Comparison of Outcomes in Immediate Implant-Based Breast Reconstruction: Acellular Dermal Matrix versus Inferior Dermal Flap

Luís Mata Ribeiro, MD1 Rita P. Meireles, MD2 Irís M. Brito, MD2 Patricia M. Costa, MD1 Marco A. Rebelo, MD3 Rui F. Barbosa, MD3 Miguel P. Choupina, MD3 Carlos J. Pinho, MD3 Matilde P. Ribeiro, MD3

1 Plastic and Reconstructive Surgery Department, Centro HospitalarUniversitário Lisboa Central, Hospital São José, Lisbon, Portugal
2 Plastic and Reconstructive Surgery Department, Centro Hospitalar e Universitário de Coimbra, Coimbra, Portugal
3 Plastic and Reconstructive Surgery Department, Instituto Português de Oncologia do Porto, Porto, Portugal

Arch Plast Surg 2022;49:158–165.

Abstract

Background Implant-based breast reconstruction has evolved tremendously in the last decades, mainly due to the development of new products and techniques that make the procedure safer and more reliable. The purpose of this study was to compare the outcomes in immediate one-stage breast reconstruction between acellular dermal matrix (ADM) and inferior dermal flap (IDF).

Methods We conducted a retrospective comparative study of patients submitted to immediate breast reconstructions with an anatomical implant and ADM or IDF in a single center between 2016 and 2018. Outcomes evaluated included major complications, early complications, reinterventions, readmissions, and reconstruction failure. Simple descriptive statistics and univariate analysis were performed.

Results A total of 118 breast reconstructions (85 patients) were included in the analysis. Patients in the IDF group had a higher body mass index (median = 27.0) than patients in the ADM group (median = 24). There were no statistically significant differences among both groups regarding immediate major complication, early complications, readmissions, and reinterventions.

Conclusion There are no significant differences in complications between the ADM and IDF approach to immediate implant breast reconstruction. In patients with higher body mass index and large, ptotic breasts, we recommend an immediate implant reconstruction with IDF.

Keywords
► acellular dermis
► breast implants
► mammoplasty
► mastectomy
► retrospective studies

DOI https://doi.org/10.1055/s-0042-1744404.
ISSN 2234-6163.

© 2022. The Korean Society of Plastic and Reconstructive Surgeons. All rights reserved. This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (https://creativecommons.org/licenses/by-nc-nd/4.0/)
Thieme Medical Publishers, Inc., 333 Seventh Avenue, 18th Floor, New York, NY 10001, USA
Immediate breast reconstruction is a critical step in reducing the psychological burden associated with breast cancer and mastectomy. This kind of reconstruction has developed immensely in the last few years, mostly since it was found to be safe from an oncological perspective (i.e., does not affect the diagnosis nor the incidence of breast cancer recurrence).\footnote{Mata Ribeiro et al. \textit{Archives of Plastic Surgery} Vol. 49 No. 2/2022 © 2022. The Korean Society of Plastic and Reconstructive Surgeons. All rights reserved.}

In most western countries, due to increasing rates of obesity, implant-based reconstruction is favored by many surgeons. In these patients, autologous reconstruction is more challenging, with higher rates of severe complications and morbidity.\footnote{Another solution to the lower pole problem is the development of acellular dermal matrices (ADMs), biologic meshes that provide structural support for the native tissue, allowed surgeons to attempt an immediate single-stage breast reconstruction, providing better lower pole coverage and inframammary fold definition, improved aesthetic results, and reducing capsular contracture rates.\textsuperscript{3–8} Another solution to the lower pole problem was the development of an inferior dermal flap (IDF). This technique was first reported by Bostwick\textsuperscript{9} for immediate breast reconstruction after prophylactic mastectomies in patients with breast ptosis. The lower pole skin that is usually removed during a Wise-pattern mastectomy is deepithelialized, creating a dermal flap that can then be sutured superiorly to the pectoralis major providing complete implant coverage. Hammond et al\textsuperscript{10} also reported the successful use of this technique as a two-stage procedure for oncoclastic breast reconstruction. The IDF serves the same purpose of a matrix, providing better coverage and better control of the implant pocket and limiting muscle dissection.\textsuperscript{11,12}} Due to these limitations, most surgeons use a two-stage technique (placement of a tissue expander in the mastectomy pocket initially, and then changing to a permanent implant a few months later) which provides more predictable results and less tension on the skin flaps.\footnote{Methods}

