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FACULTY OF  
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**PATIENT SATISFACTION IN BREAST REDUCTION  
USING THE MEDIAL PEDICLE TECHNIQUE *VERSUS*  
THE INFERIOR PEDICLE TECHNIQUE**

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A dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Medicine in Plastic and Reconstructive Surgery.

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## DECLARATION

I, Peter Noko Mokwatlo, declare that this dissertation is my own, unaided work. It is being submitted for the degree of Masters of Medicine in Plastics and Reconstructive Surgery at the University of the Witwatersrand, Johannesburg. This dissertation has not been submitted before for any degree or examination at this or any other university.

.....

Peter Noko Mokwatlo

.....day of ..... 2018

I certify that this study was approved by the Human Research Ethics Committee (medical) of the University of the Witwatersrand, Johannesburg, with Clearance certificate Number: M180527

## ABSTRACT

**Background:** Breast reduction surgery is an accepted and commonly performed procedure for addressing gigantomastia for cosmetic and functional purposes. It has been proven to have a high rate of patient satisfaction. It is a functional operation, improving quality of life in symptomatic patients.

**Aims:** This study evaluated patients' satisfaction in subjects who had undergone breast reduction surgery between June 2017 and June 2018 at Chris Hani Baragwanath Academic Hospital (CHBAH), Helen Joseph Academic Hospital (HJAH) and Netcare Rand Clinic, using the medial pedicle technique versus the inferior pedicle technique.

**Methods:** Patient satisfaction was evaluated by assessing the following domains, satisfaction with breasts, satisfaction with nipples, satisfaction with outcome, psychosocial well-being, sexual well-being, physical well-being. The BREAST-Q questionnaire is a measuring tool employed to evaluate patient satisfaction secondary to breast reduction that meets international and federal standards. A total of 30 patients completed the BREAST-Q questionnaire in the clinics as they came for their follow-ups post-surgery. Fifteen participants had undergone breast reduction through the medial pedicle technique whilst the other 15 had had the procedure performed using the inferior pedicle technique.

**Results:** The pedicles used were medial (n =15) and inferior (n =15). The findings were; breast satisfaction: medial pedicle technique  $68.9 \pm 17.6$ , inferior pedicle technique  $69.6 \pm 18.7$  with a p-value of 0.926. Physical wellbeing: medial pedicle technique  $62.7 \pm 19.6$ , inferior pedicle technique  $84.2 \pm 14.2$  with a p-value of 0.002. The two techniques performed equally on average and in all the domains except in the physical wellbeing domain where the inferior pedicle technique had a statistically significant superiority to the medial pedicle technique.

### **Conclusions:**

The use of different techniques in breast reduction will continue. Through the use of tools like the BREAST-Q questionnaire in patient related outcome measurements, we will gain a window into the patients' feeling about the different techniques and in the process learn or change to techniques that offer better patient satisfaction. The resected breast tissue should have been weighed at the time of operation. Symptom relief is based on the volume of tissue resected.

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## TABLE OF CONTENTS

DECLARATION.....	ii
ABSTRACT.....	iii
LIST OF ABBREVIATIONS.....	vii
DEFINITIONS.....	viii
LIST OF FIGURES.....	ix
LIST OF TABLES.....	x
CHAPTER 1: INTRODUCTION.....	1
1.1 Background.....	1
1.1.1 Surgical anatomy of the breast.....	3
1.1.2 Gigantomastia.....	7
1.1.3 Pre-operative details.....	8
1.1.4 Markings:.....	10
1.1.5 Intraoperative.....	12
1.1.6 Breast reduction techniques.....	12
1.1.7 Patient satisfaction after reduction mammoplasty.....	18
1.1.8 Patient satisfaction secondary to breast reduction using the medial pedicle versus the inferior pedicle technique.....	19
1.2 Aim.....	19
1.3 Objectives.....	20
CHAPTER 2: METHODOLOGY.....	21
2.1 Study design.....	21
2.2 Study site.....	22
2.3 Population.....	22
2.4 Sample size.....	22
2.5 Study Instrument.....	22
2.6 Ethics.....	22
2.7 Data collection.....	24

2.8 Data analysis.....	24
CHAPTER 3: RESULTS.....	26
CHAPTER 5: CONCLUSIONS.....	39
REFERENCES.....	41
APPENDICES.....	49
Appendix A: Participant Information Sheet.....	49
Appendix B: BREAST-Q Questionnaire.....	51
Appendix C: Demographic Data collection tool.....	56
Appendix D: Plagiarism Declaration.....	57
Appendix E: Turn-it-in Report.....	58
Appendix F: Ethics Certificate.....	59

## LIST OF ABBREVIATIONS

ABNSW:	Asymmetry, breast shape, nipple shape, skin condition and wound scar
BMI:	Body mass index
HR-QOL:	Health-related quality of life
IMF:	Inframammary fold
IQR:	Inter quartile range
NAC:	Nipple areola complex
PI:	Primary Investigator
PROM:	Patient-reported outcome measure

## DEFINITIONS

- Gigantomastia: Minimum of 1800g of breast tissue per side removed.
- Breast hypertrophy: A benign condition characterised by gradual and continuous growth of the breast typically commencing in puberty and not regressing.
- Pedicle: The source of or tissue carrying blood supply to a specific area of the body.



## LIST OF FIGURES

- Figure 1.1: Ideal breast measurements for the adult woman
- Figure 1.2: Anatomy of the breast
- Figure 1.3: Blood supply to the breast
- Figure 1.4: Excisional techniques, history and evolution
- Figure 1.5: Pedicle and skin resection patterns
- Figure 1.6: Inferior pedicle markings
- Figure 1.7: Medial pedicle markings

## LIST OF TABLES

Table 3.1: Summary statistics of variables of interest

## CHAPTER 1: INTRODUCTION

### 1.1 Background

The history and development of breast reduction surgery occurred over numerous centuries. The first person to depict the points of interest of the methodology was Paulus from the Greek island of Aegina in the 6<sup>th</sup> century when he described the treatment for gigantomastia as described in Purohit's publication of 2008<sup>1</sup>. The earliest recorded reduction mammoplasty was done by Hans Schaller using breast amputation in 1561<sup>2</sup>. In 1882, Guinard performed and described a breast lifting procedure which comprised of the reduction of the breast volume and suturing of the remaining breast tissue to the chest wall<sup>3</sup>. Breast reduction surgery is indicated for the treatment of gigantomastia with its associated complications such as headaches, backaches, bra strap grooves on the shoulders, breast pain, inframammary fold (IMF) infections and maceration, loss of sensation in the breast, arms and fingers as well as for improving the cosmetic look of breasts. It may also be indicated for polycystic mastitis. Breast reduction surgery is contraindicated in the following circumstances: suspicion of malignancy, current or recent lactation (i.e. less than 6 months), mastalgia (may get worse), diabetes mellitus, active or current smoking (wound healing complications), irradiated breast (reduced or questionable vascularity, significant scars to breasts). Obesity alone is a relative contraindication. The size of the breast was believed to be a critical determinant of the social class to which a woman belonged, particularly in countries like Brazil, which have an abundance of racial and cultural blend<sup>4</sup>. The emphasis during the 19<sup>th</sup> century was more on removal of excess tissue than the subsequent aesthetic look as advocated by Theodor *et al.*, (1868)<sup>5</sup>. The first decade of the 20<sup>th</sup> century saw the emergence of an emphasis on aesthetic outcome as espoused by Hippolyte in Purohit's publication of 2008<sup>1</sup>. Breast reduction surgery is becoming more popular as more and more patients become exposed to the benefits of the procedure. In America, in 1988 the number of breast reduction surgeries performed was about 40 000 and this number had doubled by 1999<sup>6</sup>. The goals of breast reduction surgery are vast

and include improving symptomatology, decreasing breast volume whilst minimizing scarring and maintaining an aesthetically pleasing breast contour. In addition, breast reduction aims to achieve the size and shape desired by the patient, maintain breast symmetry, ability to lactate and nipple sensation. Lastly, it also aims to maintain nipple eversion. Biesenberger (1928) described the criteria for a perfect breast reduction as follows<sup>7</sup>:

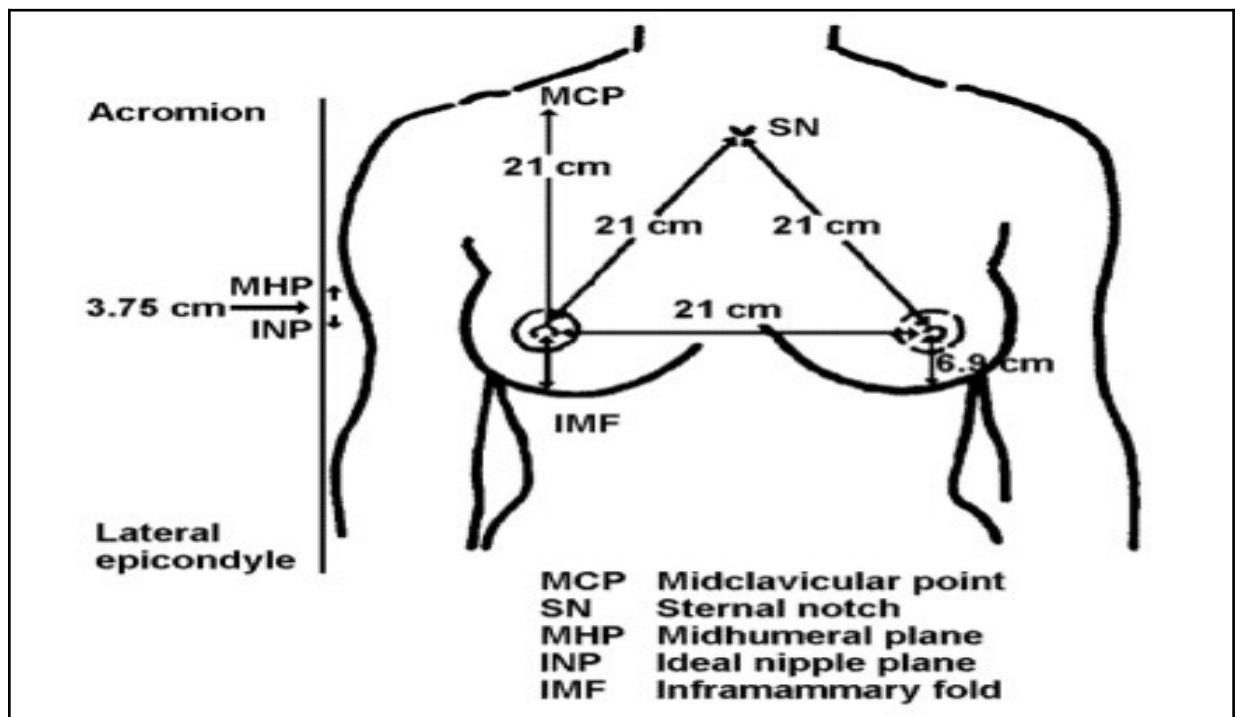
1. “The breast should be lifted to a youthful and natural form in proportion to other parts of the body.”
2. “The two breasts should be symmetrical”.
3. “The nipple and areola should be translocated to an appropriate location”.
4. “The blood supply to the nipple and areola should not be jeopardized”.
5. “The function of the breast should be preserved”.
6. “The scars should not be visible through normal clothing or be above the areola””.
7. “The operation must be applicable to all forms of deformity”.
8. “The procedure should be a one stage operation”.

