



ORIGINAL ARTICLE

**Breast Reduction with a Superomedial Pedicle (Hall-Findlay's Technique):  
Zagazig University Hospital Experience**

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**ABSTRACT**

**Background:** Breast reduction remains a commonly performed operation, with more than 122,000 breast reductions performed in 2013 (American Society for Aesthetic Plastic Surgery (2014)). Breast reduction, also known as reduction mammoplasty, is a procedure to remove excess breast fat, glandular tissue and skin to achieve a breast size more in proportion with the body and to alleviate the discomfort associated with excessively large breasts (macromastia). **Aim of the study:** was to evaluate the short-time outcome effects of superomedial pedicle using Hall-Findlay's technique of the breast reduction, to evaluate the effects on operative time, short-time outcome, the short-term effects and the complication rate of superomedial pedicle of the breast reduction. **Methods:** A total of 12 consecutive patients with bilateral breast hypertrophy underwent superomedial pedicle breast reduction in Plastic Surgery Unit, Zagazig University Hospital were included in this study during the year 2018. The operation was performed according to Hall-Findlay superomedial pedicle technique. All operations were performed by a double team of surgeons, with each team including a resident and a senior surgeon who was the leader of the operation. **Results:** Superomedial pedicle can be safely utilized in large size breast reduction without an expanded danger of NAC. **Conclusions:** The Hall-Findlay technique has aesthetic results and low complication rates in patients underwent breast reduction. We plan to expand the patient population that can undergo this technique, so more patients can benefit from its advantages.

**Keywords:** Breast Reduction, Superomedial Pedicle, Hall-Findlay's Technique

**INTRODUCTION**

Many breast reductions have been performed successfully in the outpatient setting and have been safely combined with additional procedures<sup>(1, 2)</sup>. In addition, the ideal technique should be consistently reproducible and teachable to the next generation of surgeons. Although plastic surgeons most commonly perform breast reduction with an inferior pedicle, a variety of pedicles for nipple perfusion should be maintained in the plastic surgeon's armamentarium to address reductions of various sizes and to allow for facile

oncologic reconstruction of lumpectomy defects throughout the breast<sup>(3)</sup>.

The superomedial pedicle of vertical reductions or superior pedicle-based reduction was modified from Hall-Findlay's medial, who had gained popularity as a means to decrease operative times, improve superior pole fullness, and reduce the tendency of pseudoptosis/bottoming-out classically associated with the inferior pedicle<sup>(4)</sup>. It has been described with the use of circumvertical/lollipop, circumvertical with short transverse, and classic Wise-pattern skin resections<sup>(5)</sup>.

The procedure is fast and involves few adjustments. The pedicle is of full thickness and the skin is not undermined, but the resection is beveled. The desirable breast tissue superiorly is left in place, and the undesirable breast tissue inferiorly and laterally is removed. The durability of the breast shape appears to be due to the heavy inferior breast tissue and the lack of reliance on skin for shaping. Schlenz et al. <sup>(6)</sup> and Hall-Findlay <sup>(7)</sup> showed that the superomedial pedicle technique may better preserve sensation to the nipple-areola complex (NAC) than the superior pedicle technique.

Operative times can be reduced with technique for multiple reasons. The surface area of the pedicle that requires deepithelialization is significantly less. The total distance of pedicle border to be isolated from the surrounding parenchyma is decreased. There is no significant thinning/flap creation or superior undermining, and the resection can be done in one en bloc piece. All these reduced or eliminated steps can reduce the operative time (3).

#### AIM OF THE WORK

The aim of the study is to evaluate the short-time outcome effects of superomedial pedicle using (Hall-Findlay's technique) of the breast reduction, to evaluate the effects on operative time, short-time outcome, the short-term effects and the complication rate of superomedial pedicle of the breast reduction

#### SUBJECTS AND METHODS

A total of 12 consecutive patients with bilateral breast hypertrophy underwent superomedial pedicle breast reduction in Plastic Surgery Unit, Zagazig University Hospital were included in this study. The operation was performed according to Hall-Findlay superomedial pedicle technique. All operations were performed by a double team of surgeons, with each team including a resident and a senior surgeon who was the leader of the operation. The study was approved by the institutional review board (IRB). Informed consent to participate was obtained from each subject. The work has been carried out in accordance with The Code of Ethics of the World Medical Association

(Declaration of Helsinki) for studies involving humans

Patient demographics, including age, body mass index, size of reduction, nipple-areola complex sensation, minor and major postoperative complications and symptomatic relief were assessed.