The development of ADMs, biologic meshes that provide structural support for the ingrowth of native tissue, allowed surgeons to attempt an immediate single-stage breast reconstruction, providing better lower pole coverage and inframammary fold definition, improved aesthetic results, and reducing capsular contracture rates.\textsuperscript{3–8} Another solution to the lower pole problem was the development of an inferior dermal flap (IDF). This technique was first reported by Bostwick\textsuperscript{9} for immediate breast reconstruction after prophylactic mastectomies in patients with breast ptosis. The lower pole skin that is usually removed during a Wise-pattern mastectomy is deepithelialized, creating a dermal flap that can then be sutured superiorly to the pectoralis major providing complete implant coverage. Hammond et al\textsuperscript{10} also reported the successful use of this technique as a two-stage procedure for oncologic breast reconstruction. The IDF serves the same purpose of a matrix, providing better coverage and better control of the implant pocket and limiting muscle dissection.\textsuperscript{11,12}

This study aimed to compare the outcomes and the incidence of postoperative complications between immediate single-stage breast reconstruction using ADM or an inferior dermal sling (IDF).

**Patients submitted to immediate reconstruction with tissue expanders/implants exclusively, or autologous flaps were excluded from the study. Three senior oncological surgeons performed all mastectomy interventions. Five senior plastic surgeons performed the breast reconstructions. We reviewed hospital records independently for all patients, collecting data on patient demographics, including age, body mass index (BMI), genetic risk, smoking history, diabetes mellitus, and hypertension. We also noted whether the reconstructions were unilateral or bilateral. Outcomes assessed included major immediate complications (hematoma, infection requiring intravenous pharmacological treatment, mastectomy flap necrosis, and implant extrusion), early complications (infection, hematoma, implant extrusion, seroma formation), reinterventions, readmissions, need for implant removal (any-time), length of stay, total breast drainage, and duration of breast drainage. All immediate complications that led to a reintervention or additional treatment with more extended hospitalization were classified as major. Early complications include the complications occurring after hospital discharge and within the first 6 months postoperatively. Minimum follow-up time was 6 months (6–12 months).

Statistical analysis was performed with SPSS (version 24). Descriptive statistics were presented as medians and percentiles P25 and P75, for continuous variables. For categorical variables, frequencies (n) and percentages (%) were presented. Categorical variables associations with implant + ADM versus implant + IDF were performed with a chi-square or Fisher’s exact tests. Mann–Whitney tests were performed for continuous variables associations. Significance was considered for $p < 0.05$.**

**Surgical Technique**

**Acellular Dermal Matrix**

All surgeons used Native (MBP Biologics, Neustadt-Glewe, Germany, license holder Decom, Marcon, Venezia, Italy). After a skin-sparing mastectomy, the ADM was used as an inferior sling for the breast implant (\textit{Fig. 1}). The inferolateral margin of the pectoralis major muscle was released, and the ADM was sutured close to the inframammary fold and the inferior border of the muscle following its lateral contour. The breast implant was introduced through the central pocket left open and then placed below the pectoralis major superiorly, and the ADM inferiorly and this interface was closed over the implant with absorbable sutures. Exceptionally, in skin and nipple sparing mastectomies via inframammary approach we opted to begin the reconstruction by securing the ADM to the pectoralis major muscle. After this step we would insert the implant and finally suture the ADM to the inframammary sulcus (\textit{Figs. 2–6}). Two drains were used, one in the retropectoral space and the other in the subcutaneous space.

