

# Our experiences regarding combined use of pedicle plication and dermal flap suspension in inferior pedicle inverted-T scar reduction mammoplasty

## İnferior pediküllü ters T skarlı redüksiyon mamoplastide pedikül plikasyonu ve dermal flep süspansiyonunun kombine kullanımına dair tecrübelerimiz

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**Received/Accepted:** May 18, 2019 /September 28, 2019

**Conflict of interest:** There is not a conflict of interest.

### SUMMARY

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**Objective:** To present clinical outcomes and experiences regarding the combined use of plication and dermal flap suspension of inferior pedicle in inverted-T scar reduction mammoplasty.

**Method:** One hundred and twenty-one cases with bilateral macromastia were operated by using the present technique between March 2008 and November 2017. The cases were reviewed retrospectively regarding demographics, preoperative findings, and postoperative outcomes. Of the 121 cases, 22 were excluded from the study analysis.

**Results:** The mean age of the cases was 39.77 years. The mean preoperative diameter of NAC and the mean preoperative distances of mid-clavicle-to-nipple, nipple-to-IMF and IMF were 6.54, 33.48, 15.98 and 25.09 cm, respectively. The mean weight of excised tissue per case was 2033.32 g. There were three cases with unilateral T-junction dehiscence and two cases with unilateral T-junction necrosis. Furthermore, one case presented with bilateral, and two cases presented with unilateral superficial partial necrosis of NAC. At long-term, six cases had a slight asymmetry, two had bilateral pseudoptosis, and three had bilateral hypertrophic scarring among the transverse incision of the inverted-T scar. One case underwent bilateral excision of lateral dog ears, and one underwent surgery due to unilateral fat necrosis at postoperative 3<sup>rd</sup> month — two cases presented with unilateral loss of NAC sensation. The overall satisfaction with the operation was high.

**Conclusions:** The outcomes of this study led us to conclude that the combined use of pedicle plication and dermal flap suspension improves the shape and position controllability of the inferior pedicle, produces a projectile and stabilized breast mound, aids in achieving satisfactory long-term cosmetic outcomes, and prevents breast deformities. Extended operative time can be considered as a disadvantage of the technique.

**Keywords:** Breast reduction, dermal flap, inferior pedicle, mammoplasty, pedicle plication

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## ÖZET

**Amaç:** Bu çalışmada, inferior pediküllü ters T skarlı redüksiyon mamoplasti uygulanan hastalarda pedikül plikasyonu ve dermal flep süspansiyonunun kombine kullanımıyla ilgili klinik sonuçların ve tecrübelerin aktarılması amaçlanmıştır.

**Yöntem:** Mart 2008 ve Kasım 2017 tarihleri arasında bilateral makromasti nedeniyle 121 hastaya tariflenen teknikte redüksiyon mamoplasti uygulandı. Demografik veriler, preoperatif bulgular ve postoperatif sonuçlar açısından olgular retrospektif olarak değerlendirildi. Yirmi iki hasta çalışmaya dahil edilmedi.

**Bulgular:** Hastaların ortalama yaşı 39,77'yd. Meme başı-areola kompleksinin preoperatif ortalama çapı ve klavikula orta noktası-meme başı, meme başı-inframamarian kıvrım ve inframamarian kıvrımın preoperatif ortalama uzunluğu, sırasıyla, 6,54, 33,48, 15,98 ve 25,09 cm'yd. Hasta başına eksize edilen meme dokusu ortalama ağırlığı 2033,32 g'dı. Ters T skarın birleşim noktasında üç hastada unilateral detaşman, iki hastada ise unilateral nekroz gözlemlendi. Ayrıca bir hastada bilateral, iki hastada ise unilateral olarak meme başı-areola kompleksinde kısmi yüzeysel nekroz gözlemlendi. Uzun dönemde altı hastada hafif düzeyde asimetri, iki hastada bilateral psödopitozis ve üç hastada ters T skarın transvers insizyonunda bilateral hipertrofik skar gelişimi gözlemlendi. Bir hastada bilateral köpek kulağı deformitesinin düzeltilmesi, bir hastada ise unilateral yağ nekrozunun eksizyonu amacıyla postoperatif 3. ayda cerrahi işlem gerçekleştirildi. İki hastada unilateral meme başı-areola kompleksinde duyu kaybı gözlemlendi. Operasyon sonrası hasta memnuniyeti yüksekti.

