

Virtual Surgical Planning For Facial Feminization Surgery: A Comparison Of Three-Dimensional Plans And Actual Results

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Introduction

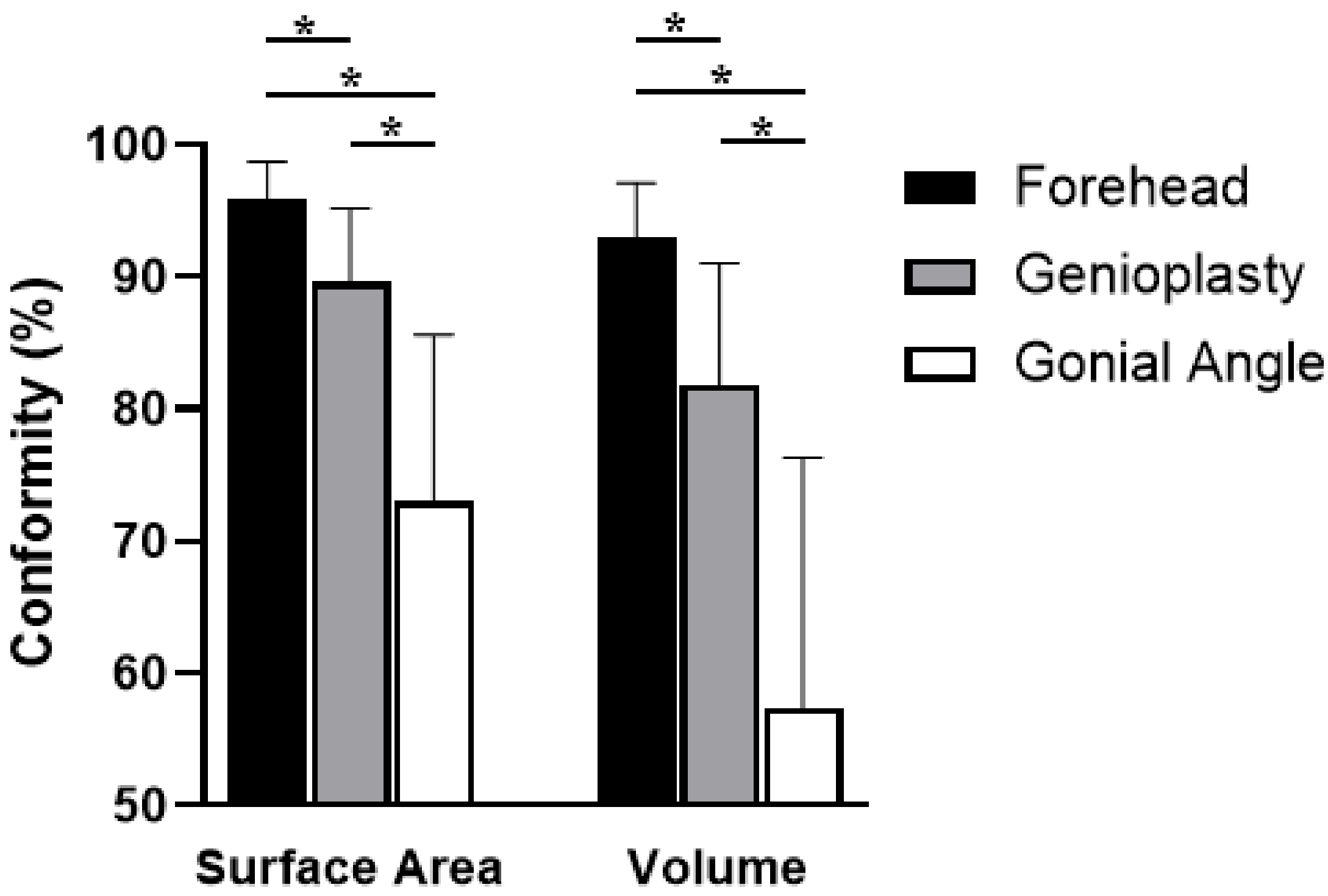
- Facial feminization surgery (FFS) aims to reduce gender dysphoria through alterations to both bone and soft tissue.
- Virtual surgical planning (VSP) has become increasingly common in the field, helping to reduce complications and improve aesthetic outcomes.
- While promising, existing literature comparing surgical plans with post-operative results has often been limited in sample size or scope of analysis.
- The present study analyzed a cohort of FFS patients using a comprehensive set of morphometric measurements.

Methods

- Patients who underwent frontal sinus setback, suprabrow contouring, genioplasty, or gonial angle reduction at a single academic institution were identified.
- All procedures were planned using 3D surgical plans provided by a 3rd party company (Materialise), and post-operative CT imaging was obtained.
- Forehead, chin, and gonial angle regions were analyzed for both VSP and post-operative CT scan. Surface area, volume, and region-specific measurements were calculated.
- Conformity of the post-operative result to the surgical plan was calculated for each measurement using the following formula:
 - $\text{Conformity} = \left(1 - \frac{|VSP - Post|}{VSP}\right) \times 100$
- Conformity was compared among procedures using ANOVA analysis with post-hoc pairwise t-test measurement.

Results

- A total of 80 patients were identified
 - 69 forehead procedures, 74 genioplasties, 45 gonial angle reductions.
- Forehead volume conformity (92.9%) was significantly higher than that of genioplasty (81.8%) and gonial angle reduction (57.3%) (p<0.0001 for both).
- Forehead surface area conformity (95.8%) was significantly higher than that of genioplasty (89.6%) and gonial angle reduction (73.0%) (p<0.0001 for both).



Conclusion

To our knowledge, this study represents the largest and most comprehensive analysis of FFS VSP accuracy in live patients to date. Forehead procedures demonstrated the highest fidelity in both volume and surface area among all FFS procedures analyzed. Deviations from the surgical plan highlight opportunities for continued improvement in gender-affirming surgical planning.