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A Novel Approach for Improving Midface Aesthetics: A Pilot Study

Koji Yamamoto, DDS

Background: Asian individuals often seek solutions to address midface depression and enhance nasal alar base morphology to achieve Western facial aesthetics. Current treatment options, including injections and invasive procedures, have limited efficacy and safety. To address these challenges, we introduced the "modified A-10 surgery," which integrates the Point A-Koji method, titanium plates, and artificial dermis insertion.

Methods: The efficacy of the modified A-10 surgery was illustrated using a case study of a 22-year-old woman. Surgical planning was based on dental cone-beam computed tomography data, with lateral cephalometric radiographs used to determine the titanium plate dimensions. The surgery involved customized plate alignment, fixation, and artificial dermis insertion.

Results: The modified A-10 surgery substantially improved facial aesthetics and structural parameters. Facial convexity increased from 15.5 degrees to 23.2 degrees, enhancing the 3-dimensionality. The nasolabial angle shifted from 91.9 degrees to 110.2 degrees, achieving the desired mouth projection. Other measurements, such as the E-line to the lower lip and the distance from point A to the subnasal point, contributed to refined aesthetics. The nasal alar base thickness increased by 2.2 mm (19.5%), correcting the depression.

Conclusions: The modified A-10 surgery represents a minimally invasive and comprehensive solution for midface depression and nasal alar base enhancement. By combining the Point A-Koji method, titanium plates, and artificial dermis insertion, this surgery successfully achieved improved facial aesthetics and contours. The results validate its potential as a long-term solution, with implications for anti-aging interventions and promising avenues for future research. *(Plast Reconstr Surg Glob Open 2024; 12:e6260; doi: 10.1097/GOX.0000000000006260; Published online 25 October 2024.)*

INTRODUCTION

In a recent breakthrough, 2 innovative treatment approaches have been introduced: the Point A-Koji method,[1] which aims to increase the nasolabial angle, and the A-10 surgery,[2] which focuses on refining the morphology of the alar base and the nasolabial angle. These methods are particularly relevant for individuals who seek to address the characteristic Asian facial features of midface flatness and concavity. A common aspiration among these individuals is to achieve a midface contour with anterior sculpting, similar to the profiles commonly observed in Western societies. Treatment options for depression of the nasal alar base involve various strategies, including noninvasive injection therapies, such as hyaluronic acid[3,4] and fat injections,[5] and more invasive procedures, such as artificial bone grafting and prosthesis placement.[6] In addition, a possible solution is Le Fort II osteotomy[7,8]; however, this surgery poses some challenges such as invasiveness,

From the Cozy Yamamoto Dental Clinic, Ama, Aichi Prefecture, Japan.

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Limitations regarding long-term follow-up inherently exist in this article type.

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financial implications, and potential side effects (eg, nerve complications, nasal deformity, and occlusal changes).[9] The insertion of foreign objects, such as prostheses, to treat nasal depression raises concerns regarding bone resorption,[10] dislocation of the inserted materials, foreign body sensation, and complications with facial muscle movement. Despite their popularity, injection therapies have limitations, including volume constraints, diffusion to unintended areas due to muscle movement, risk of vascular complications, and long-term maintenance of the desired results. The A-10 surgery primarily focuses on improving the narrow nasolabial angle, which is an indicator of mouth protrusion and slightly alters the volume of the nasal floor, and is not typically performed in patients with considerable midface depression in the regions encompassing the nasal column and alar base. Despite providing some improvement in the depression of the nasal alar base, the A-10 surgery often fails to produce comprehensive results. In response to this need, we have formulated a breakthrough surgery called the "modified A-10 surgery." Through this innovative treatment method, we aim to offer promising solutions for individuals seeking to address midface depression and refine the nasal alar base. The technique builds on existing approaches while addressing their limitations and providing a comprehensive and effective means of achieving the desired facial aesthetics with minimal invasiveness and lasting results.

Takeaways

Question: Are there easier and safer methods to achieve a 3-dimensional morphology to assist patients with midface depression?

Findings: This study evaluates the effectiveness of modified A-10 surgery as a safer, minimally invasive approach for improving the 3-dimensional midface appearance, specifically addressing midface depression in patients. The procedure demonstrated significant improvements in midface contour while minimizing surgical risks.

Meaning: The modified A-10 surgery offers a promising option for individuals seeking improvements in facial aesthetics with a more defined and 3-dimensional structure and provides a valuable noninvasive antiaging solution for middle-aged patients.

