Research Article

Patient Satisfaction and Complications after Breast Reconstruction using Mesh or Acellular Matrices

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Abstract

Background: Reconstructive surgeries using mesh or acellular dermal matrix (ADM), play a key role in restoring physical appearance and improving patient satisfaction suffering from breast cancer. The choice between these materials affects both physical symptoms and psychological outcomes, emphasizing the need for personalized surgical approaches to optimize patient satisfaction and quality of life.

Methods: The study included breast reconstruction patients treated with either mesh (TiLOOP® bra pocket) or ADM (SurgiMend). Approved by the ethical board, the study utilized the breast Q questionnaire at 3 time points - preoperative, postoperative at discharge and three months later. Data were manually collected in Excel, and due to the small sample size, only descriptive statistics were performed.

Results: The study included 45 patients, 22 with breast cancer and 23 undergoing risk reducing surgery (rrNSM). In the breast cancer group, we used 15 times a mesh and 7 times ADM, while in the prophylactic group only 2 were reconstructed with an ADM. In the breast cancer group 12 received neoadjuvant chemotherapy (NACT). From these 12 patients after NACT 6 suffered from complications while nobody had one without NACT. There were 3 complications out of 8 patients with mesh and 3 complications out of 4 patients with ADM. In the rrNSM group 4 suffered from complications. All were reconstructed with mesh. Postoperative questionnaires revealed distinct differences between the ADM and mesh group. The ADM group generally experienced fewer physical symptoms, such as reduced sensitivity and fewer sleep disturbances, and reported better outcomes in terms of body image, confidence, and feelings of sexual attractiveness. On the other hand, the mesh group showed some improvement in breast symmetry and confidence over time. In terms of sexual well-being, ADM patients felt more comfortable and confident during sexual activity, though both groups saw a decrease in satisfaction with their sex life postoperatively. ADM patients were more satisfied with the appearance of their breasts, both clothed and unclothed, and reported better acceptance of their body and femininity.

Conclusion: Patients with breast cancer have often more risk factors for complications like previous operations or lower subcutaneous fat tissue, therefore ADMs were used more often, but after NACT ADMs lead to more complications compared to mesh.

Trial Registration: The study was approved by the ethical board Medical University Vienna under the reference number 1367/2021.

Keywords: *Breast-surgery, breast reconstruction, acellular dermal matrix, mesh*

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1. Introduction

Breast surgery plays a critical role in the management and treatment of various conditions, including breast cancer, benign breast diseases, and cosmetic concerns. The importance of breast surgery extends beyond the immediate surgical outcomes, as it significantly impacts a patient's long-term quality of life, psychological well-being, and body image. Reconstructive breast surgery, particularly following mastectomy, is essential for restoring the breast's physical appearance and improving the patient's psychological well-being. Research has demonstrated that reconstruction significantly enhances patient satisfaction, self-esteem, and overall quality of life compared to mastectomy alone [1].

Modern breast surgery must address different patient needs, ranging from reconstruction after mastectomy to aesthetic enhancements. Two prominent methods examined in our study are the use of mesh and acellular dermal matrix (ADM). Mesh is used to provide additional support to the implant, particularly in the context of immediate breast reconstruction post-mastectomy. This method is favored for its ability to stabilize the implant, reduce the risk of complications like capsular contracture and for its cheaper price compared to ADM. Studies have shown that synthetic meshes, such as titanium-coated polypropylene (TCPM), offer good biocompatibility with acceptable complication rates and satisfactory cosmetic outcomes [2]. ADM, a biological mesh derived from processed human or animal tissue, is another widely used material in breast reconstruction. ADMs are employed to support implants and enhance tissue integration. They offer several advantages, such as improving the aesthetic outcomes of breast reconstructions. While high patient satisfaction rates and good cosmetic results have been reported, there is an increased risk of severe complications leading to implant loss due to seroma [3]. Both mesh and ADM methods are critical tools in modern breast surgery, offering options that cater to different clinical scenarios. The choice between these methods often depends on factors such as the patient's anatomy, the desired cosmetic outcome, and the surgeon's expertise.

Physical symptoms such as pain, sensitivity, and postoperative complications or infection are strongly influenced by the surgical method used. While mesh provides structural support, it can sometimes lead to complications such as infection or implant loss. Similarly, ADMs are valued for their tissue integration properties but are also associated with certain risks, including higher rates of severe complications in some cases [3]. Beyond physical symptoms, the psychological outcomes of breast surgery are equally significant. The impact on body image, confidence, and sexual health are pivotal components of a patient's overall satisfaction with their surgery. The choice of surgical method can profoundly affect how patients perceive their bodies postoperatively. For example, patients who undergo reconstruction with mesh may experience varied psychological outcomes, with some reporting issues related to body image or confidence, particularly if complications arise. In comparison, ADMs can provide good aesthetic outcomes, leading to higher satisfaction in terms of body image and self-confidence [2].

In conclusion, while the technical success of breast surgery is paramount, the true measure of its effectiveness lies in its ability to preserve and enhance a patient's quality of life. This includes minimizing physical symptoms and ensuring positive psychosocial outcomes, such as improved body image, confidence, and sexual health. Both mesh and ADM methods offer distinct advantages and challenges in these areas, highlighting the need for personalized surgical planning and patient-centered care.

