Superomedial pedicle reduction mammaplasty with and without drains: a comparative analysis

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Abstract

Background: Postoperative suction drainage has historically been a routine part of care following reduction mammaplasty surgery. Purported benefits are a reduction in complications such as haematoma, seroma, delayed wound healing and loss of nipple or areola. The aim of this study is to compare the complication profile of breast reduction surgery patients who had received postoperative drains and those who had not.

Methods: A retrospective analysis was conducted of consecutive reduction mammaplasties performed by experienced surgeon and co-author Dr Merten. A total of 172 patients over the period January 2011 to June 2017 were identified. Statistical analysis with regression modelling was used to compare the complication profile between patients who had and had not received postoperative drainage.

Results: Patients were evenly divided between the ‘drained’ (n=86) and ‘drainless’ (n=86) cohorts. There was no significant difference in age, smoking status and diabetic status between the two groups (p>0.05). Mean body mass index (BMI) was significantly higher in the drained group (29.0 compared to 25.7 in the drainless cohort, p<0.05). Patients in the drained group also had a significantly higher breast weight reduction (660g compared to 536g, p<0.05). There was significantly more vertical skin resection patterns in the drained group (n=25 or 29.1%) as compared to the drainless group (n=8 or 9.3%) (with p=0.001). Using multivariate logistic regression, drains resulted in a slightly lower risk for complications but this difference was not statistically significant (OR 0.84; 95% CI=0.39-1.81; p=0.66). However, BMI was strongly associated with complications (p=0.007).
Conclusions: Our results support the contention that routine postoperative drain insertion in reduction mammoplasty does not significantly reduce complications irrespective of the patient’s BMI, breast tissue reduction weight, use of liposuction or skin resection pattern.

Keywords: mammoplasty, postoperative complications, drainage, haematoma, seroma

Introduction
Postoperative suction drainage has been a routine part of care following reduction mammoplasty surgery. Purported benefits are a reduction in complications such as haematoma, seroma, delayed wound healing and loss of nipple or areola as a result of minimising dead space. However, the use of suction drains is not without inherent issues and potential risk. Drainage tubes are a source of patient concern, discomfort and inconvenience, are prone to migration and occlusion, and may be a potential source of infection through a stab incision if brought out separately. They can also produce an additional scar on the patient’s chest and, from an economic perspective, patients discharged with drains in situ require an increased level of care in the community.

Several randomised studies have suggested that the use of surgical drains following breast reduction does not result in any significant difference in wound healing or haematoma rates.1-3 Two systematic reviews also concluded that there was no significant benefit to using postoperative wound drains in reduction mammoplasty.4,5 Despite this, most surgeons in the United States and United Kingdom routinely use drains.6-8 At present, there is no data from the Asia-Pacific or other regions regarding trends or practices with regards to reduction mammoplasty.

The advantages of the superomedial pedicle with various skin resection patterns in reduction mammoplasty are well-known.9 They relate primarily to its safety profile, reproducibility and adaptability and superior aesthetic results as compared to alternative pedicle designs. However, one prospective observational study found a significantly higher risk associated with postoperative wound drainage in superiorly-based pedicles (superior and superomedial) compared to inferior pedicle breast reduction, perhaps due to the larger dead space created by dissection within the central aspect of the breast.10 This led Anzarut et al to recommend the routine use of drains to avoid complications in patients undergoing superiorly-based pedicles.10 Only one previous study, however, has directly compared complications between superomedial pedicle breast reduction with and without drains and found no significant difference in complication profile.2 In light of this conflicting data, we sought to compare the complication profile of superomedial breast reductions with and without drains using a sizeable sample of consecutive patients operated on by a single experienced surgeon, co-author Dr Merten.

Methods
Through a review of Dr Merten’s patient database, a total of 172 consecutive patients who underwent bilateral breast reductions between January 2011 and June 2017 were identified.

Patients were categorised into ‘drained’ (n=86) and ‘drainless’ (n=86) groups. The surgeon’s practice had shifted in May 2015 from using drains following reduction mammoplasty to drainless postoperative care which meant that all drainless cases were from the latter 24 months of the study period and all drained breast reductions were performed over more than four years up to May 2015.