All patients were evaluated for inclusion into the study.

#### Inclusion Criteria:

1. Patients with breast hypertrophy
2. Patient's ages range from 20-55 years
3. Patients who want had breast reduction

#### Exclusion Criteria:

1. Gigantomastia
2. Fatty patients

#### Methods and Surgical Technique

##### Operational design and Marking

The charts of all patients with bilateral breast hypertrophy that underwent superomedial pedicle breast reduction were included in this study. Hall-Findlay superomedial pedicle technique is used by the two senior authors of the study. Charts were analyzed for the incidence of delayed wound healing, nipple necrosis, infection, seroma, reoperation, and palpable/symptomatic fat necrosis. Submitted specimen weights were recorded.

#### Preoperative-Matter

Preoperatively, physical examination was document the following:

1. Preoperative multiview photographs
2. Shoulder bra strap grooving,
3. Breast intertrigo,
4. Previous breast surgery breast masses,
5. Current nipple sensation,
6. Sternal notch-to-nipple distance,
7. Nipple-to-IMF

#### Biochemical investigation:

- Complete blood picture and prothrombin time (PTT) and activity were routinely used to establish preoperative adequacy of hematocrit and coagulation.
- Liver function tests
- Kidney function tests

#### Radiological investigation:

Preoperative mammogram is mandatory for all patients. Submit all resected breast tissue for pathologic examination to

exclude previously unrecognized breast cancer.

**Preoperative Marking:**

Preoperative marking was performed with the use of a Wise pattern. The operation truly begins in the preoperative area with markings in the standing position. Standard breast landmarks are drawn including the sternal notch, chest midline, inframammary fold (IMF), breast meridian, which may not coincide with the preoperative nipple position, and the breast meridian at the IMF. The arms may be raised to help delineate the lateral border of the breast in those with a significant excess lateral chest tissue. The Pitanguy point, or the anterior projection of the IMF into the breast meridian, is marked by direct palpation or using a flexible ruler positioned under the breast.

Make the preoperative markings on an erect patient. Mark the breast midline, draw the IMF, and the vertical axis of the breast beneath the IMF. Displace the breast medially and laterally in relation to the vertical axis of the breast marked below the IMF. This medial and lateral displacement determines the margins of skin resection. Special mention is made of a superior displacement while marking to provide a final conical breast shape.

Nine or 10-cm vertical limbs are drawn from this point, generally using an angle of divergence to create an equilateral triangle. Longer vertical limbs are required than those generally used with inferior pedicle reductions to accommodate the increased projection achieved with the superomedial pedicle. The angle may be manipulated for especially wide breasts, to remove pigmented areolar skin, or to further cone the breast. By only marking a triangle preoperatively, as opposed to the entire keyhole pattern, the position of the nipple–areolar complex (NAC) may subsequently be decided intraoperatively after resection and tailor tacking. Although this may add 15 to 20 minutes to the operative time, it allows for more exact placement of the NAC on the reduced breast mound and essentially eliminates postoperative nipple malposition or asymmetry.

The vertical limbs are then connected to the medial and lateral inframammary fold marking with smooth, curvilinear lines, with care taken to avoid extending onto the visible medial portion of the breast. The lateral incision is curved slightly upward at the most lateral aspect to allow further reduction of the lateral aspect of the breast, reduce dog-ear creation, and shape the lateral breast.

The patient is then positioned supine with arms abducted on the operating room table. The pedicle is marked starting superiorly at the apex of the triangle, extending inferiorly almost parallel to the lateral vertical limb, forming a smooth U around the NAC, and terminating at the junction of the medial vertical and horizontal limbs. A breast tourniquet is applied. The cookie cutter is used to mark the new desired NAC circumference.