The primary aim of the current study was to compare the postoperative outcomes after breast reconstruction surgery using mesh or ADM with respect to physical symptoms, psychological and emotional impact, sexual health and satisfaction, and overall satisfaction with the appearance of the breast and the effort limiting complication rates when using an algorithm to find the right choice of structural support for each patient.

2. Materials and Methods

All patients in need of a breast reconstruction who were operated in the time of the study were pooled for inclusion into the study. Furthermore, patients who did not fill the questionnaire for the assessment of patient satisfaction were excluded from the study. They filled an informed consent contract and were 1:1 randomized with (Link) either to be in the group who are operated with the material the algorithm chooses or with mesh/ADM the operator chose. The algorithm can be found in (Figure 1). We included items like body mass index, diabetes, smoking, cortisone therapy, previous breast operations, neoadjuvant chemotherapy, irradiation, striae distensae and thickness of subcutaneous tissue. If they suffer from one of the below, we first measured the blood circulation of the skin and decided afterwards if we would perform direct-to-implant or reconstruction with an expander used.

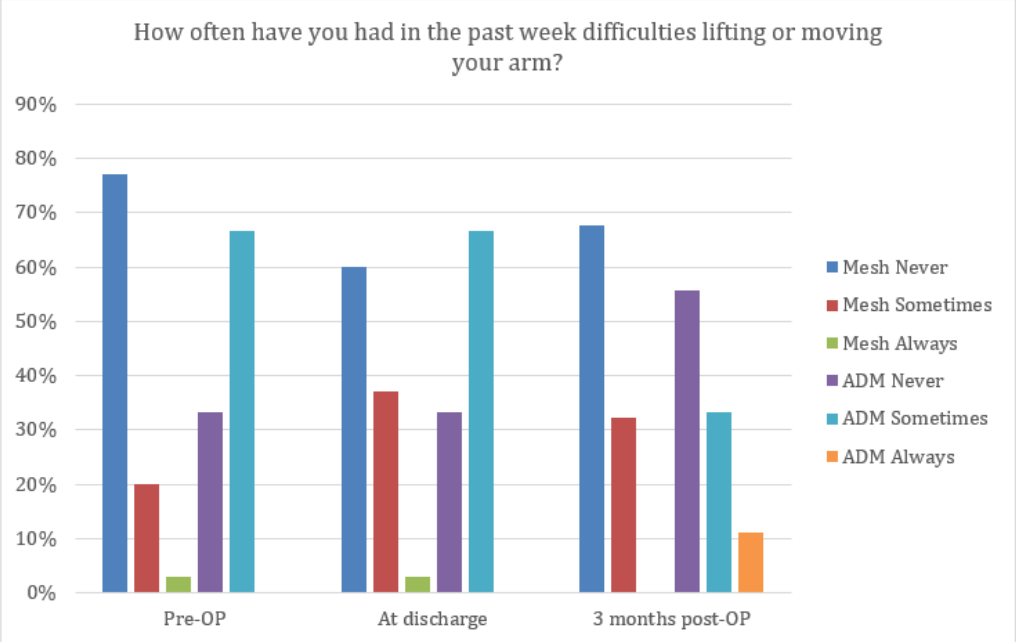

FIGURE 1. Comparison of relative distributions of the responses to the question addressing difficulties in lifting or moving the arm pre-operatively, at discharge, and three months post-operatively. Both groups were given three choices for response, "Never", "Sometimes", and "Always".

- Skin tension after skin reduction.
- Big breast conserving therapy under 3 months previous the operation.
- Neoadjuvant chemotherapy less than 3 weeks previous.
- Irradiation of the breast in the last year before the operation.
- Striae distensae in more than 2 quadrants also after skin reduction.
- Under 5mm subcutaneous fat tissue.
- Wished reconstruction for bigger breasts.
- After previous breast skin necrosis.
- Diabetes with a glycated hemoglobin above 9.

The study was approved by the ethical board Medical University Vienna under the reference number 1367/2021. Patients filled breast Q questionnaire [4] at three time points (preoperatively, at discharge and 3 months after the operation. Here we took also standardized pictures of the breasts. At the end the surgeon, who performed and a not involved surgeon rated the results with Harris scale (excellent- good fair - acceptable - not acceptable) [5].

All data were collected in Microsoft Excel 365 manually. Due to a small number of patients only descriptive statistics were performed.

3. Results

3.1. Patient Data

Overall, 45 patients were included in the study, nine of which received ADM and 36 received a TCPM. The average age of those receiving ADM was 45,6 years (+/- 9), while the age of those receiving a mesh was 42,3 years (+/- 12). The resected volume of those in the ADM group was 548,4 ml (+/- 265 ml) while it was 394,9 ml (+/- 153,8 ml) in the mesh group. 22 suffered from breast cancer and 23 were undergoing risk reducing surgery (rrNSM). In the breast cancer group, we used 15 times a mesh and 7 times ADM, while in the prophylactic group only 2 were reconstructed with an ADM and the remaining 21 were reconstructed with mesh. In the breast cancer group 12 received neoadjuvant chemotherapy (NACT).

