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Mobile Bony Cap (Meysem Yorgun Technique): An Innovative Technique in Preservation Rhinoplasty for Crooked Nose Deformity

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Background: Crooked nose deformity is a vertical axis deviation of the nasal pyramid; despite all advancements, it remains a significant problem to resolve. In this study, we present our I- and C-shaped crooked nose rhinoplasty results with this new osteotomy technique.

Methods: This study included 25 patients with I- or C-shaped crooked nose deformities who underwent correction with a closed-approach let-down procedure. In this technique, the middle vault is preserved, the bony cap is mobilized and preserved, and the lateral nasal bones are equalized by a piezo device or classical osteotomes. By the mobilization of the bony cap, tension on the dorsal septum is released, and slight asymmetries are hidden behind this mobile bony cap.

Results: The postoperative angles for both type I and C deformities were closer to the ideal angle, and the difference was statistically significant. All patients were satisfied with their aesthetic and functional results.

Conclusions: In this procedure, we correct asymmetries at the lower maxillary nasal junction, such as in the let-down approach, as well as asymmetries at the K-point, such as in the structural approach. Thus, we combine the advantages of both techniques. Additionally, the mobile-bony cap left on the patient is very useful for releasing the tension of the septal dorsum and hiding slight asymmetries that remain below in the patients. *(Plast Reconstr Surg Glob Open 2023; 11:e4919; doi: 10.1097/GOX.0000000000004919; Published online 13 April 2023.)*

INTRODUCTION

Crooked nose deformity is a vertical axis deviation of the nasal pyramid on basal and/or frontal views and is still a challenging problem for rhinoplasty surgeons. Despite all technological, anatomical, and surgical advancements, achieving a straight nose may not be possible in a significant group of patients. Several techniques, such as double or asymmetric osteotomies, spreader grafts, cartilage scoring, and several onlay graft techniques, have been described in the literature.[1–4] Because a significant number of patients still undergo revision surgeries for crooked nose, we believe that this problem has not yet been fully resolved.

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The nasal pyramid has three sections: the upper, middle, and lower thirds. Deviations may be seen in all three sections. Upper-third deviations are generally caused by bony pyramid deviations, and lower two-third deviations are caused by cartilaginous and soft tissue structures.[5] Preoperative analysis of deviation on nasal bones and cartilaginous structures is very important and essential to resolve this problem.

There are four different types of crooked nose deformities described in the literature:[2,6–8]

Cartilaginous type: The deviation involves less than two-thirds of the cartilaginous structures of the nose. There is no deviation on the bony part.

Linear type (I-shaped): The nasal axis is deviated to one side with a linear shape.

C-shaped: The major etiological reason for this most frequent type of deviation is septal cartilage fracture. The vertical axis of the nose is C-shaped, and the concavity may face the right or left side.

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S-shaped: This most complicated type has different angulations and deviations on one-third of the nasal pyramid.

Compared with classical structural rhinoplasty techniques, preservation rhinoplasty is a very popular technique and has many advantages, such as achieving a more natural middle vault.[9,10] Because there is no need for middle vault repair, the results are closer to the natural look in terms of the middle vault. In our technique, the middle vault is preserved, the bony cap is mobilized and preserved, and the lateral nasal bones are equalized by a piezo device or classical osteotomes. By the mobilization of the bony cap, tension on the dorsal septum is released, and slight asymmetries are hidden behind this mobile bony cap. Here, we present our I- and C-shaped crooked nose rhinoplasty results with this new osteotomy technique.

