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ORIGINAL ARTICLE BREAST

New Design for Axillary Dual-Plane Endoscopic Breast Augmentation for Asians: the Feasibility of Two Types of Dual-Plane Implant Pockets in 70 Patients as Measured by the BREAST-Q

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Abstract

Background The design methods for dual-plane implant pockets for axillary endoscopic breast augmentation vary among different countries. We applied a modified approach for an Asian population.

Methods Seventy patients with micromastia underwent our modified approach between 2011 and 2014. Breasts were divided into two types according to the soft-tissue pinch thickness of the lower pole: type I (thickness >2 cm; Group I) and type II (thickness ≤2 cm; Group II). The levels at which the pectoralis major (PM) was severed were 6–6.5 cm and 3–4 cm below the nipple for type I and II pockets, respectively. Then, dissection of the retromammary space was continued from the severance level downward to the new inframammary fold for type I pockets, whereas no dissection was made for type II pockets. All patients completed the pre- and post-operative BREAST-Q augmentation modules.

Results During a mean follow-up of 10 months (range, 6–12 months), patients reported higher satisfaction with breasts after surgery than before surgery (satisfaction scores of 64.9 ± 5.6 vs. 14.7 ± 11.0). The mean satisfaction score for the overall outcome was 91.3 ± 17.3. However, there was no significant difference in physical well-being (87.1 ± 10.4 vs. 85.2 ± 11.7). No complications such as severe capsular contracture or displacement occurred.

Conclusion Distinguishing the need for a type I or II dual-plane pocket can lead to good outcomes and optimal soft-tissue coverage. The higher satisfaction and quality of life reported by our patients indicate that our new design is feasible and safe for most Asians with a medium build.

Level of Evidence II This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Micromastia · Endoscope · Breast augmentation · Dual-plane technique · BREAST-Q

Introduction

Endoscopic-assisted breast augmentation has been performed for nearly two decades. The use of an endoscope through an axillary approach has made breast augmentation safer and more efficient while also avoiding scar formation on the breast surface [1–3]. The dual-plane technique not only offers the advantages of both retromammary and retropectoral pockets, but also optimizes the implant-mammary gland-PM (pectoralis major) dynamics, which can decrease the rate of capsular contraction [4]. Axillary endoscopic dual-plane breast augmentation has been proven to be safe for treating micromastia, especially among patients whose pinch thickness at the upper breast pole is <2 cm. Although the general treatment process is similar among plastic surgeons in different regions worldwide, the operative details and their corresponding advantages as well as operative experiences differ [5–8]. The dual-plane

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technique for breast augmentation is typically indicated for Chinese patients with micromastia, who are usually young, thin, and of moderate height [5]. Oversized implants are not appropriate for these patients, because they are likely to result in an unnatural appearance, unnatural movement, and excessive stiffness [8]. Thus, for these patients, the dual-plane pocket must be carefully designed to achieve optimal soft-tissue coverage of the implants, especially at the upper and lower poles. We previously studied methods for the new design of dual-plane pockets by anatomizing fresh female cadavers [9]. After 1 year of practice and modification of our technique, we found that dual-plane implant pockets with different positions of PM severance can be simplified to two types [10]. Our classification can be applied to most breasts because of its good coordination among the optimal implant coverage, minimal damage to PM function, and appropriate implant soft-tissue dynamics. To apply these findings in more patients with micromastia and achieve good outcomes with minimal complications, we divided breasts into two types according to the soft-tissue pinch thickness of the lower pole of the breast. Here we describe our methods for designing the dual-plane implant pockets and report our experience in Chinese women.

Patients and Methods

Masking Design

Three teams participated in our study: the designer of preoperative marking, the surgical team, and the follow-up team. Preoperative marking was completed according to the fixed standards by researchers who did not participate in the surgery. The surgical team did not take part in the evaluation, statistical analysis, and follow-up. Finally, the follow-up team was not informed of the dual-plane types. Patients were masked to the pocket type throughout the study.

Patients and Breast Types

Between 2011 and 2014, female patients with micromastia underwent axillary endoscopic dual-plane breast augmentation with our modified techniques in our department. The exclusion criteria were previous operation on a breast, ptosis, and tubular breasts, but no cases had to be excluded for these reasons. Each patient provided informed written consent for participation in this study.

Breasts were divided into two types according to the soft-tissue pinch thickness of the lower pole for determining the application of two dual-plane pocket techniques. In type I, the soft tissue of the lower pole was quite soft with a pinch thickness of greater than 2 cm, and the appropriate dual-plane pocket was type I (PM severance level: 6–6.5 cm below the nipple). In type II, the soft tissue of the lower pole was tight with poor elasticity with a pinch thickness of $\leq$2 cm, and the appropriate dual-plane pocket was type II (PM severance level: 3–4 cm below the nipple). Seventy-eight breasts (39 patients) were categorized as type I (Group I), and 62 breasts (31 patients) were categorized as type II (Group II). The type was consistent between left and right breasts in all patients.

