

## **Surgical Complications of Prepectoral Breast Reconstruction with Implants**

**Karimova M.N.**

*professor assistant of Oncology department*

**Abduvalieva M.**

*Magistr of oncology department*

**Ergashev J.**

*Magistr of oncology department*

**Abstract:** Reconstructive plastic surgeries with one-stage prepectoral implant placement in patients with breast cancer (BC) are becoming increasingly important. Good aesthetic results and high quality of life are the main incentives for performing such surgeries. The experience of using this intervention for more than 10 years in patients with BC, including after systemic combined treatment, allows us to evaluate its outcomes and the possibility of complications. This article presents the results of observation in the department of oncology and reconstructive plastic surgery of the mammary gland of patients after one-stage breast reconstruction with prepectoral placement of textured (45%) and polyurethane (47.5%) endoprotheses, as well as tissue expanders (7.5%). The observation period was 65 months. The study assessed the frequency of complications such as seroma, hematoma, "red breast" syndrome, rippling, diastasis of the wound edges, implant loss, capsular contracture of grades III-IV. In addition, clinical examples of some complications are given. Analysis of the literature and our own experience indicate that careful selection of patients and improvement of surgical technique contribute to the further dissemination of this method and minimization of the risk of possible complications.

**Key words:** *breast reconstruction, prepectoral reconstruction, breast cancer, tissue expander, textured implant, polyurethane implant*



**Introduction** Breast cancer (BC) is the most common oncological disease in women [1]. Modern developments in diagnostics allow detection of malignant neoplasms of the mammary glands at early stages, which makes it possible to improve long-term treatment results, increase

overall and relapse-free survival of patients, and apply functionally sparing operations [2, 3]. Today, much attention is paid to maintaining a good quality of life for patients, subject to compliance with all the basic principles of cancer treatment. In order to maintain a woman's social activity years after systemic treatment for breast cancer, it is necessary to competently use modern drug therapy in combination with functionally sparing surgical treatment. The efforts of doctors are aimed at ensuring that in the future nothing reminds of the cancer diagnosis. A good aesthetic result of breast reconstruction serves as a "litmus test" of the comprehensive treatment, on which the further psychoemotional component of the overall quality of life depends [4–6]

**Material and method:** In 2024, scientists from the Samarkand branch of the Republican Specialized Scientific and Practical Center of Oncology and Radiology published a scientific paper on prepectoral installation of mammary gland endoprosthesis as an alternative to subpectoral reconstruction in primarily operable forms of breast cancer and sufficient thickness of integumentary tissues [7]. In the period from April 2021 to September 2024, 340 one-stage reconstructions with prepectoral implant installation after subcutaneous/skin-sparing mastectomy using polyurethane-coated implants in patients with breast cancer were performed at this institution. The results of the intervention in 208 patients were analyzed. According to the data obtained, such complications of the postoperative period as prolonged seroma, "red breast syndrome", capsular contracture of grades III-IV according to J.L. Baker, implant protrusion/extrusion, suture dehiscence, necrosis, infectious complication, rippling, endoprosthesis integrity violation and implant rotation [7]

In December 2022, American authors published a paper on the results of reconstruction with prepectoral implant placement compared with subpectoral [8]. The study described the clinical results of breast reconstruction with prepectoral implant placement over 11 years. The authors compared the incidence of the same complications in reconstructions with prepectoral and subpectoral implant placement. A total of 758 reconstructions with prepectoral implant placement were performed in 468 patients and 163 reconstructions with subpectoral implant placement were performed in 100 patients. According to the study, it was found that reconstruction with prepectoral implant placement is associated with a low complication rate compared to reconstruction with subpectoral implant placement. The incidence of capsular contracture, implant protrusion, and local relapses did not increase with prepectoral implant placement. In September 2023, Italian authors published a literature review on reconstruction with prepectoral implant placement, analyzing data for the previous 5 years [9]. The article emphasized that the prepectoral implant placement method is safe and feasible in combination with both meshes and without covering the lower pole of the implant. It was noted that with prepectoral placement of the breast endoprosthesis, postoperative pain syndrome is significantly reduced and there is no symptom such as animation [9].