The pedicle and new NAC are incised, and the pedicle is deepithelialized. The breast tourniquet is released to allow for isolation of the pedicle. The assistant is directed to maintain the breast in a straight position on the chest wall, and the pedicle is created using the cautery to dissect straight down to the chest wall. All the remaining breast tissue within the Wise pattern is resected en bloc down to just above the pectoralis fascia.

No undermining of the medial, lateral, or superior breast is needed. The pedicle is then rotated into the apex of the vertical limbs to assess rotation. Rotation may be difficult in more ptotic breasts where the NAC sits more than 2 to 4 cm inferior to the bottom of the vertical limbs. Undermining of the deep surface of the distal pedicle at the chest wall and/or scoring of the dermis along the inferomedial vertical limb may be used to improve the arc of rotation as needed.

The skin is then tailor-tacked with staples and the patient raised to a seated position to assess symmetry and volume. Additional volume may be removed if further reduction is needed, by thinning of the deep side of the pedicle or thinning of the lateral flap. The new nipple position is marked in the sitting position with the cookie cutter centered at, or just below, the most projecting point of the breast.

Closure is started with a trifurcation suture, coning the breast and minimizing lateral standing cutaneous deformities by advancing the lateral flap medially. A closed suction drain is placed at the IMF per surgeon discretion. The marked area for the new NAC is incised and deepithelialized (fig1, 2).

Cruciate incisions are made through the dermis, and the NAC is delivered. It is important not to perform full-thickness resection of the skin and subcutaneous tissue in this location, as the medial half of this circle is part of the superomedial pedicle.

The superior most point of the vertical limbs is closed first with a 3-0 Monocryl (Ethicon Inc., Somerville, NJ) deep dermal suture to set the new areolar circumference. Sutures are then placed at the 12, 3, and 6 o'clock positions of the nipple to assist in symmetric, centric inset. The remaining skin incisions are closed with 3-0 Monocryl dermal sutures and running 4-0 Monocryl subcuticular. The breasts and drain sites are then dressed per surgeon preference.

Throughout closure, the nipple is inspected for evidence of vascular congestion or ischemia. Conversion to a free nipple graft may be required if the arc of rotation approaches 180 degrees or the nipple shows evidence of ischemia/congestion. In these situations, the pedicle can be trimmed back to well-vascularized tissue and used as a bed for grafting without losing the aesthetic benefits of the superomedial pedicle.

#### **Intraoperative details:**

The superomedial pedicled mammoplasty begins by deepithelialization of the pedicle and circumscription of the NAC. The pedicle is developed by incision along markings straight down to but not through the loose areolar connective tissue plane directly above the superficial pectoralis major muscle fascia. The breast tissue to be excised is beveled outward, especially laterally and inferiorly. The flap is at least 1cm thick at the margins, and the beveling is performed as needed to resect the necessary breast tissue.

Exposure of the pectoralis fascia is not necessary; retaining some of the tissue just superficial to the pectoralis may account for

the retention of sensation with the medial pedicle.

The weight of reduction specimen from each breast was calculated intraoperatively. Mean weight of reduction per individual was used for matching purposes (pathologic weights were used for confirmation).

#### **Postoperative follow-up**

A gauze bandage is lightly placed over the incisions and the skin is covered with elastoplast. A surgical brassiere is then used for comfort and to hold the breast in place. Patients are advised to use the surgical bra continuously for approximately 2 weeks and then to progress to a sports bra day and night for 2 months.

The first postoperative follow-up was in a week time, the second at 6 months, the third at 1 year, and all patients were advised to wear a sports bra for 24 hours for 6 weeks (Fig 3).

### **RESULTS**

Age was distributed as  $38.0 \pm 3.21$  with minimum 33 and maximum 45, weight was  $85.25 \pm 7.22$  with minimum 72 and maximum 95, BMI was distributed as  $29.78 \pm 2.42$  with minimum 26 and maximum 33 (Table 1). Only one case was smoker 25% were diabetic 75% were married (9) cases 7 from them have children and all 7 were breast feeder (Table 2). Also, HB distribution in pre as  $12.27 \pm 0.48$  and post  $11.92 \pm 0.6$  is with no significant decrease (Table 3). Table (s1) showed specimen weight distributed as  $798.33 \pm 67.53$ . Twenty five percent of studied group were complicated; the highest complication were loss sensation and bad scar, followed by seroma, fat necrosis and infection and then wound dehiscence, Diminished breast milk, finally hematoma and skin necrosis (Table s2). 66.7% were satisfied with result (Table s3).