MATERIALS AND METHODS

Case 1

Modified A-10 Surgery: An Innovative Approach

To demonstrate the efficacy of our innovative surgical approach, we present the case of a 22-year-old woman with a history of undergoing the Point A-Koji method in 2020. Driven by her desire for improved 3-dimensional facial morphology, the patient opted for modified A-10 surgery. Informed consent was obtained from the patient after receiving an explanation regarding the risks and benefits of the modified A-10 surgery and being informed of the off-label use of titanium plates for this surgery. Institutional ethics approval was not required because of the study design.

To prepare for the surgery, an accurate 3-dimensional model was created from dental cone-beam computed tomography (CBCT) data in the STL format. This model served as a canvas on which the surgical plan was meticulously crafted.

Particular attention was paid to the lateral cephalometric radiograph, which allowed us to calculate the optimal dimensions and angles for bending the titanium plate. On the day of surgery, the patient was in good general health with no nasal complaints. The surgical journey began under infiltration anesthesia using Aura injection dental cartridges (Showa Pharmaceutical Co, Ltd, Aichi, Japan).

The first step involved making incisions and dissecting the gingival mucosa along the maxillary-buccal junction on both sides. Favorable bone condition was confirmed, setting the stage for the surgery. A 2020 titanium plate covering the thin bone was discovered (Fig. 1A). The surgery required careful removal of the thin bone (Fig. 1B).

A new 0.6-mm-thick, 40-mm-long titanium plate from Lorenz (Zimmer Biomet Holdings, Inc; Warsaw, IN) was used to match the bone surface and facial morphology. This custom plate was carefully aligned and fixed to the bone with 2 screws (diameter 1.5 mm, length 6.0 mm). To ensure structural integrity and safety, the screws were positioned between the inferior edge of the pyriform aperture and the apex of the maxillary anterior teeth (Fig. 2A).

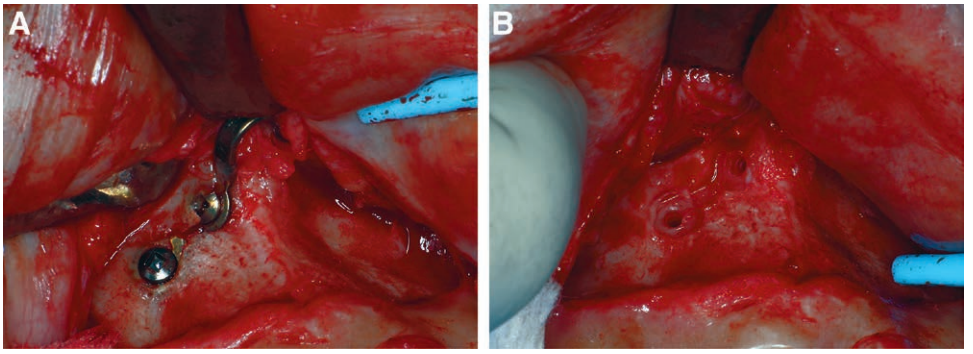

Fig. 1. This figure compares the condition of the bone with the 2020 plate in place and after its removal. A, An intraoperative image displaying the 2020 plate with the thin bone. B, An intraoperative image taken after the titanium plate was removed.

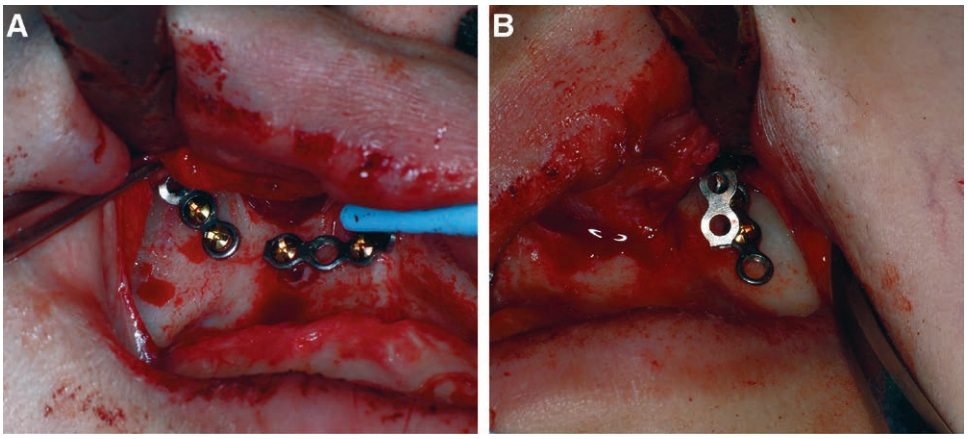

Fig. 2. This figure shows the placement of plates on both sides of the pyriform aperture during surgery. A, An intraoperative image showing plate fixation on the right side of the pyriform aperture, located beneath the anterior nasal spine. B, An intraoperative image showing plate fixation on the left side of the pyriform aperture.