Preoperative Marking

Markings were applied with the patient in the standing position (Fig. 1). The anterior median line was marked with a vertical line. The medial border was at least 1.5 cm from the anterior median line to avoid inadvertently disrupting the intercostal and internal mammary perforators. The anterior axillary line was marked as the lateral border. The existing inframammary fold was outlined simply. Then, the basic width of the breast was measured by a vernier caliper. By subtracting the thickness of the local soft tissue and 3.5 cm from the basic width, we calculated the appropriate height of the desired new inframammary fold (Fig. 1, dotted lines e_1-d, e_2-d) [11]. The top of a tape and the nipple were pinched maximally, superiorly stretching the skin of the lower half of the breast. According to the height, the desired new inframammary fold was marked at 6 o'clock by a dot, completed by a curve parallel to the existing fold (Fig. 1, dotted curved line F), and then connected with the medial and lateral border lines. The upper border of the new pocket was marked along the level of the second intercostal space. For type I breasts, the level where the PM was severed (Fig. 1, curved line G) was marked at 6–6.5 cm below the nipple level (Fig. 1, dotted lines e_1-g and e_2-g). For type II breasts, the level was marked at 3–4 cm below the nipple level (Fig. 1, dotted lines e_1-g and e_2-g). Once the four borders had been drawn on the breast, the location of the axillary incision was designed along the existing axillary fold close to the chest wall. To allow easy control and use of common-size silicone gel implants, the length of the incision was generally 4.0–5.0 cm.

According to the TEPID and High Five system, the proper implant volume was selected for each patient [12–15]. The height of the implant was selected as follows. If M-e1/M-e2 was equal to e1-e2, we usually selected a medium-height implant. If M-e1/M-e2 was greater than e1-e2, a full-height implant was chosen, and if M-e1/M-e2 was less than e1-e2, a low-height implant was considered most suitable for the breast [16].

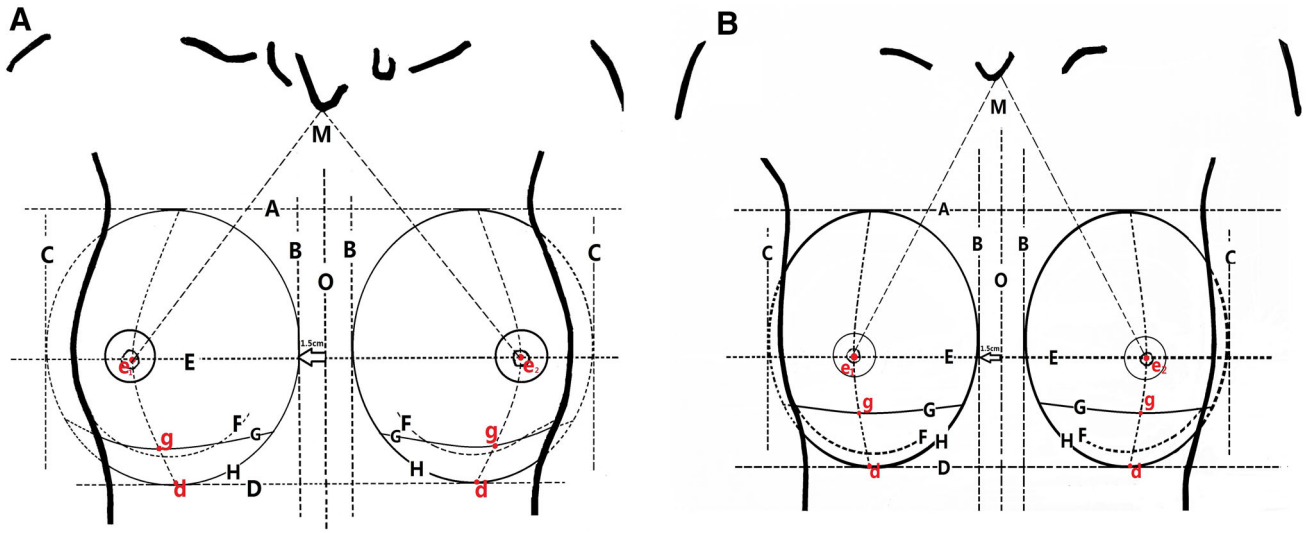

Fig. 1 Preoperative design for **a** type I and **b** type II breasts. The *circles* show the dissection range for the dual-plane implant pocket, and *dotted lines A, B, C,* and *D* show the borders of the pocket. *Dotted line O* is the anterior median line; *dotted line A* shows the upper border; *dotted line B* shows the medial border, at least 1.5 cm from *dotted line O*; *dotted line C* shows the lateral border, which is the anterior axillary line; *dotted line D* shows the lowest point of the desired new inframammary fold; *dotted line* e_1*-d* or e_2*-d* shows the height of the desired new inframammary fold; *dotted line E* shows the level of the nipple; *dotted curved line F* shows the existing inframammary fold; *curved line G* is the level at which the PM is severed; *curved line H* is the desired new inframammary fold, parallel to the existing one (*dotted curved line F*)

Surgical Technique

The surgical team included one senior surgeon, two assistants, one anesthetist, and one scrub nurse. All procedures were performed under general anesthesia. The patient was placed in the supine position with both arms abducted 90°–100°. In each operation, the sequence was from left to right. Two milliliters of local anesthesia solution containing 0.75 % lidocaine and 1/200,000 units of epinephrine were injected beneath the incision. A 4–5-cm skin incision was made and deepened to the lateral border of the PM muscle. If desired, a finger-sweep technique was applied to enlarge the tunnel approach to allow enough space to insert a U-shaped retractor.