In 2024, an article was published on our experience of using reconstructions with prepectoral implant placement, performed from 2021 to 2024 in 308 patients with an oncological diagnosis against the background of systemic treatment (radiation and chemotherapy), where the development of complications was assessed [10]. In this paper, which is a continuation of this study, we present the results of monitoring the operated patients, taking into account the accumulated experience

**Personal experience (Discussion):** In the Samarkand branch of the Republican Specialized Scientific and Practical Center for Oncology and Radiology, 750 reconstructive plastic surgeries were performed in patients with breast cancer from January 2020 to May 2024. The presented

study included 400 patients who had an endoprosthesis (polyurethane or textured implants, or tissue expanders) installed prepectorally.

Inclusion criteria for the study: no contraindications to surgical treatment, thickness of the integumentary tissue of the mammary gland, assessed on the basis of the pinch test,  $\geq 1$  cm.

The volume, width, height and profile of the implants installed were selected depending on the constitutional features of the patients, the results of preliminary measurements and the volume of the sizes that were most suitable for intraoperative measurements. The average age of the patients was 47.7 years. Depending on the stage of breast cancer, the patients were distributed as follows: stage 0 (pTisN0M0) - 58 (14.5%) patients, stage I (pT1N0M0) - 147 (36.75%), stage IIA (pT0-2N0-1M0) - 105 (26.25%), stage IIB (cT2-3N0-1M0) - 61 (15.25%), stage IIIA (cT0-3N1-2M0) - 23 (5.75%), stage IIIB (cT4N0-2M0) - 5 (1.25%), stage IIIC (cT0-4N3M0) - 1 (0.25%).

**Table. Frequency of complications in patients, n (%)**

**Table. Incidence of complications in patients, n (%)**

Complication	Textured implant (n=190)	Polyurethane-coated implant (n=180)	Tissue expander (n=30)
Grade III-IV capsular contracture	24 (6)	11 (2.75)	2 (0.5)
Seroma	13 (3.25)	7 (1.75)	Not evaluated
Implant loss	6 (1.5)	3 (0.75)	0
Diastasis of the wound edges	5 (1.25)	3 (0.57)	0
Hematoma / Hematoma	0	3 (0.75)	0
Red breast syndrome	0	10 (2.5)	0
Rippling	0	13 (3.25)	0

**Result:** The type of complications during the postoperative period and the frequency of their

development were assessed during regular examinations in the postoperative period and using the photography method before surgical treatment, after surgery and during further complex treatment at its various stages with the consent of the patients. Thus, the patients were constantly under the surgeon's supervision, which allowed early and late postoperative complications to be identified in a timely manner.

Prepectoral implant placement is possible if the following conditions are met: pinch test thickness of the integument is  $\geq 1$  cm and a positive decision of the multidisciplinary council that at this stage of systemic treatment the patient is indicated for reconstructive plastic surgery using an implant. The operation is contraindicated in case of polyvalent allergy and autoimmune disease, unsatisfactory somatic condition of the patient (infectious or any chronic disease in the acute stage).