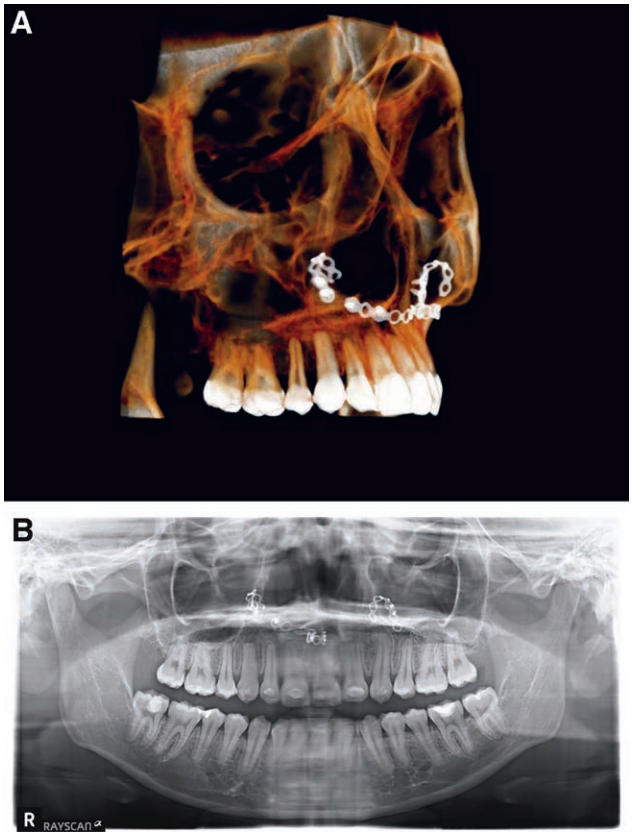

Fig. 3. This figure illustrates postoperative imaging at 8 months, comparing different radiographic views. A, A postoperative (8M) CBCT image. B, A postoperative (8M) panoramic radiograph.

Similar steps were repeated with a 0.6-mm-thick, 30-mm-long titanium plate placed along the margin of the adjacent pyriform aperture (Fig. 2B).

CBCT (Fig. 3A) and panoramic radiography (Fig. 3B) performed immediately after implantation provided a comprehensive visual assessment. This imaging confirmed the absence of interference with vital structures, such as the incisive canals, nasal and sinus cavities, and roots of adjacent teeth. Our precision-guided technique successfully avoided unwanted complications while achieving the desired aesthetic outcomes. An artificial dermis (Terudermis, Olympus Terumo Biomaterials Corporation, Tokyo, Japan) was placed between the plates and bone interface to enhance the growth of the surrounding tissue.

The incisions were carefully sutured using 5-0 silk gingival sutures. Postoperative care included administration of antibiotics and analgesics. Suture removal was uneventful at 2 weeks, highlighting the smooth recovery process. The tenets of the Declaration of Helsinki were adhered to, and the patient provided informed consent for every facet of the surgical process.

Assessment of Facial 3-Dimensionality and Mouth Protrusion

We rigorously evaluated facial 3-dimensionality and mouth protrusion to comprehensively assess the impact of our innovative surgical technique. Using a combination of facial photographs and lateral cephalometric radiography, we performed preoperative and 8-month postoperative analyses (Figs. 4–6). These assessments were guided by a set of indices designed to quantify multidimensional changes in facial structure and mouth projection.

The facial 3-dimensionality index served as the central parameter for evaluating the transformative effects of the surgery. The key components of this index are as follows: (1) total facial convexity (glabella-pronasal-pogonion), which indicates the overall curvature of the facial profile, and (2) facial convexity (glabella-subnasal-pogonion), which focuses on the curvature of the central region of the face.

The mouth protrusion index allowed for a detailed examination of changes in mouth protrusion. The parameters of this index are as follows: (1) nasolabial angle (columella-subnasal-labrale superius), which provides an objective measure of changes in the degree of mouth protrusion, providing insight into changes in the midfacial region; (2) E-line to the lower lip (the shortest distance

Fig. 4. This figure presents preoperative images from various angles to assess the facial features. A, A preoperative image showing the frontal view of facial features. B, A preoperative image showing the 3-quarter view of facial features. C, A preoperative image showing the lateral view of facial features.