**Sonuç:** Bu çalışmanın sonuçları pedikül plikasyonu ve dermal flep süspansiyonunun kombine kullanımıyla inferior pedikülün istenilen pozisyonda konumlandırılarak şekillendirilebildiğini, projektıl ve stabil bir meme kitlesinin elde edildiğini ve meme deformitelerinin önüne geçilerek uzun dönemde tatminkar kozmetik sonuçların elde edildiğini göstermektedir. Uzamış cerrahi süre tekniğin bir dezavantajı olarak görülebilir.

**Anahtar sözcükler:** Dermal flep, inferior pedikül, meme küçültme, pedikül plikasyonu, redüksiyon mamoplasti

## INTRODUCTION

Macromastia or breast hypertrophy is defined as an excessive and generalized enlargement of one or both breasts above the average proportion with no pathologic processes, lesions, or underlying diseases.<sup>1,2</sup> The recommended treatment approach for symptomatic cases of macromastia is by reduction mammoplasty. Combination of various skin excision patterns, including periareolar, J-shaped, L-shaped, horizontal, vertical, or inverted-T pattern and different dermoglandular flap designs, including superior, superomedial, lateral, inferior, central, or vertical bipedicle, can be employed depending on size of the breast, degree of ptosis, and preference and experience of the surgeon.<sup>3,4</sup>

The vertical or inverted-T skin excision patterns are the most commonly preferred techniques for reduction mammoplasty.<sup>5-7</sup> The superior or superomedial pedicle is generally used in the vertical scar pattern, while many surgeons favor an inferior pedicle in the inverted-T pattern. The inferior pedicle is very reliable in maintaining breastfeeding ability and retaining sensation and vascularity of the nipple-areola complex (NAC), it can eliminate the need for NAC grafting even in cases of gigantomastia, and it has a smooth learning curve for junior trainees.<sup>4,8-11</sup> However, development of pseudoptosis (bottoming-out deformity) due to

gravity-induced stretching of vertical limb of the inverted-T scar and a flat and boxy-shaped breast with poor projection are highlighted as its major criticisms.<sup>10,12-16</sup> Furthermore, time-consuming deepithelialization of a large area and tension at the T-junction, which may result in difficulty in suture closure and subsequent wound dehiscence, are noted as its technical challenges.<sup>10,16</sup>

In this article, it was aimed to present clinical outcomes and experiences in a series of inverted-T scar reduction mammoplasty, in which plication and dermal flap suspension of the inferior pedicle were performed together. While combined use of these maneuvers helps to avoid unintended outcomes of the inferior pedicle, it aids in generating a projectile and conical breast mold with satisfying cosmetic results.

## MATERIAL AND METHODS

From March 2008 to November 2017, 121 cases with bilateral macromastia were operated by the authors with the present technique in two different institutions. Of the cases, 22 were excluded from the analysis due to the use of free nipple grafts, having a follow-up period of fewer than 12 months, or missing data records regarding demographics and breast measurements. Preoperative physical examination and breast ultrasonography were performed for all cases. For the cases with an age of more than 40 years, mammography was

performed in addition to ultrasonography. Further investigations were carried out only when abnormal or suspicious radiological findings were detected.