The tumescent solution consisting of 500 ml of normal saline, 12 ml of 2 % lidocaine, 6 ml of 5 % sodium bicarbonate, and 0.6 ml of 1:1000 epinephrine was injected into the retropectoralis space around the inframammary fold to decrease bleeding. Upon lifting the PM with the U-shaped retractor, a 10-mm, 30° endoscope and electrocautery were inserted into the upper retropectoral pocket. The upper pole and medial, lateral, and lower parts of dual-plane implant pockets were orderly established using the endoscopic dissecting instruments. Once the retropectoral pocket was dissected, the PM was severed to create dual-plane space along the marking (Fig. 1, curved line G) designed preoperatively until subglandular fat or the mammary gland was seen on the monitor. Then, the PM was separated into two parts, the upper part and lower part. In type II breasts, the dissection of the dual-plane pocket was basically finished, whereas in type I breasts, the dissection of the retromammary space in front of the lower PM continued until the new inframammary fold was reached. Any restrictions such as fasciculus or pinnate attachment points were released to ensure that the pocket could be lifted easily using a retractor. However, meticulous attention must be paid to avoiding any damage to the branches of the internal thoracic artery near the parasternal line.

In the next step, further hemostasia was achieved with the aid of the endoscope and monopolar cauterization. Negative pressure drainage was left and fixed. An anatomic, textured silicone gel implant was inserted into the dual-plane pocket via the axillary approach with the help of S-shaped retractor. The final size of the implant could be adjusted if needed according to the volume of the dual-plane pocket already completed. Placement of the implant was assessed and further adjusted if necessary. On the monitor, the exact placement of the implant could be observed. In type I breasts, the upper part of the implant was behind the PM, and its lower part was behind the mammary gland. In type II breasts, only the range of the implant near the severance position of the PM was in the retromammary plane. The incision was closed by a discontinuous intradermal suture technique with 4-0 absorbable sutures. An elastic supportive dressing was applied at the upper and lower positions of the breast for 7 days to keep the implant in the appropriate location. The drainage

was removed once the output from each side was <20 mL per 24 h postoperatively.

Outcome Assessment

During the following-up appointments, the symmetry, breast contour, breast separation or gathering, softness, sensitivity of the nipple–areola complex, axillary scarring, and patient complications were assessed and recorded by the follow-up team.

All patients completed the BREAST-Q augmentation module at 1 day before surgery and 6 months after surgery to evaluate their condition in the last 2 weeks of the study period [17–19]. We used five subthemes of the BREAST-Q augmentation module: psychosocial well-being, sexual well-being, physical well-being chest and upper body, satisfaction with breast, and satisfaction with outcome [20]. The subtheme of satisfaction with care was not applied in this study. QScore software was used to transform the raw responses provided by patients into BREAST-Q data [21]. Scores ranged from 0 to 100 (with a higher number indicating higher satisfaction or better quality of life). The results are presented as mean ± standard deviation (SD) values. The SPSS program version 17.0 (SPSS, Chicago, IL, USA) was used for statistical analysis.

Results

Between 2011 and 2014, 70 patients (140 breasts) entered this study. All cases were followed up for an average of 10 months (range, 6–12 months). The demographic data of all patients are shown in Table 1. The mean patient age was 29.8 ± 7.0 years (range, 18–45 years; Table 1). However, patients in Group I were significantly older than those in Group II ($P < 0.05$). The distribution of patient age groups concentrated on 20–30 years and then 31–40 years (Fig. 2). Also, the difference in mean BMI between the two groups was significant, indicating that patients in Group II were thinner than patients in Group I (Table 1). There were no significant changes in patient weight from before the operation to the end of the follow-up period.

Operative Outcome

All patients recovered from surgery uneventfully. The mean operative time among all patients was 97.8 ± 11.5 min (range, 70–117 min; Table 2), and the operative time for Group I was longer than that for Group II (102.1 ± 11.1 vs. 96.0 ± 11.3 min; $P < 0.05$). The mean size of implants among all patients was 228.6 ± 13.5 cc (range, 200–255 cc; Table 2). Although the mean size was less than that commonly used in American and European patients, it was satisfactory for most patients in this study, according to the relatively conservative esthetic standards of Chinese patients and other Asians. An implant size of 225 cc was most commonly chosen in this study, followed by 215 cc and 245 cc (Fig. 3). Patients in Group I chose larger implants than patients in Group II, which may correspond to better elasticity of skin, larger implant pockets, or more soft-tissue coverage in Group 1 ($P < 0.05$, Table 2). The average hospital stay of all patients was 3.6 days, and the average drainage time was 3 days. The average drainage volumes were 74.9 ml, 41.5 ml, and 22.8 ml on the first 3 days. No significant differences were found between the two groups with respect to hospital stay, drainage time, and drainage volume ($P > 0.05$, Table 2). Actually, it was observed that the tumescent solution accounted for most of the drained liquid, especially during the first 2 days after surgery.