Fig. 5. This figure presents postoperative images at 8 months from various angles to assess the facial features. A, A postoperative (8M) image showing the frontal view of facial features. B, A postoperative (8M) image showing the 3-quarter view of facial features. C, A postoperative (8M) image showing the lateral view of facial features.

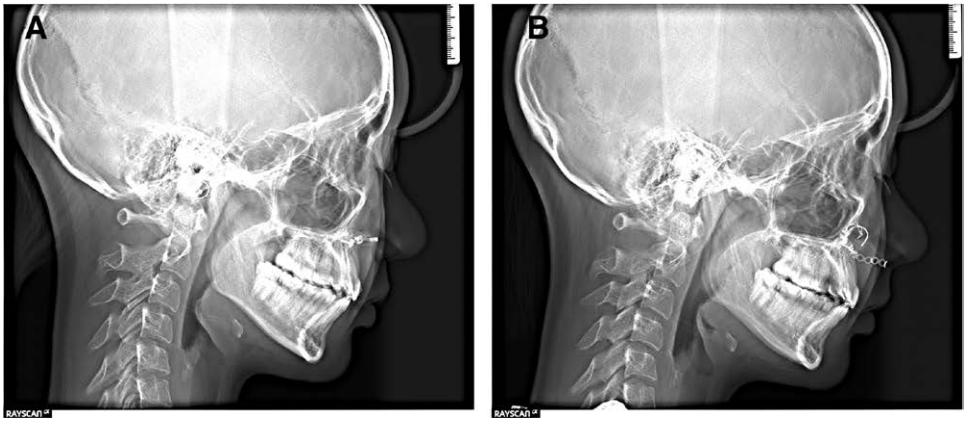

Fig. 6. This figure compares lateral cephalometric radiographs before and 8 months after the surgery. A, Preoperative lateral cephalometric radiographs. B, Postoperative (8M) lateral cephalometric radiographs.

between the pronasal pogonion and lower lip), which quantifies the vertical displacement of the lower lip in relation to a line connecting the tip of the nose to the chin, revealing variations in mouth projection; and (3) the distance from point A to the soft subnasal point, which quantifies the efficiency of the titanium plate around the subnasal point.

Assessment of Nasal Alar Base Position and Tissue Changes

The effect of the surgery on the nasal alar base position and the associated tissue changes were carefully assessed using dental CBCT. Specifically, the insertion of the titanium plate and Terudermis resulted in shifts in the nasal alar base position. These changes were quantified by measuring the minimum soft tissue thickness at the most depressed area of the nasal alar base on axial images, positioned 6 mm above the palatal plane through the anterior nasal spine and posterior nasal spine. [**See figure, Supplemental Digital Content 1**, which displays preoperative axial image showing minimum soft tissue thickness in the most depressed area of the nasal alar base, 6 mm above the palatal plane, via the anterior nasal spine and posterior nasal spine. A, preoperative; B, postoperative (8M); and C, postoperative (15M), **http://links.lww.com/PRSGO/D577**.] We performed preoperative and 8- and 15-month postoperative analyses. Our evaluation strategy included a comprehensive set of indices to objectively measure changes in facial 3-dimensionality, mouth protrusion, and nasal alar base position. These analytical tools illuminated the efficacy of our surgical approach and provided a quantitative basis for assessing the aesthetic and structural changes achieved by our innovative techniques.

Table 1. Changes in Major Items and Their Means before and after Modified A-10 Surgery

Analysis Items	Mean		Preoperative	Postoperative
	Asian	White		
Index of facial 3-dimensionality				
Total facial convexity (glabella-pronasal-pogonion), degrees			47.5	50.8
Facial convexity (glabella-subnasal-pogonion), degrees	7.6	14.79	15.5	23.2
Index of mouth protrusion				
Nasolabial angle, degrees	87.86	102	91.9	110.2
E-line to lower lip, mm	2		-2	-2
Distance point A to subnasal point, mm			14.7	18.3

Table 2. Changes in CT Analysis at the Nasal Alar Base before and after Surgery

Analysis Items	Preoperative	Postoperative (8M)	Postoperative (15M)	Increase Amount, mm (15M)	Amount of Increase, %
Tissue thickness, mm					
Average	11.3	13.7	13.6	2.2	119.5
Right side of nasal alar base	11.8	14.1	14.0	2.2	118.3
Left side of nasal alar base	10.9	13.3	13.1	2.3	120.7