From these 12 patients after NACT 6 suffered from complications while nobody had one without NACT. There were 3 complications out of 8 patients with mesh and 3 complications out of 4 patients with ADM. In the rrNSM group 4 suffered from complications. All were reconstructed with mesh. In the ADM group, three (33.3%) complications were reported, one of these being a dislocation of the implant and two being wound-healing disorders with necrosis. In the mesh group, nine complications in 7 (20%) patients were reported, two of these being dislocations of the implant, two suture insufficiencies, two seromas, two wound-healing disorders with necrosis, and one postoperative bleeding.

3.2. Decision with or without Algorithm

In order to decide which operation method should be used, an algorithm was used in 22 patients and based on the score achieved, it was decided whether a mesh or an ADM was used. Through the randomizer another 23 patients were assessed by the responsible physician and the treatment was decided based on experience of the physician. Of the 22 patients for whom the treatment decision was taken based on the algorithm, 17 received a mesh and 5 received an ADM. Of the 23 patients without algorithm, 19 received a mesh and 4 received an ADM. Six patients (27.3%) in the algorithm group and 4 patients (17.3%) without algorithm suffered from complications.

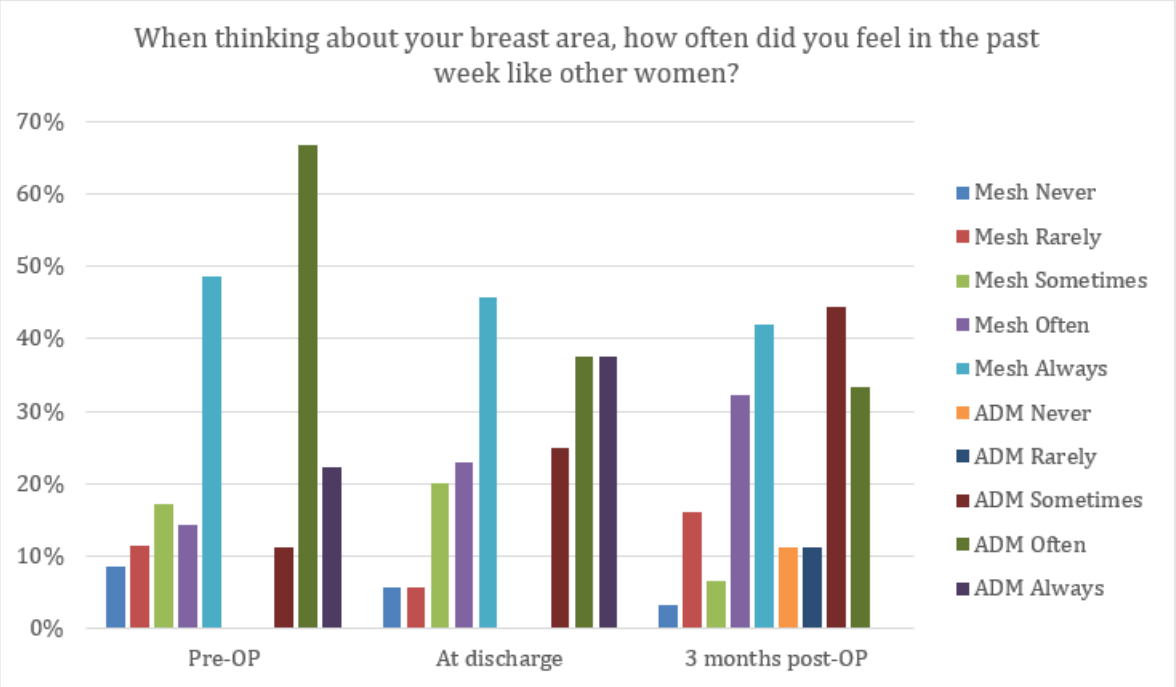

FIGURE 2. Comparison of relative distributions of the responses to the question addressing feminine self-perception pre-operatively, at discharge, and three months post-operatively. Both groups were given five choices for response, "Never", "Rarely", "Sometimes", "Often", and "Always".

