

Original Article

A retrospective study of primary breast augmentation: recovery period, complications and patient satisfaction

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Abstract: Background: The most critical thing in breast augmentation surgery is to determine the location for implant placement. However, few researches on this were carried out in China. We therefore conducted this retrospective study to compare the recovery period, complications and patient satisfaction at two different implant placement locations—the subglandular plane and the subpectoral plane. Methods: A total of 144 patients were included. All of them have undergone primary aesthetic breast augmentation with cohesive silicone gel implant. Then they were divided into two groups according to the implant location: group A (in the subglandular plane) and group B (in the subpectoral plane). Data collected were patient data, surgery-related indicators, recovery, complications and patient satisfaction. Results: Thirty-nine patients were assigned to group A, and 105 patients to group B. In terms of patient data, no significant difference was found in age, follow-up time and the size of prosthesis between the two groups, but there existed statistically significant difference in body mass index (BMI) and the preoperative mammary tissue thickness ($P < 0.05$). For surgery-related indicators and recovery, group A was better than group B in surgical blood loss, duration of pain and indwelling drainage tube, with statistical significance ($P < 0.05$). But regarding the complications, significant difference was found only in the nipple-areola numbness ($P < 0.05$). Overall, 76% of the patients reported they were “satisfied” with the outcome or the outcome was “perfect”. Conclusion: Implant placement in the subglandular plane has a shorter recovery period than that in the subpectoral plane. The occurrence of complications and degree of patient satisfaction are similar in the two groups.

Keywords: Breast augmentation, subglandular, subpectoral

Introduction

According to the American Society of Plastic Surgeons, the number of plastic surgery procedures continues to grow steadily in United States. A total of 15.1 million cosmetic surgery procedures were performed in US in 2013, which have been increased by 3% since 2012. Among them, 290 thousand breast augmentation surgeries were performed in 2013; surgery of this kind continues to be the top cosmetic surgical procedure since 2006 [1]. In china, breast augmentation is also one of the most popular cosmetic procedures. However, there is a lack of research on the recovery period, complications and patient satisfaction of the procedures.

Selecting pocket location for breast implant is the most important decision in breast augmen-

tation [2]. Internationally, there are four main locations: subglandular, subpectoral, subfacial and dual-plane locations. In china, the first two are selected very commonly. In this study, we will compare the recovery period, complications and patient satisfaction of these two kinds of locations.

Patients and methods

A retrospective study was conducted in the Department of Plastic and Reconstructive Surgery of Southwest Hospital, with the approval of the Ethics Committee of the Third Military Medical University. A total of 144 women were included in this study. They underwent primary aesthetic breast augmentation with cohesive silicone gel implant between March 2009 and December 2013. All of them received a subglandular or subpectoral breast implant and

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Table 1. Pre-operative general conditions of patients

Characteristics	Subglandular	Subpectoral	P Value
No. of patients (%)	39 (27%)	105 (73%)	
Age, years			
Mean (SD)	38.10 (8.12)	31.21 (7.54)	0.00
Range	22~63	18~55	
BMI, kg/m ²			
Mean (SD)	20.19 (1.47)	19.17 (1.94)	0.04
Range	17.10~23.10	15.2~24.7	
Smoking			0.35
Yes	2	12	
No	37	93	
Previous pregnancy			0.00
Yes	36	66	
No	3	39	
Mammary tissue thickness, mm			
Mean (SD)	9.39 (4.56)	7.87 (2.39)	0.03
Follow-up, months			0.77
Mean (SD)	32.50 (13.80)	31.66 (14.20)	
Range	8~51	3~59	
Implant volume, cc			
Mean (SD)	201.92 (17.15)	199.62 (20.97)	0.13
Range	175~225	175~335	

attended a follow-up appointment for at least 1 month after surgery. The surgical procedures were performed at the Department of Plastic and Reconstructive Surgery of Southwest Hospital. Patients in group A received breast implants in the subglandular plane, while those in group B received in the subpectoral plane.

Data collected were patient data, surgery-related indicators, recovery, complications and patient satisfaction. Patient data included age, pregnancy, body mass index (BMI), smoking status, surgical time, implant volume, and so on. Surgery-related indicators and recovery involved operative time, surgical blood loss, duration of pain, and duration of hospital stay. And complications and patient satisfaction were included in the follow-up.

Surgery

The volume of breast implant depended on the breast size, thickness of the mammary soft-tissues, stretchability of skin, patient's height, patient's expectation and some other factors. All implants were round with textured surfaces. Whether to place them in the subglandular or

subpectoral plane was mainly determined by thickness of the mammary soft-tissues and the surgeon's experience. Intravenous (IV) antibiotics were given once both preoperatively and postoperatively.