Patients were operated on at three sites—Concord Repatriation General Hospital (Concord, Sydney, Australia), Hunters Hill Private Hospital (Hunters Hill, Sydney, Australia) and Macquarie University Hospital (Macquarie University, Sydney, Australia).

Surgical technique
All cases were performed under general anaesthesia with a single dose of intravenous antibiotics at induction. A 100 mL local anaesthetic solution containing a 3 mg/kg dose of ropivacaine and 0.5 mg of adrenaline was infiltrated into each breast, avoiding the superomedial nipple-areola pedicle region. A higher-volume, but more dilute, tumescent mixture was used with additional lateral chest infiltration if liposuction was being
performed in this area.

A superomedial pedicle was used in all cases and reduction weights were recorded for each breast. In the drained cohort, a size 14 French silicone suction drain was brought out laterally from the lower axillary region. Drains were removed when drain volume had subsided to 20 to 50 mL over 24 hours, almost always the day following surgery. No patients were sent home with drains in situ.

Data collected from a retrospective review of each patient’s record included age, body mass index (BMI), diabetic status, smoking status, pedicle design, skin resection pattern, breast reduction weight (combined weight for both breasts), length of stay and occurrence of complications. Smokers were declined surgery until they had ceased smoking for at least six weeks preoperatively.

Statistical analysis
Statistical analyses were performed using SAS® software version 9.4 (SAS Institute Inc, Lane Cove, New South Wales, Australia). Descriptive statistics included mean and standard deviation (SD) for continuous variables and percentages for categorical variables. Bivariate associations between complications and potential categorical predictor variables, such as skin resection pattern, were assessed using the Fisher’s exact (or chi-square) test. Bivariate associations between complications and continuous predictor variables, such as BMI, were assessed using the two-sample t-test.

To assess whether the use of postoperative drains after bilateral breast reduction was associated with any increase in complications, we first used an unadjusted logistic regression model. However, because of the potential for confounding by other variables, we also formed an adjusted model by considering the following confounders: age, BMI, diabetes, smoking, reduction volume (grams), skin pattern (vertical or Wise) and liposuction. These covariates remained in the adjusted model if they were significant at the p<0.05 level. Age, breast reduction weight and BMI were modelled using three-knot restricted cubic spline functions (placing knots at the 5th, 50th and 95th percentiles). The final logistic regression model was adjusted for BMI and liposuction only. The odds ratio (OR) and Wald 95% confidence interval (CI) for complications were reported and compared for patients who received drains and those who did not. Interactions between the use of drains and all covariates were tested at the p<0.05 level. No significant interactions were evidenced.

Results
The 172 patients in the study were equally divided between the drained (n=86) and drainless (n=86) cohorts. Patient characteristics of the two groups are set out in Table 1.

There was no significant difference in age, history of smoking and diabetic status between the two groups. The mean BMI, however, was significantly higher in the drained group (29.0 compared to 25.7, with p<0.05). Patients in the drained group had a significantly higher breast reduction weight (660g compared to 536g, with p<0.05). Skin resection pattern difference between the two groups was

<table>
<thead>
<tr>
<th>Table 1: Characteristics of drained and drainless groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age [mean ± SD] (years)</td>
</tr>
<tr>
<td>BMI [mean ± SD] (kg/m²)</td>
</tr>
<tr>
<td>Mean breast reduction weight (g) [mean ± SD]</td>
</tr>
<tr>
<td>Smoking</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Liposuction</td>
</tr>
<tr>
<td>Skin pattern</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
also found to be significant with 25 patients in the drained group having a vertical skin resection compared to eight patients in the drainless group (p=0.001).

Forty-six (26.7%) of all patients experienced complications. Of these, 25 patients had received postoperative drains and 21 had not. Complication profiles of the two groups are set out in Table 2.

Complications were stratified into ‘major’ and ‘minor’, depending on the need for reoperation. There were eight major complications in total (Table 3), with five occurring in the drained group and three in the drainless group.

Of these, eight major complications, four were haematomas requiring evacuation and two were postoperative wound infections requiring debridement. The remaining two occurred in the same patient and comprised operative interventions for an initial seroma followed by a secondary infected collection.