**Inferior Dermal Flap**

The patient is marked in the upright position for a Wise-pattern incision (\textit{Fig. 7}). The vertical lines, approximately 7 cm, are positioned closer to the nipple-areola complex (NAC) than in the standard technique to decrease tension
on the closure. The convergence of these lines (the cephalic most vertical mark) is kept as low as possible, near the NAC. The plastic surgeon initially deepithelializes the lower pole skin (Fig. 8) that would usually be discarded in the Wise-pattern breast reduction (the part on top of the inferior pedicle and the lateral edges). Oncologic surgeons then proceeded with the mastectomy through a classic circum-areolar incision, allowing for small modifications in a later phase. After the mastectomy is complete, the remaining incisions are done, and the lower edge of the pectoralis major muscle is lifted and the retropectoral pocket dissected (Fig. 9). The breast implant is introduced through the pocket between the pectoralis major and IDF sling. Two short full-thickness incisions are made on the lateral and medial edges of the IDF to recreate a more natural contour. The interface between the muscle and the IDF is closed with tacking absorbable sutures (Fig. 10). Finally, the inverted T incision is closed over the autoderm (Fig. 11). Two drains were used, one in the retropectoral space and the other in the subcutaneous space.

**Results**

A total of 85 women underwent immediate implant-based breast reconstruction. Seventy-three women underwent reconstruction with ADM, comprising 101 reconstructions.

---

*Fig. 1* Illustrative images depicting acellular dermal matrix + implant breast reconstruction. (A) Profile view. (B) Frontal view.

*Fig. 2* Pectoralis major muscle elevation.

*Fig. 3* Acellular dermal matrix suture to pectoralis major muscle.
(45 unilateral and 28 bilateral). Twelve women were submitted to reconstruction with IDF, totaling 17 reconstructions (7 unilateral and 5 bilateral).

Patient demographics and comorbidities are shown and compared in Table 1. Patients in the IDF group had higher BMI (median = 27.0) than patients in the ADM group (median = 24.0) (p = 0.009). There were no more statistically significant results.

Outcomes are displayed in Table 2. There were no statistically significant differences among both groups.

Discussion

One-stage breast reconstruction is nowadays commonly performed in most centers, especially since the significant developments made regarding the production of silicone implants allowing a more natural contour and feel, being close to matching the contralateral breast. Despite this, it was difficult providing a moderate size reconstruction due to lack of sufficient soft tissue coverage of the implant. The pectoralis major muscle was usually dissected and sutured to the serratus myofascial component inferiorly, providing a well vascularized cover for the implant but a minimal, rigid, pocket. The use of ADM and IDF allowed surgeons to more easily cover the lower pole of the breast, creating a natural ptotic shape, capable of more expansion and avoiding dissection of the serratus fascia or muscle which helps to reduce surgical morbidity and improve patient recovery.2,8,13

In our study, comparing two groups of patients submitted to breast reconstruction using either ADM or IDF, we found the patients in the IDF group to have significantly higher BMI values.

Similar ranges of complications have been reported for immediate breast reconstruction using ADM and IDF.8 Our immediate major complications rate using ADM was 15.8% which is slightly less than the average results reported in the literature, ranging from 16.7 to 36.8%.3,5,8,14–16 Concerning IDF reconstruction we had a 23.5% rate of major complications which is also in accordance to most published results (7.5–32.2%).2,8,11,13,17
Fig. 7  Illustrative images depicting inferior dermal flap + implant breast reconstruction. (A) Wise-pattern markings ("A," "B," and "C" represent the vertices) and area to be deepithelialized; gray area will be removed. (B) After mastectomy, showing pectoralis major and IDF. (C) After implant placement and initial closing sutures between pectoralis major and IDF. (D) Final aspect, the initial points "B" and "C" joint together.

Fig. 8  Initial Wise-pattern markings and deepithelization.

Fig. 9  Pectoralis major muscle dissected and pocket created; # signals PM muscle; * signals inferior dermal flap.
Most authors point out that IDF reconstructions are commonly performed in women with large volume breasts and ptosis and also heavier mastectomy specimen weights, which can represent a risk factor for complications.\textsuperscript{10,16} Although we did not evaluate breast dimensions nor mastectomy weights, the cohort of patients submitted to IDF reconstruction had a significantly higher BMI compared with the ones that underwent ADM reconstruction. In a thinner woman with smaller, less ptotic breasts, this technique might not be feasible since there is not enough tissue to

Table 1 Patient demographics and preop comorbidities comparison between ADM and IDF

|                | ADM (n = 101) | Inferior dermal flap (n = 17) | p-Value |
|----------------|--------------|-------------------------------|---------|
| Age            | 44.5 (38.0–49.0) | 45.0 (43.0–51.0) | 0.192   |
| BMI            | 24.0 (21.0–26.5) | 27.0 (23.0–27.5) | 0.009\textsuperscript{*} |
| Neoadjuvant chemotherapy | No | 99 (98.0%) | 17 (100.0%) | > 0.990 |
|                | Yes | 2 (2.0%) | 0 (0.0%) |         |
| Genetic risk   | No | 55 (54.5%) | 9 (52.9%) | > 0.990 |
|                | Yes | 46 (45.5%) | 8 (47.1%) |         |
| Smoking        | No | 87 (86.1%) | 12 (70.6%) | 0.148   |
|                | Yes | 14 (13.9%) | 5 (29.4%) |         |
| DM             | No | 98 (97.0%) | 17 (100.0%) | > 0.990 |
|                | Yes | 3 (3.0%) | 0 (0.0%) |         |
| Hypertension   | No | 96 (95.0%) | 14 (82.4%) | 0.088   |
|                | Yes | 5 (5.0%) | 3 (17.6%) |         |

Abbreviations: ADM, acellular dermal matrix; BMI, body mass index; DM, diabetes mellitus; IDF, inferior dermal flap.
Note: Results presented as median (P25–P75) or n (%); p-value calculated with Mann–Whitney test for continuous variables and chi-square/Fisher’s test for categorical variables.
\textsuperscript{*}Statistically significant.

Table 2 Outcomes comparison between ADM and IDF group

|                | ADM (n = 101) | IDF (n = 17) | p-Value |
|----------------|--------------|--------------|---------|
| Major immediate complications | No | 85 (84.2%) | 13 (76.5%) | 0.182   |
|                | Yes | 16 (15.8%) | 4 (23.5%) |         |
| Major hematoma | No | 98 (97.0%) | 15 (88.2%) | 0.151   |
|                | Yes | 3 (3.0%) | 2 (11.8%) |         |
| Infection      | No | 100 (99.0%) | 17 (100.0%) | > 0.990 |
|                | Yes | 1 (1.0%) | 0 (0.0%) |         |
| Mastectomy flap necrosis | No | 87 (86.1%) | 15 (88.2%) | > 0.990 |
|                | Yes | 14 (13.9%) | 2 (11.8%) |         |
| Prosthesis extrusion | No | 88 (90.7%) | 17 (100.0%) | 0.352   |
|                | Yes | 9 (9.3%) | 0 (0.0%) |         |
| Minor immediate complications | No | 81 (80.2%) | 11 (64.7%) | 0.203   |
|                | Yes | 20 (19.8%) | 6 (35.3%) |         |