Although breast reduction surgery has evolved over time, with modifications to make it safer, there are still complications associated with this procedure. Short term complications include haemorrhage, haematoma, infection, nipple areola complex (NAC) necrosis, necrosis of skin at the T-junction with inverted T-skin incisions and nipple misplacement<sup>8</sup>. Mondor’s disease and patient dissatisfaction have also been reported<sup>8</sup>. Long term complications include fat necrosis, scars, loss of nipple sensation, symmastia, patient dissatisfaction and lactation problems, although according Mandrekas *et al.*, (1996) more than 70% of patients who fell pregnant were able to lactate. Furthermore, some patients reported sexual and psychological problems following breast reduction surgery<sup>8</sup>.

### **1.1.1 Surgical anatomy of the breast**

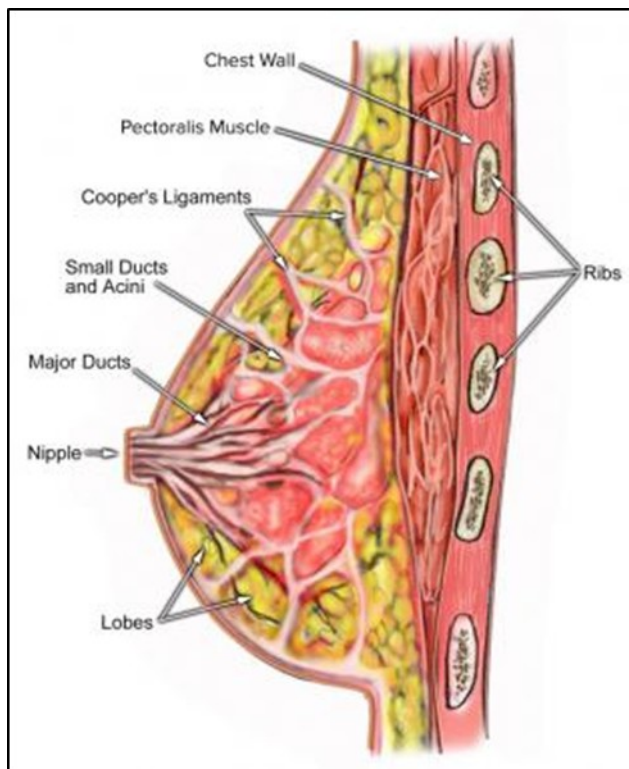
To understand and appreciate the techniques employed in breast reduction surgery, a thorough knowledge of the anatomy of the breast is imperative. When undertaking a careful examination of the breasts, the majority of patients will demonstrate significant dissymmetry. Pre-existent abnormalities of the chest such as kyphosis, scoliosis, pectus excavatum or pectus carinatum should be recognized and patients made aware of any abnormality presence. The presence of these abnormalities will not be addressed by the breast reduction surgery and might have an adverse influence on the final product<sup>9</sup>. The ideal breast is conical in shape. Nature has bestowed on it a “tear drop” shape with sufficient protuberance and lies between the 2<sup>nd</sup> and 7<sup>th</sup> ribs. The whole breast tissue would be situated at a level higher than the IMF, and the position of the NAC should be in the centre of the breast or to a minimal extent inferior to the centre<sup>10</sup>. It extends from the parasternal area to the anterior armpit line. The nipple is situated lateral to the midclavicular line in the 4<sup>th</sup> intercostal space. The construct of the breast covers the pectoralis major muscle fascia between the 2<sup>nd</sup> and 6<sup>th</sup> rib in the nonptotic shape. The main source of stability of breast tissue is provided by the suspensory ligaments first described by Astley Cooper as mentioned in Maxwell *et al.*, (2009)<sup>11</sup>. The suspensory ligaments are attached to the pectoralis major muscle fascia, which go across the breast parenchyma and tether onto the dermis of the skin. The upper pole of the breast is less full compared to the lower pole. An extension of the tissue of the breast from the upper outer quadrant continues into the medial wall of the axilla and is called: “The axillary tail of spence”<sup>11</sup>. The ligaments relax with aging, leading to breast ptosis. The breast is also related to the rectus abdominis muscle inferiomedially, serratus anterior muscle anterolaterally and external oblique anterolaterally.

Figure 1.1 below illustrates the ideal breast measurements in an adult woman. A triangle with equal sides is formed amongst the sternal notch and the nipples. The sides measure 21cm on average. This triangle is referred to as Penn's triangle<sup>11</sup>.



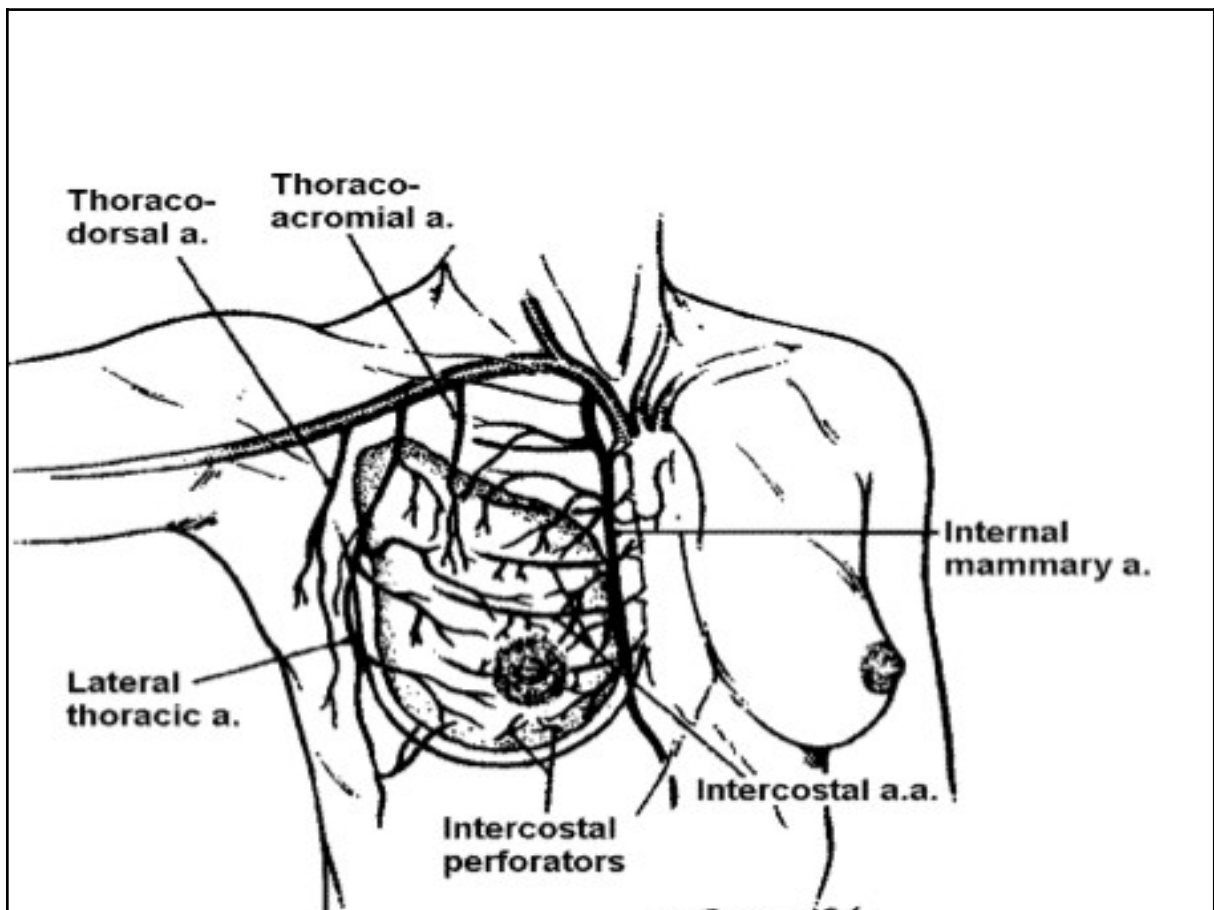
**Figure 1.1: Ideal breast measurement for the adult woman<sup>12</sup>.**

The breast comprises of fibrous, glandular tissue and fatty tissue. See figure 1.2 below.



**Figure 1.2: Anatomy of the breast<sup>13</sup>**

Advanced age results in variation of hormone levels which in turn leads to a process whereby the breast parenchyma is substituted by fatty tissue as well as failure of the supporting system of the breast tissue. The result of this is breast ptosis. Breast ptosis can be classified using various classifications. Regnault's classification is as follows: 1<sup>st</sup> degree ptosis: The nipple areola complex is positioned at the level above the inframammary fold, 2<sup>nd</sup> degree ptosis: the nipple areola complex is positioned at the level of the IMF and 3<sup>rd</sup> degree ptosis: the nipple areola complex NAC is positioned at a level inferior to the IMF. Twenty lobes drain *via* the lactiferous duct into the lactiferous sinus and then drain out. The multiple sources of blood supply to the breasts make it possible to safely perform breast reduction surgery using techniques that rely on different pedicles. Figure 1.3 below illustrates the blood supply to the breast.