By the final follow-up appointment, the patients and surgeons considered the surgical outcomes related to the breast symmetry, contour, separation or gathering, softness, sensitivity of nipple–areola complex, and axillary scarring to be good. At each visit, the measurement positions and photography parameters were the same, and the follow-up work was completed by the same researchers, not including the surgeons. Along the mid-clavicular line, the location of the nipple was moved up by 0.5 ± 0.3 cm, and along the nipple level, nipple placement was moved outward by 0.8 ± 0.2 cm. The projection of the breast was moved forward by 2.7 ± 1.2 cm (Fig. 4).

Table 1 Demographic data for all patients

Items	No.	Minimum	Maximum	Mean ± SD	Group		*P* value
					Group I	Group II	
Age (years)	70	18	45	29.8 ± 7.0	33.2 ± 6.4	28.4 ± 6.8	0.008
BMI[a] (kg/m^2)	70	20.1	25.2	21.9 ± 0.9	22.5 ± 1.5	21.5 ± 0.9	0.005

[a] Body mass index

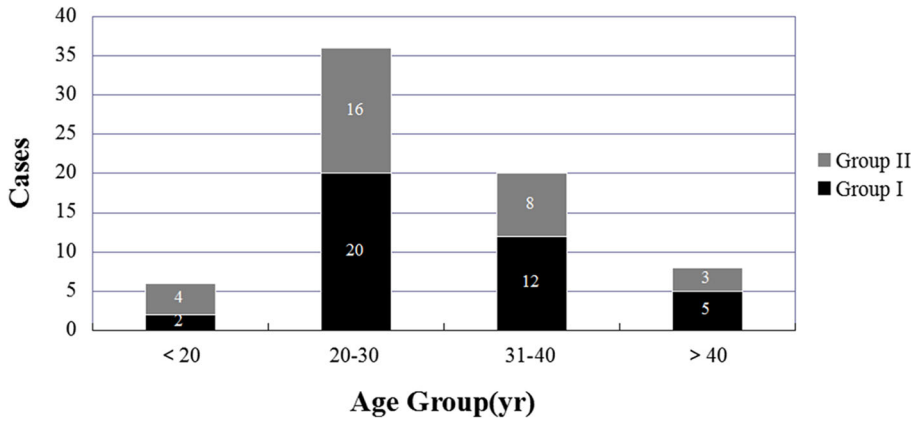

Fig. 2 Distribution of age groups

Table 2 Basic data of intraoperative and postoperative conditions

Items	No.	Minimum	Maximum	Mean ± SD	Group		*P* value
					Group I	Group II	
Operative time (min)	70	70	117	97.8 ± 11.5	102.1 ± 11.1	96.0 ± 11.3	0.040
Implant size (cc)	70	200	255	228.6 ± 13.5	238.3 ± 10.5	224.4 ± 12.4	0.000
Hospital stay (d)	70	3	5	3.6 ± 0.6	3.62 ± 0.6	3.55 ± 0.5	0.641
Drainage time (d)	70	2	4	3.0 ± 0.3	3.00 ± 0.3	2.98 ± 0.3	0.773
Drainage volume (ml)							
Day 1	70	55	105	74.9 ± 10.2	75.8 ± 10.5	74.6 ± 10.3	0.659
Day 2	70	20	62	41.5 ± 8.2	41.0 ± 8.9	41.7 ± 8.0	0.739
Day 3	70	15	36	22.8 ± 3.7	22.0 ± 6.3	21.8 ± 5.8	0.875

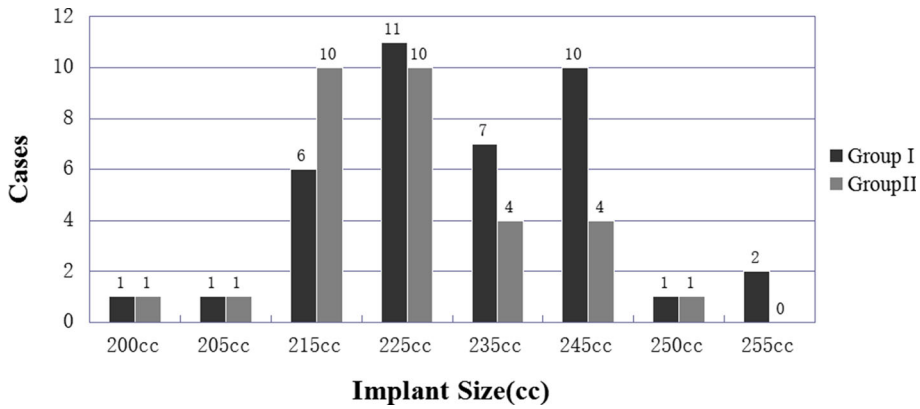

Fig. 3 Distribution of implant volume chosen in the two groups

Both patients and surgeons were satisfied with the natural appearance and movement of the augmented breasts. Only one patient reported feeling that her implants were a slightly larger than she desired, but she still considered the outcome acceptable. In one case, capsular contracture (Baker II) was recorded. No cases of complications such as displacement, hematoma, infection, or scar hyperplasia were observed. Images of example cases for the two groups are shown in Figs. 5, 6, 7 and 8.