There was no significant difference between groups regard all parameters (age, weight and BMI) (Table s4). There was no significant difference between groups regarding HB pre and post comparison between complicated and not complicated cases (Table s5). No significant difference

regarding Specimen weight comparison (Table s6). Lastly, there was no significant difference regarding association between

complication and Clinical and demographic characters (Table s7).

**Table (1): Age, weight and BMI distribution between studied groups**

Age	Mean± SD	38.0±3.21
	Median (Range)	37.5 (33-45)
Weight	Mean± SD	85.25±7.22
	Median (Range)	85.5 (72-95)
BMI	Mean± SD	29.78±2.42
	Median (Range)	30.25 (26-33)

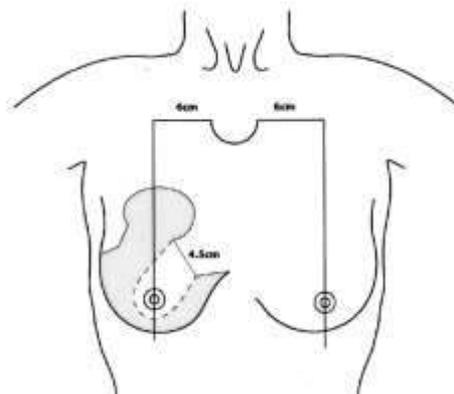
**Table (2): Clinical and demographic characters distribution among studied groups**

		N	%
Smoking	No	11	91.7
	Yes	1	8.3
DM	No	9	75.0
	Yes	3	25.0
Married	No	3	25.0
	Yes	9	75.0
Have children	No	5	41.7
	Yes	7	58.3
Breast feeder	No	5	41.7
	Yes	7	58.3
	Total	12	100.0

**Table (3): Hemoglobin pre and post operation distribution among studied group**

	HB_PRE	HB_POST
Mean± SD	12.17±0.48	11.97±0.6
Median (Range)	12.2 (11.6-13.2)	11.75 (11-13.1)

