The Effects of Moufarrege Total Posterior Pedicle Reduction Mammaplasty on Breastfeeding: A Review of 931 Cases

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Abstract

Background: Since its original description in 1979, the Moufarrege total posterior pedicle reduction mammaplasty technique has proven to be a safe and reliable procedure providing aesthetic and functional enhancement.

Objectives: To determine if the Moufarrege total posterior pedicle reduction mammaplasty affects successful breastfeeding.

Method: Retrospective chart review was performed for patients operated on between 1981 and 1997, and a written questionnaire was given. Patients were asked about their ability to lactate and successfully breastfeed preoperatively and postoperatively. The t-test and χ² test were used to compare means and categorical variables, respectively. Values were also compared with a sample of women (n = 2223) from the Quebec general population as collected by the Longitudinal Study of Child Development in Quebec (ELDEQ, 1998-2002).

Results: A total of 931 patients (all women) underwent reduction mammaplasty during the study period at Jewish General Hospital, Montreal, Quebec, Canada (H.S.) or Hotel-Hôtel-Dieu, Montreal, Quebec, Canada (E.B. and R.M.). There was a 62% response rate to the questionnaire. There were no statistically significant differences in the percentage of women able to lactate postoperatively vs preoperatively (98% vs 100%, respectively; P = .2). The percentage of women able to successfully breastfeed for 4 and 6 months was also not statistically different when comparing postoperative vs preoperative ability (4 months: 33% vs 44%, P = .13; 6 months: 29% vs 28%, P = .77). The sample of women from the Quebec population did not differ statistically from those undergoing the Moufarrege breast reduction in terms of successful breastfeeding for 1, 2, 3, and 4 months (59% vs 67%, 52% vs 47%, 42% vs 41%, and 40% vs 33%, respectively).

Conclusions: The Moufarrege breast reduction technique is a reliable and safe procedure that does not seem to negatively affect the success of breastfeeding based on the results of our retrospective chart review and patient questionnaire.

Level of Evidence: 4

Keywords
breast reduction, reduction mammaplasty, breastfeeding, lactation, Moufarrege reduction mammaplasty

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We have previously shown that there are no differences in patients’ breastfeeding capacity after reduction mammoplasty compared with women of the North American general population during the first month postpartum.\textsuperscript{5} The World Health Organization (WHO) and the Canadian Public Health organizations, however, recommend at least 6 months of exclusive breastfeeding for infant health,\textsuperscript{6,7} and the success of breastfeeding up to this duration after mammoplasty has not been previously investigated with any single pedicle type.

The objective of this study was to determine whether the Moufarrege total posterior pedicle reduction mammoplasty affects successful breastfeeding for the recommended WHO duration of 6 months. In this article, lactation is defined as the ability to let down milk from the breast nipple–glandular organ, and breastfeeding is defined as exclusive feeding of breast milk for the stated duration.

**METHODS**

**Operative Technique**

**Preoperative consultation**

A complete history and physical were performed on each patient. The surgeon met with each patient to discuss goals and expectations, and a full consent was obtained. Preoperative blood analysis, including complete blood count and coagulation profile, was performed when appropriate. All patients older than 35 years underwent a mammogram, and only those with normal mammograms were seen in consultation; otherwise, they were referred to surgical oncology.

**Operative details**

The breasts were marked in the preoperative holding area. The new nipple position was placed at the level of the inframammary fold (IMF). The angle between the 2 horizontal keyhole arms was not always the same; it ranged from 90 degrees in a nonptotic or minorly ptotic breast (type 1 ptosis), to 140 degrees in a ptotic breast with gland fullness in the IMF (type 2 ptosis), to 180 degrees in a very ptotic breast with gland emptiness at the level of the IMF (type 3 ptosis).\textsuperscript{4} These keyhole arms were continued on the surface of the breast in the manner of 2 meridians on the globe and met on the IMF. The skin area between the 2 arms constituted the skin surface to be removed. The more ptotic the breast, the larger the skin surface to be removed.