The boundaries of implant pocket were marked preoperatively by the surgeon with the patient in standing position. All procedures were performed under general anesthesia. Adrenaline 1/200,000 dilution was injected at the operation sites to reduce surgical blood loss. Axillary or periareolar incision was made in all cases. The surgeon created pocket manually or using blunt dissectors, and then inserted and adjusted the implant manually. Drains were used in most patients

based on the surgeon's preference and the implant pocket.

Satisfaction

Patients were interviewed by telephone about their satisfaction, which included overall satisfaction, satisfaction with breast shape and attitudes toward some complications. The follow-up time was no less than 3 months after breast augmentation. Satisfaction was rated on a scale of 1 to 5, in which 5 = very satisfied, 4 = somewhat satisfied, 3 = neither satisfied nor dissatisfied, 2 = somewhat dissatisfied, and 1 = very dissatisfied.

Statistical analysis

Statistical analysis was performed using the SPSS 17.0 statistical software for Windows. Measurement data (such as average age, BMI, follow-up time, thickness of the mammary tissues, Follow-up time, implant volume, operative time, surgical blood loss, duration of pain, duration of indwelling drainage tube and duration of postoperative hospital stay) were compared with *t* test. The enumeration data (such

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Table 2. Surgery-related indicators and post-operation recovery

Characteristics	Subglandular	Subpectoral	P Value
Operative time, min			
Mean (SD)	81.49 (18.42)	78.38 (24.11)	0.49
Range	40~114	35~150	
Surgical blood loss, ml			
Mean (SD)	35.00 (28.87)	45.60 (27.73)	0.02
Range	5~130	10~100	
Duration of pain, hours			
Mean (SD)	47.54 (17.95)	66.92 (19.97)	0.00
Range	18~77	22~123.5	
Duration of indwelling drainage			
Tube, days, mean (SD)	1.46 (1.39)	2.98 (1.21)	0.00
Range	0~5	1~9	
Duration of postoperative			
Hospital stay, days, mean (SD)	5.23 (3.00)	6.05 (2.13)	0.13
Range	2~12	2~12	

as smoking, previous pregnancy, CC and asymmetry/displacement and complications) were analyzed mainly by chi-square statistics. The comparisons of infection, nipple-areola numbness and reoperation rate were made with Fisher's exact test. The Wilcoxon rank-sum test was used to compare patients' satisfaction. The ordinal logistic regression was used to analyze all the related factors probably influencing patients' satisfaction, which was included preoperative general conditions, surgery-related indicators, post-operation recovery and complications. The significance test was two-tailed. A p value < 0.05 was considered statistical significant.

Results

Patient data

A total of 144 patients were enrolled in our study. The 39 patients in group A received silicone-filled breast implants in the subglandular plane, while the 105 patients in group B received in the subpectoral plane. The average age in group A was 38.1 years (ranged from 22 to 63 years), and in group B was 31.21 years (ranged from 18 to 55 years). BMI ranged from 17.10 to 23.10 kg/m² (mean = 20.19 kg/m²) in group A, and from 15.20 to 24.70 kg/m² (mean = 19.17 kg/m²) in group B. The preoperative thickness of mammary soft-tissues was measured by color Doppler ultrasound at later-superior quadrant, with a mean of 9.39 mm in

group A, and 7.78 mm in group B. Patients were followed up for a mean of 32.50 months (ranged from 8 to 51 months) in group A, and 30.99 months (ranged from 3 to 57 months) in group B. The mean size of prosthesis was 201.92 ml and 199.62 ml in group A and group B, respectively. There was no significant difference in age, follow-up time, implant volume and smoking status between the two groups, but great significant difference in BMI, the preoperative thickness of mammary tissues and previous pregnancy status ($P < 0.05$) (Table 1).

Surgery-related indicators and recovery

Depending on the patient's situations, we figured out some surgery-related indicators (Table 2). First of all, the mean operative time for group A and group B was 81.49 min and 78.38 min, respectively. Although no significant difference was found in operative time, there existed statistically significant difference in surgical blood loss, duration of pain and duration of indwelling drainage tube. Group A was better than group B in the three aspects. The average surgical blood loss in group A (35 ml) was less than that in group B (45.60 ml) ($P < 0.05$). As for the duration of pain, the mean time was 47.54 h in group A, superior to 66.92 h in group B ($P < 0.05$). Additionally, the mean time of indwelling drainage tube was 1.46 days in group A, and 2.98 days in group B ($P < 0.05$). At last, there was no statistically significant difference in the duration of postoperative hospital stay between the two groups, with a mean of 5.23 days and 6.05 days in group A and group B, respectively.