**Figure 1.3: Blood supply to the breast<sup>14</sup>.**

The core sources of arterial supply to the breast are the internal mammary artery, the lateral thoracic artery and branches of the intercostal arteries. The main arterial supply is from perforators of the internal mammary artery, estimated to accord to 60% of the arterial supply and supplying mainly the medial half. The remainder of the blood supply comprises of the lateral thoracic artery perforators, according 30% of and mainly responsible for arterial supply to the upper lateral quadrant, the lateral and medial intercostal artery perforators to the lower lateral quadrant and the minor sources from the axillary, the subscapular, the thoracodorsal and the thoracoacromial vessels<sup>15</sup>. The distribution of the vascular supply of the breast implies that the medial based pedicles will have more robust pedicles compared to the other sides. The deep artery from the fourth interspace supplies an inferior or central pedicle. The importance of this is that the medially and inferiorly based pedicles have a robust blood



supply compared to other pedicles, and that their robustness will be more or less similar. There are vessels that curve around the inferior aspect of the breast from the fifth and possibly the sixth interspace and enter the breast at a position similar to that of the inferior mammary fold. They have a deep origin and curve around to enter the breast in the superficial subcutaneous tissue<sup>16</sup>. The venous drainage comprises of a deep and superficial system. The deep venous system empties *via* perforators into the internal mammary vein. The superficial system is further divided into the transverse system and longitudinal system. The transverse veins run in the subcutaneous tissue and drain into the internal mammary vein whilst the longitudinal veins drain into the superficial veins of the lower neck. Minor drainage is also through perforators that drain into the axillary veins, intercostal veins and vertebral veins.

The innervation of the breast is derived from the anterior and lateral cutaneous branches of the 2<sup>nd</sup>-6<sup>th</sup> intercostal nerves, along with contributions from the cervical plexus<sup>17-19</sup>. The branch from the 4<sup>th</sup> intercostal nerve is believed to be responsible for innervation of the NAC of the breast before and after plastic surgery<sup>17-19</sup>. Lymphatic drainage includes cutaneous, internal mammary, posterior intercostal and axillary routes<sup>14</sup>. The internal thoracic channels carry a minor portion of lymph<sup>14</sup>.

### **1.1.2 Gigantomastia**

The definition of gigantomastia is breasts that require excision of more than 1800g of mammary tissue per breast<sup>20</sup>. This however, is a post-operative diagnosis made after the breast tissue is resected and weighed. This definition however, provides a challenge preoperatively on diagnosis and prognosis.

There is poor understanding of the pathology and/or physiology that contributes to breast hypertrophy/gigantomastia. Breasts have receptors which respond to changes in the levels of hormones. The hormone estrogen, in particular, leads to enlargement of the breasts<sup>21</sup>. These

hormonal changes occur mainly during puberty and pregnancy. Breast hypertrophy is suggested to be a result of multiple factors such as abnormal end-organ hormonal sensitivity, genetic predisposition and overall body weight<sup>22, 23</sup>. Studies such as Jabs *et al.*, (1990) noted normal numbers of estrogen receptors and levels of estrogen amongst women with breast hypertrophy, suggesting that the hypersensitive state of receptors to estrogen in certain patients might be the aetiology of breast hypertrophy<sup>21</sup>.

Gigantomastia adversely affects patients both psychologically and physically. The BREAST-Q questionnaire incorporates both a physical and a psychosocial module. Patients may present with headaches, back and neck pain, brassiere straps grooves over the shoulders, IMF maceration with itching, stretch marks of the skin, prominent visible veins and low self esteem<sup>24</sup>. Women with gigantomastia experience both physical and psychological hurdles. They are sometimes overwhelmed by day to day activities as well as the inconvenience of finding clothes that fit comfortably. They may also find it impossible to take part in physically strenuous exercises. An accurate rate at which gigantomastia occurs has not been documented, however, the differential diagnosis of gigantomastia is as follows: pseudogigantomastia associated with obesity, gravid hypertrophy of the breast associated with pregnancy, virginal hypertrophy, fibroadenomas and cystosarcoma phylloides. Management can be conservative or surgical, utilizing breast reduction techniques.

### **1.1.3 Pre-operative details**

Prior to breast reduction surgery, a thorough medical history and examination is conducted. This is done to assess if a woman is a good candidate for surgery. The following are noted:

- Height, weight, body mass index (BMI) and bra size
- Weight of breast estimated by bra straps cutting into shoulders, difficulty sleeping, discomfort when wearing bras

- Usage of arms to lift the breasts
- Musculoskeletal problems such as headaches, back, neck and shoulder pain.
- Rashes or intertrigo in the IMF
- Paraesthesias of the ulnar side of the hand
- Breast cancer history
- Previous breast surgery, reduction technique
- Breastfeeding, obstetrical history
- Drugs, medication, smoking, bleeding disorders

Examination entails detecting and documenting the following: general condition of the patient (fit for surgery), poor posture, and specific to the breast: breast size, ptosis, bra straps grooves, stretch marks (striae), IMF rashes, nipple areola sensation and areola size. Furthermore, palpitation for lumps and nodes (look out for cancer), checking for nipple discharge, previous incisions and scarring also need to be conducted.

The findings from the history and examination will dictate the pre-operative investigations that need to be performed. Within our setting, a full blood count, urea and electrolytes and a chest X-ray are done for all patients. Patients over the age of 40 years undergo a compulsory mammogram. Patients 30 years and older with a high risk for breast cancer such as a family history, undergo a breast ultrasound. Ultrasonography to screen for breast cancer prior to surgery is more sensitive in the younger age group because of the high density of the breast tissue. Beer *et al.*, also advocated subjecting patients to a mammogram 3 months after surgery, as such results can be used as a control for future mammogram results<sup>25</sup>..

Once the patient, surgeon and one other person signed consent to the operation, patients are instructed to stop taking any form of nicotine 6 to 8 weeks before the day of the breast reduction surgery. Exposure to nicotine is associated with a slow wound healing process in

every day practice. It must be noted though that comprehensive controlled research still has to be undertaken to support this observation<sup>26</sup>. Furthermore, patients are encouraged to lose weight with a target BMI of 30 or less. A study by Gust *et al.*, in 2013 suggested that patients with higher BMI have a greater risk of surgical site complications<sup>27</sup>.

In addition, the patient is instructed to stop medications that lead to bleeding such as NSAIDS, Aspirin, over the counter medications such as St. John's Wort, garlic, ginkgo biloba and multivitamins that have not been prescribed by a doctor. Oral contraceptives and hormone replacement therapy are also stopped as they predispose the patient to a high risk of developing deep venous thrombosis.

The patient is also counseled about the resulting scars, namely: a circular scar around the NAC which is camouflaged by the interface formed by the difference between the NAC and surrounding skin colour, a vertical scar running down from the NAC inferiorly along the central breast meridian to the IMF and a horizontal scar hidden in the IMF.

Surgical as well as potential anaesthetic complications are also discussed with the patient.

#### **1.1.4 Markings:**

Skin markings are crucial to the entire procedure. The markings are a guide, ensuring that the surgeon correctly excises excess breast tissue and skin. Markings are done preoperatively in the ward. Minor adjustments are performed intraoperatively. The initial markings are performed with the subject in an upright position, with the arms by the side of the trunk and both shoulders at the same level. The sternal notch and umbilicus are connected through a line. This line helps to delineate the two halves of the chest. The breast meridian is determined by measuring the distance between the acromion and the sternal notch. A line is drawn vertically down from the midpoint of this distance and traverses the breast in its centre.

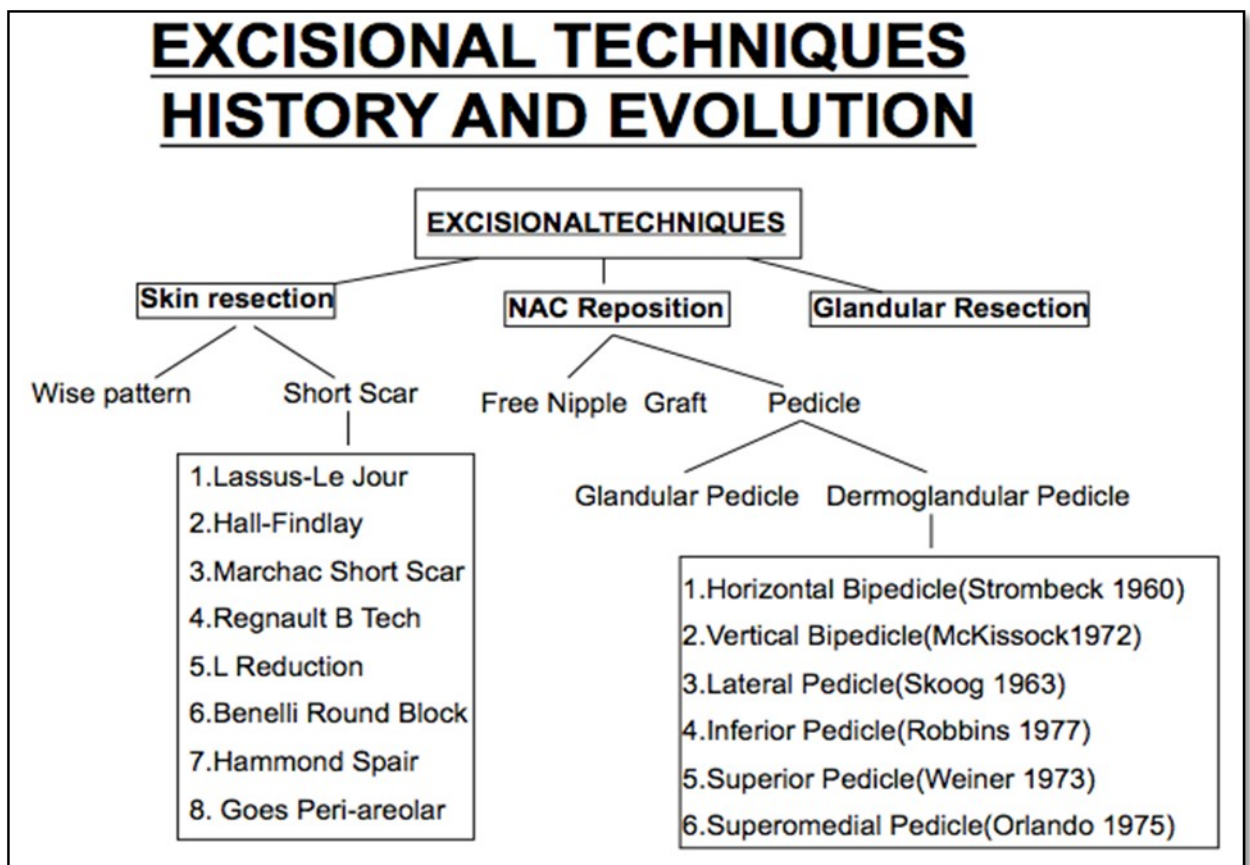
The most important decision to be made is the position of the new NAC. This should be marked at a position level with the IMF. The technique involves placing the fingers of one hand underneath the breast, locating the IMF level first, and then transposing that level onto the anterior surface of the breast by marking the point where the fingers of the hand behind the breast and the fingers of the hand anterior to the breast meet along the breast meridian. This point is confirmed against several landmarks, including the mid-humeral level or within a range of 18-24cm from the sternal notch to the breast meridian taking into consideration the patient's body habitus. The majority of surgeons recommend placing the NAC 18-24cm from the sternal notch to a point along the breast meridian. The nipple should be placed lower in mature fatty breast and higher in young patients with firm glandular breasts<sup>28</sup>. The diameter of the new NAC is between 4.5 and 5cm, the outline of which is marked with a cookie cutter. The upper part of the Wise key-hole pattern is placed centrally along the breast meridian at the level of the new NAC, and markings are done recreating a Wise key-hole pattern. The vertical limbs of the keyhole pattern measure 5cm. A longer vertical limb leads to premature bottoming out of the breast. The vertical limbs will form part of the vertical scar and are important in that they form the breast brassiere holding the breast tissue together and leading to a more aesthetically pleasing breast mound. The lateral and medial limbs extend from the vertical limbs to the edges of the IMF markings. The IMF marking and markings for the pedicle are done intraoperatively. In our setting, we routinely use antibiotics perioperatively. Platt *et al.*, (1993) found that administration of antibiotics intra-operatively lead to a lower rate of wound infection<sup>29</sup>. Serletti *et al.*, (1994) on the other hand did not detect any difference in the rate of wound infection between two groups of patients, one group receiving antibiotics and the other group not<sup>30</sup>.