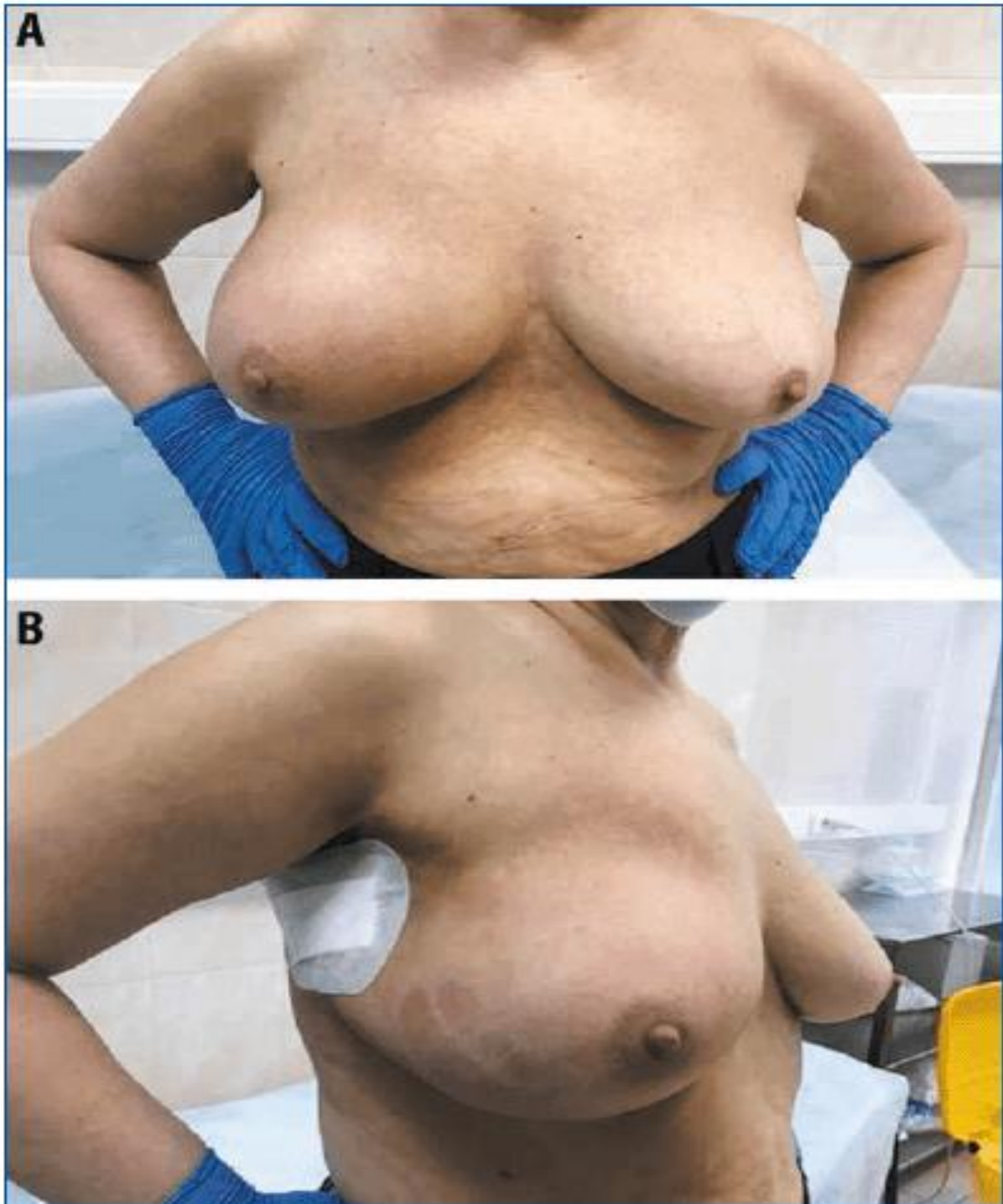
Over 65 months of observation in the Department of Oncology and Reconstructive and Plastic Surgery of the Breast, 180 (45%) patients were fitted with polyurethane-coated implants, 190 (47.5%) with textured implants. Prepectoral tissue expander placement during one-stage reconstruction was performed in 30 (7.5%) cases. It should be noted that when planning a surgical operation and reconstruction method, many criteria are individually taken into account and a decision is made on the type of implant to be installed and the type of pocket for the implant bed (skin-fat or skin-muscle).

During the entire observation period, we noted the main postoperative complications during prepectoral endoprosthesis installation. We assessed the incidence of seroma and hematoma, "red breast" syndrome, rippling, wound edge diastasis, implant loss, capsular contracture grades III–IV.

The duration of postoperative lymphorrhea after lymphadenectomy was reduced by both isolating the cavities of the endoprosthesis bed and the axillary region using suturing, and performing a biopsy of the sentinel lymph nodes. This type of complication is currently rare.

Complications were assessed depending on the type of implant covering shells (textured, polyurethane or tissue expander coating). The table presents summary data on the frequency of complications during prepectoral placement of textured, polyurethane implants and tissue expander.

Figures 1–7 show examples of complications during the postoperative period after prepectoral placement of textured or polyurethane implants.



**Fig. 1.** Long-term (over 3 months) seroma after reconstruction of the right mammary gland with a polyurethane implant against the background of systemic treatment: A - front view, B - side view

**Fig. 1.** Pictures of a female patient with long-term seroma for 3 months after right breast reconstruction with a polyurethane-coated implant during systemic treatment: A — front view, B — side view