BREAST-Q Results

Pre- and post-operative BREAST-Q augmentation modules were completed 1 day before surgery and at least 6 months

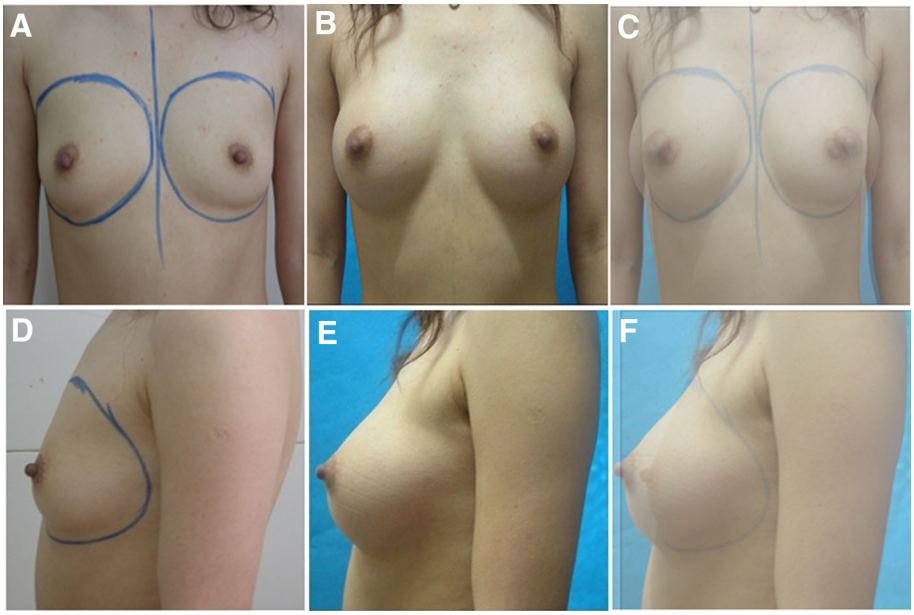

Fig. 4 Thirty-year-old patient with type I breasts. **a**, **d** Preoperative views. **b**, **e** Postoperative views obtained 10 months after surgical implantation of Mentor medium height-medium projection 235-cc anatomical implants. **c** Overlaid view of (**a**, **b**) showing the shift of the nipple-areola complex. **f** Overlaid view of (**d**, **e**) showing the change in breast projection

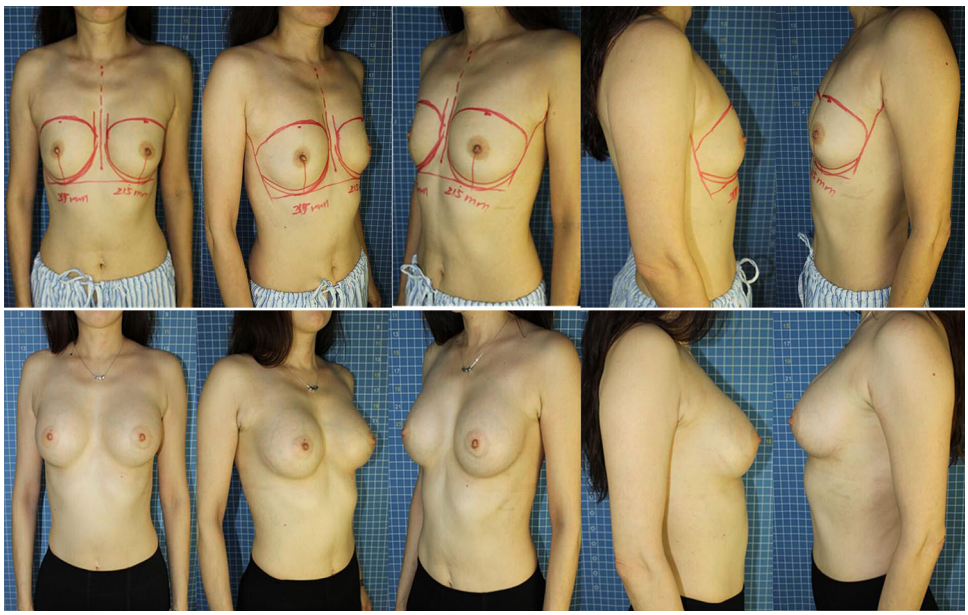

Fig. 5 Thirty-five-year-old patient with type I breasts with one lactation episode. (*Above*) Preoperative views. (*Below*) Postoperative views obtained 10 months after surgical implantation of Mentor medium height-medium projection 245-cc anatomical implants. The implant size was changed just before surgery based on the patient's preference

after surgery, respectively. The results are listed in Tables 3, 4, 5. The scores indicated higher satisfaction with breasts after surgery than before surgery (64.9 ± 5.6 vs. 14.7 ± 11.0, $P < 0.05$; Table 5) with respect to the natural appearance and good mobility of augmented breasts. Satisfaction with the overall outcome after surgery was quite high (91.3 ± 17.3; Table 4). For the domains of quality of life, scores for psychosocial well-being and sexual well-being before surgery were 10.2 ± 13.1 and 16.1 ± 9.3, respectively (Table 3), and these increased significantly to 78.9 ± 10.1 and 83.9 ± 8.5 after surgery (Tables 4, 5), suggesting an observable improvement of quality of life. Yet, there was no significant difference of physical well-being pre- and post-operation (87.1 ± 10.4 vs. 85.2 ± 11.7, $P > 0.05$; Table 5), suggesting no effect on the physical health of patients in this study.