### **1.1.5 Intraoperative**

The patient is placed supine with the arms positioned at 90 degrees in relation to the trunk. The IMF markings are done along the IMF crease. The marking extends medially to about 3cm from a line drawn vertically between the umbilicus and the sternal notch, whilst laterally it ends at the anterior axillary line. The markings for the pedicle depend on the pedicle technique chosen.

### **1.1.6 Breast reduction techniques**

There are several techniques for breast reduction surgery<sup>28</sup>. The history and evolution of these techniques is summarized in figure 1.4 below.

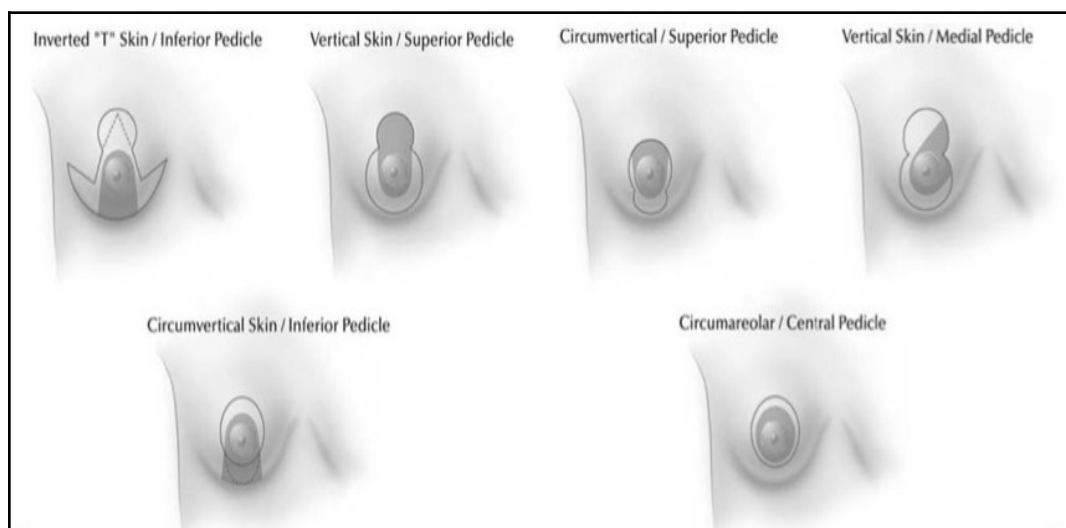


**Figure 1.4: Excisional techniques history and evolution<sup>28</sup>.**

All breast reduction mammoplasty techniques involve three basic maneuvers according to Lemmon: 1) “removal of excess breast tissue”, 2) “resection of redundant or extra skin to accommodate a reduced glandular volume” and 3) “repositioning of the NAC”<sup>28</sup>. The repositioning of the nipple areolar complex is performed ideally with its neurovascular components intact. The three common methods of achieving this are: 1) on a parenchymal pedicle; 2) on a dermal pedicle, or 3) on a dermal-parenchymal pedicle (the most common). When the latter method is used, the nipple areola complex is left attached to the surrounding dermis and underlying parenchyma, improving perfusion. The true value of the dermis may be in providing venous drainage rather than arterial perfusion. This however has not been proven. De Souza *et al.*, (2004) identified 4 basic principles which made the procedure reproducible and led to predictable results<sup>31</sup>. They focused on the moulding of the breast tissue with horizontal and vertical resections, the development of small medial and lateral flaps to accentuate the shape, and the development of the breast tissue underneath and immediately around the nipple- areola complex<sup>31</sup>. Resection and shaping of the parenchyma is done independently from the skin envelope. Two decisions to be made are: the skin incision pattern and the pedicle choice. Irrespective of the pedicle choice, the above principles still apply. Schwarzman in 1930 described a procedure where the nipple and areola was transposed, based on a medial pedicle<sup>32</sup>. Aufricht in 1949 removed a wedge from the upper quadrant, or lateral quadrant or from the entire half<sup>33</sup>. In 1956, Wise modified Biesenbergs’ operation<sup>34</sup>, however, he contributed more in terms of excision patterns and production of safer breast reductions<sup>35</sup>. Strombeck (1960) described a vertical bi-pedicle reduction technique to transpose the NAC and resect the rest of the breast tissue<sup>36</sup>. McKissock (1972) on the other hand described the vertical bi-pedicle technique in which the vascularity of the NAC depended on an intact dermal parenchymal pedicle<sup>37</sup>. Pitanguy (1967) described the horizontal dermal pedicle that results in a shape similar to the keel of a boat and sacrifices the central and lower portions of the breast tissue as well as the superior dermal pedicle<sup>38</sup>. Robbins

(1977), and Courtiss *et al.*, (1977) contributed towards the development of the inferior pedicle technique<sup>39, 40</sup>. The inverted T-skin incision can be used with any pedicle type, including a superior pedicle, inferior pedicle, vertical bi-pedicle, central mound pedicle, and supero-medial pedicle<sup>15, 41</sup>. Figure 1.5 below shows some of the pedicle and skin resection patterns. The skin resection pattern and pedicle type differ amongst different surgeons. The shift from the emphasis on resection to good aesthetic outcome led to Lejour (1994), Lassus (1996) and Hall-Findlay (1999) all contributing towards the pioneering of short vertical scar techniques<sup>42-</sup>

44.



**Figure 1.5: Pedicle and skin resection patterns<sup>41</sup>.**

### ***1.1.6.1 The inferior pedicle technique***

Many authors including Robbins (1977), Courtiss *et al.*, (1977), Ribeiro *et al.*, (2002) and Georgiade *et al.*, (1979) have described reduction mammoplasty with nipple transposition using an inferior dermoglandular pedicle<sup>39, 40, 45, 46</sup>. Breast volumes of 300-2500g have been



successfully resected with this technique<sup>45</sup>. However, Mandrekas *et al.*,(1996) reported a largely favorable experience with the inferior pedicle technique for reduction mammoplasty<sup>8</sup>. Indeed, surgeons in the USA prefer using the inferior pedicle technique compared to other techniques<sup>47</sup>. In a 2002, the American Society for Aesthetic Plastic Surgery survey with 554 respondent surgeons, 56% of the respondents utilized an inferior pedicle and wise-pattern excisional technique<sup>47</sup>. The markings for the inferior pedicle are illustrated in figure 1.6 below.



**Figure 1.6: Inferior pedicle markings.**

The NAC is placed superiorly on the dermal-parenchymal pedicle. The bottom of the breast pedicle should be 8cm in moderately enlarged breasts but can be up to 10cm in larger breasts. The base is positioned on the breast meridian. The skin around the NAC and below it is de-

epithelialised all the way to the position of the inferior mammary fold. The excess breast tissue medially between the vertical limb, horizontal limb and the border of the pedicle is then excised, cutting straight down to the pectoralis fascia. The same applies to breast tissue engulfed by the Wise - pattern key-hole superiorly and the upper border of the pedicle inferiorly. The dermal-parenchymal pedicle is then fixed with a 3.0 vicryl suture to the pectoralis fascia superiorly to negate bottoming out of the breast. Once haemostasis has been achieved the breast is rinsed with normal saline, drains are inserted and the wound closed using a 4.0 monofilament suture in two layers. The inferior pedicle technique's unfavorable results include breasts that have a boxy shape, hypertrophic scarring and a poor long term projection with bottoming out. However, Rohrich *et al.*, in 2004 reported a high patient and surgeon satisfaction with use of this technique<sup>47</sup>. The benefits include excellent postoperative sensation of the nipple areolar complex and adjacent breast tissue<sup>40</sup>. Central to the success of the inferior pedicle technique is the reliable blood supply to the NAC and surrounding dermoglandular tissue. The deep artery from the fourth interspace supplies an inferior or central pedicle. There are vessels that curve around the inferior aspect of the breast from the fifth and possibly the sixth intercostal space and enter the breast at the level of the IMF. They have a deep origin and curve around to enter the breast in the superficial subcutaneous tissue<sup>16</sup>.

#### ***1.1.6.2 The medial pedicle technique***

Adjustments to the supero-medial pedicle technique described by Orlando *et al.*, (1975) led to the development of the medial pedicle technique<sup>48</sup>. The arterial supply to the medial pedicle originates at the third intercostal space as a branch of the internal mammary artery and curves up over the breast in the subcutaneous tissue<sup>20</sup>. Figure 1.5 above illustrates the medial pedicle technique preoperative skin markings using a vertical incision and other pedicle techniques

and skin incisions. Figure 1.7 below illustrates a medial pedicle technique using a Wise-pattern key-hole.



**Figure 1.7: Medial pedicle markings.**

The markings for the medial pedicle breast reduction are the same as for the inferior pedicle technique except for the pedicle marking. This technique involves placing the base of the pedicle supero-medially within the  $\frac{3}{4}$  circle of the Wise-pattern key-hole markings which represent the future position of the NAC. The base is usually 6cm, and for large breasts an 8-10cm base is acceptable. The length of the pedicle is not crucial. The important factor is the ability of the pedicle to rotate into the future NAC space secondary to excision of breast parenchyma. The skin surrounding the NAC and on the pedicle is de-epithelialised, excess tissue excised medially, inferiorly, superiorly and laterally using the markings as a guide. The

rest of the procedure is as outlined for the inferior pedicle technique above. The NAC sensation is optimized by leaving a thin layer of fat on the pectoralis major fascia, thereby sparing the lateral cutaneous branch of the fourth intercostal nerve as it courses above the pectoralis major fascia.