Complications

The follow-up survey was conducted among 124 patients (response rate, 86.1%). Complications such as capsular contracture (CC, Baker grade III/IV), infection, asymmetry/displacement and nipple-areola numbness were summarized on implant levels. The reoperation rate was still calculated on patient level. Three

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Table 3. Post-operative complications in the two groups

Characteristics	Subglandular	Subpectoral	P Value
No. of patients (Response Rate)	35 (89.7%)	89 (84.8%)	
Capsular contracture (III/IV)	3 (4.3%)	5 (2.8%)	0.85
Infection	0 (0%)	1 (0.56%)	1.00
Asymmetry/displacement	0 (0%)	10 (5.6%)	0.10
Nipple-areola numbness	5 (7.14%)	0 (0%)	0.00
Reoperation	1 (2.86%)	1 (1.12%)	0.49

tion. Significant difference existed in nipple-areola numbness ($P < 0.05$), but not in the other complications ($P > 0.05$) (Table 3).

Patient satisfaction

Patients were asked to grade their overall satisfaction level (Figure 1) on a scale of 1 (poor) to 5 (perfect). 76% of patients in

group A and 74% of patients in group B were satisfied with the outcome. They rated their overall satisfaction greater than 4 points. Then in group A, 24% of patients rated their satisfaction as 3 points. In group B, 20% of patients gave their overall satisfaction 3 points, indicating that they were neither satisfied nor dissatisfied with the outcome. Finally, 6% of patients in group B were dissatisfied with the result. These women rated the overall satisfaction as 1 or 2 points. The satisfaction with breast shape was similar to overall satisfaction (Figure 2). All the grades in two groups had no statistically significant difference ($P > 0.05$). The analysis of ordinal Logistic regression showed that patients' satisfaction was only related to the happening of capsular contracture ($OR = e^{2.935}$) and asymmetry/displacement ($OR = e^{1.384}$). That meant the happening of capsular contracture and asymmetry/displacement were the risk factors to reduce the patients' satisfaction ($P < 0.05$), while other factors such as the implant location and the happening of nipple-areola numbness had no obvious relationship with patients' satisfaction ($P > 0.05$).

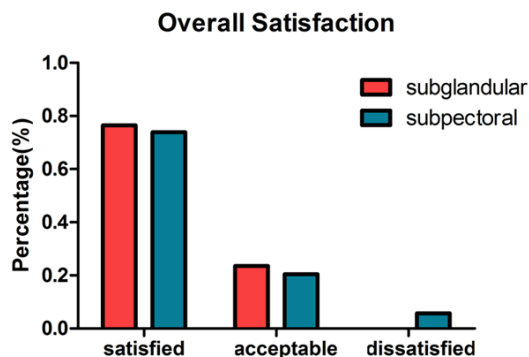


Figure 1. The patients' overall satisfaction in the two groups.

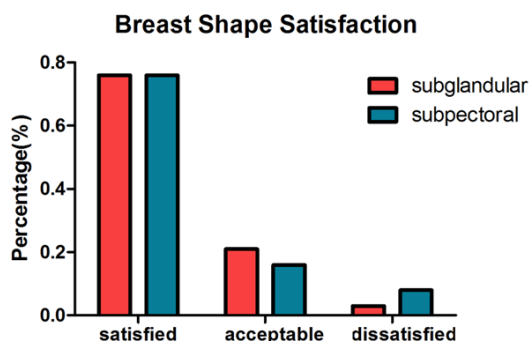


Figure 2. The patients' breast shape satisfaction in the two groups.

augmentations developed a CC in group A, and 4 augmentations in group B. One augmentation from group B had an infection 10 months after surgery, and was treated by removing the prosthesis. There was no case of hematoma formation. No asymmetry/displacement was found in group A, but 10 were found in group B. In contrast, no nipple-areola numbness was observed in group B, but 3 were found in group A. One patient from group A underwent reoperation because she felt uncomfortable with breast implant after operation. One patient from group B experienced reoperation because of infec-

Discussion

The number one priority in breast augmentation is to select pocket location for implant, which determines the quality and quantity of long-term soft tissue coverage of breast implants [2]. The four commonly selected implant pocket locations are subglandular, subpectoral, subfacial and dual-plane, each of which has specific indications as well as limitations [3, 4]. Our study only focuses on subglandular and subpectoral planes. For patients with more mammary tissue and subcutaneous fat, it is more appropriate to place the implant in the subglandular plane. In contrast, for those with less mammary tissue and subcutaneous fat, the prosthesis is often implanted in the subpectoral plane [5]. As the latter patients are

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usually slim with a low BMI, group B had a lower BMI and thinner mammary tissue than group A.