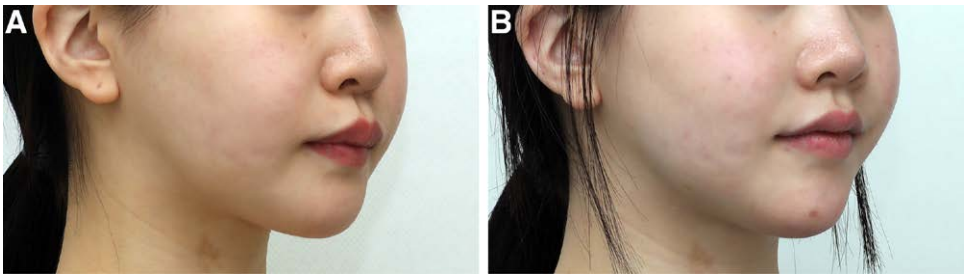

Fig. 7. This figure shows the changes in facial features from preoperative to 7 months postoperative in a 3-quarter view. A, A preoperative image showing the 3-quarter view of facial features. B, A postoperative (7M) image showing the 3-quarter view of facial features.

RESULTS

The modified A-10 surgery demonstrated its efficacy through its transformative effects, as evidenced by the significant changes observed across multiple dimensions.

Changes in Facial Appearance

A comparison of pre- and postoperative facial images of the patient who underwent the modified A-10 surgery revealed that the perinasal area moved forward and that the midface became more 3-dimensional, resulting in a more attractive facial appearance. Pre- and postoperative cephalometric analyses (Table 1) were performed using lateral cephalometric radiographs.

The total facial convexity changed from 47.5 degrees preoperatively to 50.8 degrees postoperatively, whereas facial convexity changed from 15.5 degrees preoperatively to 23.2 degrees postoperatively. In addition, the nasolabial angle changed from 91.9 degrees preoperatively to 110.2 degrees postoperatively, and the E-line to the lower lip changed from -2.0 mm preoperatively to -2.0 mm postoperatively. The distance from point A to the subnasal point decreased from 14.7 mm before surgery to 18.3 mm after surgery (Table 1). These results suggest the successful achievement of a more 3-dimensional impression of the midface, leading to improved facial aesthetics.

Changes in the Thickness of the Nasal Alar Base

The modified A-10 surgery introduces a novel approach by combining the Point A-Koji method with the use of 2 titanium plates and artificial dermis insertion. We evaluated the effectiveness of the modified A-10 surgery for treating depression of the nasal alar base.

The following data present the measurements of the thickness around the nasal alar base (Table 2), indicating that the measurements on the right side were 11.8 mm before surgery, 14.1 mm at 8 months post-surgery, and 14.0 mm at 15 months post-surgery. Similarly, the measurements on the left side were 10.9 mm before surgery, 13.3 mm at 8 months post-surgery, and 13.1 mm at 15 months post-surgery. This indicates an average increase of 2.2 mm (19.5%) in thickness at 15 months post-surgery. These data underscore the tangible impact of the modified A-10 surgery, demonstrating effective improvement in midface depression with the incorporation of titanium plate fixation.

Cases 2 and 3

Modified A-10 surgery was performed on 2 patients (cases 2 and 3). Preoperative facial assessments revealed midfacial depression in both patients. Postoperative facial photographs taken 9 months after surgery for case 2 and 7 months after surgery for case 3 showed a reduction in this

Fig. 8. This figure shows the changes in facial features from preoperative to 9 months postoperative in a 3-quarter view. A, A preoperative image showing the 3-quarter view of facial features. B, A postoperative (9M) image showing the 3-quarter view of facial features.

depression. Additionally, neither patient reported significant foreign body sensation, and their progress was satisfactory (Figs. 7 and 8).

DISCUSSION

In this study, we present the results of the modified A-10 surgery, an innovative approach that combines the principles of the Point A-Koji method with the incorporation of 3-titanium plates and artificial dermis insertion. We aimed to address midface depression and enhance the nasal alar base morphology, providing patients with a comprehensive solution to achieve their desired facial aesthetics.

Lateral cephalometric radiographic analysis played a pivotal role in assessing the transformative effects of the modified A-10 surgery. The facial convexity angle, an indicator of facial 3-dimensionality, significantly shifted from 15.5 degrees before surgery to 23.2 degrees 8 months after surgery. This change demonstrates the capacity of the surgery to enhance the overall curvature of the facial profile, leading to a more aesthetically pleasing appearance. Generally, the average facial convexity is 7.6 degrees among Asians and 11 degrees to 14.79 degrees among White people.[11–13] These results suggest that surgery improved facial convexity with an anterior shift of the soft tissue Sn point, resulting in a more 3-dimensional facial appearance.

The nasolabial angle, a crucial measure of mouth protrusion, changed from 91.9 degrees preoperatively to 110.2 degrees 8 months postoperatively. This change aligns the nasolabial angle within the range observed in individuals of White descent, highlighting the success of the surgery in achieving the desired mouth projection. Generally, the mean nasolabial angle is 87.86 degrees and 109 degrees in White people.[14–16]

Additionally, the increase in the distance from point A to the subnasal point, from 14.7 mm preoperatively to 18.3 mm 8 months postoperatively, underscores the effectiveness of the titanium plate in augmenting the nasal region.

The modified A-10 surgery demonstrated its capacity to improve the position of the nasal alar base, thereby addressing depression in this region. Our assessment of tissue thickness before surgery and 15 months after surgery revealed an average increase of 2.2 mm (19.5%), confirming the success of our approach in rectifying the nasal floor depression. The artificial dermis, strategically placed under the titanium plates, further contributed to the improvement in the nasal alar base morphology. Terudermis has been used for many years, mainly for gingival growth, extraction socket preservation, and hemostasis, and is considered safe.[17] The collagen layer of Terudermis is a less antigenic collagen formed via protease treatment of the young bovine dermis and digestive cleavage of the telopeptide region. Collagen without this telopeptide is called atelocollagen, which is known to be less antigenic because it has no telopeptide moiety.[18] Terudermis promotes wound healing[19] and acts as a scaffold to facilitate infiltration from the surrounding tissue, which disappears within 4 weeks.[20] Connective tissue grows much faster than bone.[21] According to the literature, even highly invasive osteotomies sufficiently resolve swelling within 6 months.[22] However, the face is very finely shaped, and attention must be paid to its future progress.

The modified A-10 surgery offers a minimally invasive and lasting solution for individuals seeking to address midface depression and enhance facial aesthetics. The success of the surgery in achieving significant changes in facial angles, mouth protrusion, and nasal alar base position is promising.

As an antiaging intervention, the modified A-10 surgery holds potential for middle-aged patients who desire to restore youthful facial contours. The comprehensive impact of this surgery on multiple dimensions of facial appearance opens avenues for further exploration in the field of aesthetic surgery. Further long-term studies are warranted to assess the durability and stability of these outcomes. The nasal alar base is also a site of depression owing to piriform aperture enlargement resulting from age-related changes.[23] Therefore, the A-10 surgery may be applicable as an antiaging treatment for middle-aged patients.

However, the surgery has some limitations. Upward displacement of the nasal tip angle and nervous foreign body sensations occur postoperatively; this is a reality that cannot be addressed. Therefore, the suitability of the patient must be assessed preoperatively. Nevertheless, any postoperative dissatisfaction can be resolved by removing the implanted titanium plate. Thus, the surgery can be recommended as a near-reversible treatment.

Compared to conventional treatment, the modified A-10 surgery may offer a more minimally invasive intervention and better surgical outcomes. Technological advances, such as the advent of robot-assisted surgery, 3-dimensional imaging technology, and virtual consultations have revolutionized modern treatment. These advances have enabled

improved surgical outcomes, ensured minimally invasive procedures, improved surgical accuracy, and reduced patient recovery times. Demonstrating the effectiveness of the modified A-10 surgery requires studies with greater case numbers, improved objective evaluation of long-term outcomes and treatment,[24,25] and use of patient-reported outcome measures for surgical results.[26,27]

CONCLUSIONS

The modified A-10 surgery represents a significant advancement in addressing midface depression and enhancing the nasal alar base morphology. The combination of the Point A-Koji method with the use of titanium plates and artificial dermis insertion provides patients with a comprehensive and effective means of achieving their desired facial aesthetics. The results of this study underscore the transformative effects of this surgery and its potential as a lasting solution for individuals seeking facial enhancement.

Koji Yamamoto, DDS
Cozy Yamamoto Dental Clinic
108 Shinoda Yahara
Ama, Aichi Prefecture 490-1211, Japan
E-mail: article@a10.email
Twitter: @rzAKCOC2I5Ymzhl
Instagram: dds.cozy

DISCLOSURE

The author has no financial interest to declare in relation to the content of this article.

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