All reduction mammoplasties were performed under general anesthesia. Patients were prepped and draped in a sterile fashion. Each breast was infiltrated in the subcutaneous plane with 20 mL of a diluted mixture of lidocaine + epinephrine in 20 mL of normal saline. The outer and medial skin flaps surrounding the skin surface to be removed were detached from the glandular tissue up to the muscle fascia in a relatively bloodless plane (Figure 1). At that stage, all of the breast gland was exposed at all inferior, upper, lateral, and medial sides (Figure 2). In effect, these incisions resulted in the remaining breast gland being attached by its posterior side on the pectoralis muscle. Gland resection was directed at the medial quadrant (very small amount of gland) but mainly the outer quadrant with its axillary extension (Figure 1). No resection was performed in the upper or lower quadrant. The remaining gland constituted a whole uninterrupted blood supply, from the highest to the lowest limits of the breast,
containing the nipple-areolar complex (NAC) and completely attached on its posterior aspect to the pectoralis muscle, with preservation of the perforating vessel system and intercostal nerves (Figure 2). Electrocautery was used to achieve hemostasis.

Breast reconstitution began by placing the NAC in its new position and covering the remaining gland by suturing the lateral and medial skin flaps to each other in a vertical suturing line. The vertical incision was transformed to an “inverted-T” whenever the vertical line exceeded 6 cm in length.

The principle of this technique is that vascular and sensory structures as well as galactophorous ducts are not distorted or twisted (as can be done in the lateral- or medial-based pedicles). There is a complete continuity of all remaining glandular tissue and ducts to the NAC after resection. This is an easy procedure on which to train residents, and it requires a relatively short time for execution because of its methodological steps.

A Penrose drain was applied in the outer upper quadrants, and the skin was closed in 2 layers. Steri-Strips (3M, St Paul, Minnesota) and a bulky dressing were applied, and patients were discharged home.

**Postoperative care**

Patients were seen on the second postoperative day, at which time the Penrose drain was removed and dressings were replaced. Further follow-up visits occurred at 1 week, 1 month, 3 months, and 6 months after surgery. All patients were seen on a yearly basis.

**Study Design**

This study was performed with appropriate written informed consent from patients and institutional review board approval, and it was conducted in accordance with the Declaration of Helsinki. The inclusion criterion for this study was a >250-g tissue reduction as per the Quebec Government requirements for a breast reduction. Only patients (if older than 35 years) with normal mammograms underwent reduction mammoplasty.

A written questionnaire was sent to all women who underwent the Moufarrege total posterior pedicle reduction mammoplasty between 1981 and 1997. This survey was used to investigate patients’ pre- and postoperative breastfeeding ability and success. Patient overall satisfaction with the surgery was assessed on a 4-point Likert scale ranging from 0, not satisfied; 1, little satisfied; 2, very satisfied; and 3, extremely satisfied.

Women were asked about their ability to lactate and successfully breastfeed preoperatively and postoperatively. The reasons for opting not to breastfeed (for personal reasons or other psychosocial factors) were not assessed in this study. We also believed that comparing our patients’ responses with responses from the rest of the population would eliminate any psychosocial bias.

A retrospective hospital chart review was performed to supplement all necessary information such as operative complications and their perioperative medical course. The chart review was comprehensive of both hospital and private office notes. Continuous variables (breastfeeding duration) were compared using a paired t test (intragroup comparisons) and an independent t test (intergroup comparisons). Values were also compared with a sample of women (n = 2223) from the Quebec general population as collected by the Longitudinal Study of Child Development in Quebec (ELDEQ, 1998-2002). The χ² test was used to consider statistically significant.