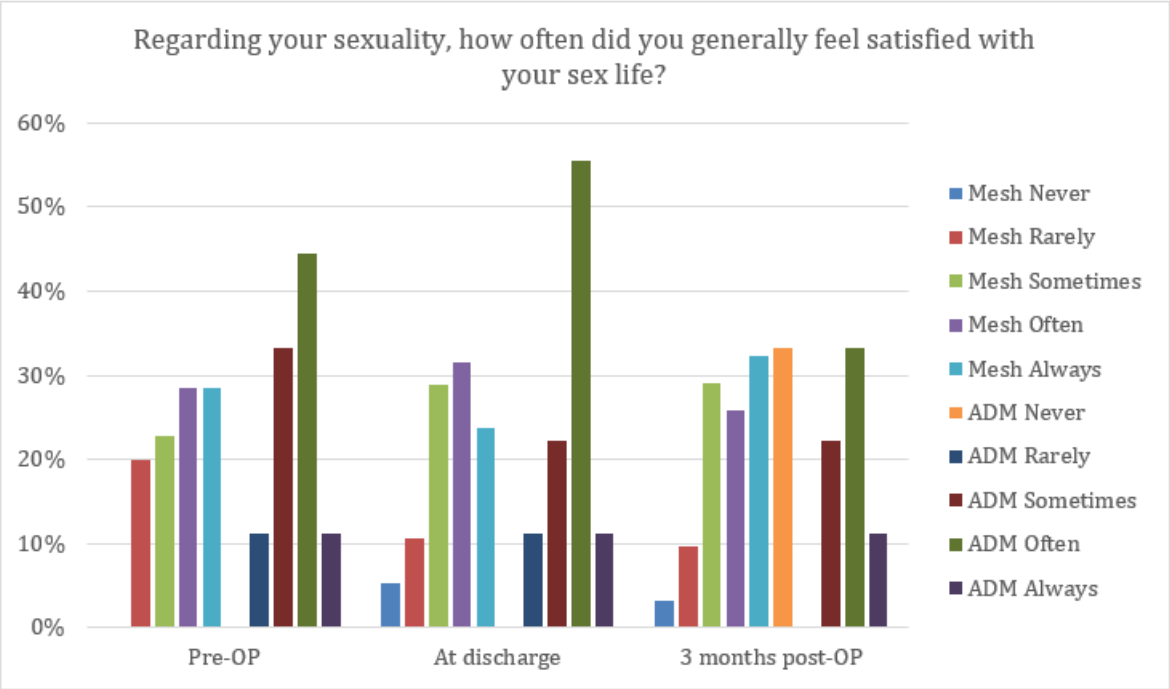

FIGURE 3. Comparison of relative distributions of the responses to the question addressing satisfaction with sexual activity pre-operatively, at discharge, and three months post-operatively. Both groups were given five choices for response, "Never", "Rarely", "Sometimes", "Often", and "Always".

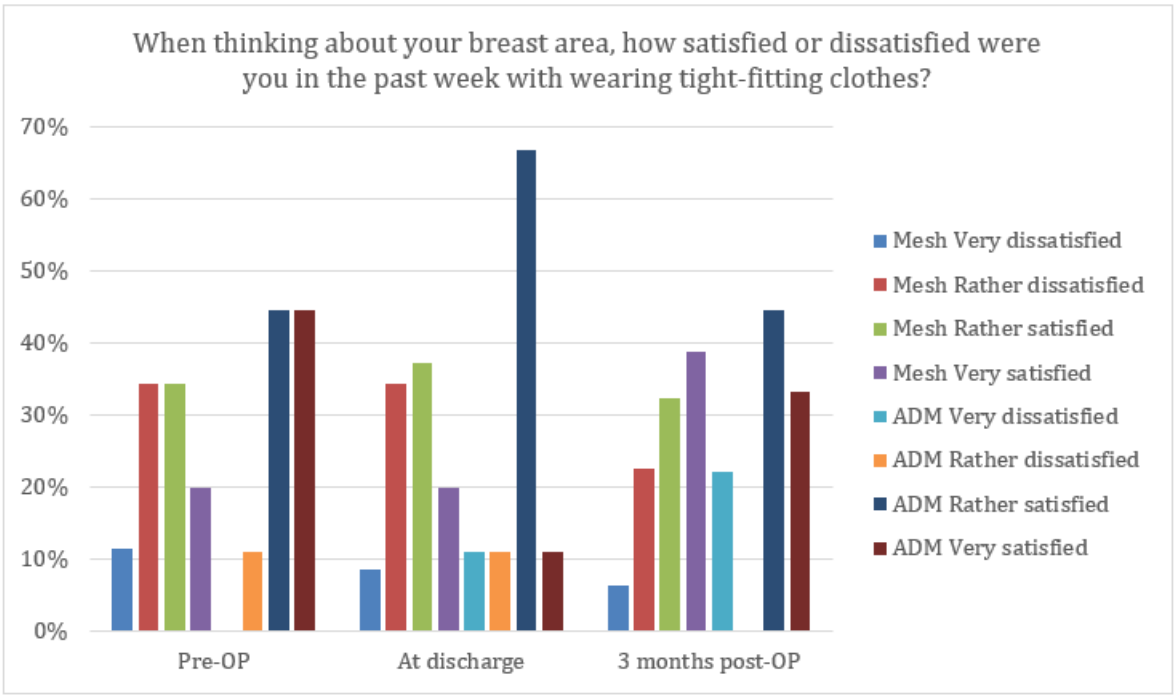

FIGURE 4. Comparison of relative distributions of the responses to the question addressing satisfaction with tight-fitting cloths pre-operatively, at discharge, and three months post-operatively. Both groups were given four choices for response, "Very dissatisfied", "Rather dissatisfied", "Rather satisfied", and "Very satisfied".

TABLE 1. Basic patient-data on relevant information.

	ADM	Mesh
Overall patients	9	35
Age (years)	45,6 (+/- 9)	42,3 (+/- 12)
Resected Volume (ml)	548,4 (+/- 265)	394,9 (+/- 153,8)
Complications	3	9

3.3. Questionnaire with Respect to the Operation Method

With regard to the reported symptoms and complaints, the results show differences between the two groups (mesh and ADM) at various time points. A detailed overview of the results for this question can be found in (Table 2). Regarding difficulties in lifting or moving the arms, the majority of patients in both groups reported no or only occasional difficulties at all times. Interestingly, the mesh group showed a slight increase in difficulties after the operation compared to the ADM group. Concerning sleep disturbances due to breast complaints, there were only minor differences between the groups before the operation. However, after the operation, more patients in the mesh group reported sleep disturbances, while complaints in the ADM group decreased after three months. A feeling of tension or a pulling sensation in the breast was occasionally experienced in some patients in both groups. Sharp pain or painful feeling in the breast was also occasionally experienced in some patients in both groups. A clear difference was not visible in either case. Increased sensitivity in the breast showed hardly any differences between the groups before the operation.

TABLE 2. Questionnaire on symptoms pre-OP, at discharge, and 3 months post-OP comparing mesh and ADM.

	Mesh			ADM		
How often have you had in the past week:	**Never**	**Sometimes**	**Always**	**Never**	**Sometimes**	**Always**
Difficulty lifting or moving your arms?						
Pre-OP	27	7	1	3	6	0
At discharge	21	13	1	3	6	0
3 months post-OP	21	10	0	5	3	1
Sleep disturbances due to breast complaints?						
Pre-OP	28	7	0	4	5	0
At discharge	19	16	0	4	4	1
3 months post-OP	24	7	0	7	2	0
A feeling of tension in the breast?						
Pre-OP	19	15	1	4	5	0
At discharge	10	24	1	3	6	0
3 months post-OP	19	11	1	4	5	0
A pulling sensation in the breast?						
Pre-OP	19	15	1	4	5	0
At discharge	8	26	1	2	7	0
3 months post-OP	17	14	0	6	3	0
Increased sensitivity in the breast?						
Pre-OP	27	7	1	7	0	2
At discharge	30	5	0	6	2	1
3 months post-OP	19	11	1	5	4	0
Sharp pain in the breast?						

Pre-OP	30	5	0	6	3	0
At discharge	23	12	0	5	4	0
3 months post-OP	24	7	0	6	3	0
A painful feeling in the breast?						
Pre-OP	29	6	0	8	1	0
At discharge	17	18	0	4	5	0
3 months post-OP	13	18	0	6	3	0
Pain in the chest muscles?						
Pre-OP	28	7	0	7	2	0
An uncomfortable feeling in the breast?						
Pre-OP	21	14	0	6	3	0
A throbbing feeling in the breast?						
Pre-OP	31	4	0	9	0	0
Difficulty lying on the side of your operated breast?						
At discharge	10	23	2	3	5	1
3 months post-OP	20	8	3	7	1	1
Swelling (lymphedema) of the arm on the side(s) of the breast operation?						
At discharge	32	3	0	8	1	0
3 months post-OP	27	3	1	8	1	0

Absolute patient numbers for each answer is given.

However, after the operation, more patients in the mesh group reported increased sensitivity, while complaints in the ADM group remained mostly unchanged, indicating less postoperative stress and sensitivity. Pain in the chest muscles or an uncomfortable feeling in the breast was occasionally present in some patients in both groups without major impairments. A throbbing feeling in the breast was only occasionally reported by patients in the mesh group and not at all in the ADM group. The latter three questions (pain in the chest muscles, uncomfortable feeling in the breast, and throbbing feeling in the breast) were only asked before the operation.

At discharge, more patients in both groups reported difficulties lying on the operated breast side, while these difficulties decreased after three months without any clear preference for the group. Swelling (lymphedema) of the arm on the side of the breast operation was rarely reported, but seemed to be equally distributed among both groups. The latter two questions were only asked postoperatively at discharge and after three months.

The second group of questions addressed the feelings of the participants about their breast area. A detailed overview of the responses can be found in (Table 3). Regarding confidence when being with other people, the majority of patients in the mesh group mostly reported confidence, while there were comparably fewer such patients in the ADM group. Concerning the emotional ability to do the things they want, there were hardly any differences between the groups with most patients claiming the ability often or always. A similar situation is seen in the question about emotional health of the patients. When asked whether the patients felt equal to other women, most of the patients in the mesh group had a wide range of answers, however, the ADM group showed a remarkable worsening of the responses to these questions, especially after three months. Thus, some patients had the feeling that they were not equal to other women. When asked about confidence, however, many women in the mesh group did not feel confident.

In comparison, most women in the ADM group felt confident most or all of the time. Especially with respect to their femininity, many patients in the mesh group indicated dissatisfaction, while the satisfaction

level in the ADM group tended to be better. Likewise, while most of the patients in the ADM group were able to accept their body always or most of the time, many patients in the mesh group were struggling with this acceptance. Many patients in the mesh group did not see themselves like other women, attractive or even normal. Hardly any patient in the ADM group answered "never" or "rarely" to these questions.

TABLE 3. Questionnaire on psychosocial and emotional impact regarding the breast-area pre-OP, at discharge, and 3 months post-OP comparing mesh and ADM.

	Mesh					**ADM**				
When thinking about your breast area, how often did you feel in the past week:	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
Confident when you were with other people?										
Pre-OP	1	4	5	17	8	0	0	3	4	2
At discharge	1	4	5	16	9	0	0	3	3	3
3 months post-OP	0	2	2	11	16	1	0	2	3	3
Emotionally able to do the things you want to do?										
Pre-OP	0	1	7	17	10	0	0	2	6	1
At discharge	1	1	5	17	11	0	0	2	5	2
3 months post-OP	0	1	3	11	16	0	1	1	4	3
Emotionally healthy?										
Pre-OP	0	3	6	14	12	0	0	2	6	1
At discharge	0	3	6	14	12	0	0	2	5	2
3 months post-OP	1	0	4	11	15	0	0	4	1	4
Equal to other women?										
Pre-OP	3	6	4	8	14	0	0	2	6	1
At discharge	1	6	3	10	15	0	0	2	5	2
3 months post-OP	2	2	5	10	12	1	3	1	2	2
Self-confident?										
Pre-OP	3	5	7	12	8	0	0	1	7	1
At discharge	0	6	8	10	11	0	0	2	4	3
3 months post-OP	1	1	6	11	11	1	1	2	1	4
Feminine in your clothing?										
Pre-OP	2	2	7	13	11	0	0	3	4	2

At discharge	2	1	8	12	12	0	0	2	6	1
3 months post-OP	1	1	5	8	16	2	0	1	3	3
Able to accept your body?										
Pre-OP	1	6	8	15	5	0	0	5	2	2
At discharge	1	4	11	12	7	0	0	3	4	2
3 months post-OP	1	4	4	9	13	1	1	2	4	1
Normal?										
Pre-OP	2	2	6	7	18	0	0	1	5	3
At discharge	0	3	9	7	16	0	0	2	4	3
3 months post-OP	2	2	2	10	15	1	1	4	3	0
Like other women?										
Pre-OP	3	4	6	5	17	0	0	1	6	2
At discharge	2	2	7	8	16	0	0	2	3	3
3 months post-OP	1	5	2	10	13	1	1	4	3	0
Attractive?										
Pre-OP	3	4	8	15	5	0	0	4	3	2
At discharge	0	7	12	10	6	0	0	4	3	2
3 months post-OP	1	3	5	11	11	2	1	3	3	0

Absolute patient numbers for each answer is given.

When asked about the patients' sexuality and their feelings about it, the ADM group was overall more positive compared to the mesh group. A detailed overview can be found in (Table 4). Regarding feeling sexually attractive when clothed, the majority of patients in both groups reported attractiveness at least sometimes at any point. Interestingly, 9 patients in the mesh group who had, prior to the operation, reported to not always feel that way, postoperatively reported to always feel attractive. Meanwhile, hardly any patient in the ADM group reported to never or rarely feel attractive. Concerning feeling comfortable or relaxed during sexual activity, the patients in the ADM group reported that they were more often comfortable and relaxed compared to some patients in the mesh group. Similarly, patients in the ADM group were generally more often sexually confident compared to the mesh group. There was, however, no major difference postoperatively in both questions. Interestingly, in both groups the satisfaction with the patients' sex life decreased after the operation. In this context, some patients in both groups indicated that they felt less attractive without clothes on postoperatively. Surprisingly however, while the patients in the ADM group became less sexually confident about their uncovered breasts, patients in the mesh group became more sexually confident about their uncovered breasts.

With respect to the last question about satisfaction of the patients when thinking about their breast area, although the overall majority of patients indicated that they were rather satisfied or very satisfied, there was a

remarkable number of patients, especially in the mesh group, who said that they were rather or very dissatisfied. A detailed overview can be found in (Table 5). When asked about satisfaction with the appearance of their breasts when clothed, more patients in the mesh group signaled dissatisfaction, although the majority was satisfied. However, two patients in the ADM group said that they were dissatisfied postoperatively. Concerning satisfaction with wearing tight-fitting clothes, there were many patients in both groups who were dissatisfied. In the mesh group in particular, the number of dissatisfied patients decreased 3 months after the operation. With respect to the appearance of the breasts when unclothed, the overall satisfaction level was lower in both groups. Again, a slight improvement could be seen in the mesh group after 3 months. The patients were asked preoperatively how comfortable their bras fitted. While the majority in both groups signaled satisfaction, 8 of 35 patients in the mesh group and 1 of 9 patients in the ADM group were not satisfied.

TABLE 4. Questionnaire on sexual health and satisfaction regarding the breast-area pre-OP, at discharge, and 3 months post-OP comparing mesh and ADM.

	Mesh					**ADM**				
Regarding your sexuality, how often did you generally feel:	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
Sexually attractive when you are clothed?										
Pre-OP	1	5	11	14	4	0	0	5	3	1
At discharge	1	4	11	14	5	0	0	6	2	1
3 months post-OP	0	3	8	7	13	2	0	1	3	3
Comfortable/relaxed when you are sexually active?										
Pre-OP	3	3	7	13	9	0	0	3	4	2
At discharge	3	3	8	13	8	0	0	4	4	1
3 months post-OP	2	2	8	10	9	2	0	3	3	1
Sexually confident?										
Pre-OP	1	5	9	13	7	0	0	4	4	1
At discharge	4	2	10	11	7	0	1	4	3	1
3 months post-OP	1	3	8	11	8	2	0	4	2	1
Satisfied with your sex life?										
Pre-OP	0	7	8	10	10	0	1	3	4	1
At discharge	2	4	11	12	9	0	1	2	5	1
3 months post-OP	1	3	9	8	10	3	0	2	3	1
Sexually confident about the appearance of your uncovered breast?										
Pre-OP	4	3	8	12	8	0	0	4	3	2

At discharge	3	5	11	6	7	0	0	5	2	2
3 months post-OP	2	2	10	9	8	3	1	3	1	1
Sexually attractive when you are unclothed?										
Pre-OP	3	4	15	8	5	0	0	5	3	1
At discharge	3	5	15	5	5	0	0	5	3	1
3 months post-OP	2	3	10	8	8	3	1	5	0	0

Absolute patient numbers for each answer is given.