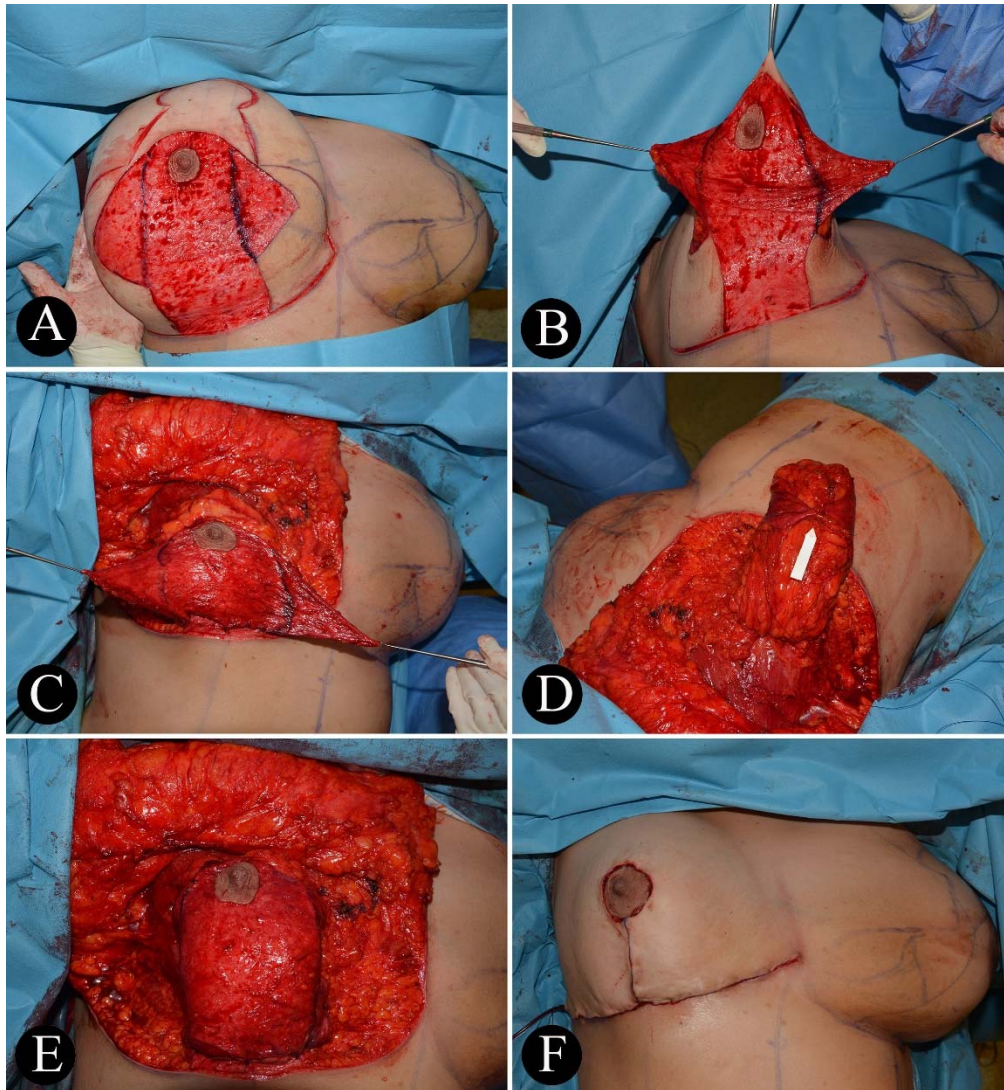
Written informed consent of all cases, and the institutional ethics committee approval was obtained (ATADEK; 2019-14/68), and the study was performed in accordance with the principles of the Declaration of Helsinki.

### Preoperative markings

Standard photographs of frontal, lateral, and oblique views were taken of all cases before the breast marking performed in an upright

standing position. The new nipple was placed on the breast meridian at the anterior projection of IMF or at the level of mid humerus on cases with ptosis of IMF. A modified Wise pattern technique, as already described by Özyazgan et al.,<sup>17</sup> was performed, and a NAC was marked with a diameter of 42-45 mm. An 8-10 cm wide inferior pedicle was located over the breast meridian, and it was marked out as a curve around the NAC leaving a 1-3 cm margin. The equilateral triangular dermal flaps were marked on either side of the inferior pedicle with a base located between its superior pole and 6-7 cm below to the inferior pole of the NAC.