Good cosmetic results have been reported using the medial pedicle technique. Breast and nipple projection was satisfactorily achieved in all patients following reduction mammoplasty using this technique as reported by Faria *et al.*, (1999)<sup>49</sup>. Nahabedian *et al.*, (2002) reported that breast shape and projection achieved by this method is equivalent to that achieved with the inferior pedicle technique<sup>50</sup>. In addition, loss of nipple areola sensation was infrequent with the medial pedicle technique, but however, more frequent compared to the inferior technique<sup>50</sup>.

#### **1.1.7 Patient satisfaction after reduction mammoplasty**

The majority of patients gave positive feedback after undergoing breast reduction surgery<sup>51-53</sup>. Patients were very happy with the outcome of their breast surgery. Davis *et al.*, surveyed 780 women between 1981 and 1992<sup>52</sup>. They found that the majority of patients were happy with their outcome<sup>52</sup>. Similarly, Dabbah *et al.*, studied a smaller group of 285 women between 1988 and 1993 of which 95% of women were most pleased with the procedure results<sup>53</sup>.

Scores for depression, body image, and anxiety increased remarkably post breast reduction surgery using specific questionnaires<sup>49</sup>. Patients' subjective analysis of their own breasts is different from the surgeon's perspective. The Asymmetry, breast shape, nipple shape, skin condition and wound scar (ABNSW) scoring system is used to analyse the aesthetic outcomes of breast surgery objectively<sup>54</sup>. This system gives a score of 0 to 3 to all aspects of breasts analysed i.e. asymmetry, breast shape, nipple deformation, skin condition and wound scar: 0=poor, 1=fair, 2=good, 3=excellent. The shortcoming with this measuring tool as far as this

study is concerned is that it takes into consideration the surgeon's views. The BREAST-Q is a patient-reported outcome measure (PROM) instrument designed to evaluate outcomes among women undergoing different types of breast surgery. There are five BREAST-Q modules, each of which is comprised of multiple scales, breast reduction being one of them. Patients are required to fill out a questionnaire pre- and/or post-operation<sup>3</sup>. The BREAST-Q can be used to study the impact and effectiveness of breast surgery from the patient's perspective<sup>55</sup>. The different scoring systems available to measure patient satisfaction secondary to breast reduction share similar domains.

### **1.1.8 Patient satisfaction secondary to breast reduction using the medial pedicle versus the inferior pedicle technique**

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The inferior pedicle technique is regarded as the most adaptable when compared with other available techniques. It consistently produces good results, in particular: breast volume and shape, nipple sensitivity, adequate projection of the nipples as well as the ability to breastfeed<sup>8, 16</sup>. Patients who had undergone reduction mammoplasty by the inferior pedicle technique and those who had reduction mammoplasty by the medial pedicle technique had the same rates of sensation<sup>56</sup>. There is a paucity of studies comparing the levels of patient satisfaction secondary to breast reduction and comparing the satisfaction/dissatisfaction levels between techniques utilizing the inferior pedicle and the medial pedicle. This study evaluated patient satisfaction secondary to reduction mammoplasty between the two groups using the BREAST-Q questionnaire.

## **1.2 Aim**

The aim of this study was to explore patient satisfaction following breast reduction surgery comparing the medial pedicle technique to the inferior pedicle technique.

### **1.3 Objectives**

The main objective of this study was to assess satisfaction amongst patients who have undergone reduction mammoplasty.

Other objectives included:

- To compare the medial pedicle technique with the inferior pedicle technique results.
- To determine which of the two techniques resulted in better patient satisfaction.

## **CHAPTER 2: METHODOLOGY**

### **2.1 Study design**

This was a retrospective study involving patients who have undergone breast reduction surgery utilizing the medial pedicle technique and the inferior pedicle technique. A total of 30 patients, (60 breasts) age between 18 and 55 years with a BMI of 23 to 33 who underwent breast reduction surgery during the period of June 2017 to June 2018 at Chris Hani Baragwanath Academic hospital, Netcare Rand Clinic and Helen Joseph Academic Hospital were enrolled in the study. Fifteen of the patients had undergone surgery by the inferior pedicle technique whilst the other 15 had the medial pedicle technique performed. The surgeons were doctors from the University of the Witwatersrand Plastic Surgery Department using either the inferior pedicle technique or the medial pedicle technique. The operations had been performed under general anaesthesia following standard markings for both the inferior pedicle technique and the medial pedicle technique using a Wise key-hole pattern that results in an inverted T-scar. The choice of which technique to use was at the surgeons' discretion. All participants were given an information pamphlet detailing the purpose of the study and their right to refuse to partake without being prejudiced. A BREAST-Q questionnaire was completed by the consented participants (See Appendix B). The questionnaire comprised of the post-operative breast reduction module of the BREAST-Q. The six scales covered were: satisfaction with breast, satisfaction with nipples, satisfaction with the outcome, physical well-being, sexual well-being and psychosocial well-being. The participants were not required to fill out their names, signatures, hospital numbers or contact numbers as to de-identify all participants as requested by the HREC (medical) of the University of the Witwatersrand, to protect patient anonymity. Therefore a consent form was not used. Those who opted to participate completed the form by themselves and handed the report back to the principal investigator (PI). At this stage the PI assessed their hospital files to fill out the age, BMI and sternum to NAC levels. The PI then added up the scores and converted the raw scores into an

equivalent Rasch score using the BEAST-Q guidelines. Statistical analysis was carried out to analyse variations between the two patient groups. Two sample independent T-tests were utilised to compare the means of satisfaction and well-being variables of the two groups, employing a 5% level of significance ( $p < 0.05$ ) and generating p-values for each of the variables.

## **2.2 Study site**

It was a multi-site study involving three hospitals namely CHBAH, HJAH and Netcare Rand Clinic all situated in Johannesburg, South Africa.

## **2.3 Population**

All patients who had undergone breast reduction surgery between June 2017 and June 2018 at CHBAH, HJAH and Netcare Rand Clinic were included in the study.

## **2.4 Sample size**

A minimum of 30 participants took part in the study: 15 who had the inferior pedicle technique and 15 who had the medial pedicle technique performed.

## **2.5 Study Instrument**

The BREAST-Q questionnaire was used as the measurement tool.

## **2.6 Ethics**

Permission to conduct the research was requested and approved by the CEOs of CHBAH, HJAH and Netcare Rand Clinic and approval to conduct this research study was obtained from the Human Research Ethics Committee (HREC) (medical) of the University of the Witwatersrand (See Appendix F).



Participants were given an information sheet outlining the purpose of the study and their rights (See Appendix A). Patients who consented to take part in the research did so voluntarily and anonymously by giving answering the questionnaire. Patient names, hospital numbers and any information that may identify the patient were not included as per the HREC (medical) of the University of the Witwatersrand recommendation. Participants were allowed to withdraw from answering questions at any time when they felt uncomfortable with the line of questions or for any other personal reason without jeopardizing their current or future medical treatment. There were no physical risks associated with taking part in the study. No participant was reimbursed for anything as questionnaires were completed during routine clinical follow-up hospital visits.

The PI did retrieve the age, BMI and the sternum to NAC distances from the patients' files when participants returned the questionnaires, and documented this information on the completed questionnaires. All this information was transferred onto the demographic data form (See Appendix C). The data was stored on a computer which requires a password to access any documentation. This password is only known by the PI. No participants reported experiencing any psychological distress whilst completing the questionnaires, but on the contrary many took it as an opportunity to discuss breast surgery. There was no need to refer any participant for professional psychological counseling. It must be noted that all the issues and queries raised by the patients were brought up and answered after the participants had filled out the questionnaires. This helped in ruling out any influence the PI might have had on how participants responded to the questions raised.

Data and/or project output will be used towards qualification for a master of medicine degree in Plastics and Reconstructive Surgery, presentation at academic meetings, congresses and possible publications.

Permission for the use of the BREAST-Q questionnaire has been granted and credit to developers of the questionnaire is and will be given by acknowledging their contribution to this study and any presentations and publications arising from this study.

The research is also intended to ultimately improve future breast reduction patient care in our unit and possibly elsewhere too, in as far as choosing the technique that leads to better patient satisfaction.

## **2.7 Data collection**

Patients were requested to complete the BREAST-Q questionnaire (see Appendix B) at the clinic during their scheduled follow-up visits. No patients without scheduled visits were included in the study. The PI explained the purpose of the study to the participants and their right to withdraw their participation without any given reason, was emphasised. The patient information sheet (see Appendix A) was handed out together with the questionnaire. The majority of patients completed the questionnaire. Those who chose not to participate, were not asked the reasons for their choice, and went on to be seen by surgeons at the clinics for their clinical follow-ups.

The process of completing the questionnaire did not take more than 20min and none of the participants reported or looked inconvenienced in any manner.

## **2.8 Data analysis**

Descriptive and inferential analysis were used to analyse the participant responses to the BREAST-Q questions. Means and Standard Deviations (SD) were calculated for variables that were normally distributed, while medians and interquartile ranges (IQR) were used to describe variables that were not normally distributed. Two-sample independent T-tests or Wilcoxon rank-sum tests were used to compare the means or

medians of the satisfaction and wellbeing variables between the two patient groups (medial- and inferior pedicle technique) as appropriate, depending on each variable's distribution, using a 5% Confidence Interval of significance generating p-values for all variables measured.

## **CHAPTER 3: RESULTS**

Of the total of 30 respondents who completed the BREAST-Q questionnaire, 15 had the reduction performed by the medial pedicle technique and the other 15 by the inferior pedicle technique. The average age of the participants was 34.2 years ( $\pm 8.8$ ), with an age range from 19 to 55 years. The average breast satisfaction was 69.3%, nipple satisfaction was 76.3%, outcome satisfaction was 83%, sexual wellbeing was 65.3%, psychosocial wellbeing and physical wellbeing had a median of 100 and 72 respectively.