Complications were also classified into the following subgroups: haematoma/seroma, wound breakdown, partial nipple necrosis and wound infection. Among the 46 patients who experienced complications, there were a total of 60 subgroup complications, with some patients experiencing more than one complication. Some form of wound breakdown was the most common type of complications with 16 occurrences in the drained group and 13 in the drainless group. Less common were wound infection (11 and 5), haematoma/seroma, and partial nipple necrosis.

### Table 2: Complication profile between drained and drainless groups

<table>
<thead>
<tr>
<th>Complications</th>
<th>Drained (n=86)</th>
<th>Drainless (n=86)</th>
<th>P-value</th>
<th>P adjusted*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>5 (5.8%)</td>
<td>3 (3.5%)</td>
<td>0.47</td>
<td>0.77</td>
</tr>
<tr>
<td>Minor</td>
<td>20 (23.3%)</td>
<td>18 (20.9%)</td>
<td>0.71</td>
<td>0.80</td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haematoma/seroma</td>
<td>7 (8.1%)</td>
<td>6 (7%)</td>
<td>0.77</td>
<td>0.76</td>
</tr>
<tr>
<td>Wound breakdown</td>
<td>16 (18.6%)</td>
<td>13 (15.1%)</td>
<td>0.68</td>
<td>0.80</td>
</tr>
<tr>
<td>Nipple necrosis</td>
<td>1 (1.2%)</td>
<td>1 (1.2%)</td>
<td>0.99</td>
<td>0.91</td>
</tr>
<tr>
<td>Wound infection</td>
<td>11 (12.8%)</td>
<td>5 (5.8%)</td>
<td>0.19</td>
<td>0.63</td>
</tr>
</tbody>
</table>

* P-value for logistic regression

### Table 3: Summary of major complications

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>BMI</th>
<th>Drain</th>
<th>Skin resection</th>
<th>Mean breast reduction volume (g)</th>
<th>Complication</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26</td>
<td>21.2</td>
<td>No</td>
<td>Vertical</td>
<td>442</td>
<td>Unilateral haematoma</td>
<td>Evacuation on Day 1 postoperatively</td>
</tr>
<tr>
<td>2</td>
<td>41</td>
<td>26.3</td>
<td>No</td>
<td>Wise</td>
<td>932.5</td>
<td>Unilateral haematoma</td>
<td>Evacuation on Day 1 postoperatively</td>
</tr>
<tr>
<td>3</td>
<td>39</td>
<td>27.5</td>
<td>No</td>
<td>Wise</td>
<td>632.5</td>
<td>Unilateral wound infection and partial nipple necrosis</td>
<td>Operative wound debridement</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>19.5</td>
<td>Yes</td>
<td>Vertical</td>
<td>80</td>
<td>Unilateral haematoma</td>
<td>Evacuation on Day 0 postoperatively</td>
</tr>
<tr>
<td>5</td>
<td>49</td>
<td>39.2</td>
<td>Yes</td>
<td>Wise</td>
<td>2209</td>
<td>Unilateral wound infection with collection</td>
<td>Operative drainage</td>
</tr>
<tr>
<td>6</td>
<td>38</td>
<td>39.2</td>
<td>Yes</td>
<td>Wise</td>
<td>1287.5</td>
<td>Unilateral wound dehiscence</td>
<td>Operative debridement and wound repair</td>
</tr>
<tr>
<td>7</td>
<td>53</td>
<td>39.8</td>
<td>Yes</td>
<td>Wise</td>
<td>1234</td>
<td>Unilateral haematoma</td>
<td>Evacuation on Day 1 postoperatively</td>
</tr>
<tr>
<td>8</td>
<td>47</td>
<td>42.8</td>
<td>Yes</td>
<td>Wise</td>
<td>905</td>
<td>Unilateral seroma followed by secondary infection</td>
<td>Operative drainage on Day 7 postoperatively and reintervention for infection on Day 25</td>
</tr>
</tbody>
</table>
seroma (7 and 6) and partial nipple necrosis (1 and 1).