### Surgical technique (Figure 1)



**Figure 1:** A. Deepithelialized triangular dermal flaps and inferior pedicle, B. elevated triangular dermal flaps with a thickness of 1-1,5 cm, C. plicated inferior pedicle, D. sutured tips of the medial and lateral triangular dermal flaps at the posterior aspect of the inferior pedicle, which was shown with an arrow, E. final appearance of the inferior pedicle fixed to the pectoralis fascia, and F. subcutaneous suture closure of the right breast.

All surgical procedures were performed under general anesthesia with prophylactic antibiotic usage and strict sterile precautions. After infiltration of the breast parenchyma with a tumescent solution, including lactated Ringer's solution, lidocaine, and epinephrine, dermal incisions were performed according to the preoperative markings. Tumescent infiltration was not performed at the base of the inferior pedicle to avoid circulatory impairment. A breast tourniquet was then applied, and without intradermal tumescent infiltration, triangular-shaped dermal flaps and inferior pedicle were de-epithelialized, except for the NAC. Subsequently, the triangular dermal flaps were elevated with a thickness of 1-1.5 cm to avoid injury to the subdermal plexus. The inferior pedicle was then raised with great care to preserve the horizontal septum, excess skin and dermo-glandular tissue among the Wise pattern were excised leaving a breast tissue with a thickness of 1.5–2 cm on the chest wall to protect the intercostal nerves sensing the NAC, and the skin flaps were thinned until the desired breast volume was achieved.

Pedicle plication was performed horizontally with running polydioxanone sutures. The superior plication border was located 6-7 cm below the inferior pole of the NAC, where the dermal flaps end inferiorly, and the inferior plication border was located 1 cm above the IMF. On the inferior border, a superficial incision exposing the subcutis was performed to facilitate the plication. Subsequently, the tips of the medial and lateral triangular dermal flaps were sutured together at the posterior aspect of the inferior pedicle and then to the pectoralis fascia with deep muscle bites at the level of the third or fourth rib using a 2-0 polydioxanone suture. The superior pole of the inferior pedicle was then sutured to the pectoralis fascia at the level of the second or third rib to provide a stable pedicle fixation. After meticulous

hemostasis and insertion of the closed-suction drains through stab skin incisions on each breast, temporary skin sutures were placed, and the patient was placed in a semi-sitting position to check the symmetry of the breasts. The skin incisions were closed by interrupted and running dermal sutures. The dressing was done with dry gauze layers, and compressing adhesive tapes were applied to support and shape the breasts. All excised breast tissue was weighed and submitted for histopathologic examination.

### Postoperative care

Starting from the postoperative day 1, a wireless surgical bra was fitted, and the patient was advised to wear the bra for at least 4-6 weeks. The drains were removed when the drainage was less than 20 ml during 24 hours, and the cases were generally discharged after the drains were removed.

### RESULTS

The mean age and follow-up period of the cases were  $39.77 \pm 12.05$  years (range, 17 to 67 years) and  $28.19 \pm 11.60$  months (range, 12 to 61 months), respectively. Hypertension was the most common accompanying disease ( $n=9$ ), followed by asthma ( $n=5$ ), hypothyroidism ( $n=4$ ), diabetes mellitus ( $n=3$ ), and rheumatoid arthritis ( $n=1$ ). With respect to preoperative measurements, the mean distances of mid-clavicle-to-nipple, nipple-to-IMF, and IMF and diameter of NAC were  $33.48 \pm 4.89$  cm,  $15.98 \pm 3.92$  cm,  $25.09 \pm 4.13$  cm, and  $6.54 \pm 1.55$  cm, respectively. The mean weight of excised tissue per case was  $2033.32 \pm 928.42$  g. No premalignant or malignant pathologic findings were noted on the histopathological examination of the excised tissue specimens. The mean preoperative breast measurement values of right and left breasts are presented in Table 1.