TABLE 5. Questionnaire on overall satisfaction with the appearance of the breast pre-OP, at discharge, and 3 months post-OP comparing mesh and ADM.

	Mesh				**ADM**			
When thinking about your breast area, how satisfied or dissatisfied were you with the following in the past week:	**Very dissatisfied**	**Rather dissatisfied**	**Rather satisfied**	**Very satisfied**	**Very dissatisfied**	**Rather dissatisfied**	**Rather satisfied**	**Very satisfied**
How you look clothed in the mirror?								
Pre-OP	2	6	18	9	0	0	6	3
At discharge	1	6	17	11	0	2	6	1
3 months post-OP	0	3	11	17	0	2	2	5
Being able to wear tight-fitting clothes?								
Pre-OP	4	12	12	7	0	1	4	4
At discharge	3	12	13	7	1	1	6	1
3 months post-OP	2	7	10	12	2	0	4	3
How you look unclothed in the mirror?								
Pre-OP	3	8	19	5	0	2	5	2
At discharge	3	10	16	6	0	2	6	1
3 months post-OP	3	5	15	8	3	2	4	0
How comfortable your bras fit?								
Pre-OP	2	6	10	17	0	1	6	2
With the shape of your operated breast when wearing a bra?								
At discharge	1	5	20	9	0	1	7	1

3 months post-OP	1	3	20	7	0	1	4	4
How normal you feel in your clothes?								
At discharge	0	4	21	10	0	1	7	1
3 months post-OP	0	2	14	15	1	0	5	3
How your operated breast stands/hangs?								
At discharge	3	6	20	6	0	0	8	1
3 months post-OP	1	4	16	10	0	2	4	3
How evenly shaped your operated breast looks?								
At discharge	4	10	16	5	0	2	5	2
3 months post-OP	1	6	15	9	0	4	4	1
With the contour (outline) of your operated breast?								
At discharge	2	4	22	7	0	0	5	4
3 months post-OP	0	11	11	9	0	0	5	4
How your breasts match in size?								
At discharge	2	12	12	9	0	2	4	3
3 months post-OP	0	5	14	12	1	3	4	1
How normal your operated breast looks?								
At discharge	3	7	19	6	0	3	4	2
3 months post-OP	1	7	16	7	0	2	5	2
How alike your breasts look?								
At discharge	4	11	13	7	0	2	4	3
3 months post-OP	1	8	12	10	1	3	5	0

Absolute patient numbers for each answer is given.

Subsequently, the patients were asked postoperatively whether they were satisfied with the shape of their operated breasts and the majority was rather or very satisfied. Furthermore, the patients were asked about their level of satisfaction with how normal they felt dressed postoperatively. Again, the majority of the patients were rather or very satisfied in both groups. The patients were asked how they felt about their operated breast hanging or standing and most of them indicated overall satisfaction. However, after 3 months the level of satisfaction in the mesh group slightly increased while it decreased in the ADM group. When asked about the contour (outline) of the operated breast all patients in the ADM group indicated

satisfaction, while in the mesh group there was a remarkable dissatisfaction, which even increased after 3 months. With respect to the shape of the operated breast the patients were further asked how normal and how evenly shaped their operated breast looked. The majority of the patients in both groups believed that their operated breast looked normal, however the rate of dissatisfaction was higher regarding the shape of the breasts with a slight improvement after 3 months. With respect to symmetry of both breasts the patients were asked how their breasts matched in size postoperatively and how similar they looked. 14 of 35 patients in the mesh group and 2 of 9 patients in the ADM group were dissatisfied regarding equal size of the breasts at discharge, while 5 of 31 patients in the mesh group and 4 of 9 patients in the ADM group were dissatisfied after 3 months. 15 of 35 patients in the mesh group and 2 of 9 patients in the ADM group furthermore said at discharge that they were dissatisfied about the similarities between their breasts. After 3 months 9 of 31 patients in the mesh group and 4 of 9 patients in the ADM group were still dissatisfied.

4. Discussion

The results indicate distinct differences in postoperative outcomes between the mesh and ADM groups. The mesh group experienced a slight increase in physical difficulties, such as arm movement and sleep disturbances, compared to the ADM group, which showed some improvement in these areas over time. The mesh group also reported more instances of increased breast sensitivity and discomfort after surgery, while the ADM group maintained a more stable postoperative experience.

When considering the use of either mesh or ADM in breast reconstruction, it is essential to evaluate their respective impacts on clinical outcomes, particularly concerning postoperative physical symptoms and complications. Breast cancer patients are more likely having risk factors for complications, such as smaller subcutaneous fat tissue or previous operations. That fact may lead surgeons to use ADMs as it provides more texture, but we found a higher percentage of complications with ADM after neoadjuvant chemotherapy. Mesh has been associated with lower levels of early postoperative pain compared to ADM, especially when used in prepectoral implant-based breast reconstructions. This reduced pain is largely due to the mesh's ability to support the implant without requiring submuscular placement, which typically involves more muscle manipulation and, consequently, greater discomfort during recovery. In a study comparing poly-4-hydroxybutyric acid mesh to ADM, patients reported significantly less pain in the mesh group, highlighting its advantage in terms of postoperative comfort [6]. We were not able to reproduce this finding in the present study; however, it should be noted that in the present study the ADMs were not placed submuscularly and thus were more comparable to the mesh.