Discussion

Various procedures and institutional experiences for the dual-plane technique in axillary endoscopic breast augmentation have been described in many articles published by surgeons around the world [4–7, 22]. Among them, Tebbetts

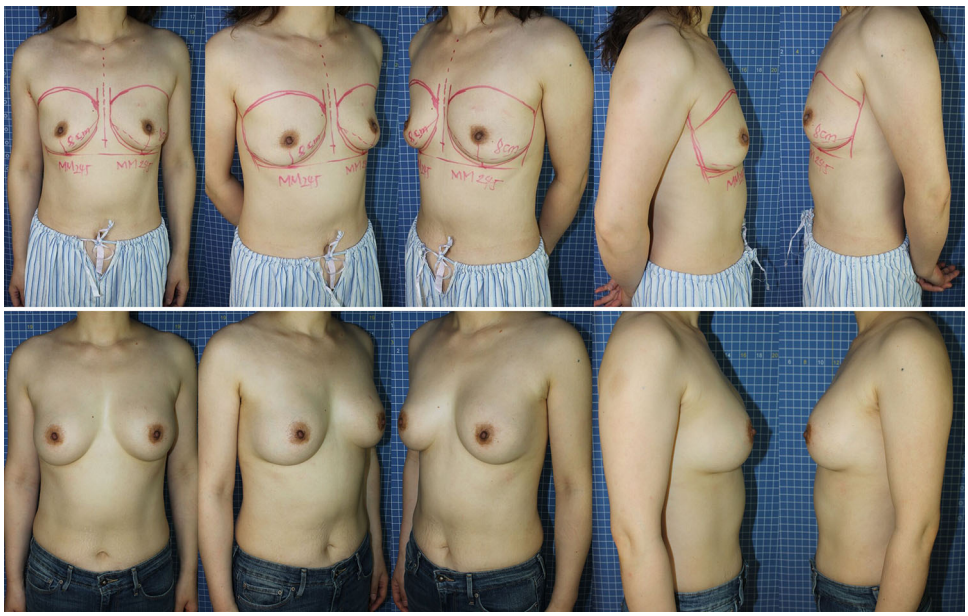

Fig. 6 Thirty-two-year-old patient with type I breasts with one lactation episode. (*Above*) Preoperative views. (*Below*) Postoperative views obtained 9 months after surgical implantation of Mentor medium height-medium projection 245-cc anatomical implants

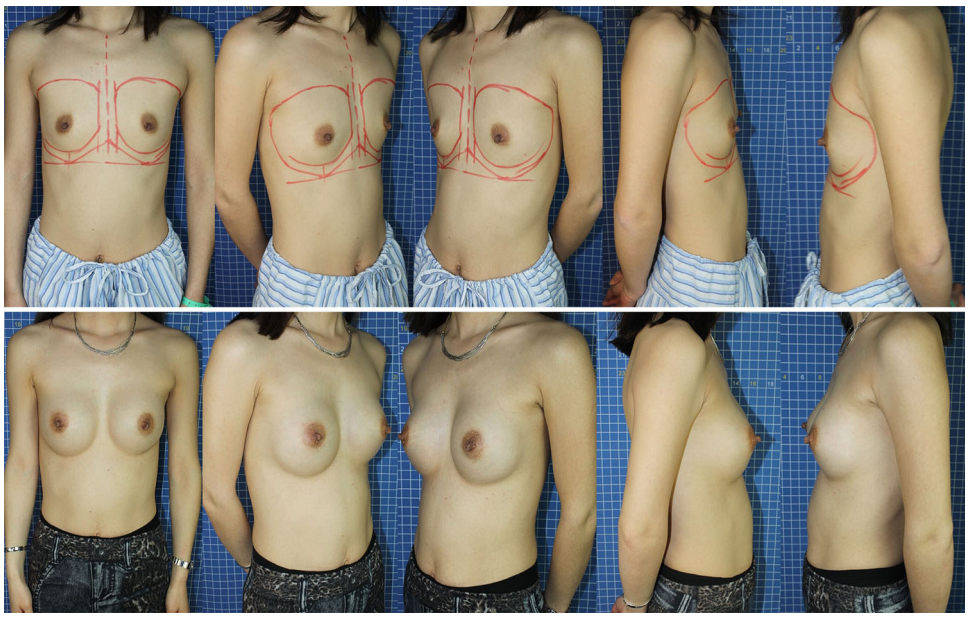

Fig. 7 Twenty-four-year-old patient with type II breasts and no reproductive history. (*Above*) Preoperative views. (*Below*) Postoperative views obtained 11 months after surgical implantation of Mentor full height-medium projection 215-cc anatomical implants

et al. [4] designed their dual plane according to three types as follows: no PM interface separation, separation inferior or superior to the edge of the areola, and dissection upward to the retromammary space. Although they showed the practicability and scientific validity of their method, their approach is still not quite ideal for Chinese patients in whom smaller implants are typically desired. Luan et al. [5] reported their experience with designing the implant pocket at 1.5 cm or 2–3 cm above the inframammary fold. We consider that their design for the position PM division may not be high enough to achieve optimal coverage for type II breasts, as defined in our study.