### **3.1 Medial pedicle technique**

The average age of this group of 15 patients was  $36.3 \pm 10.9$  years with a minimum of 18 and a maximum of 55 years. The average BMI was  $29.9 \pm 3.1$  with a minimum of 23, and a maximum of  $33 \text{ kg/m}^2$ . The sternum to NAC distance on the right side was 35(32-38) with a minimum of 29, maximum of 39cm, on the left side it was 34(32-38) with a minimum 29 and a maximum of 40cm. The average breast satisfaction was  $68.9 \pm 17.6$  with a minimum of 30 and maximum of 92cm. (One patient did not answer the questions for this variable). The nipple satisfaction average was  $78.5 \pm 19.2$  with a minimum of 14 and maximum of 100. (One patient did not answer the questions on this variable). The average for satisfaction with outcome was  $83.5 \pm 16.1$  with a minimum of 59 and maximum of 100. (Four patients did not answer questions on this variable). The average for the psychosocial wellbeing was 100 (92-100) with a minimum of 12 and maximum 100. (Three patients did not answer questions pertaining to this variable). The average for sexual wellbeing was  $56.9 \pm 25.1$  with a minimum of 31 and maximum of 100. (Six respondents did not answer questions on this variable). The average for physical wellbeing was  $62.7 \pm 19.6$  with a minimum of 20 and maximum of 100. (Three respondents did not answer questions pertaining to this variable). The average satisfaction for the group taking into consideration the above mentioned variables is  $74.3 \pm 15.8$  with a minimum of 36.5 and maximum 98.

### **3.2 Inferior pedicle technique**

The average age of this group of 15 patients was  $32.2 \pm 5.7$  with a minimum of 24 and maximum 45. The average BMI is  $31.5 \pm 1.5$  with a minimum of 29 and maximum of 34. The sternum to NAC distance on the right side was 36(33-38) with a minimum of 32 and maximum of 37, for the left side 36(34-37) with a minimum of 31 and maximum of 43. The average for breast satisfaction was  $69.6 \pm 18.7$  with a minimum of 39 and maximum of 100. One patient did not answer questions posed in this variable. The average for nipples satisfaction was  $74.3 \pm 21.3$  with a minimum of 30 and maximum of 100. The average for satisfaction with outcome was  $82.5 \pm 19.8$  with a minimum of 52 and maximum of 100. Three respondents did not answer questions posed in this variable. The average for psychosocial wellbeing was 100(66-100) with a minimum of 0 and maximum 100. Two respondents did not answer questions posed in this variable. The average for sexual wellbeing was  $71.4 \pm 27.2$  with a minimum of 31 and maximum 100. Four respondents did not answer questions posed in this variable. The average for physical wellbeing was  $84.2 \pm 14.2$  with a minimum of 65 and maximum of 100. The average satisfaction inclusive of the abovementioned variables was  $75.8 \pm 16.6$  with a minimum of 48 and maximum of 100. Table 2.1 below is a summary of the variables of interest.

Interestingly, analysis of the following variables: age, BMI, sternum to NAC distance, breast satisfaction, nipples satisfaction, satisfaction with outcome, psychosocial well-being, sexual well-being and average satisfaction did not demonstrate any statistically significant difference between the two groups

Importantly, physical well-being was the only variable with a statistical difference ( $p=0.002$ ) between the two groups with the inferior pedicle group faring better.

There was no difference in satisfaction between the two techniques when all the parameters were assessed and the average scores calculated and compared.

**Table 3.1: Summary statistics of variables of interest**

Variable	Medial pedicle technique			Inferior pedicle technique			p-value
	n	Mean $\pm$ SD / median(IQR)	min-max	n	Mean $\pm$ SD / median(IQR)	min-max	
Age	15	36.3 $\pm$ 10.9	18-55	15	32.2 $\pm$ 5.7	24-45	0.212
BMI	15	29.9 $\pm$ 3.1	23-33	15	31.5 $\pm$ 1.5	29-34	0.085
Sternum NAC right	15	35 (32-38)	29-39	15	36 (33-38)	32-37	0.454
Sternum NAC left	15	34 (32-38)	29-40	15	36 (34-37)	31-43	0.35
Breast satisfaction	14	68.9 $\pm$ 17.6	30-92	14	69.6 $\pm$ 18.7	39-100	0.926
Nipple satisfaction	14	78.5 $\pm$ 19.2	45-100	15	74.3 $\pm$ 21.3	30-100	0.585
Outcome satisfaction	11	83.5 $\pm$ 16.1	59-100	12	82.5 $\pm$ 19.8	52-100	0.892
Psychosocial well-being	12	100 (92-100)	12-100	13	100 (66-100)	0-100	0.282
Sexual well-being	8	56.9 $\pm$ 25.1	31-100	11	71.4 $\pm$ 27.2	31-100	0.253
Physical well-being	13	62.7 $\pm$ 19.6	20-100	15	84.2 $\pm$ 14.2	65-100	<b>0.002</b>
Average satisfaction	15	74.3 $\pm$ 15.8	36.5-98	15	75.8 $\pm$ 16.6	48-100	0.808

## **CHAPTER 4: DISCUSSION**

Several breast reduction surgery techniques are used based on specific vascular pedicles used by different surgeons. The decision of which technique to use depends on the specific case as well as on the operating surgeon's comfort and experience with specific techniques. In our setting, most of the surgeons are comfortable performing the medial pedicle technique, the supero-medial pedicle technique and the inferior pedicle technique.

The different techniques have been used continually, despite the absence of any studies on the satisfaction levels of patients, comparing the different techniques. To date there is no literature, locally or internationally, on the patient satisfaction levels comparing the medial pedicle- and the inferior pedicle techniques. This study measured patient satisfaction levels in two groups of patients, one using the medial pedicle technique and the other using the inferior pedicle technique. A self-administered BREAST-Q questionnaire comprising of the following domains: satisfaction with outcome, satisfaction with breasts, satisfaction with nipples, psychosocial wellbeing and sexual wellbeing was used. Interestingly, no statistically significant differences were found in any of the variables provided on the BREAST-Q questionnaire, except for the physical wellbeing variable.

The evolution of breast reduction surgery with emphasis shifting from volume reduction to aesthetic outcome was outlined in the Introduction section. Furthermore, the traditional measurements of success such as morbidity and mortality are steadily being replaced by patient related outcomes measurements. This development is even more important in the plastic surgery discipline than other surgery disciplines. It might not be a matter of life or death for the plastic surgeons, but the patient's quality of life is of utmost importance. PROMs which place emphasis on quantifying patients' perceptions of their outcomes are playing an increasingly important role<sup>57</sup>. The BREAST-Q was developed in 2009 by a group of surgeons from the Memorial Sloan Kettering Hospital led by A.L. Pusic. The BREAST-Q can be

applied to different breast procedures and allocate scores to patient satisfaction and quality of life. The six modules are Reconstruction, Reduction/Mastopexy, Augmentation, Mastectomy, Breast Conserving Therapy and Latissimus Dorsi Scales. The questionnaires can be applied preoperatively and/or postoperatively. In this study these questionnaires were applied postoperatively in line with the study applicable questions. The different scales can also be utilised individually. In this current study the variables that were used were: physical wellbeing, sexual wellbeing, psychosocial wellbeing, satisfaction with breasts, satisfaction with nipples, general outcome satisfaction. Psychometric evaluation reveals high reliability, validity and responsiveness to surgical intervention across all scales according to the Plastic Surgery Foundation. The BREAST-Q is a PROM that enables scientists and surgeons to evaluate the satisfaction levels of patients and their health related quality of life issues<sup>58</sup>. Dean and Crittenden concluded that the BREAST-Q is well suited for clinical effectiveness research and is easily incorporated into routine patient care<sup>59</sup>. The BREAST-Q questionnaire is supported as a user-friendly instrument to measure the influence of breast surgery from the patients' perspective<sup>57</sup>. The limitations that may be anticipated with a self-administered questionnaire are the literacy levels of the participants, the issue of language and the eagerness of patients to please the surgeon, hence the importance of anonymity of participants in this study. The use of Rasch analysis makes it possible to select a range of items for each scale that differ in terms of item difficulty such that they map out the construct that they propose to measure. The combination of extensive detailed qualitative research and modern psychometric methods make it possible to measure constructs, such as patient satisfaction, in a more clinically meaningful and scientifically robust way than has been done in the past in such patient groups<sup>57</sup>. Other tools looking into PROMs such as the SF-36 questionnaire are also in use and have been validated to satisfy minimum psychometric requirements across diverse population groups. This findings support the use of the SF-36 survey across diverse populations studied<sup>60</sup>. The SF-36 was not designed specifically for breast surgery. Others



such as the Rosenberg scale, only deal with the self-esteem issues and would have fallen short of addressing all the different scales that the study was assessing. The ABSNW is another tool that could have been used, however, the surgeon's input regarding the post-operative results is incorporated into it. The BREAST-Q was therefore chosen as a study tool for this study, because it deals specifically with breast issues and from a patient's satisfaction perspective rather than a surgeon's satisfaction perspective.

In this chapter the differences or similarities of data collected between the two breast reduction techniques are discussed.

During the development of the BREAST-Q, Cano *et al.*, (2012) came to the conclusion that breast surgery impacted women in six main areas namely: satisfaction with breasts, satisfaction with nipples, satisfaction with outcome, psychosocial wellbeing, sexual wellbeing and physical wellbeing<sup>57</sup>.

#### **4.1 The satisfaction variables:**

##### **4.1.1 Breasts**

The reasons behind patients' requests for breast reductions are many and varied. The questions postoperatively posed to the participants regarding their breasts involved the following matters: How the breasts look in clothes, how the breast size matches the rest of the body, satisfaction with the size of the breasts, the shape of the breasts when wearing a bra, how equal in size the breasts are, how comfortable bras fit? Furthermore patients were questioned on the satisfaction with the shape of the breasts when not wearing a bra, the look in a mirror when clothed, how the breasts sit/hang on the chest, how normal the breasts look, and the location of the scars? All these questions address issues related to the size and symmetry of the breasts postoperatively, since the smaller and more symmetrical the breasts the easier it is to find well fitting bras, the more likely it is to look good when naked and when

wearing clothes, and the more likely the feeling that the size of the breasts is in keeping with the size of the body.