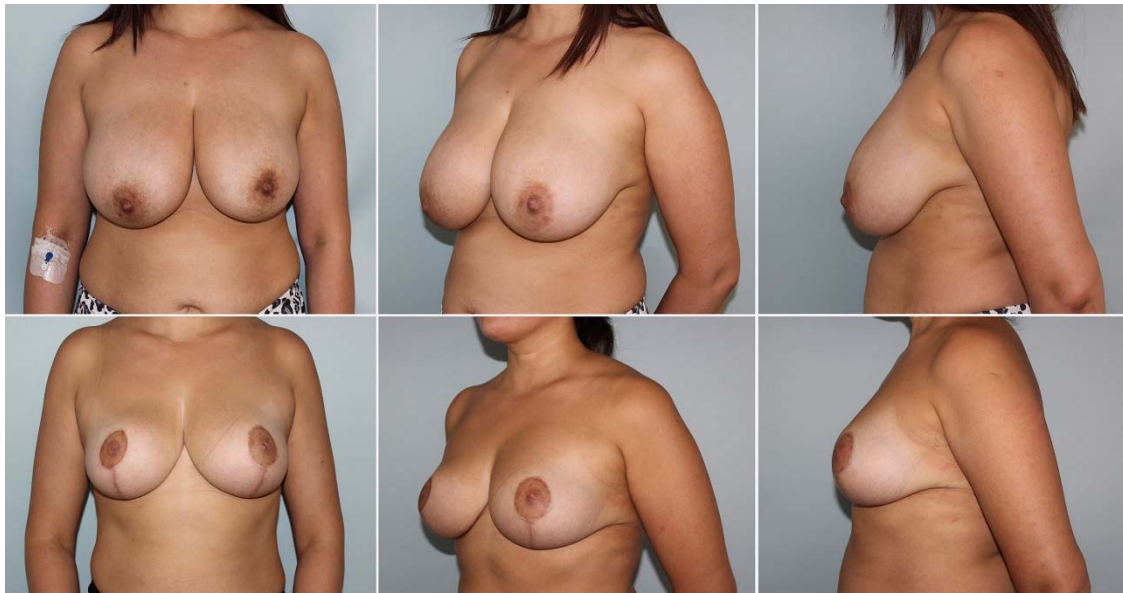
**Table 1:** Mean preoperative measurements of right and left breasts.

| Measurements                 | Right breast (mean $\pm$ SD) | Left breast (mean $\pm$ SD) |
|------------------------------|------------------------------|-----------------------------|
| Midclavicle-nipple (cm)      | $33.58 \pm 4.89$             | $33.39 \pm 4.93$            |
| Nipple-IMF (cm)              | $15.98 \pm 3.94$             | $15.97 \pm 3.92$            |
| IMF (cm)                     | $25.05 \pm 4.08$             | $25.13 \pm 4.20$            |
| NAC (cm)                     | $6.56 \pm 1.55$              | $6.52 \pm 1.56$             |
| Weight of excised tissue (g) | $1021.32 \pm 487.79$         | $1010.84 \pm 461.19$        |

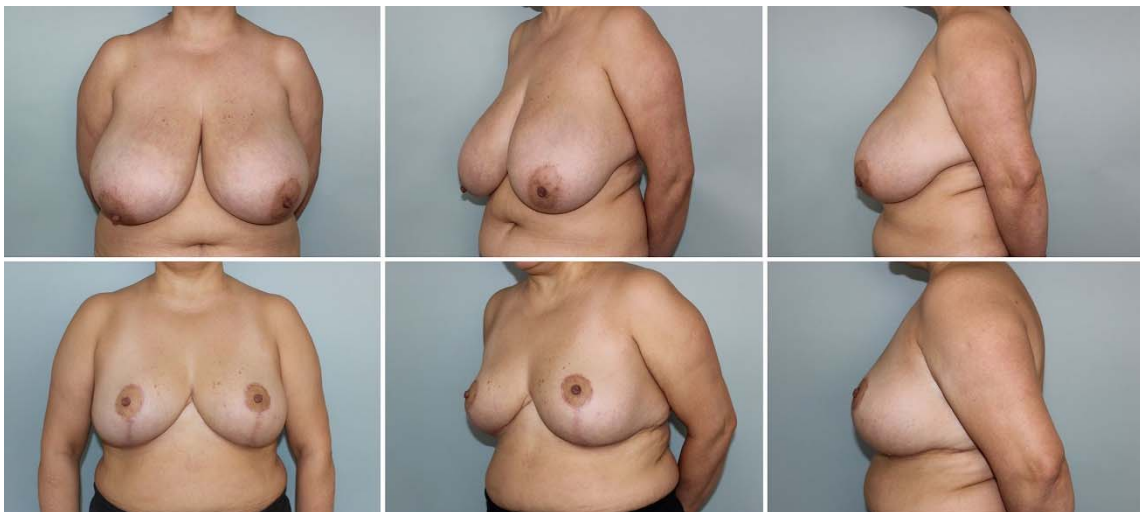


There were three cases with unilateral T-junction dehiscence and two cases with unilateral T-junction necrosis due to excessive tension during skin closure. Furthermore, one case presented with bilateral, and two cases presented with unilateral superficial partial necrosis of the NAC in the form of epidermolysis. All wounds healed spontaneously with dressing changes, required no further surgical intervention, and did not impair the final appearance of the breasts. At long-term, six cases had a slight asymmetry, and two had bilateral pseudoptosis, but all were satisfied and did not request a further surgical

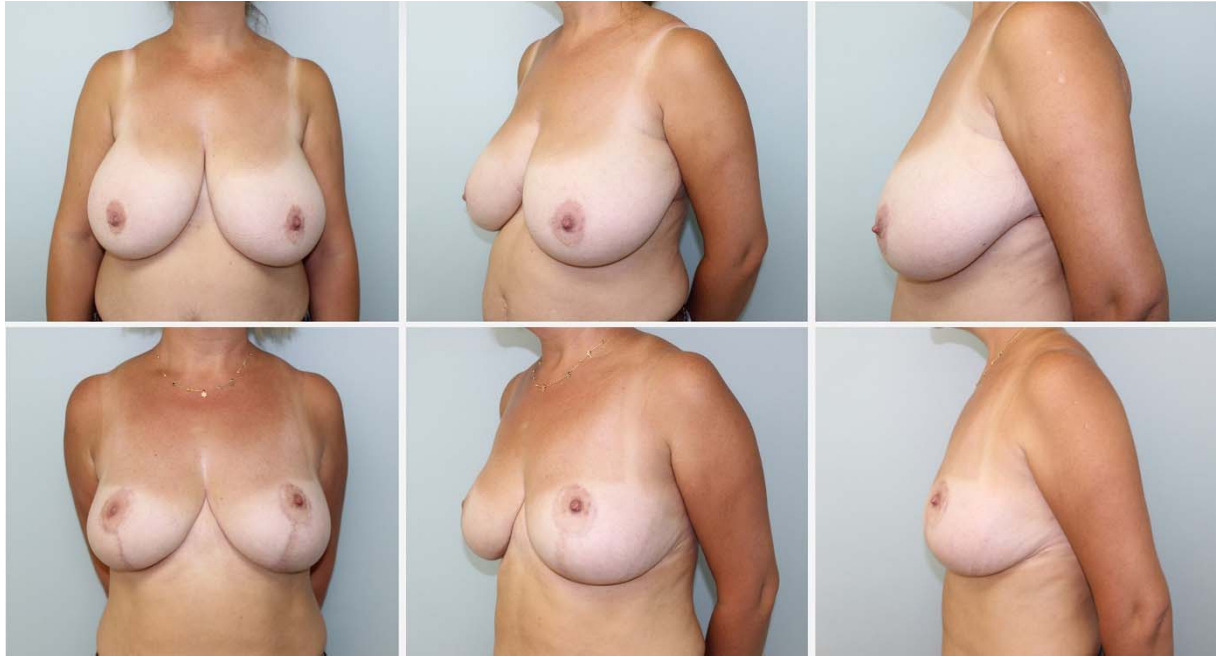
correction. Three cases showed bilateral extensive hypertrophic scarring among the transverse incision of the inverted-T scar, and all demonstrated considerable improvement following intralesional corticosteroid injections. One case underwent bilateral excision of the dog ears at the lateral end of the transverse scars, and one underwent surgery due to unilateral fat necrosis of the lower pole at postoperative 3<sup>rd</sup> month. Two cases presented with unilateral loss of NAC sensation. The overall satisfaction with the operation was high. Three representative cases are shown in Figures 2-4.