This finding suggests that ADM may correlate with overall less postoperative pain. This, however, contradicts the existing literature, according to which ADM is associated with higher levels of postoperative pain [7]. This, too, however, is attributed to its submuscular placement, which was not done in the present study. In fact, Caputo *et al.* showed in their 2021 study that the prepectoral placement of ADM was indeed associated with less postoperative pain compared to subpectoral placement [8]. The prepectoral approach is also advantageous in preserving the function of the pectoralis major muscle, which can be compromised in subpectoral reconstructions. A study by Wazir and Mokbel (2018) reviewed the evolving role of prepectoral ADM-assisted breast reconstruction and confirmed that this approach reduces dysfunctional pain associated with pectoral muscle manipulation, making it a favorable option for patients seeking less postoperative discomfort and better postoperative mobility of the upper limbs [8, 9].

In terms of complications, mesh materials tend to have a lower associated risk of infection and seroma formation compared to ADM. For instance, in a retrospective cohort study involving patients who underwent reconstruction with ULTRAPRO® mesh, the incidence of major complications, including infections and seromas, was notably lower than in those who received ADMs. These findings imply that

mesh may be a safer alternative in terms of reducing postoperative complications [10]. Conversely, the use of ADM has been linked to higher rates of these complications. A meta-analysis revealed that ADM significantly increases the risk of developing seroma and infection. Specifically, the use of ADM was associated with a 4,24-fold increase in the likelihood of seroma and a 5,37-fold increase in the risk of infection, compared to reconstructions without ADM. These complications are particularly prevalent in patients with higher body mass indexes or those undergoing radiation therapy [11]. The present study only had a limited number of complications and, thus, was not sufficiently reliable to conclude an advantage for one method or the other. It must be pointed out that complication assessment has to be done in a prospective manner, as otherwise postoperative complications may be underreported [12]. In this context, the present study has major limitations, as the complications were not assessed prospectively.

Despite these risks, patients often report high satisfaction with the aesthetic outcomes of ADM-assisted reconstructions. The ability of ADM to produce more natural-looking results, including better breast contouring, significantly contributes to patient satisfaction and quality of life after surgery. This satisfaction is a crucial aspect of recovery, as the psychological and emotional benefits of a pleasing aesthetic outcome can enhance overall well-being [13]. This was also seen in the present study, as the ADM group generally reported higher levels of confidence, body acceptance, and self-esteem, particularly regarding their femininity and attractiveness. Conversely, patients in the mesh group struggled more with body image, self-confidence, and satisfaction with their breast appearance, both clothed and unclothed.

With respect to sexuality, the mesh group reported increased sexual confidence regarding their uncovered breast, while the ADM group experienced a decline in this area. A study by Ohlinger *et al.* (2021) assessed quality of life after subpectoral implant-based breast reconstruction using either synthetic meshes or ADMs. The study found no significant differences in overall satisfaction with sexual attractiveness between the two materials [14]. Similarly, Gschwantler-Kaulich *et al.* (2016) conducted a randomized controlled trial comparing outcomes between ADM and titanized mesh (TiLOOP® Bra) in immediate implant-based breast reconstruction. The study found no significant differences in patient satisfaction with cosmetic results, which includes aspects related to body image and sexual attractiveness [5]. Patient-reported outcomes relating to sex life after breast reconstruction reveal only nuanced differences between ADM and mesh. For instance, a study by Blohmer *et al.* (2020) focused on immediate ADM-assisted breast reconstruction found that patients reported an increase in sexual functioning during the first year after surgery. This suggests that ADM may contribute to improved satisfaction in this domain, likely due to better aesthetic outcomes and integration with host tissue, which enhances body image and confidence [15]. In contrast, studies focusing on synthetic meshes, such as the TiLOOP® Bra, have shown that while these materials provide stable and satisfactory reconstructive outcomes, they do not necessarily lead to superior results in terms of sexual well-being when compared to ADM. A study evaluating the use of TiLOOP® Bra in prepectoral implant placements reported high levels of patient satisfaction with sexual well-being, but the scores were not significantly different from those of patients who underwent ADM-assisted reconstructions [16].

5. Conclusion

The choice between mesh and ADM in breast reconstruction should be tailored to each patient's specific needs, considering the potential risks and benefits. Mesh typically offers lower rates of physical discomfort, capsular contracture, and infections, making it a safer option for many patients. ADM, while associated with higher complication rates, may still be the preferred choice for those prioritizing superior aesthetic outcomes. After neoadjuvant chemotherapy mesh should be preferred. Ultimately, a patient-centered approach, considering factors such as body mass index, radiation therapy, and personal aesthetic goals, is essential to optimizing reconstruction outcomes.

Conflicts of Interest

None.

Human Ethics and Consent to Participate Declarations Missing

All procedures performed involving human participants adhered to the ethical standards of the institutional research committee and the 1964 Helsinki Declaration and its later amendments and its conform to CONSORT 2010 guidelines. Informed consent was obtained from all individual participants included in the study.

This declaration aims to assure the research community and the public of our commitment to ethical conduct and integrity in our research. We understand the importance of these ethical considerations and believe that our adherence to these principles will contribute to the credibility and reliability of our findings. The study was approved by the ethical board Medical University Vienna under the reference number 1367/2021. Informed consent to participate in the study was obtained from participants.

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