Both techniques have been demonstrated to safely remove more or less the same amount of breast tissue weight. According to Wong *et al.*, (2014) the medial pedicle technique is a superior alternative in cases of extreme breast hypertrophy and has been shown to be safe in resections larger than 1500g<sup>61</sup>. Courtiss *et al.*, (1977) reported that the inferior pedicle technique was safe for reductions between 300g and 2500g<sup>40</sup>. Georgiarde *et al.*, (1979) concurred that the inferior pedicle technique can be used routinely in reduction mammoplasties requiring the removal of either small amounts (200g) or large amounts (2500g) of tissue, and more importantly with consistency producing satisfactory aesthetic results and excellent patient satisfaction<sup>46</sup>. With this in mind, it follows that by utilising either technique the surgeon can remove quite substantial amounts of breast tissue, resulting in smaller breasts which translates into better patient satisfaction in breast size. The issue of breast symmetry depends on the surgeon's experience and skill. With regard to scarring appearance and location, both techniques the resulting scars are the same, because the incision pattern is the same. The Wise-key pattern incision was used for both groups of patients in this study. The incision pattern results in an inverted T-scar which comprises of a horizontal scar hidden in the IMF, and a periareolar scar that is camouflaged by the interface between the areola and the breast skin, where the skin colours are different. The vertical scar which courses down from the inferior aspect of the NAC circumference along the breast meridian is the only scar visible in the upright position and is known to heal well. The two techniques therefore share similar scarring patterns and the same ability to remove large quantities of breast tissue. Mizgala *et al.*, (2000) noted that patients were accepting of the inverted T scar that faded with time<sup>62</sup>.

For breast reduction patients the issue of scarring seems to be minor in relation to the advantage and benefits of the procedure itself. Menendez *et al.*, (2017) have shown that patients are less concerned about scarring after breast reduction surgery<sup>63</sup>. They compared the Wise pattern incision to the vertical incision. Theoretically the vertical incision should do better on patient satisfaction as it eliminates the inframammary scar. However, Menendez *et al.*, (2017) reported no statistically significant difference between these two groups<sup>63</sup>.

In our setting there is emphasis on scar management both intraoperatively, ensuring that closure is not too tight, and postoperatively through the use of micropore tape over the scars. As a result the scars heal and mature quickly. Specific scar taping enhances the maturation of the scar and manage the related problems<sup>64</sup>. What they demonstrated was the insignificance of scars as far as this group is concerned. Furthermore, with the improvement and emphasis on scar management, which leads to better outcomes, it makes sense that the issue of scarring is becoming increasingly less important and not impacting negatively on patient satisfaction. The two techniques have been shown to have the ability to result in the resection of nearly the same amount of breast tissue safely, and resulting in the same scarring patterns. As a result of this the patient satisfaction levels between the two groups are not expected to differ as far as this scale is concerned. [Breast satisfaction](#) data [in this current study](#), does not demonstrate any statistically significant difference [between](#) the two [study](#) groups [with a p-value of X.XX](#).

#### **4.1.2 Nipples**

The questions posed regarding the patient's nipple appearance were: how high or low the nipples were on the breast, how the nipples are lined up in relation to each other, the shape of nipples and areolas, how nipples and areolas look and the extent of sensation in nipples? This current study showed an overall nipple satisfaction p-value of 0.585, which once again is not statistically significant. The first question in this scale relates to the distance the NAC can be moved during breast reduction and the second part addresses the phenomenon of breast

bottoming out. The cut-off distance at which breast reduction can be performed safely using the inferior pedicle technique has been reported to be 15cm whereas for the medial pedicle technique the challenge has more to do with the ability to rotate the pedicle into the new NAC position. The longest sternum to NAC distance in this current study group was 43cm. The ideal NAC position is between 18cm and 24cm. To achieve the ideal position in the longest sternum to NAC distance in our study, the NAC would have been moved 19cm. As mentioned earlier the cut-off point is just a guide of 15cm. However, in some cases the new NAC position can be placed between 24cm and 27cm to ensure the viability of the pedicle. The majority of the NAC's did not require to be moved beyond 15cm. The implication thereof is that there was no limitation in terms of how high the NAC could be positioned, taking into consideration the aesthetically accepted range of 19-24 cm. The second part of the question is expected to have more negative scoring for the inferior pedicle technique due to the phenomena of "bottoming out", pseudoptosis and "star-gazing" (the upward rotation of the nipple-areola complex) which are a common postoperative problems when using the inferior pedicle breast reduction technique<sup>65</sup>. The concept of breast bottoming out over time after breast reduction surgery refers to breast parenchymal tissue sagging below the IMF over time, in the process leading to a descend and upward pointing of the NAC. This phenomenon is observed in the inferior pedicle technique. This phenomena is expected to negatively affect the position of the NAC and lead to poor patient satisfaction in relation to the position of the nipple. It has to be mentioned that this particular occurrence is a long term phenomena that is observed beyond six months postoperatively. The participants in this study included patients who were in the acute phase of the postoperative period and would therefore not be experiencing these phenomena. The location or positioning of the nipple areola complex also depends on the experience and competence of the operating surgeon with the specific technique used. It follows then that when the questionnaire was completed the inferior pedicle technique group would have not experienced the "bottoming out" and "star gazing"

phenomena and would have been happy with their nipple position. According to Swanson (2013) 21.5% of patients who underwent a Hall-Findlay reduction reported absence of nipple sensation<sup>66</sup>. Hall-Findlay (2012) reported an 85% rate of normal nipple sensation<sup>16</sup>. On the other hand, Courtiss and Goldwyn (1977) reported a 35% rate of loss of nipple sensation 24 months after an inverted T, inferior pedicle breast reduction<sup>40</sup>. They found no difference in sensation between the medial pedicle technique and the inferior pedicle technique. Although larger resections were performed for the medial pedicle technique group in the current study there was no correlation with the size of reduction performed and sensory outcomes. If we were to ignore the symmetry and size variable contribution to our score obtained in the current study (the choice of pedicle technique has no influence), and the fact that the different authors mentioned above do not report significant differences in sensation, then the data from this study is in agreement with and supports what the abovementioned authors have found.

The nerve supply to the NAC is derived mainly from the lateral cutaneous branch of the 4th intercostal nerve which runs deep in the breast and cutaneous branches from the anterior cutaneous branches which run superficially. The resection pattern followed in the medial pedicle technique *versus* the inferior pedicle technique in theory leads to a higher preservation of sensation with the medial pedicle technique, in theory at least. Both techniques lead to preservation of the lateral antecutaneous branch of the 4<sup>th</sup> intercostal nerve, the main nerve supply, whilst the branches from the anterior cutaneous nerves are less interrupted in the medial pedicle technique. The current study shows no difference in nipple sensation between reduction mammoplasty by either the inferior pedicle technique or the medial pedicle technique. Other authors also agree with these findings.

#### **4.1.3 Outcome**

The questions on outcome variables included: right decision to undergo the operation, encourage other women in a similar situation to undergo the procedure, willingness to do it

again, positive life changing surgery experience and whether the expectations were met? The important and common factor is the patients' expectations. If the patient's expectations are met, they are more likely to view the whole experience positively, will recommend it to other patients, would also regard it as the right choice to have made and would not mind undergoing the procedure again. High levels of satisfaction were recorded for this variable in both groups. The resultant alleviation of symptoms of heavy breasts and other symptoms associated with gigantomastia lead to a better quality of life for patients. This contributes to the agreement that the right decision was made to undergo the procedure. Both techniques result in volume reduction of the breast tissue and subsequent quality of life benefits. The importance of counselling for patients before they undergo any surgical operation cannot be overemphasized. For elective procedures such as breast reduction it is very important for patients to be counselled. In our institution the patient is counselled at the time they come for the first consultation. The patients are requested to come back a few weeks later, during which time they are encouraged to gather more information on the subject and to also discuss the decision with family members as well as patients who had already undergone the procedure. The second visit is used to answer any questions the patient may have and also to consolidate what was discussed in the first consultation. The counselling focuses on anaesthetic and surgical complications. Moreover the patients' expectations are recorded and the surgeon outlines a realistic outcome of the procedure. Patients' expectations and reality are different. Proper and in depth counselling in this regard reduces the gap between a patient's expectations and what can be achieved in reality. The key to this scale is managing the patients' expectations by the preoperative information given and the confidence level which play an important part in the satisfaction levels. Although the obtained p-value for the outcome variable between the medial- and the inferior pedicle technique in this study was not statistically significant at 0.892, this result shows that irrespective of the technique used, the important factor in this scale is managing the patients expectations, which also means that this

scale might not be suitable for comparing different techniques, as the outcome is dependent on the quality of preoperative counselling. Overall, counselled patients appeared happier, the whole experience is positive and therefore, they are more likely to recommend the procedure to other individuals.

#### **4.1.4 Wellbeing**

##### **4.1.4.1 Psychosocial wellbeing**

The questions raised in the psychosocial wellbeing variable were about confidence in a social setting, feeling good about one self, equal worth to other women, outside looks representing inner feeling and of self-worth. Breast reduction surgery leads to lower breast volume, the ease of finding and wearing comfortable fitting bras, translating into a feeling of worth, fitting into social groups and a general good feeling. Faria *et al.*, (1999) discovered that patients were less anxious, had improved moods, improved perception of their body image and were generally happy<sup>49</sup>. Kececi *et al.*, (2015) have demonstrated low esteem preoperatively and high self-esteem postoperatively using the Rosenberg self-esteem scale<sup>67</sup>. Irrespective of the pedicle used most of the breast reduction surgery patients in the present study reported high levels of psychosocial wellbeing with a p-value of 0.282 which although statistically insignificant is an important clinical finding.

##### **4.1.4.2 Sexual wellbeing**

The variables recorded were: feeling sexually attractive, confidence during sex, sexual confidence when clothed and/or unclothed as well as satisfactory sexual life. Self-esteem translates into feeling good about oneself and therefore increased confidence in every setup, including during sexual intercourse. The results of both groups reflect a high level of sexual wellbeing. The reporting of a satisfactory sexual life is complex as it also relies on the sexual partner of the participant, for example: if the partner has or is experiencing sexual dysfunction issues, it will negatively impact on the participant's response, which has nothing to do with

the breast reduction surgery. Other respondents may feel that such a question is encroaching on their privacy whilst others may be celibate for personal reasons. A study by Oral *et al.*, (2018) showed that reduction mammoplasty has a positive impact on self-confidence, physical appearance opinion, despondency, and apprehension but no effect on sexual fulfilment of the patient<sup>68</sup>. Guimaraes *et al.*, (2015) demonstrated that aesthetic breast surgery has a positive impact on the sexuality of patients<sup>69</sup>. The current study compared the medial pedicle *versus* the inferior pedicle technique and no significant difference regarding sexual wellbeing was found with a p-value of 0.253, which is not statistically significant.