MATERIALS AND METHODS

This retrospective study included 25 patients who underwent correction with I- or C-shaped crooked nose deformities between February 2020 and April 2021 with a single experienced surgeon (M.Y.). Patients with a previous nasal surgical history (septoplasty, rhinoplasty, or endoscopic sinus surgery) were excluded from this study. This retrospective study was approved by the Haseki Research and Education Hospital Ethical Committee, and all patients were informed both verbally and via written comprehensive consent forms. All procedures performed in this study were in accordance with the ethical standards of institutional and national ethics committees and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The AGREE reporting checklist was used for standardization for methodological quality.[11] Preoperative and postoperative photographs with seven different angles (frontal, lateral, oblique, helicopter and basal views), as well as videos, were taken and recorded. Patients were followed for 12 months to 24 months, and a postoperative evaluation was performed at least 12 months after the surgery. Image analysis was performed with the GeoGebra License program (version 6.0.677-wgeometry), and the deviation angles were measured using the (anterior) views, provided the Frankfort horizontal line was parallel to the ground. The deviation angles of the C-type and I-type crooked nose were measured as previously described in the literature.[12] The GeoGebra program is a free, easy-to-access, easy-to-use program, and the measurements were easily performed by the authors. The ideal angular value is 180 for C-type deformities and 0 for I-type deformities. Surgical results were classified according to the rate of correction of deviation angles. With surgical correction, 90%–100% closeness to the ideal angle was evaluated as excellent, 70%–89% closeness as good, 50%–69% as acceptable, and less than 50% as unsuccessful. A postoperative angle closer to the ideal angle was considered more successful.

Takeaways

Question: Despite all technological, anatomical, and surgical advancements, correcting a crooked nose may not be possible in a significant group of patients.

Findings: In this study, we would like to present our I and C shaped crooked nose rhinoplasty results with a new osteotomy technique. In this technique, the middle vault is preserved, the bony cap is mobilized and preserved, and the lateral nasal bones are equalized by a piezo device or classical osteotomes.

Meaning: This presented technique may be an alternative for treating crooked nasal deformities.

SURGICAL TECHNIQUE

After preparing the surgical field, patients were covered with sterile surgical cloths. After local anesthetic administration, the closed approach let-down technique is preferred. Infracartilaginous and marginal incisions were applied. Supraperichondrial and subperiosteal dissection was performed carefully. Wide subperiosteal dissection is essential for better visualization and control of lateral osteotomies and ostectomies. First, the lateral nasal walls were measured and recorded. Planned lateral nasal walls were calculated according to the hump and equalized on both sides. First, osteotomies were localized 2–3 mm caudal the bony cap and with an average of 8 to 10 mm in size (DBE in Fig. 1), and their connection with the upper lateral cartilages was preserved on both sides. Mobilization of the bony cap allows the cartilage to move freely, and this maneuver helps the correction of the middle third deviation.

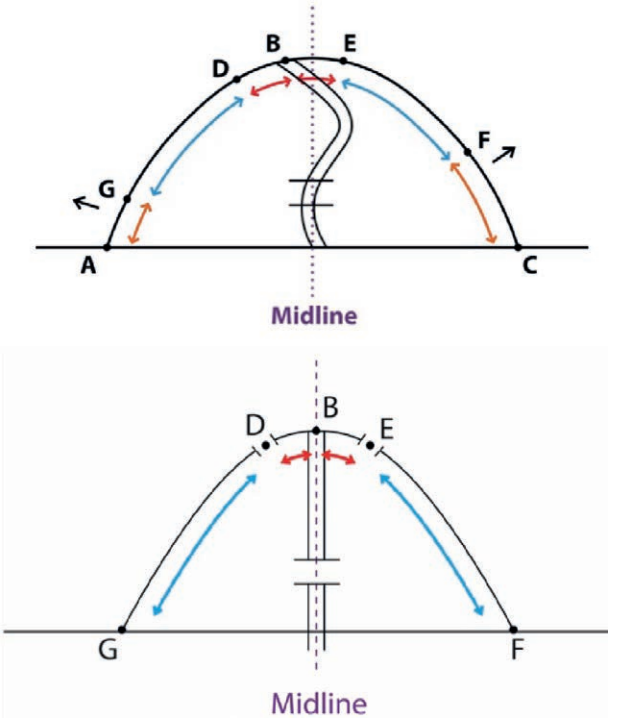

Fig. 1. Schematic diagram of the surgery from base view.