**RESULTS**

The total number of patients who underwent Moufarrege total posterior pedicle reduction mammoplasty from 1981 to 1997 was 927. There were 571 independent responses to the surveys, for a response rate of 61.7%. Mean age at the time of the surgery was 32.8 years (range, 14–82 years). Mean (SD) follow-up time was 20.8 (4.6) years. A total of 146 women breastfed, of whom 48.6% (n = 71) breastfed preoperatively and 54.8% (n = 80) breastfed postoperatively. About half of the women (n = 75) had not breastfed preoperatively, and 98% of those (n = 73) were successful after the operation. The complications in our series included cases of nipple necrosis and 11 cases (2%) of skin-healing changes that were found in the T-junction between the horizontal and vertical incisions, all of which healed with conservative dressing changes. Patient satisfaction rates with the procedure were as follows: not satisfied, n = 22 (4%); little satisfied, n = 16 (3%); very satisfied, n = 122 (24%); and extremely satisfied, n = 352 (69%).

There were no statistically significant differences in the percentages of women able to lactate after surgery compared with preoperative lactation rates (98% vs 100%, respectively; P = .2). The percentage of women able to successfully breastfeed for 4 and 6 months was also not statistically different when comparing postoperative vs preoperative ability (4 months: 33% vs 44%, P = .13; 6 months: 29% vs 28%, P = .77; Figure 3). The number of women from the general Quebec population did not differ from those who had undergone Moufarrege breast reduction in terms of successful breastfeeding for 1 month (59% vs 67%, P = .07), 2 months (52% vs 47%, P = .37), 3 months (42% vs 41%, P = .92), and 4 months (40% vs 33%, P = .13) (Figure 4).

**DISCUSSION**

Breastfeeding exclusively for 6 months, as recommended by the WHO, provides the child and mother with many documented health benefits. Such practice has been shown to benefit the growing, breastfeeding infant by meeting caloric needs and reducing the incidence of and mortality from infectious disease. The breastfeeding mothers also benefit from this practice via a decrease in postpartum bleeding and a decreased risk of breast and ovarian cancer. It is not surprising that more women are
conscious about these benefits and recommendations, and thus they inquire about the possible effects that breast surgery may have on their future desires to breastfeed.

The plastic surgery literature has many different reports on patients’ ability to breastfeed or lactate after breast reduction surgery with the various pedicle and incision types available. In reviewing the literature in the PubMed and MEDLINE database from 1950 to 2008 using the search terms reduction mammaplasty, reduction mammoplasty, breast reduction, breast feeding, and lactation, we found 26 studies discussing the effects of reduction mammoplasty on breastfeeding. Horizontal pedicles were studied by Ragnell et al in 1957, Muller in 1974, Lossing and Homstrom in 1985, and Deutinger and Deutinger in 1990. The range of breastfeeding success was from 36% to 60%. Unfortunately, the duration of breastfeeding was not adequately defined. Twelve studies reviewed the inferior pedicle, 8 of which compared it with other pedicles. These 8 studies compared the inferior pedicle with various others such as the superior, medial, and bipedicle (horizontal or vertical). The 11 other studies reviewed the various other pedicles. It was difficult to accurately assess the effects of each pedicle on the success of exclusive breastfeeding, as the duration was again inadequate and inconsistent. Cruz-Korchin and Korchin further studied the differences in breastfeeding rates among women who had undergone reduction surgery, comparing to rates in women with macromastia. Although they found no differences between the 2 groups, the breastfeeding durations the authors studied were not as long as the recommended 6-month duration. During our literature review, we came to the general conclusion that these variations were the result of an inconsistent definition of lactation and breastfeeding, inadequate control comparisons, and inadequate follow-up times. We also found that the breastfeeding activity was dependent not only on the type of pedicle that was used but also on the mothers’ motivation, nursing and health care encouragement, and psychological effects.