(Continued)
Table 2 (Continued)

|                          | ADM (n = 101) | IDF (n = 17) | p-Value |
|--------------------------|---------------|--------------|---------|
| Minor hematoma           |               |              |         |
| No                       | 99 (98.0%)    | 17 (100.0%)  | 0.990   |
| Yes                      | 2 (2.0%)      | 0 (0.0%)     |         |
| Minor infection          |               |              |         |
| No                       | 101 (100.0%)  | 17 (100.0%)  | –       |
| Yes                      | 0 (0.0%)      | 0 (0.0%)     |         |
| Marginal flap necrosis   |               |              | 0.111   |
| No                       | 83 (82.2%)    | 11 (64.7%)   |         |
| Yes                      | 18 (17.8%)    | 6 (35.3%)    |         |
| Early complications      |               |              | > 0.990 |
| No                       | 84 (83.2%)    | 14 (82.4%)   |         |
| Yes                      | 17 (16.8%)    | 3 (17.6%)    |         |
| Early infection          |               |              | 0.591   |
| No                       | 95 (94.1%)    | 17 (100.0%)  |         |
| Yes                      | 6 (5.9%)      | 0 (0.0%)     |         |
| Early hematoma           |               |              | > 0.990 |
| No                       | 100 (99.0%)   | 17 (100.0%)  |         |
| Yes                      | 1 (1.0%)      | 0 (0.0%)     |         |
| Early prosthesis exposure|              |              | > 0.990 |
| No                       | 91 (90.1%)    | 16 (94.1%)   |         |
| Yes                      | 10 (9.9%)     | 1 (5.9%)     |         |
| Seroma                   |               |              | 0.157   |
| No                       | 94 (93.1%)    | 14 (82.4%)   |         |
| Yes                      | 7 (6.9%)      | 3 (17.6%)    |         |
| Total breast drainage (mL)| 370.0 (180.0–840.0) | 450.0 (210.0–820.0) | 0.558 |
| Duration of breast drainage (d)| 8.0 (6.0–12.0) | 8.0 (7.0–9.0) | > 0.990 |
| Reintervention           |               |              | 0.501   |
| No                       | 84 (83.2%)    | 13 (76.5%)   |         |
| Yes                      | 17 (16.8%)    | 4 (23.5%)    |         |
| Readmitted               |               |              | 0.689   |
| No                       | 89 (88.1%)    | 16 (94.1%)   |         |
| Yes                      | 12 (11.9%)    | 1 (5.9%)     |         |
| Surgery if readmitted    |               |              | 0.154   |
| No                       | 1 (8.3%)      | 1 (100.0%)   |         |
| Yes                      | 11 (91.7%)    | 0 (0.0%)     |         |
| Prosthesis removal anytime|               |              | 0.127   |
| No                       | 84 (83.2%)    | 17 (100.0%)  |         |
| Yes                      | 17 (16.8%)    | 0 (0.0%)     |         |

Abbreviations: ADM, acellular dermal matrix; IDF, inferior dermal flap. Note: Results presented as median (P25–P75) or n (%); p-value calculated with Mann–Whitney test for continuous variables and chi-square/Fisher’s test for categorical variables.

create a dermal sling used to cover the implant. Not only the measurements required to perform this technique are dependent on the breast dimensions they are also dependent on what size the patient wants because the permanent implant will always have to be smaller than the native breast in immediate one-stage reconstructions. We offered a contralateral mastopexy/breast reduction to all patients who underwent unilateral reconstruction with IDF since the conversion of a ptotic breast into a young breast shape produced a significant asymmetry.

In our study, we found a difference between both techniques concerning reconstructive failure that even tough is not statistically significant might be clinically relevant. ADM reconstruction group had more implant removals than the IDF group (16.8% vs. 0%). Despite the similar complications rate between both groups, there are some differences regarding their nature that we believe can explain this circumstance. The IDF group suffered mostly from seroma (which usually does not compromise the reconstructive process) and marginal skin necrosis. Since the IDF reconstruction provides a complete vascularized layer (as opposed to ADM) for implant coverage, even if the skin does not survive there is still a healthy layer of tissue beneath protecting the implant and making the extrusion less likely. On the other hand, in the ADM group the most frequent complications were marginal/mastectomy flap necrosis, prosthesis extrusion, and infection. These can all lead to reconstructive failure. Hon et al. in a study comprising 101 immediate breast reconstructions and comparing patients submitted to ADM and IDF reconstruction, did not find a significant difference between both groups concerning reconstructive failure. The authors used a two-stage approach for all patients. We think this may have contributed to their low complication rates. Randomized prospective clinical studies are needed to evaluate this hypothesis.