**Figure 2:** Before (upper row) and 12<sup>th</sup> month (lower row) views of a 40-year-old case after resection of 550 g from the right breast and 470 g from the left breast.



**Figure 3:** Before (upper row) and 15<sup>th</sup> month (lower row) views of a 47-year-old case after resection of 740 g from the right breast and 840 g from the left breast.



**Figure 4:** Before (upper row) and 30<sup>th</sup> month (lower row) views of a 45-year-old case after resection of 810 g from the right breast and 830 g from the left breast.

## DISCUSSION

Suspension of the inferior pedicle by using pectoralis major muscle flap,<sup>18</sup> superficial fascial system,<sup>19</sup> autologous dermal flaps,<sup>10,12,20-22</sup> acellular dermal matrix,<sup>23</sup> etc., have been introduced to overcome unintended outcomes of the inferior pedicle. With many specific modifications defined, autologous dermal flaps are the procedure of choice today by most plastic surgeons.<sup>12</sup> Various advantages of the dermal flaps over other suspension techniques, including ease of flap dissection and shaping, lack of donor site morbidity, cost-effectiveness, and benefits of using an autologous and biological material, can be considered as the primary reasons for their popularity.<sup>12,24</sup>

In the literature, there are various published series investigating the effectiveness of the dermal flaps with or without plication of the inferior pedicle. In a study performed by Kankaya et al.,<sup>22</sup> clinical outcomes of a dermal flap suspension technique were analyzed retrospectively in thirteen cases followed-up more than one year. In the surgical procedure, two pairs of quadrangular-shaped dermal flaps were elevated from each side of the inferior pedicle and without its plication, the pedicle was fixed to the rib periosteum through the dermal flaps. The authors stated that the technique they used eliminates the requirement for the pedicle plication in terms of preventing

pseudoptosis. In another study performed by Temel et al.,<sup>20</sup> a similar modification, in which two pairs of quadrangular- and triangular-shaped dermal flaps were used to suspend the pedicle to the rib periosteum, was performed in a more extensive series. The authors reported that there were no cases with the development of pseudoptosis and breast asymmetry, and most cases were satisfied with the postoperative appearance of the breasts. The reason stated for not to perform the pedicle plication was the concerns of the authors regarding the circulatory compromise of the NAC. In our opinion, both techniques can be useful for the prevention of pseudoptosis and recurrent ptosis, if the appropriate suspension of the inferior pedicle is performed by using the defined dermal flap modifications. However, the boxy breast appearance may be a significant problem in long-term due to anterior compression of the pedicle, which may be observed due to its fixation to the side pectoralis fascia under high tension by the dermal flaps and also due to not using pedicle plication.