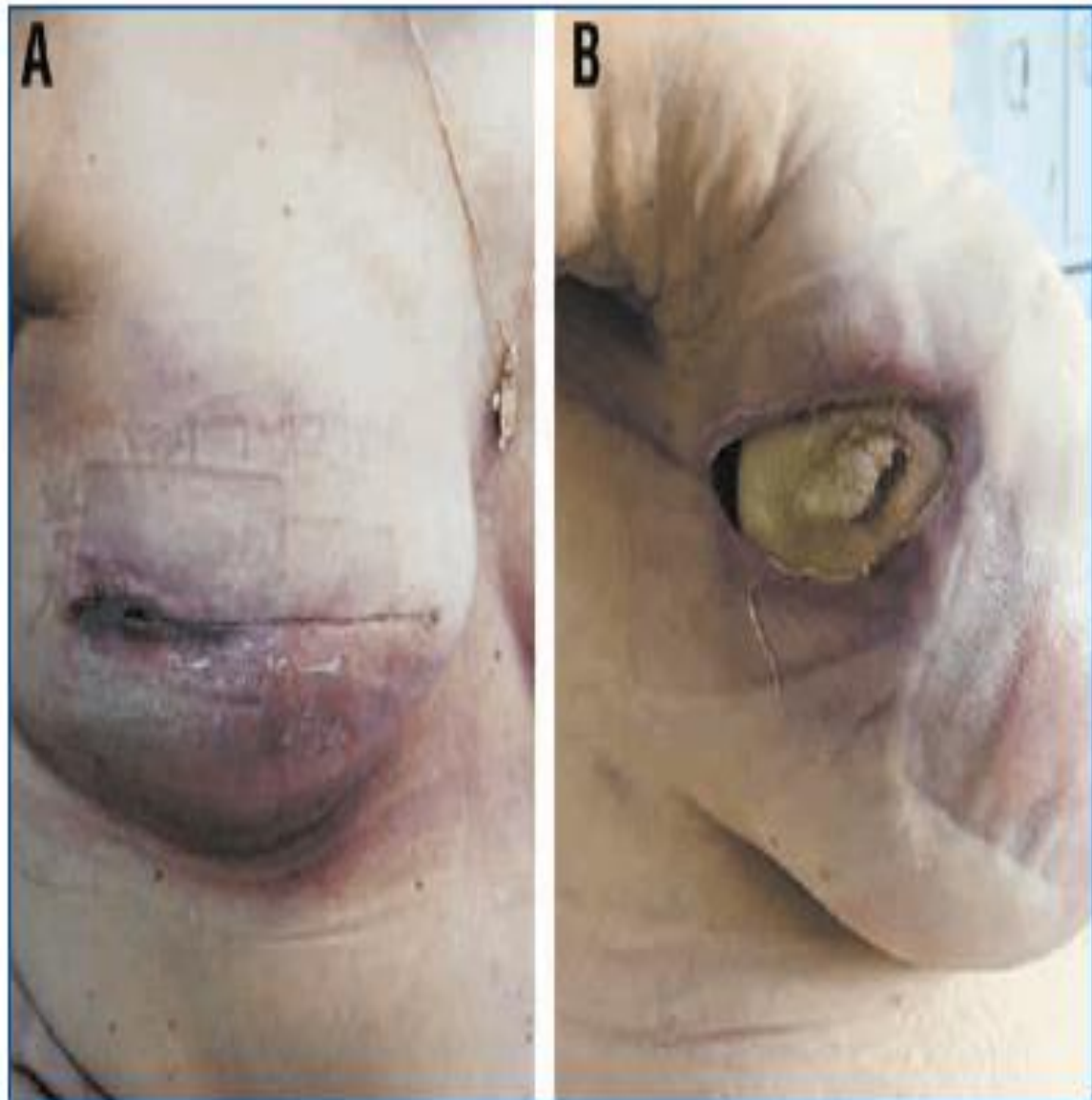


Fig. 2. Diastasis of the wound edges 2 months after the installation of textured implants (A) and 8 months after the installation of polyurethane implants (B)

**Fig. 2.** Diastasis of the wound edges in a female patient 2 months after the placement of textured implants (A) and 8 months after the placement of polyurethane-coated implants (B)

