



Integrated Forehead and Temporal Augmentation Using 3D Printing-Assisted Methyl Methacrylate Implants

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Abstract

Background: Achieving aesthetic results with forehead augmentation procedures remains challenging. We have developed a method of integrated forehead and temporal augmentation using a three-dimensional (3D) printing-assisted methyl methacrylate implant.

Objectives: The study objective was to assess the importance of combined temporal augmentation when performing forehead augmentation.

Methods: We identified 34 patients (from 2000 to 2010) who underwent forehead augmentation with a methyl methacrylate implant contoured in situ during surgery and 41 patients (from 2010 to 2016) who underwent integrated forehead and temporal augmentation with a prefabricated methyl methacrylate implant. We conducted a retrospective chart review of patient data including operation time, complications, and instances of revision surgery. Two blinded plastic surgeons scored the aesthetic results of the operations on a 4-point scale (1, poor, to 4, excellent) based on preoperative and posttreatment photographs.

Results: The integrated augmentation method resulted in a lower frequency of posttreatment implant removal (one [2%] vs. six [18%]; $P < .05$), a lower frequency of filler injection for touch up (one [2%] vs. six [18%]; $P < .05$), and higher mean aesthetic scores (3.7 ± 0.5 vs. 2.2 ± 1.0 ; $P < .001$) compared to the forehead augmentation method. There was no statistically significant difference in surgical complications between the two groups.

Conclusions: Integrated forehead and temporal augmentation using a 3D printing-assisted methyl methacrylate implant may be the optimal available procedure, enabling the custom fabrication of contours requested by the patient and providing a rejuvenating and balancing effect on facial appearance.

Level of Evidence: 3

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The contouring of the forehead affects the aesthetic appearance of the periorbital and midface regions and is important for determining the overall appearance of the face. A rounded, full, or smoothly surfaced forehead is typically considered attractive, whereas a narrow, flattened, or retruded forehead may be less desirable. The supraorbital ridge contours can markedly enhance the aesthetic features around the orbits.¹ The forehead, glabella, and radix represent a critical triad in aesthetic rhinoplasty, forming the nasofrontal angle.² For these reasons, forehead augmentation has become popular among Asians as part of a comprehensive approach to improve their facial features aesthetically.^{3–6}

Forehead augmentation has been performed in various ways, including the placement of alloplastic implants, injection of absorbable dermal fillers, and autologous fat grafting.^{5–7} Silicone implants, at one time the first choice

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