It is well known that Asian women are usually short and slim with small breasts. Most of them wear B cup bras, and some wear A cup [6]. Subpectoral breast augmentation is appropriate for those women with small breasts. Therefore, in our study, the number of patients in group B is larger than that in group A, and the volume of the implants for Asian women is smaller than that for white women.

CC is the most common complication in primary breast augmentation. In our study, the rates of CC in the two groups were 4.3% and 2.8% respectively, similar to the incidence of 4%-5% during the first 2 years after surgery as reported previously [7, 8]. Theoretically, subpectoral augmentation has a lower incidence of CC than subglandular augmentation [9, 10]. As shown previously, the longer the follow-up was, the greater the risk of developing capsular contracture would be [11]. In our research, group B did have a lower rate of CC than group A, but the difference was not significant. A possible explanation for this may be inadequate sample size and short-term follow-up.

The rates of infection and reoperation in our study are lower than those in previous studies [12, 13]. In group A, no cases of infection were reported, and the reoperation rate was 2.86%. One patient felt uncomfortable one year after surgery and requested to remove the implant. Actually, judging by surgeons, nothing was abnormal with her breasts, which suggests that the subjective feeling of patients is also an important factor that can affect reoperation rate. In group B, one patient experienced both infection and reoperation. The infection was caused by a boil in breast skin, which kept growing that the implant had to be removed at last. In our study, no hematoma and seroma were reported.

It has been reported that subpectoral augmentation has a high incidence of implant displacement and breast asymmetry [14], and this might be attributed to muscle contractions of the pectoralis [15-17], which is consistent with the results of our research. The rate of asymmetry/displacement was 5.6% in group B, while it was 0 in group A. However, there was no statistical significance. Increase in sample size may lead to positive results.

Nipple-areola numbness was only observed in group A. Five implanted breasts experienced persistent nipple-areola numbness after surgery, while the incidence in group B was 0. The incidence of the two groups in our study was lower than that reported by some other papers [18, 19]. However, the persistent numbness incidence of group A was 7.14%, higher than that reported by Swanson E, et al. [20]. Most of their patients accepted inframammary incision and submuscular location. In our study, a majority of patients in group A were performed periareolar incision, and patients in group B mainly underwent axillary incision. Incision, implant position and size of the prosthesis are considered the three major factors that could lead to nipple-areola numbness. Mofid MM et al. has clarified that implant position is impossible to affect sensory outcome [21], and the relationship of the prosthesis size with nipple-areola numbness remains controversial [19, 21, 22]. Therefore, we prefer to consider that the nipple-areola numbness is an incision-related complication.

Although many studies report high rates of overall patient satisfaction with the breast augmentation [20, 22-24], our results are a little disappointing in this regard. Generally speaking, complications or some side effects will affect the level of patient satisfaction. Given the low complication incidence in our study, we attribute the low rates of overall satisfaction to too high expectations and inadequate pre-operative communication. In addition, very few patients will rate their overall satisfaction as 1 or 2 points. Those who gave 3 points had a vague answer. Some of them were evaluated as satisfying with both the breast softness and shape in the later interview at hospital. In the next stage of work, we will upgrade our method and be more conscientious with the investigation of patient satisfaction.

In the present study, patients in group A have a better recovery. They have significantly less surgical blood loss, and shorter duration of pain and indwelling drainage than group B. Previous studies have also reported that subpectoral augmentation caused significant postoperative breast pain [25, 26], which, we think, is a meaningful outcome. Sometimes both planes are acceptable for a woman, and the planes leading to better postoperative recovery or less surgical injury should be chosen, which is validated by our research.

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Our research has a number of limitations. First, it is a retrospective study conducted in only one center; thus, the number of patients is limited. Second, as it is difficult to obtain long-term follow-up, some of implant recipients are lost to follow-up. Third, this research is only performed in Chinese women.

Conclusions

In summary, each of the implant placement location has its indications and complications. When choosing a pocket plane, we must take all the factors into consideration. The two groups in our study have similar rates of satisfaction. Little difference exists in the incidence of complications, except for the rate of nipple-areola numbness. Importantly, patients in group A have a shorter recovery period after surgery than those in group B. In addition, Group A has less surgical blood loss, shorter duration of pain, and earlier pulling out of drainage tube.

Disclosure of conflict of interest

None.

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