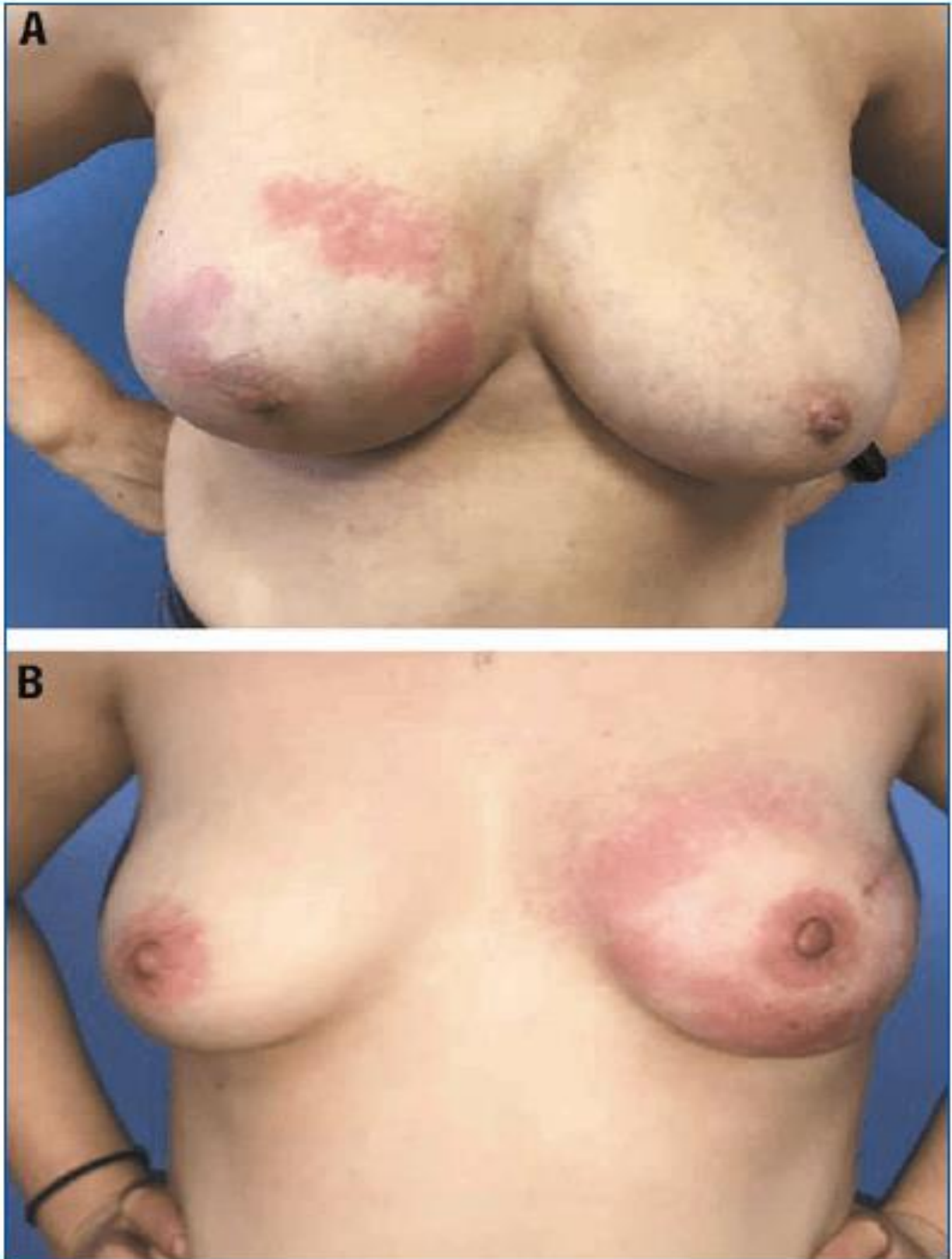


Fig. 3. Cases of "red breast" syndrome 4 weeks (A) and 3 months (B) after installation of a polyurethane implant

**Fig. 3.** Cases of red breast syndrome 4 weeks (A) and 3 months (B) after the placement of a polyurethane-coated implant

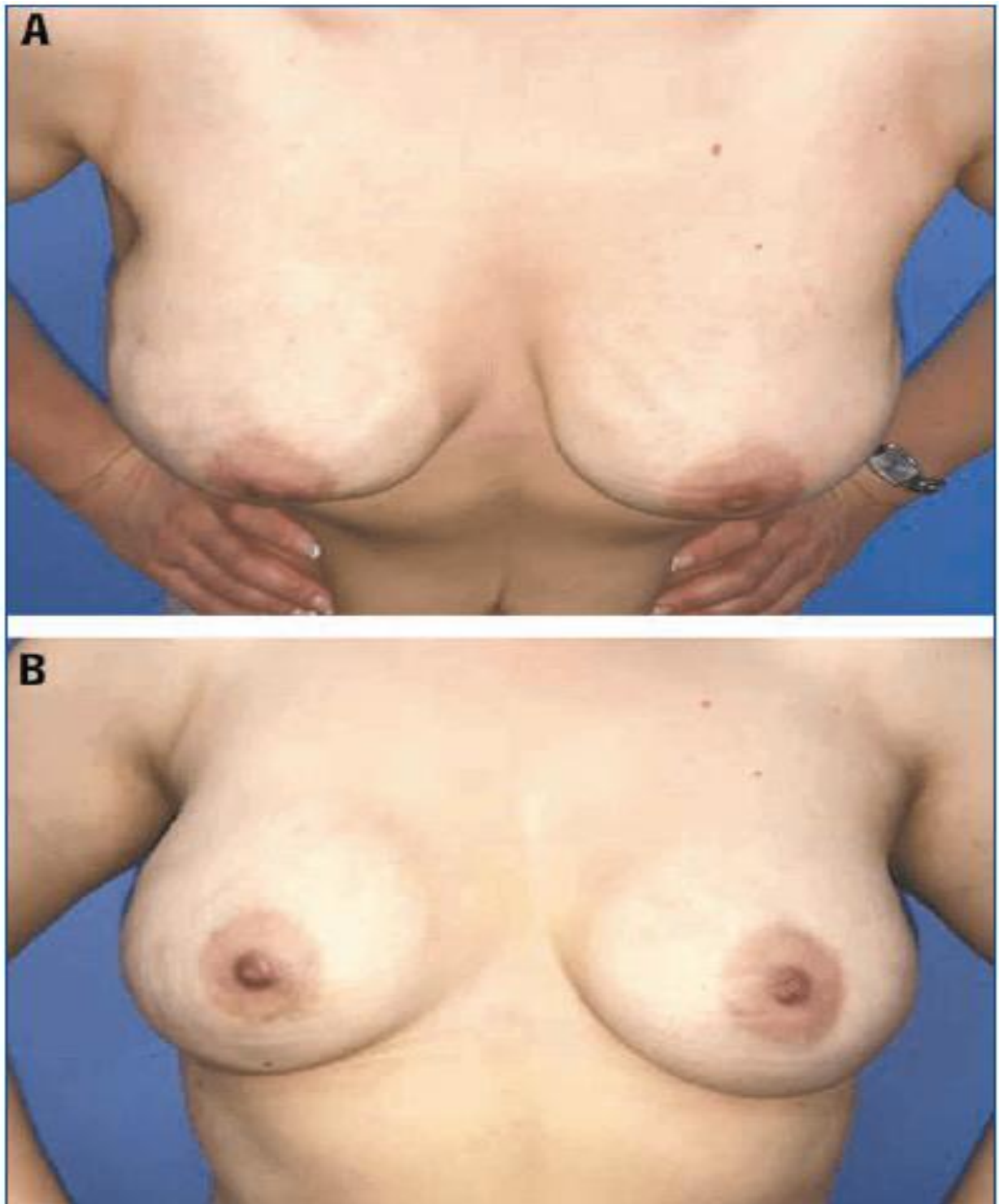


Fig. 4. A case of development of the rippling effect through 12 months after reconstruction with prepectoral installation of a polyurethane implant: A - top view, B - front view

**Fig. 4.** Case of the development of the rippling effect 12 months after reconstruction with a prepectoral installation of a polyurethane implant: A — top view, B — front view



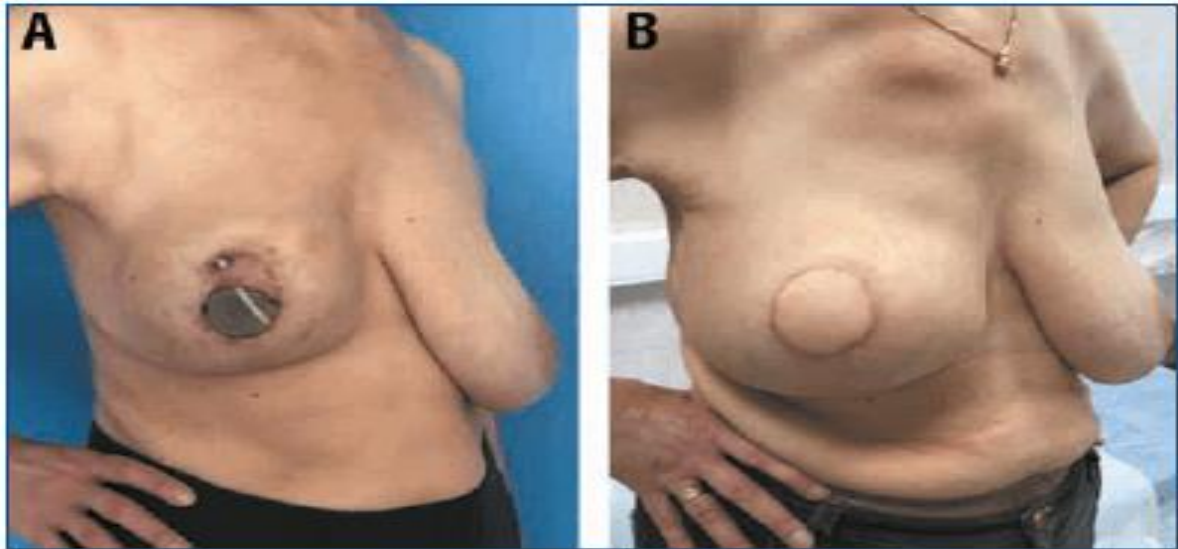


Fig. 5. Case of protrusion of a textured implant (A) and the appearance of the same patient 2 months after reconstruction with a thoracodorsal flap using a textured implant (B)

**Fig. 5.** Case of protrusion of a textured implant (A) and a view of the same female patient 2 months after reconstruction with a thoracodorsal flap using a textured implant (B)

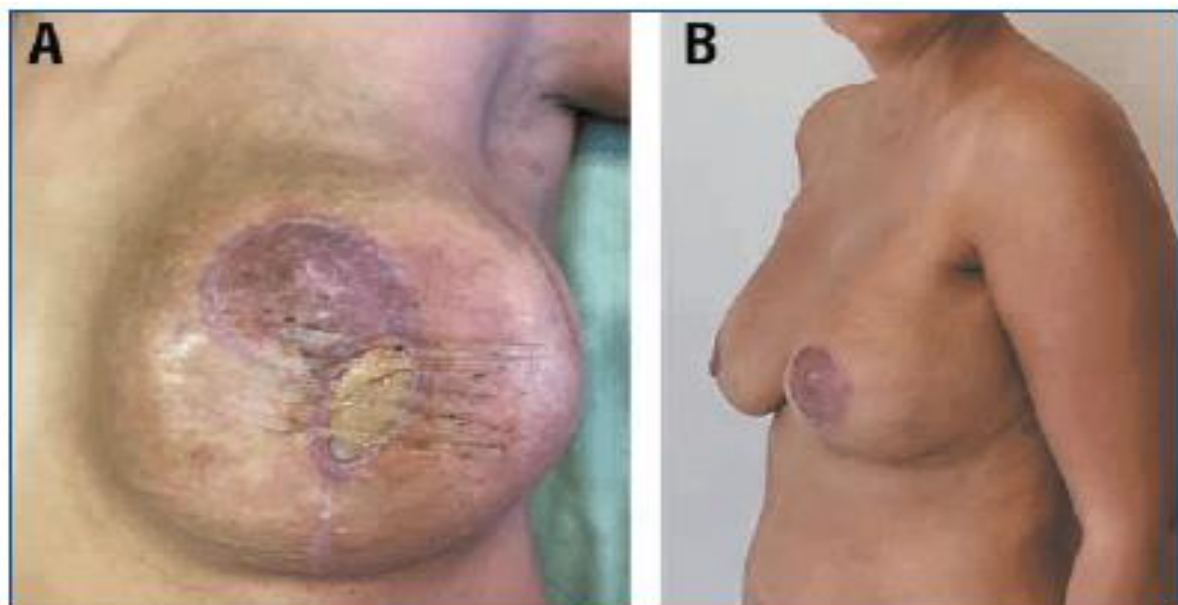


Fig. 6. Case of protrusion of a polyurethane implant (A) and view 9 months after repeated reconstruction using a tissue expander with its subsequent replacement with a textured implant (B)

**Fig. 6.** Case of protrusion of a polyurethane-coated implant (A) and a view 9 months after repeated reconstruction using a tissue expander followed by its replacement with a textured implant (B)