For this study, we adopted the WHO definitions of lactation and breastfeeding. Lactation was defined as the ability to let down milk from the breast nipple–glandular organ; breastfeeding was defined as exclusive feeding of breast milk for the stated duration. We provided an evidence-based recommendation for superior study methodology to match comparison of breastfeeding rates in women with breast reduction to rates in the general population to achieve a better correlation for cause and effect. In this study, we compared not only breastfeeding success among the same population of women who underwent reduction mammoplasty but also results from our patients with the rest of the Quebec population. Furthermore, the follow-up time in this study was 13 to 19 years, allowing an adequate average time for successful pregnancy and delivery for our patients, who were at a mean age of 32.8 years upon undergoing their reduction mammoplasty surgery. To further minimize bias and strengthen the study outcomes measures, only 1 surgeon (R.M.) performed all the procedures. Furthermore, the large sample size of our series helped to increase the study power and minimize statistical errors.

The Moufarrege total posterior pedicle reduction mammoplasty has proved to be a reliable surgical procedure with satisfactory aesthetic outcomes. It is an easy procedure on which to train residents and takes an average of 45 to 60 minutes of total operative time for a bilateral procedure. This technique was originally designed to overcome the “bottoming out” of the inferior pedicle, the torsion effect that resulted from the rotation of the medial and lateral pedicles, and the sensory nerve and perforator...
artery sacrifice that came with bipedicled reductions.\textsuperscript{1,3,34} The pedicle is not twisted in any manner when it is positioned at the new NAC markings, unlike the twisting that may occur in a medially or laterally based pedicle, for example.

The functional outcomes shown in this study—particularly the ability to successfully breastfeed after Moufarrège reduction—further underscore the advantages of this technique. We have shown that women are able to exclusively breastfeed for the recommended duration of 6 months. Furthermore, we appropriately compared our patients’ preoperative and postoperative breastfeeding abilities. The Moufarrège total posterior pedicle reduction mammaplasty did not affect the ability to breastfeed in this comparison, nor did it affect women’s ability to breastfeed in comparison to women in the general population.

The unique anatomical sparing of breast nipple-glandular tissue as well as sensory nerves to the NAC and the lack of twisting of the pedicle all likely contribute to the lack of any negative effects on lactation from the Moufarrège procedure. Having patent mammary ducts with nipple continuity is essential for successful lactation. The sensory input from the nipple is also key for the “let-down” reflex. The lack of pedicle twisting and the decreased risk of tissue ischemia/fat necrosis also may prevent deleterious effects on lactation. All these advantages are unique to the Moufarrège reduction.

One limitation of our study is that it was retrospective. The hospital and private office chart review was performed retrospectively, and the surveys sent to the patients were also based on the retrospective search. As such, patient recall bias is an inherent limitation and may have affected the accuracy of the results reported in the surveys. Furthermore, patients may have moved or changed addresses, thus limiting the response rates. In addition, patients who may have had negative experiences or outcomes might not have responded to surveys.

Another limitation of surgical studies on this topic is the focus on anatomy and physiology of the breastfeeding performance. In fact, we have previously shown that breastfeeding is dependent not only on the anatomy but also on psychosocial factors such as mother motivation and social encouragement.\textsuperscript{5} The first step to determining the effects of breast surgery is to rule out anatomic and physiologic factors, as we have attempted to do with this study. We recommend additional multicenter, prospective blinded trials to better assess the effectiveness of the Moufarrège total posterior pedicle reduction mammaplasty on breastfeeding and allow comparison with other reduction surgeries. Furthermore, we recommend additional assessment of the psychosocial factors that can influence breastfeeding and its inclusiveness.

CONCLUSIONS

The Moufarrège total posterior pedicle reduction mammaplasty does not seem to negatively affect breastfeeding. With Level 4 (retrospective) evidence-based support, we can now confidently counsel patients who are undergoing reduction mammaplasty with the Moufarrège technique and encourage them to breastfeed if they desire to do so in the future. Again, we recommend multicenter prospective blinded trials to better assess the effect of reduction mammaplasty on breastfeeding, including an assessment of the psychosocial factors that can influence breastfeeding.

Disclosures

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