The pedicle plication is a critical maneuver in inferior pedicle inverted-T scar reduction mammoplasty for several advantages, most importantly, it reduces tension at the T-junction by lifting the IMF and decreases the risk of wound dehiscence and skin necrosis, which was observed only in five cases of the present series. Furthermore, by folding the pedicle on itself

and shortening the pedicle length, it aids in increasing projection of the pedicle, placing the NAC in the desired position, and producing a cone-shaped pedicle mound with the NAC centered on it. Its ability to minimize the stretching of the vertical limb of the inverted-T scar, which is widely recognized as the leading cause of pseudoptosis, can be regarded as another advantage of the pedicle plication.<sup>9,10,12,25</sup> Although there is a concern that the plication can lead to arterial insufficiency and venous congestion of the NAC due to the increase of tension over the vascular structures of the pedicle,<sup>20</sup> it is our observation and others that this maneuver can be used reliably, even with the dermal flap suspension techniques.<sup>10,12</sup> Despite the loss of continuity of dermal and subdermal plexuses due to a dermal incision performed to facilitate the plication, only three cases of the present series presented with unilateral ( $n= 2$ ) or bilateral ( $n= 1$ ) superficial partial necrosis of the NAC. In our opinion, it was primarily due to the relatively longer nipple-IMF distance of these cases than the total sample, with a mean of 21.33 cm. It should also be noted that, in a study performed by Iwuagwu and Drew,<sup>26</sup> deskinning of the inferior pedicle, a more aggressive maneuver than performing a dermal incision, was shown not to increase the risk of circulatory complications of NAC in reduction mammoplasty.

The fact that the plication does not address medial and lateral portions of the inferior pedicle,<sup>10</sup> this maneuver may not be able to prevent lateral bulging and boxy breast appearance alone. To solve this issue, the plication was combined with dermal flap suspension in the present series, and the tips of dermal flaps were sutured to each other at the posterior aspect of the inferior pedicle. This maneuver caged and compressed the plicated pedicle on both sides and thus it provided a narrow breast mound and an increase at the projection of pedicle. In our opinion, the low rates of postoperative breast deformities and circulatory complications of NAC of this series demonstrate success and reliability of combining pedicle plication with dermal flap suspension.

To the best of our knowledge, there are two published series in the literature in which dermal flap suspension is combined with inferior pedicle plication during reduction mammoplasty.<sup>10,12</sup> In a study performed by Echo et al.,<sup>12</sup> the technique was performed in 66

cases presented with macromastia. The authors reported that satisfactory and favorable long-term outcomes were obtained, and postoperative breast deformities and circulatory complications of NAC were not observed in any of the cases. In the other study performed by Zic et al.,<sup>10</sup> more laterally extending triangular dermal flaps were used to suspend the pedicle, and the authors called the technique “dermal cage.” Of the 26 cases they submitted to surgery, one developed pseudoptosis, two presented with necrosis of NAC, and eight had a slight asymmetry. The authors stated that most of the cases with breast asymmetry were early in their series, and this outcome was mainly attributed to the authors’ learning curve. In both clinical series, the dermal flaps were designed as a triangle on each side of the inferior pedicle, as in the technique described by Aydin et al.<sup>27</sup> and as we performed. Based on our clinical experience and as defined by the authors, easy manipulation of triangular-shaped dermal flaps during the suspension of the inferior pedicle is the main reason to prefer this flap pattern.

As limitations of the present study, lack of postoperative breast measurements, lack of a quantitative method regarding the diagnosis of pseudoptosis, and also lack of a scale to measure patients’ postoperative satisfaction did not prevent us from being able to conclude our findings in such a large series. We believe that a further longitudinal and prospective study may help to confirm the results of the present study.

## CONCLUSION

The outcomes of the present study suggest that combining the pedicle plication with the dermal flap suspension improves the shape and position controllability of the inferior pedicle and thus contributes to producing a projectile and stabilized breast mound. It is an effective means of achieving satisfactory long-term outcomes and preventing postoperative deformities in cases undergoing inferior pedicle inverted-T scar reduction mammoplasty. Extended operative time due to a larger area of de-epithelialization than the routine procedure and applying more than one technical maneuver can be considered as a disadvantage of the present technique. However, these can be overcome easily by subsequent surgical experience.

**Supporting information:** This study was accepted to be presented as an oral presentation at the 41<sup>st</sup> National Congress of Turkish Society of Plastic Reconstructive and Aesthetic Surgeons, in Samsun, Turkey, October 26<sup>th</sup> to 30<sup>th</sup>.

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