P =0.063



**Figure 1. Diagram of markings for the medial pedicle reduction mammoplasty with a Wise pattern skin envelope.**

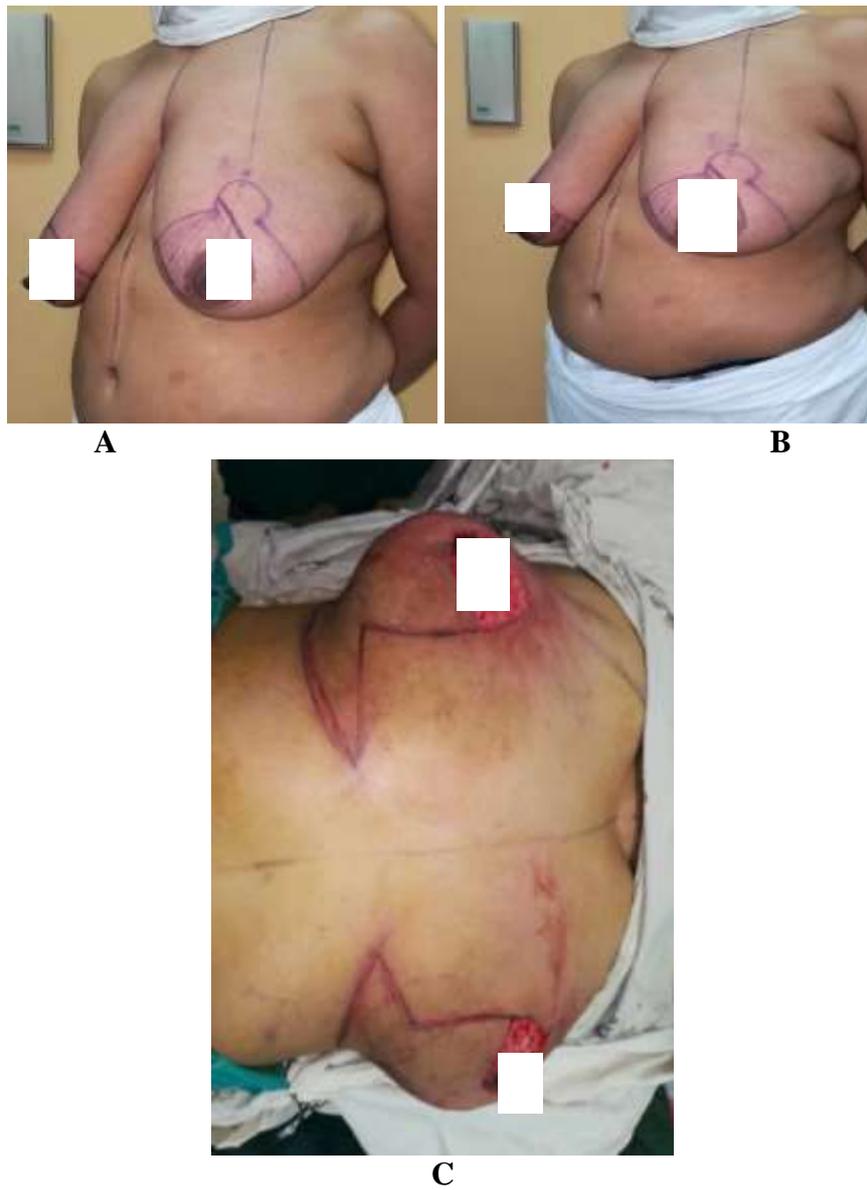


Figure 2. A, B Oblique view of preoperative markings, C Deepithelialization of superomedial pedicle





**Figure 3. Postoperative view**

### DISCUSSION

The objective of breast plastic surgery is to restore the youthful and graceful form of the breast. The objectives of this type of surgery range from the decrease of excess glandular tissue in the case of hypertrophy to breast cone remodeling in ptosis. Therefore, the focus of breast reduction surgery is to achieve an adequate volume, and to attain adequate suspension and a new shape of the breast. Several techniques are currently in use for breast reduction and the vascular pedicles responsible for the blood supply to the nipple areolar complex (NAC) are particularly important in these procedures. Breast hypertrophy can be a source of emotional and psychological distress for patients, as well as the cause of multiple problems related to the effects of the excess weight (tissue and glandular weight) on the lumbar area and shoulders as a result of gravity<sup>(8)</sup>.

The arterial supply to the breast is derived from branches of the internal mammary artery, lateral thoracic artery, intercostal artery and pectoral branch of the thoracoacromial axis. Variable anastomoses exist among these vessels providing a robust supply to the breast skin, via the subdermal plexus and the breast parenchyma. The internal mammary artery provides about 60% of the blood supply to the breast mainly through its second and third perforating branches, usually found at the breast meridian. This superficial source supplies the superior or superomedial based pedicle. A large musculocutaneous perforator (through the pectoralis major muscle) from either the

fifth or sixth branch sustains the inferior or central based pedicle and is found just medial to the breast meridian about 2 to 4 cm above the inframammary fold. The medially or superomedially based pedicle is the basis for the Hall-Findlay developed vertical reduction mammoplasty technique<sup>(9)</sup>.

The musculocutaneous and fasciocutaneous mammary branches of the lateral thoracic artery provide about 30% of the blood supply to the breast. The blood supply to the NAC is symmetric and is mainly and most reliably from superomedial source vessels (internal mammary artery)<sup>(10)</sup>.

The NAC receives sensory innervation mainly from the lateral cutaneous branch of the fourth intercostal nerve. The posterior branch runs along the pectoralis fascia till the level of the breast meridian where it makes an almost perpendicular turn, vertically coursing towards the NAC. Preservation of a full thickness pedicle with its attached pectoralis fascia is crucial to NAC innervation which serves the suckling reflex. During tissue resection, unnecessary exposure of the pectoralis fascia risks increased bleeding and loss of sensation. Additional supply to the NAC is via a plexus formed by the terminal fourth and fifth anterior cutaneous nerves, as well as the fifth lateral cutaneous intercostal nerve<sup>(11)</sup>.