#### **4.1.4.3 Physical wellbeing**

The questions asked were: In the past week, how often have you experienced headaches? Pain in your breast area? Lack of energy? Difficulty doing vigorous physical activities? Feeling physically unbalanced? Shoulder pain? Difficulty sleeping because of discomfort in your breast area? Neck pain? Painful gouges or grooves in your shoulders from your bra straps? Feeling physically uncomfortable? Rashes under your breasts? Back pain? Arm pain? Pain, numbness or tingling in your hands? The questions in this scale sought to establish the extent of relief from symptoms associated with macromastia. The more breast tissue is resected the lighter the breast weight, which in turn translates into an improvement of the symptoms associated with macromastia. Interestingly and importantly, the physical wellbeing variable of the medial pedicle technique *versus* the inferior pedicle technique had a statistically significant p-value=0.002. These results demonstrate a statistically significant difference between the two groups with the inferior pedicle group having a better outcome. The positive effect of breast reduction surgery on the physical wellbeing of patients is well documented in the literature. Shakespeare and Cole (1997) demonstrated a positive impact on physical condition, state of mind and ability to socialize<sup>70</sup>. Davis *et al.*, (1995) demonstrated an improvement of the following symptoms: back and neck aches, hand paraesthesia, breast floppiness, headaches, tiredness, pain in the breast, skin rash and shoulder indentations<sup>52</sup>.



What has not been addressed is which pedicle technique leads to a superior outcome. Theoretically a technique that enables surgeons to resect more breast tissue will lead to better alleviation of symptoms and thus a higher score for this scale. The difference in the NAC - sternum distance between the two groups is not statistically significant, since this difference is a rough guide in terms of the size of the breast preoperatively. Even though the size of the breasts between the two groups may be equal it does not mean that the amount of glandular tissue resected in the two groups is the same. Minimal resection of breast tissue in the one group will translate into minimal improvements of symptoms in that group and may explain the difference in outcome between the two groups. This is more so in this study because there were different surgeons with different levels of experience and competence involved. The only way to address this would have been to document the weight of the resected tissue postoperatively and comparing the two groups. Symptom relief is based on the volume of tissue resected. Both techniques have been demonstrated to enable surgeons to resect the same weight/volume of breast tissue.

## **CHAPTER 5: CONCLUSIONS**

The overall outcome satisfaction in the two groups, encompassing both the satisfaction- and the wellbeing scales were not statistically significantly ( $p$ -value=0.808). The lack of studies addressing this particular topic from a patient perspective makes it difficult to compare these findings of this current study with what is available in the literature. The expectation was to find no differences in the two techniques compared in this study at all. However, the study indicates a superior result on the physical wellbeing scale with the use of the inferior pedicle technique. It is believed that the answer may lie in the amount of breast tissue resected using this technique compared to the medial pedicle technique. Until a study is performed in which the breast tissue resected is weighed and correlated with the findings of this study, the reason

for the inferior pedicle technique to perform better on the physical wellbeing scale will remain unanswered.

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## APPENDICES

### Appendix A: Participant Information Sheet



**STUDY TITLE:** PATIENT SATISFACTION IN BREAST REDUCTION USING THE MEDIAL PEDICLE TECHNIQUE VERSUS THE MEDIAL PEDICLE TECHNIQUE

Dear Madam,

My name is Dr. Noko Mokwatlo and I am a Masters student in Medicine at Wits University in Johannesburg. As part of my studies I have to undertake a research project, and I would like to find out which method leads to better patient fulfillment following breast reduction between the medial pedicle technique and inferior pedicle technique. The purpose of this research project is to assess patient satisfaction following breast reduction operation comparing two different methods of breast reduction surgery.

As part of this project I would like to invite you to take part and complete a questionnaire. This will involve answering questions on a paper and will take around 30 minutes.

Participation in this study is voluntary. You are free to refuse to take part in the study or to cancel participation in the study at any stage even if consent has been

granted. If you decide not to participate in this study or you change your mind during the study, your medical care will not be affected by your decision.

You will not receive any direct benefits from participating in this study, and there are no disadvantages or penalties for not participating. You may withdraw at any time or not answer any question if you do not want to.

The questionnaire will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation, in my final research report.

If you have any questions afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you have any queries, concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the Wits University Human Research Ethics Committee telephone + 27(0)11 717 1408, email: [hrec-medical.researchoffice@wits.ac.za](mailto:hrec-medical.researchoffice@wits.ac.za)

Yours sincerely,

Dr. Noko Mokwatlo

email: [carltondoc@gmail.com](mailto:carltondoc@gmail.com)

contact number: 0720111462

Prof. E. Ndobe

email: [elias.ndobe@gmail.com](mailto:elias.ndobe@gmail.com)

contact number: 0824156140

## Appendix B: BREAST-Q Questionnaire

### BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0 PHYSICAL WELL-BEING

In the past week, how often have you experienced:

	None of the time	Some of the time	All of the time
a. Headaches?	1	2	3
b. Pain in your breast area?	1	2	3
c. Lack of energy?	1	2	3
d. Difficulty doing vigorous physical activities (e.g. running or exercising)?	1	2	3
e. Feeling physically unbalanced?	1	2	3
f. Shoulder pain?	1	2	3
g. Difficulty sleeping because of discomfort in your breast area?	1	2	3
h. Neck pain?	1	2	3
i. Painful gouges or grooves in your shoulders from your bra straps?	1	2	3
j. Feeling physically uncomfortable?	1	2	3
k. Rashes under your breasts?	1	2	3
l. Back pain?	1	2	3
m. Arm pain?	1	2	3
n. Pain, numbness or tingling in your hands because of your breast size?	1	2	3

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**Note to Investigators:** This scale can be used independently of the other scales.

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## BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0 SEXUAL WELL-BEING

Thinking of your sexuality, since your breast reduction surgery, how often do you generally feel:

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
a. Comfortable/at ease during sexual activity?	1	2	3	4	5
b. Confident sexually?	1	2	3	4	5
c. Satisfied with your sex life?	1	2	3	4	5
d. Sexually attractive in your clothes?	1	2	3	4	5
e. Sexy when <u>unclothed</u> ?	1	2	3	4	5

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**Note to Investigators:** This scale can be used independently of the other scales. The following statement can be added to the stem to provide an opportunity for the patient to decline completing this scale. 'The following questions ask about your sexual well-being. If you are uncomfortable answering these questions or do not feel that they apply to you, please check the box and skip the questions that follow.'

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j. How normal your breasts look?	1	2	3	4
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## BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0 SATISFACTION WITH NIPPLES

In the past week, how satisfied or dissatisfied have you been with:

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
a. How high or low your nipples are on your breasts?	1	2	3	4
b. How your nipples are lined up in relation to each other?	1	2	3	4
c. The shape of your nipples and areolas?	1	2	3	4
d. How your nipples and areolas look?	1	2	3	4
e. The amount of sensation (feeling) in your nipples?	1	2	3	4

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**Instructions:** These questions should be considered as stand-alone. Thus, the patient's response is taken as the score for each item. Higher scores reflect a better outcome.

**Note to Investigators:** This scale can be used independently of the other scales.

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**BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0 SATISFACTION WITH OUTCOME**  
**BREAST-Q™ - REDUCTION MODULE (POSTOPERATIVE) VERSION 2.0 SATISFACTION WITH OUTCOME**

We would like to know how you feel about the outcome of your breast surgery. Please indicate how much you agree or disagree with each statement:

	Disagree	Somewhat Agree	Definitely Agree
a. Having surgery was the right decision for me.	1	2	3
b. I would encourage other women in my situation to have breast reduction surgery.	1	2	3
c. I would do it again.	1	2	3
d. Overall the surgery was a positive experience.	1	2	3
e. Having surgery changed my life for the better.	1	2	3
f. I have no regrets about having surgery.	1	2	3
g. The outcome perfectly matched my expectations.	1	2	3
h. It turned out exactly as I had planned.	1	2	3

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**Note to Investigators:** This scale can be used independently of the other scales.

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n. Confident about your body	1	2	3	4	5
i. Attractive?	1	2	3	4	5

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**Note to Investigators:** This scale can be used independently of the other scales.

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**Appendix C: Demographic Data collection tool**

PATIENT SATISFACTION IN BREAST REDUCTION USING THE MEDIAL PEDICLE  
TECHNIQUE VERSUS THE INFERIOR PEDICLE TECHNIQUE

STUDY ID:

DATA	
Age	
BMI	
Smoker	
Skin incision and pedicle used	



## **Appendix D: Plagiarism Declaration**




PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Peter Noko Makwatha (Student number: 9001182E) am a student registered for the degree of Plastic and Reconstructive surgery in the academic year 4.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: 

Date: 2018/10/07

Appendix

**E: Turn-it-in Report**

ORIGINALITY REPORT

8%

SIMILARITY INDEX

6%

INTERNET SOURCES

8%

PUBLICATIONS

4%

STUDENT PAPERS

PRIMARY SOURCES

1	"Mastopexy and Breast Reduction", Springer Nature America, Inc, 2009 Publication	2%
2	"Vertical Scar Mammoplasty", Springer Nature, 2018 Publication	1%
3	uir.unisa.ac.za Internet Source	1%
4	www.biomedcentral.com Internet Source	1%
5	"Inverted T versus vertical scar incision technique for women undergoing breast reduction surgery", Cochrane Database of Systematic Reviews, 2016. Publication	1%
6	www.ncbi.nlm.nih.gov Internet Source	1%
7	pure.uva.nl Internet Source	1%
8	academic.oup.com Internet Source	1%
9	www.scribd.com Internet Source	1%
10	Submitted to Bolton Institute of Higher Education Student Paper	1%
11	Cosmetic Surgery, 2013. Publication	1%

## Appendix F: Ethics Certificate



R14/49 Dr Noko Mokwatlo

### HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

#### CLEARANCE CERTIFICATE NO. M180527

**NAME:** Dr Noko Mokwatlo  
**(Principal Investigator)**  
**DEPARTMENT:** Plastic and Reconstructive Surgery  
Chris Hani Baragwanath Academic Hospital  
Helen Joseph Hospital  
Netcare Rand Hospital


**PROJECT TITLE:** Patient satisfaction in breast reduction using medical  
pedicle versus inferior pedicle

**DATE CONSIDERED:** 25/05/2018

**DECISION:** Approved unconditionally

**CONDITIONS:**

**SUPERVISOR:** Prof E Ndobe

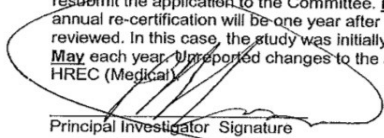
**APPROVED BY:**   
Professor CB Penny, Chairperson, HREC (Medical)

**DATE OF APPROVAL:** 24/07/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

#### DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in **May** and will therefore be due in the month of **May** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

  
Principal Investigator Signature

Date

25/06/2018

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES