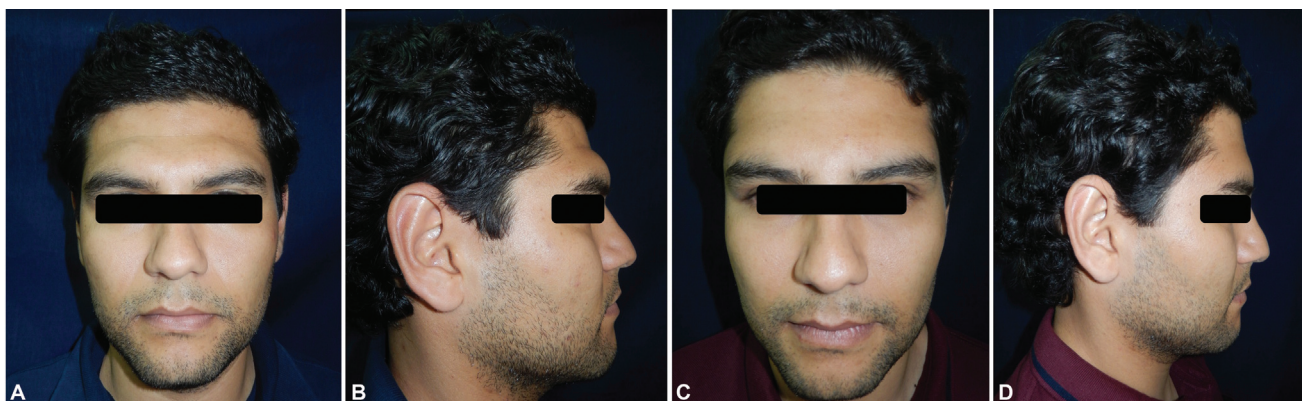
Between January 2019 and July 2022 (42 months), we performed 35 forehead reduction operations in male patients. Clinical findings were corroborated using tomographic studies in every patient. The median age was 29 years old (range, 26–32 years). The forehead reduction procedures

performed was categorized as follows: 27 anterior table osteotomy (►Figs. 4 and 5) and 8 anterior table contouring (►Fig. 6). Median forehead reduction was 2.7 mm (range, 2–3.2 mm; ►Fig. 7). The average medical follow-up for patients was 6 months, with an interval ranging from 4 to 8 months (►Table 1).

All the patients received preoperative and postoperative CT scan in three incidences (axial, sagittal, and coronal). Coronal scarring showed positive development in 32 patients (91.4%), with hair growth in the scar beginning 8 to 12 weeks after surgery. Postoperative complications were



**Fig. 5** (A) Preoperative photograph (lateral view). (B) Postoperative photograph (lateral view) after anterior table anterior table osteotomy.



**Fig. 4** (A) Preoperative photograph (frontal view). (B) Preoperative photograph (lateral view). (C and D) Postoperative photograph (frontal and lateral view) after anterior table anterior table osteotomy.



**Fig. 6** (A) Preoperative photography (frontal view). (B) Preoperative photography (lateral view). (C and D) Postoperative photography (frontal and lateral view) after anterior table anterior table contouring.



**Fig. 7** The measurement of frontal reduction was carried out by comparing preoperative and postoperative photographs with the same dimension.

seen in five cases: three cases of hypertrophic scarring and two cases of facial nerve paresis. No serious complications, as mucocele formation, were observed, and no emergency surgical operations were required. Surgical drains were removed between 24 and 48 hours after surgery.

Discussion

Frontal prominence has been categorized in the literature as frontal sinus hypertrophy, pneumosinus dilatans, pneumosinus frontalis, aerocoele, pneumocoele, sinus ectasia, hyperpneumatization, and others.<sup>10</sup> Suggested origins include different mechanisms: the presence of a one-way valve, local growth disturbances, spontaneous drainage of a mucocele, hormonal dysregulation, osteoclastic and osteoblastic activity, and trauma.<sup>11</sup>

Although some men prefer a “forceful” appearance, others may desire a softer and more “feminine” physiognomy.<sup>12</sup> The

**Table 1** Demographic and clinical characteristics of the study population (n = 35)

Patient characteristics	Total
Age, years	29 (26–32)
Sex	
Male	35 (100)
Forehead reduction procedures	
Anterior table contouring	8 (22.9%)
Anterior table osteotomy	27 (77.1%)
Amount recessed, millimeters	2.7 (2–3.2)
Follow-up, months	6 (4–8)
Complications	
Hypertrophic scarring	3 (8.57%)
Facial nerve paresis	2 (5.7%)

Note: The results are expressed as the median (IQR) or n (%).

base of this self-image predilection may be psychological, psychosocial, or simple behavioral.<sup>12</sup> The approach of forehead contouring is first to identify the problem with the patient, next to go over the changes required, and finally, to contour according to the anatomical variances that are present.<sup>12</sup>

Forehead reconstruction has been widely discussed in the scientific literature with a craniofacial focus over the years.<sup>13</sup> Initially, treatment of frontal bossing was described by Wolfe and Berkowitz<sup>4</sup> in 1978 with burring-down associated with a forehead lift.<sup>2</sup> Afterward, Komuro et al<sup>14</sup> in 1999 removed the outer table of the frontal sinus. Thick lateral portions of supraorbital rim were shaved using a surgical burr.<sup>2</sup> After removal of the mucosa from the resected anterior wall of the frontal sinus, it was divided into three pieces, trimmed at the margins, and fixed with two microplates.<sup>2</sup> Previously, we used to perform obliteration of the nasofrontal recess with a graft of temporal muscle. However, our experience with frontal facial traumas showed that the flow at the level of



the nasofrontal recess is not altered when obliteration is not performed.

Currently, autogenous tissue remains the “gold standard” of reconstructive craniofacial procedures. The autologous bone must be properly modeled and placed to recreate a new frontal bandeau,<sup>2</sup> with solid fixation obtained using microplates. Excellent results are obtained with this technique and most of the patients have no complaints and are pleased with their appearance.<sup>2</sup> In our experience, it is highly recommended to obtain a CT scan control to assure the success of our autogenous bone graft.

We consider that, independent of the surgical technique, the best approach to achieve true recontouring of the forehead is throughout sculpture of the anatomical regions, together with osteotomy and retro positioning, or setback, of the anterior wall of the frontal sinus, statement that is also in line with what is described by Capitán et al.<sup>13</sup> Moreover, it is crucial to stress to the patient that these changes are permanent, and cannot be reversed after the surgical procedure has taken place.<sup>12</sup> Consequently, strict patient selection criteria are the result of the small patient population in our study.

## Conclusion

Surgery of the forehead in properly selected male patients is sufficiently safe that it can be done for entirely aesthetic reasons. Patients are generally pleased with the outcome after forehead reduction, and there is little long-term morbidity and few complications. This procedure should be done by experienced craniofacial surgeons with experience managing the frontal sinus.

### Ethical Approval

Not required. Informed consent was accomplished in all the cases before the surgical act. All the results and images that appear in this article belong to patients who have given their express consent for their images to be published in scientific publications in compliance with current personal data protection regulations.

### Conflict of Interest

None declared.

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