Subsequently, we left 15–18 mm of lateral nasal bone on both sides (GD and EF in Fig. 1) with an equal size and shape just caudal the mobile bony cap and took the excessive bones between the lateral osteotomy lines and maxillary bone (AG and FC in Fig. 1) to prevent step deformities and the recurrence of deviations. Bony pyramid deviation is corrected with this asymmetric reduction of the bone on both sides. The important point is that the residual lateral nasal bone sizes left in the patient should be equal for symmetry. Lower strip resection of the septum and a lower strip cut in the perpendicular plate of the ethmoid bone were performed, and the let-down procedure was completed. In our technique, to correct the three-dimensional asymmetry in the lateral nasal bones, the dimensions of the lateral nasal bones are measured and equalized. The bony cap is mobilized and preserved to hide the slight asymmetries below and release the tension on the dorsal septum. A schematic diagram of the surgery is provided in Figure 1. As indicated in Figure 1, we take care to ensure that the sizes of the GD and EF pieces left in the patient are equal. To achieve this situation, the sizes of the AG and FC parts removed from the patient may be different. For septal excision generally, lower strip cartilage excision is sufficient. Rarely, if there are serious cuts in the septal cartilage, classical septoplasty methods such as triangular cartage excision or scoring may be required. (**See Video 1 [online],** which displays a brief summary of the operation.)

The SPSS statistical package (version 15.0; Chicago, Ill.) was used for all data analyses. Preoperative and postoperative angles were compared by a dependent *t* test for both I- and C-type deformities separately, and a statistically significant *P* value was accepted as less than 0.05.

RESULTS

In total, 25 patients (16 male and 9 female patients) with I-type (11 patients) and C-type (14 patients) deformities were included in the study. All patients were operated on with a closed-approach let-down procedure, and none of the patients required costal cartilage harvesting. All patients were followed at 1, 3, 6, and 12 months postoperatively, and postoperative image analysis was performed at least 12 months after the surgery.

The preoperative mean deviation angle for C-type deformities was 146.15 ± 3.59 degrees (142–154.6), and the postoperative mean deviation angle was 178.71 ± 2.12 degrees (175–180). The preoperative mean deviation angle for type I deformities was 12.49 ± 1.73 degrees (10.6–15.9), and the postoperative mean angle was 1.03 ± 1.43 degrees (0–2.9). The postoperative angles for C-type deformities were higher and closer to the ideal angle (180 degrees), and this difference was statistically significant ($P < 0.001$). The ideal angle (180 degrees) was achieved in 10 patients (10/14). The postoperative angles for I-type deformities were smaller and closer to the ideal angle (0 degrees), and this difference was also statistically significant ($P < 0.001$). The means of preoperative and postoperative angles are given in Table 1.

According to the postoperative surgical success rate, the outcomes for 17 patients (10 with C-type deformities and 7 with I-type deformities) were accepted as excellent, and those for eight patients (four with C-type deformities and four with I-type deformities) were accepted as good. The results are listed in Table 2.

Table 1. Preoperative and Postoperative Angle Values according to I or C-type Deformity

	Preoperative Angle	Postoperative Angle	*P*
C-type deformity (n = 14 patients)	146.15 ± 3.59	178.71 ± 2.12	<0.001
I-type deformity (n = 11 patients)	12.49 ± 1.73	1.03 ± 1.43	<0.001

All patients were satisfied with their aesthetic and functional results and did not encounter any complications in the postoperative period. Preoperative and postoperative digital images of two patients are presented in Figures 2–4.

DISCUSSION

Crooked nose deformity is the vertical axis deviation of the nasal pyramid to the left or right on the basal or frontal view. Generally, it occurs due to trauma during the early childhood or adolescence period and is accepted as a challenging problem to solve. Many authors have claimed that the etiologic reasons for the crooked nose are unnoticed trauma during birth or early childhood and insufficient correction of nasoseptal fractures.[13,14]

There are both functional and aesthetic problems in crooked nose deformities, and achieving a successful result is possible with appropriate preoperative analysis. Detailed examination of frontal, basal, and helicopter views and analysis of the reason for deviation are crucial for a correct preoperative plan and for ultimately successful postoperative results.