The design basis for the two type dual-plane techniques was derived from our previous study of fresh female cadavers, in which we equally divided the length of the inframammary fold into four segments spaced at approximately 2 cm [9]. In type I breasts, the position of PM severance at 6–6.5 cm below the nipple level mostly corresponds to the aponeurosis formed by the PM and anterior layers of the rectus sheath. Because the lower pole of the breast is covered with enough soft tissue, the position at which the PM is severed can be shifted downward. However, for type II breasts, the soft-tissue covering the lower pole is generally not thick enough. Thus, to avoid

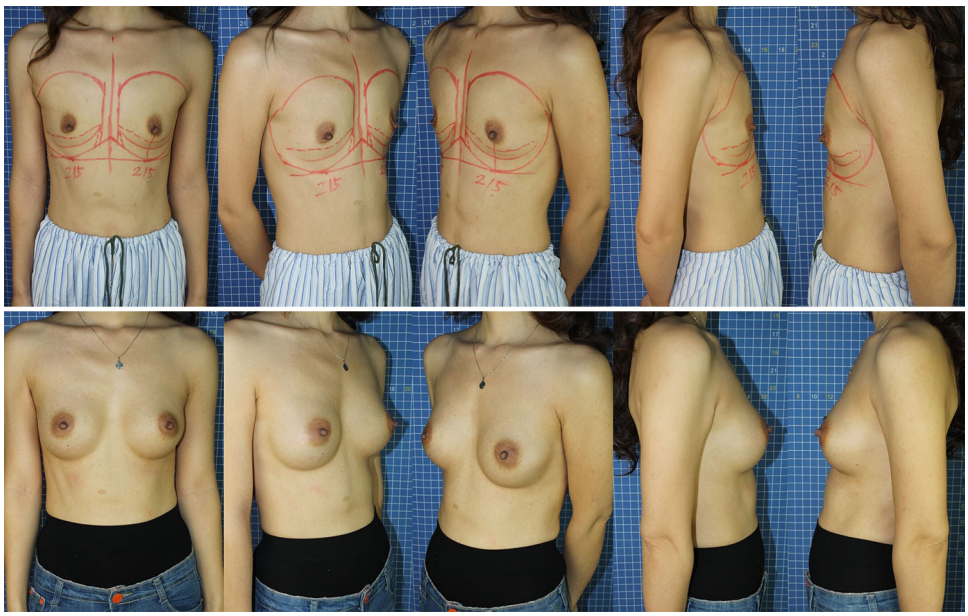

Fig. 8 Twenty-eight-year-old patient with type II breasts and no reproductive history. (*Above*) Preoperative views. (*Below*) Postoperative views obtained 10 months after surgical implantation of Mentor medium height-medium projection 215-cc anatomical implants

Table 3 QScore data for four domains of the BREAST-Q reported pre-operatively

Item	Domain	**No.**	Minimum	Maximum	Mean	SD
1a–1f	Satisfaction with breast	70	0	31	14.7	11.0
2a–2i	Psychosocial well-being	70	0	43	10.2	13.1
3a–3e	Physical well-being chest and upper body	70	66	100	87.1	10.4
4a–4e	Sexual well-being	70	0	39	16.1	9.3

Table 4 QScore data for five domains of the BREAST-Q reported post-operatively

Item	Domain	**No.**	Minimum	Maximum	Mean	SD
1a–1q	Satisfaction with breast	70	42	77	64.9	5.6
2a–2h	Satisfaction with outcome	70	14	100	91.3	17.3
3a–3i	Psychosocial well-being	70	45	100	78.9	10.1
4a–4e	Sexual well-being	70	62	100	83.9	8.5
5a–5g	Physical well-being chest and upper body	70	57	100	85.2	11.7

Table 5 Statistical comparison of scores on the BREAST-Q augmentation module between pre- and post-operative conditions

Domains	BREAST-Q Scores		*P* value
	Pre-operative	Post-operative	
Satisfaction with breast	14.7 ± 11.0	64.9 ± 5.6	0.000
Psychosocial well-being	10.2 ± 13.1	78.9 ± 10.1	0.000
Sexual well-being	16.1 ± 9.3	78.2 ± 12.7	0.000
Physical well-being chest and upper body	87.1 ± 10.4	85.2 ± 11.7	0.421

palpability of the inferior margin of the implant, the position at which the PM is severed should be shifted upward, but it must still not be higher than the sternal origin of the PM. The position at 3–4 cm below the nipple level corresponds to the costal part of the PM that does not play a key role in upper limb movement. Therefore, the middle two segments (3–4 and 6–6.5 cm) were confirmed to benefit the esthetic outcomes and to have minimal influence on the PM function.

Spear et al. [23] designed the dual-plane pocket to maximally decrease the pressure from the PM to the implant and concluded that this approach reduced the incidence rate of capsular contracture. In addition, the tendency of implants to shift upward is obviously reduced, which prevents their displacement. Similar results were observed in the present study. Full release of the pressure on the silicone gel implant mainly derived from the lower part of the PM is critical for efficiently maintaining the natural appearance, good movability, and softness of the augmented breast in the long term.