Acellular matrixes are allogeneic products, and as such, they need to be secondarily vascularized by adjacent well-perfused tissue. Logically, they cannot guarantee a successful outcome when the lower pole skin is poorly perfused. IDF has the advantage of keeping their own blood supply and providing an implant pocket that is completely vascularized. It preserves the submammary fold attachments and provides a thicker layer (compared with ADM) between the implant and the skin contributing to a more natural consistency and feel. It may also provide better tolerance to postoperative radiotherapy if needed. T-junction breakdown is quite common in Wise-pattern mastectomies and can lead to exposure and implant loss. When using the IDF technique, this critical area of fragility is placed directly over the vascularized dermis, which protects the implant but also limits skin breakdown initially. Consequently, even if the skin necrosis and the IDF becomes exposed, it is still capable of surviving and protecting the implant with meager rates of reconstructive failure. If the ADM were used in this context (Wise-pattern mastectomies for large breasts), wound breakdown would lead to ADM exposure and consequently to infection and implant extrusion.

This study has several limitations. The retrospective nature, the limited number of patients, and the fact it was conducted in
a single center make it impossible to generalize the results. The short follow-up time (6–12 months) does not allow us to make any statements regarding long-term outcomes (i.e., capsular contracture, implant malposition). The study did not evaluate additional factors that could have altered the outcomes such as radiotherapy, chemotherapy, breast size, mastectomy weight, ptosis grade, ADM size, nor did it evaluate aesthetic outcomes. We also need to acknowledge the potential presence of possible confounding variables. Economic costs (operating procedure time and ADM cost) were also not analyzed.

Our study suggests there are no significant differences in major immediate complications and early complications between the ADM and IDF approach to immediate implant breast reconstruction. In patients with a higher BMI and large, ptotic breasts (suitable for Wise-pattern skin mastectomies), we recommend an immediate implant reconstruction with an IDF. The main benefits of the IDF are its easy availability, no additional costs, and exclusive use of autologous tissue. Further prospective multicenter studies focused on complication rates and long-term outcomes are needed to clarify these conclusions.

Author Contributions
All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by L.M.R. and R.M. L.M.R. wrote the first draft of the manuscript and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Availability of Data and Material
The data was collected from the digital clinical files of the patients operated in Hospital IPO Porto in January 2020.

Ethical Approval
The study was approved by the Institutional Review Board of the Instituto Português de Oncologia–Porto (IPO Porto) (IRB No. CES 237/021).

Patient Consent
Informed consent was obtained from all individual participants included in the study.

Funding
None.

Conflict of Interest
None declared.

Acknowledgment
We would like to thank Edgar Mesquita for helping with the statistical analyses included in the article.