The use of spreader grafts is a classical and useful method for the correction of septal deformities in classical structural rhinoplasty approaches but may not be sufficient to solve the problem in some patients.[15,16] The location, number, and thickness of spreader grafts may be different from patient to patient. Generally, spreader grafts are placed on the concave side of the deformity, but asymmetric locations and different numbers of spreader grafts on both sides may be used in patients with crooked nose deformity.[17] However, the use and benefits of spreader grafts are limited in the case of bony pyramid deviations. Asymmetries in the caudal parts of the lateral nasal bones in maxillary regions cannot be solved with classical single osteotomies; in contrast, using spreader grafts can make

Table 2. Number of Patients and Percentages according to Results and Type of Deformity

Surgical Succcess	I type (n)	C type (n)	Total (n)
Excellent	7 (71%)	10 (64%)	17 (68%)
Good	4 (29%)	4 (36%)	8 (32%)
Acceptable	0	0	0
Unsuccesful	0	0	0
Total (n)	11 (100%)	14 (100%)	25 (100%)

Fig. 2. Digital photographs of a male patient. A-C, Preoperative photographs. D-F, Postoperative photographs.

the asymmetries more pronounced during the classical structural rhinoplasty approach.

Extracorporeal septal reconstruction (ECSR) is another and generally accepted final reconstruction method for severe crooked nose deformities. In the ECSR technique, the septum is totally mobilized and removed from the nose, reconstructed as an L-shaped strut and repositioned into the midline of the nose.[18] The main challenge is achieving a straight L-shape and stabilization of the new septum. Because of the highly deformed septal cartilages, achieving a straight septum is an important problem that can be solved only with costal cartilage harvesting in a

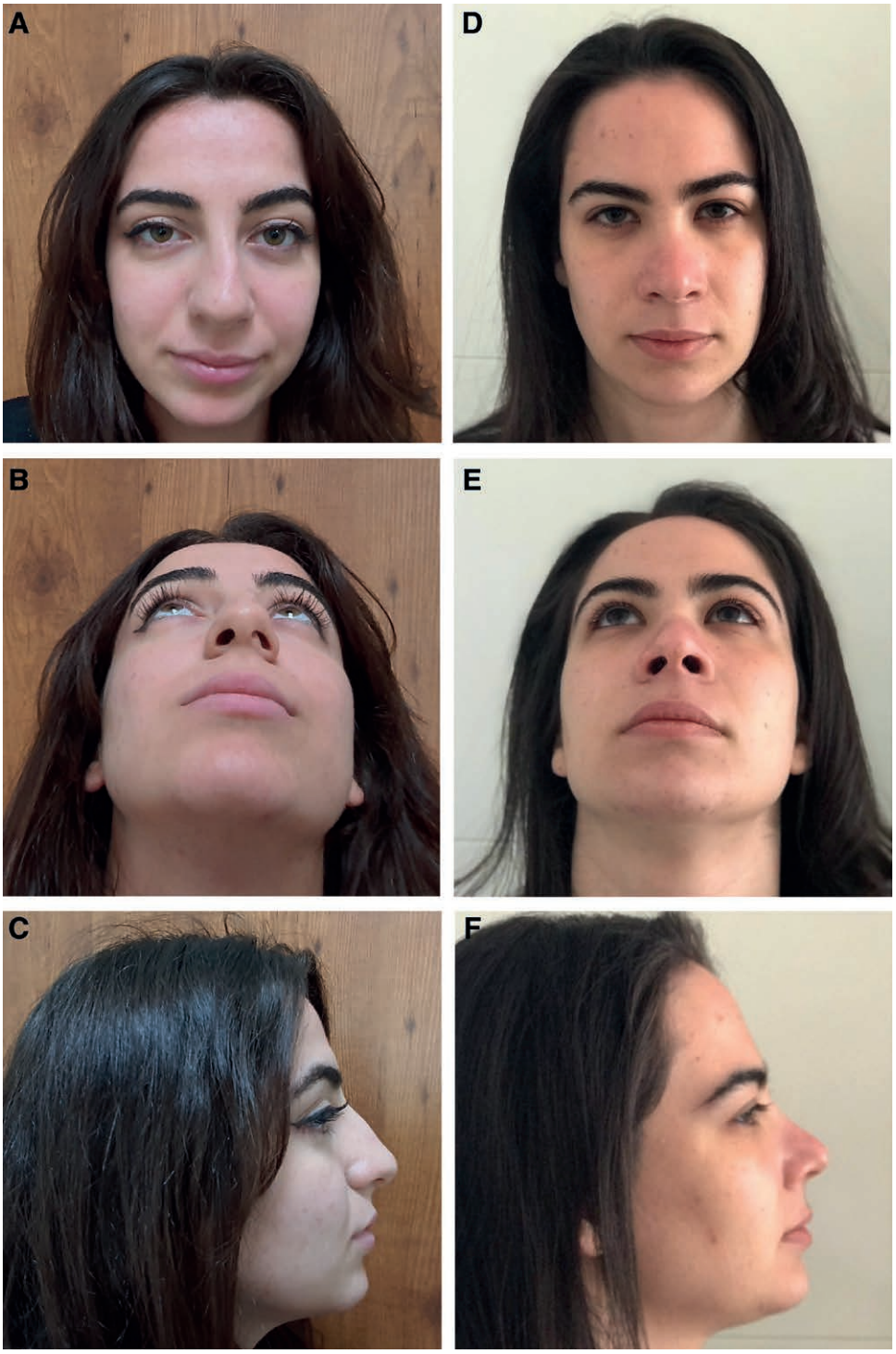

Fig. 3. Preoperative and postoperative digital photographs of a female patient. A-C, Preoperative photographs. D-F, Postoperative photographs.

significant number of patients. Many authors have hesitated to use this technique because of the risk of destabilization and technical difficulty. Additionally, combinations of different techniques, such as asymmetric osteotomies, ostectomies and spreader grafts, have been described in the literature, and the deformities have been solved.[19–21]

When the nasal pyramid is considered in three dimensions, it can be easily seen that the lateral nasal bones do not lie in a straight plane. For example, the lateral nasal bone is generally convex in its cranial parts close to the eye and concave in the caudal parts in the maxillary region. This situation becomes much more pronounced