This study was conducted, in General Surgery Department, Plastic Surgery Unit in Zagazig University Hospital during the year 2018 on 12 patients with respective breast hypertrophy underwent superomedial pedicle breast reduction.

Preoperative physical examination document the following: preoperative multiview photographs, shoulder bra strap grooving, breast intertrigo, previous breast surgery, breast masses, current nipple sensation, sternal notch to nipple distance and nipple to-IMF. Findlay superomedial pedicle technique was utilized.

In our examination, the age of patients were ranged between 33 and 45 years with a mean of  $38.0 \pm 3.21$ , patients weight were ranged between 72 and 95 kg with a mean of  $85.25 \pm 7.22$ , BMI ranged between 26 and 33 with a mean of  $29.78 \pm 2.42$ .

Kim et al. <sup>(12)</sup> utilized a vertical mammoplasty including the superomedial dermoglandular pedicle for differing degrees of breast reduction. The patients' mean age was  $41.7 \pm 11.8$  years, with a mean follow-up time of 9 months. The patients' mean weight list (BMI) was  $26.5 \text{ kg/m}^2$ .

In this study, a single case was smoker 25% were diabetic 75% were married (9) cases 7 from them have children and all 7 were breast feeder. Kim et al. <sup>(12)</sup> found that none of the patients had comorbidities, for example, diabetes mellitus or coronary artery disease. In any case, 6 patients had hypertension, and 7 had one-sided breast malignant growth.

In this study, specimen resected weight was  $798.33 \pm 67.53$  with range between 800-900 gm.

Brownlee et al <sup>(13)</sup> found mean resection weight per breast was 1016.7gm with range 77-2469 gm. These differences may be due to the fact that rest of our cases had heavy breasts than his report.

HB ratio preoperative was  $12.27 \pm 0.48$  and postoperative  $11.92 \pm 0.6$  with no significant decrease. A finding that supports the fact that SMP technique is less bloody and no bleeding morbidity on the patient.

Postoperative complications rate was 25%, no haematoma was recorded, 2 cases with seroma one case with high BMI showed postoperative wound dehiscence.

Our Results match with results of Kim et al. <sup>(12)</sup> and Brownlee et al. <sup>(13)</sup> who trusted that SMP breast reduction procedure

demonstrates a low rate of postoperative Complications.

We noticed that with specimen resection over 1100 gm for every breast the complication rate increases as Seroma, wound dehiscence, NAC necrosis. This Finding was mentioned by Heine et al. <sup>(14)</sup>, who reported higher complication rate with specimen resection over 1100 gm/breast reaching up to 20% as wound dehiscence, NAC necrosis and seroma formation.

In this study, there was no difference in the breast sensation comparing to other breast reduction techniques and this was supported by findings of Kim et al. <sup>(12)</sup> and Brownlee et al. (13), who concluded that the SMP have a general rate of NAC necrosis like all other ordinarily utilized pedicles.

In our examination, 66.7% were satisfied with result. Kim et al. <sup>(12)</sup> found that of the 33 patients, 18 patients were followed up. Among these 18 patients; 9 patients were acceptable improvement at a mean follow-up time of 5 months.

Antony et al. <sup>(3)</sup> investigated whether SMP/VS systems are appropriate for high reduction mammoplasty. They inferred that the superomedial pedicle with vertical scar reduction mammoplasty is an elective procedure for breast reduction with the benefit of a shorter entry point and expanded breast projection.

## CONCLUSION

Superomedial pedicle can be safely utilized in large size breast reduction without an expanded danger of NAC. The Hall-Findlay technique has aesthetic results and low complication rates in patients underwent breast reduction.

We plan to expand the patient population that can underwent this technique, so more patients can benefit from its advantages.

### Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

### Funding information

None declared

**Tables s1-s7 are shown in the online supplement**

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**To cite this article:** Abd El-Latif TE , Abd El-Al MH, Ali AM ,Shahout AM. Breast Reduction with a Superomedial Pedicle (Hall-Findlay's Technique): Zagazig University Hospital Experience. *ZUMJ* 2019;25(5);520-528,DOI: 10.21608/zumj.2019.8133.10570.