With the adjusted multivariate logistic regression model, the use of drains resulted in slightly less complications but this difference was not statistically significant (OR 0.84; 95% CI=0.39–1.81; p=0.66). By contrast, BMI was found to be strongly associated with complications (p=0.007) and there was no significant interaction between BMI and the use of drains (p_{interaction}>0.20).

Among both drained and drainless groups, a Wise skin resection pattern showed a 16 per cent decreased risk of complications (OR=0.84; 95% CI: 0.33–2.09), however this was not statistically significant (p=0.70). There was no significant interaction of skin pattern on complications for patients in the drained and drainless groups (p_{interaction}>0.20).

**Discussion**

The use of closed suction drainage has become routine following reduction mammoplasty. Drainage is thought to minimise fluid accumulation at the operative site and dead space between tissues, thereby preventing complications such as haematoma, seroma, wound dehiscence and nipple or areola necrosis.

Our results support the contention that routine postoperative drain insertion in superomedial pedicle reduction mammoplasty provides no significant reduction in complications. Equally, the omission of drains does not increase complications—and this occurs irrespective of a patient’s BMI, breast tissue reduction weight and the skin resection pattern (Wise or vertical). We therefore do not believe that routine drain insertion following bilateral breast reduction is warranted and our data adds to a growing body of evidence suggesting that drain insertion offers no demonstrable clinical benefit.

As far as we are aware, our study of 172 patients is the largest so far to compare the complication profile of drained and drainless breast reduction surgery. Our results are in agreement with all previous retrospective studies\(^1\)–\(^3\) that suggest that breast reduction without postoperative closed suction drainage does not increase the risk of complications. Further, as far as we are aware, this is the first study to show that drainless superomedial pedicle reduction mammoplasty is safe for both vertical and Wise skin resection patterns.

Anzarut et al,\(^10\) in a study of 111 patients, suggested that superior pedicle type reductions with a vertical skin resection pattern may lead to significantly higher postoperative drainage (~83ml in the first 24 hours) and therefore require routine drain insertion to prevent complications. Our results suggest that while there may be an increased amount of dead space produced by superiorly-based pedicles in reduction mammoplasty, there is no clinically relevant effect of this higher volume. Indeed, this additional volume is perhaps exaggerated by the effect of negative pressure in the drainage apparatus and the ‘true’ in vivo volume produced within the dead space following a superiorly-based nipple-areola pedicle is capable of being controlled by normal physiological processes.

The rate of complications in this study was 27 percent, which is broadly consistent with reported rates in the literature of 3–45 per cent.\(^14\)–\(^17\) Our multivariate analysis confirmed BMI as an independent factor for increased risk of postoperative complications following breast reduction (p<0.05), but failed to reveal any association between the breast reduction volume and complication rates. These findings replicate those reported by Chun et al.\(^18\) We would contend that this apparent discordancy may reflect significant variability in the aesthetic goals of patients, as well as a lack of correlation between reduction volume and degree of obesity. Our study provides further support for the need to counsel patients with higher BMI regarding the potential increased risk of complications.

There are certain limitations of the present study, primarily its retrospective cohort design. Bias may also be present due to the study being based on a single surgeon’s experience and on an evolution in that practice from drained to drainless breast reduction. Note should also be made of the significantly higher BMI in the drained cohort.
While this was adjusted for in the multivariate analysis, it may represent a confounding variable. Additionally, mean tissue reduction volumes in our study were 660g in the drained group and 536g in the drainless group and so our conclusions cannot necessarily be extrapolated to significantly larger breast reductions (which can exceed 1500g).

Conclusion

This large, single-surgeon study supports the results of other studies that show that superomedial pedicle breast reduction without postoperative suction drainage does not increase the risk of complications, irrespective of BMI, skin resection pattern, tissue reduction weight or use of liposuction. Eliminating the routine use of drainage has the potential to reduce lengths of stay in hospital, increase patient comfort and reduce the costs of care in the community.

Disclosure

This paper was presented at the 40th annual Australasian Society of Aesthetic Plastic Surgeons conference, Melbourne, Australia, 19–22 October 2017.

The authors have no financial or commercial conflicts of interest to disclose.

References