References
1 Nair A, Jaleel S, Abbott N, Buxton P, Matey P. Skin-reducing mastectomy with immediate implant reconstruction as an indispensible tool in the provision of oncoplastic breast services. Ann Surg Oncol 2010;17(09):2480–2485
2 Ellabban MA, Nawar A, Milad H, Ellabban MG. Single-stage immediate breast reconstruction using anatomical silicone-based implant and the hammock technique of dermal-muscle flap in large and ptotic breasts: a multicenter study. World J Surg 2020;44(06):1925–1931
3 Tasoulis MK, Teoh V, Khan A, Montgomery C, Mohammed K, Gui G. Acellular dermal matrices as an adjunct to implant breast reconstruction: analysis of outcomes and complications. Eur J Surg Oncol 2020;46(4 Pt A):511–515
4 Krishnan NM, Fischer JP, Basta MN, Nahabedian MY. Is single-stage prosthetic reconstruction cost effective? A cost-utility analysis for the use of direct-to-implant breast reconstruction relative to expander-implant reconstruction in postmastectomy patients. Plast Reconstr Surg 2016;138(03):537–547
5 Remington AC, Gurtner GC, Wan DC, Nguyen D, Momeni A. Identifying risk factors for postoperative major complications in staged implant-based breast reconstruction with AlloDerm. Breast J 2019;25(04):597–603
6 Greig H, Roller J, Ziaiariis W, Van Laeken N. A retrospective review of breast reconstruction outcomes comparing AlloDerm and DermaCELL. JPRAS Open 2019;22:19–26
7 Israeli Ben-Noon H, Farber N, Weissman O, et al. Israeli Ben-noon HT. The effect of acellular dermal matrix on drain secretions after immediate prosthetic breast reconstruction. J Plast Surg Hand Surg 2013;47(04):308–312
8 Hon HH, Mubang RN, Wernick BD, et al. Acellular dermal matrix versus inferior deepithelialized flap breast reconstruction: equivalent outcomes, with increased cost. Plast Reconstr Surg Glob Open 2017;5(06):e1382
9 Bostwick J. Prophylactic (risk-reducing) mastectomy and reconstruction. In: Bostwick J, ed. Plastic and Reconstructive Breast Surgery. Vol. II. St. Louis, MO: Quality Medical Publishing; 1990:1369–1373
10 Hammond DC, Capraro PA, Ozolins EB, Arnold JF. Use of a skin-sparing reduction pattern to create a combination skin-muscle flap pocket in immediate breast reconstruction. Plast Reconstr Surg 2002;110(01):206–211
11 Jepsen C, Hallberg H, Pivodic A, Elander A, Hansson E. Complications, patient-reported outcomes, and aesthetic results in immediate breast reconstruction with a dermal sling: a systematic review and meta-analysis. J Plast Reconstr Aesthet Surg 2019;72(03):369–380
12 Hansson E, Jepsen C, Hallberg H. Breast reconstruction with a dermal sling: a systematic review of surgical modifications. J Plast Surg Hand Surg 2019;53(01):1–13
13 Dietz J, Lundgren P, Veeramani A, et al. Autologous inferior dermal sling (autoderm) with concomitant skin-envelope reduction mastectomy: an excellent surgical choice for women with macromastia and clinically significant ptosis. Ann Surg Oncol 2012;19(10):3282–3288
14 Lee KT, Hong SH, Jeon BJ, Pyon JK, Mun GH, Bang SL. Predictors for prolonged drainage following tissue expander-based breast reconstruction. Plast Reconstr Surg 2019;144(01):9e–17e
15 Chandarana MN, Jafferbhoy S, Marla S, Soumian S, Narayanan S. Acellular dermal matrix in implant-based immediate breast reconstructions: a comparison of prepectoral and subpectoral approach. Gland Surg 2018;7(Suppl 1):S64–S69
16 King ICC, Harvey JR, Bhaskar P. One-stage breast reconstruction using the inferior dermal flap, implant, and free nipple graft. Aesthetic Plast Surg 2014;38(02):358–364
17 Ladizinsky DA, Sandholm PH, Jewett ST, Shahzad F, Andrews K. Breast reconstruction with the Bostwick autoderm technique. Plast Reconstr Surg 2013;132(02):261–270
18 Patrinely JR, Farinas A, Al-Majed B, Forte AJ, TerKonda S, Perdikis G. Acellular dermal matrix performance compared with latissimus dorsi mycrotaneous flap in expander-based breast reconstruction. Plast Reconstr Surg Glob Open 2019;7(09):e2414