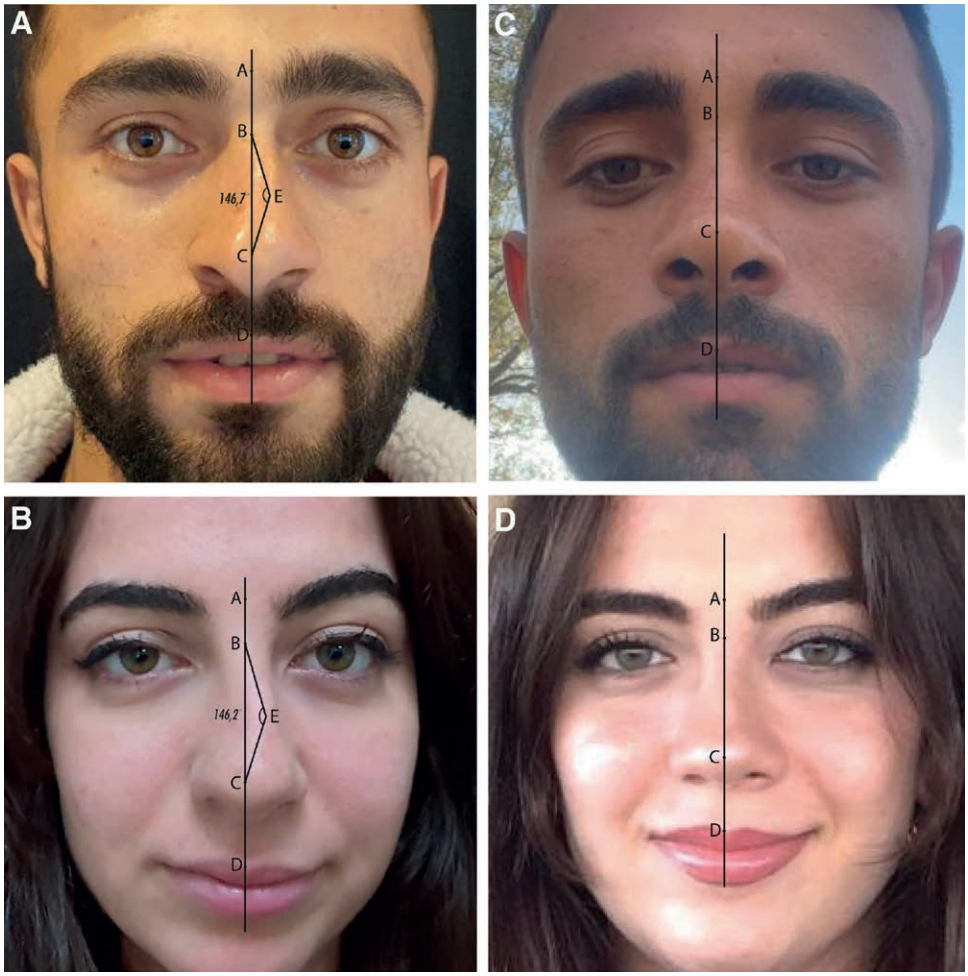

Fig. 4. Photographs of patients, with deviation angles. A-B, Preoperative photographs. C-D, Postoperative photographs.

in patients with crooked nose deformities. In our technique, to correct this three-dimensional asymmetry in the lateral nasal bone, the dimensions of the lateral bone were measured and equalized, and a mobile bony cap was left to hide the slight asymmetries below. First, osteotomies were localized 2–3 mm caudal to the bony cap and were an average of 8–10 mm in size, and their connection with the upper lateral cartilages was preserved on both sides. Mobilization of the bony cap allows the dorsal septal cartilage to move freely, and this maneuver helps the correction of the middle third deviation. Lateral nasal bones were left 15–18 mm in length, and the excessive bone just caudal the lateral nasal bone from the lower maxillary nasal bone junction was removed. Thus, we obtained a straight and more symmetric nasal bony structure assessed by three-dimensional examination on both sides. Evident irregularities on the edges of the mobile bony-cap created can be corrected with a piezo device or baby-rongeur tool. Bony pyramid deviation is corrected with this asymmetric reduction of the bone on both sides, and the important point is that the residual bone size and shape left in the patient should be equal for symmetry. We think that leaving the bony-cap in its original position restores any loss of strength for the cartilaginous skeleton of the nose and may be protective in terms of the development of saddle-nose deformity. We do not think that there is any difference between the classical let-down technique and saddle-nose development. The biggest challenge we face during this surgical technique is getting the osteotomies done at the right position. Difficulty may be encountered especially during the para-median osteotomies. In some patients, osteotomies cannot be completed with the piezo device, and intervention with classical osteotomes is required. We think that the surgeon should have mastery of both methods.

Nasal bones become fully mobile in the structural rhinoplasty approach. In addition to the advantages of the structural approach, more bone must be removed from the hump, but asymmetry in the base remains. In the structural rhinoplasty approach, the nasal bones are brought closer together and lowered. Because there is remaining asymmetry at the base, the preoperative asymmetry can be felt again while the bone is rebonded in postoperative follow-ups. In the let-down procedure, asymmetries in the nasal maxillary junction at the base can be resolved, but because the dorsum remains as one piece, asymmetries are eliminated only by removing the asymmetrical bone

at the base, and deviation to one side at the K-point can still be felt. In our technique, we correct asymmetries at the lower maxillary nasal junction, such as in the let-down approach, as well as asymmetries at the K-point, such as in the structural approach. Thus, we combine the advantages of both techniques.

CONCLUSIONS

We believe that measurement and equalization of all bony fragments both in size and 3D-direction on each side is essential for successful postoperative results. In addition, the mobile-bony cap left on the patient is very useful for releasing the tension of the septal dorsum and hiding slight asymmetries remaining below in the patients. This presented technique may be an alternative technique for crooked nasal deformities.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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All authors have made substantive contribution to this article, and all have reviewed the final paper prior to its submission. All procedures performed in this study were in accordance with the ethical standards of institutional and national ethics committees and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Approval for the study has been obtained from Haseki Education and Research Hospital Ethical Committee, İstanbul (ethical approval date and number: 16.12.2021 and 316). All patients were informed both verbally and via written comprehensive consent forms. All study participants signed an informed consent for being in the study. In addition, patients whose photographs to be published in the study signed an additional written consent form.

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