Unlike others approaches, the dissection in the subglandular plane was specially modified. In type I breasts, the original coverage of the soft-tissue of breast lower pole was moderate. Thus, the downward dissection in the subglandular space was safe until the new inframammary fold was reached without concern about palpability. The main purpose of avoiding dissection in the upper subglandular plane was to lift the upper part of breast soft-tissue by the elastic recoil derived from the upper PM. However in type II breasts, the original soft-tissue coverage of the lower pole was generally lacking. Thus, there was no additional dissection between the lower PM and subglandular plane, which could ensure the lower pole of the implant was placed into the retropectoral plane to prevent palpability. With the help of the elastic recoil derived from the upper or lower part of the dissected PM, the breast gland could be lifted up and the soft-tissue coverage around the new inframammary fold increased, especially for type II breasts. In the present study, it was observed that the clavicle midpoint-to-nipple distance, the nipple-to-nipple distance, and the breast projection were moved upward, outward, and forward, respectively (Fig. 4). Also, withdrawal of the lower PM to the inframammary fold contributed to increasing the soft-tissue coverage. These advantages made the operation procedure easier and more efficient.

Among the borders of the dual-plane pocket, the medial border must be given the most attention. We agree with the opinion of Tebbets et al. [4] that a safe distance is at least 1.5 cm from the anterior median line to prevent inadvertent disruption of the intercostal and internal mammary perforators. Among Chinese women, the average width of the lower two-thirds of the midsternum is 3.0 ± 0.5 cm [9], and the branches of the internal thoracic artery usually run out of each costal region from the 2nd to 6th intercostal spaces at 0.5–1.0 cm from the parasternal line [4, 7, 12, 13]. Therefore, it is dangerous to ignore this safe distance in pursuit of creating perfect cleavage. Based on our practice, the height of the desired new inframammary fold results from a simple formula of subtracting the mean thickness of soft-tissue and 3.5 cm from the basic width of the breast. Upon analyzing the physical characteristics of Chinese women, the length of 8–10 cm will be suitable for most of them, and this length is notably shorter than that in Americans and Europeans [8]. The upper border is equal to the height of the implant plus 1 cm and usually reaches the level of the second or third intercostal space.

The demographics of two groups were analyzed, and the mean age of patients in Group I was older than that of patients in Group II, which suggests that older patients may have greater pinch thickness and tissue extension of breasts to fit a type I dual-plane due to reproductive history or skin aging. Also, the difference in BMI between the two groups was significant, with patients in Group II being thinner than those in Group I. In terms of operative details, the mean operative time was longer for Group I than for Group II, and this difference may be associated with the larger implants used in Group I. More time may be required to finish dissecting the larger dual-plane pocket and implant the larger silicone implants.

Although the mean implant size was less than that typically chosen by American or European women [4, 7, 12, 13], it was satisfactory to most patients in this study, likely based on the relatively conservative esthetics standards of Chinese and other Asian populations. No significant difference was found between the two groups in terms of hospital stay, drainage time, and drainage volume. It has been reported that hemorrhage is associated with capsular contracture [23, 24], and thus, we consider drainage to be indispensable for the prevention of capsular contracture and ecchymoma. Actually, it was observed that the tumescent solution accounted for most of the drained liquid, especially during the first 2 days after surgery. In addition, the scar from the drainage incision was inconspicuous at 6–12 months after surgery in most patients.

According to the BREAST-Q results (Tables 3, 4, 5), patients reported higher satisfaction with breasts after surgery than before surgery with respect to the natural appearance and good mobility of augmented breasts, and overall satisfaction was quite high. In domains of quality of life, the subjective increases in psychosocial well-being and sexual well-being from before surgery to after surgery were greater than 20, which can be interpreted as ‘very much’ change in quality of life. The lack of a significant difference in physical well-being between the pre- and post-operative evaluation suggests no effect on the physical health of patients in this study.

Conclusion

Based on the pinch thickness of the lower pole, breasts were divided into two types for matching with two types of dual-plane implant pockets. Discriminating between type I and type II breasts led to good outcomes and the most optimal soft-tissue coverage for each breast type. Without dissecting the upper retromammary space in type II breasts, the procedures were simplified and still efficient with respect to optimal coverage and releasing pressure on the implant derived from the PM. In additional, in type I breasts, the lifting effect on breast soft-tissue adhering to the upper PM was increased by downward dissection in the retromammary space and severance at a lower position at 6–6.5 cm below the nipple. Moreover, withdrawal of the lower PM to the inframammary fold can contribute to increasing the soft-tissue coverage, which decreases the risk of palpability.

The low complication rate, high satisfaction scores, and higher quality of life observed indicate that the new design method is feasible and safe for fitting breast implants for most patients with a medium build, such as Asian women. For observation of long-term outcomes, all patients in the present study continued to be followed.

Compliance with Ethical Standards

Conflicts of Interest None declared.

Ethical approval Ethical approval for this study was given by the medical ethics committee of our Hospital.

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