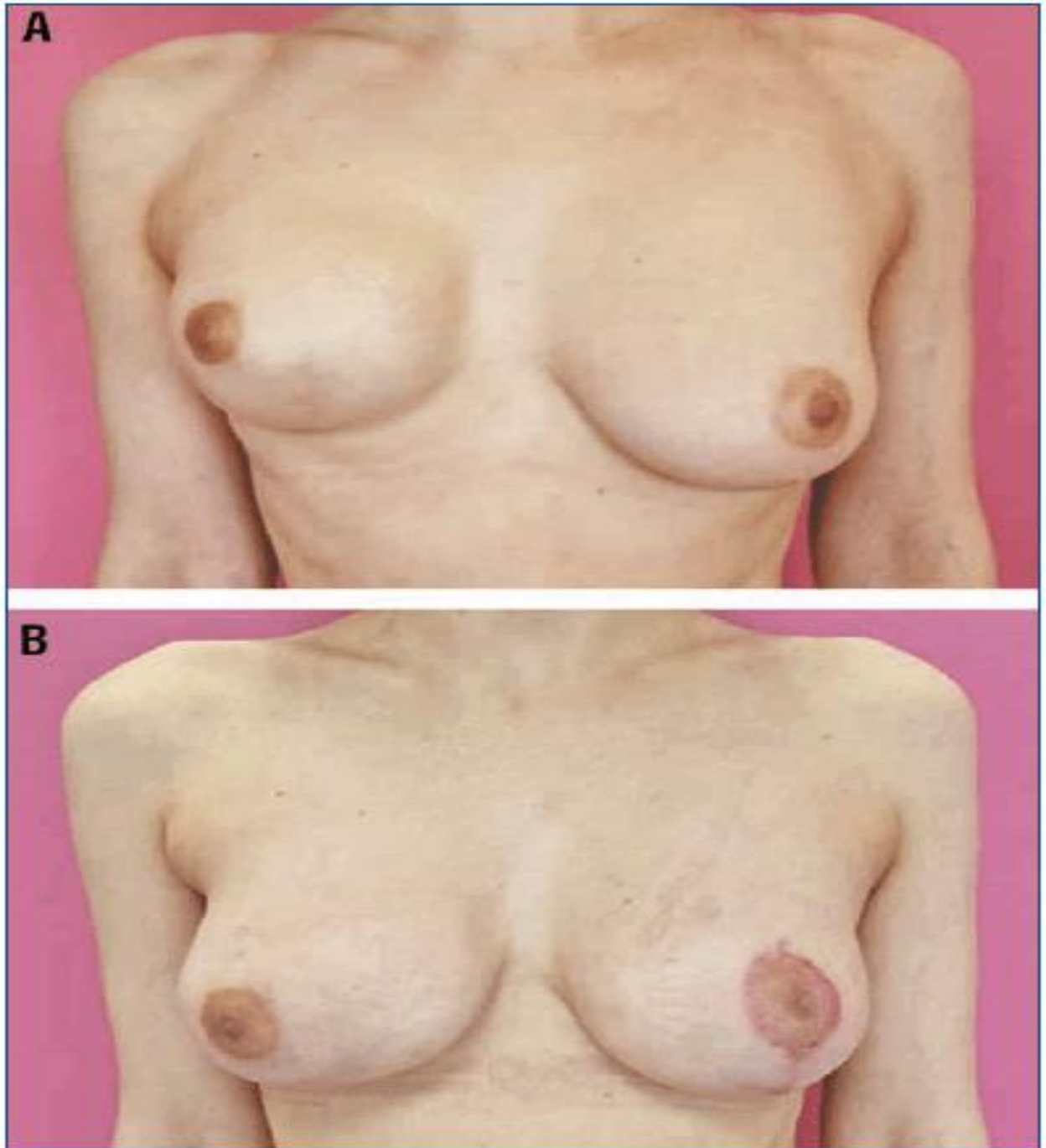


Fig. 7. A case of capsular contracture grade III-IV according to J.L. Baker 18 months after prepectoral placement of a textured implant (A) and 3 months after replacing the textured implant with a similar one on the right with capsulectomy and mastopexy on the left (B)

**Fig. 7.** Case of grade III–IV capsular contracture according to J.L. Baker 18 months after prepectoral placement of a textured implant (A) and 3 months after replacement of the textured implant on the right with a similar one, along with capsulectomy and mastopexy on the left (B)

### Conclusion

Our choice of prepectoral placement of textured and polyurethane implants is justified by good final aesthetic results. We have completely abandoned the subpectoral placement of a permanent

silicone endoprosthesis and any additional covering of the lower slope with synthetic materials. The technique of prepectoral breast reconstruction is a functionally gentle type of reconstructive plastic surgery with a shortened rehabilitation period. It should be noted that rapid recovery has a positive effect on compliance with all terms of systemic treatment of breast cancer. When choosing this reconstruction, it is necessary to remember about careful selection of patients, taking into account all indications and contraindications for surgery.

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