



Changes in Patient Reported Nipple Sensation after Superomedial Pedicle Reduction Mammoplasty in the Early Postoperative Period

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Abstract

Background: The sensitivity of the nipple-areola complex (NAC) is important to patients undergoing reduction mammoplasty and is frequently altered postoperatively.

Objective: Our aim was to evaluate NAC sensitivity as perceived by the patients, after superomedial pedicle reduction mammoplasty (SPRM), and its relationship to preoperative breast size, nipple to sternal-notch distance (NN), and total resection volume.

Patients and Methods: We performed a retrospective review of a prospectively maintained database of SPRMs in an 8-year period. We identified 133 patients, with 48 (96 NACs) having documented postoperative NAC sensitivity reports in their early postoperative course. Pre and post-operative NN, bra size and specimen weight were analyzed.

Results: Thirty-six patients (66 NACs-68.7%) reported unchanged NAC sensation, 9 patients (16 NACs-16.6%) reported decreased sensation, and 7 patients (12 NACs-12.5%) reported improved sensation. The average preoperative NN in the patients with decreased sensation was 33.8 cm with an average of 521.8 g resected. Patients with improved NAC sensation had average preoperative NN of 31 cm and an average 450.2 g resected. The preoperative NN in those patients with unchanged sensation was 32.6 cm with an average of 567.5 g resected. Preoperative cup size positively influenced nipple sensation ($p=0.001$) while resected breast volume ($p=0.2$) and postoperative cup size ($p=0.76$) had no influence on nipple sensation.

Conclusion: Patients that underwent SPRM exhibited 81.2% preserved or improved NAC sensitivity. Preoperative NN, postoperative NN and final specimen weight did not impact NAC sensitivity. Larger preoperative bra size correlated with decreased postoperative NAC sensation after SPRM.

Introduction

Reduction mammoplasty is a safe and effective method of increasing quality of life by alleviating pain and improving aesthetics for women with macromastia [1]. Symptomatic macromastia is a common problem, with patients noting back, neck, and shoulder pain, inframammary fold dermatitis, difficulty with exercise and sleeping, headache, and a host of psychological consequences [1]. Breast reduction improves quality of life in numerous ways. A survey of 178 breast reduction patients reported that 95% of participants surveyed were pleased with the results of their reduction mammoplasty, noting improved quality of life independent of tissue mass removed [2]. Maintenance of nipple-areolar complex (NAC) sensitivity is an important consideration in reduction mammoplasties. Nipple sensation is a significant component of a woman's psychological and sexual well-being, and loss of sensation is a possible complication of surgery [3]. The components of NAC sensation that appear to be most significant to preserve are light touch and erectile function [4]. Changes in nipple sensation are primarily evaluated through patients' subjective perceptions.

Alterations to NAC sensation are affected by surgical technique. The superomedial pedicle reduction mammoplasty (SPRM) technique has gained popularity and shown consistent and easily reproducible outcomes [5]. SPRM is safe, fast, and adaptable, with aesthetically pleasing results [6]. Despite growing popularity, little recent research exists on the effect of the superomedial pedicle

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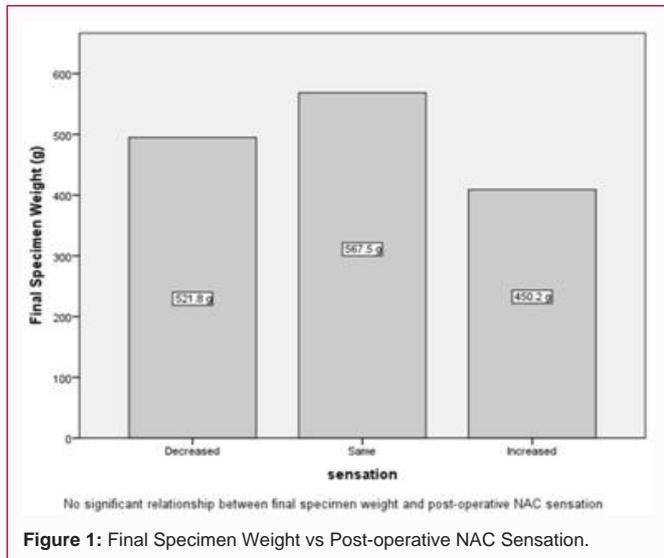


Figure 1: Final Specimen Weight vs Post-operative NAC Sensation.

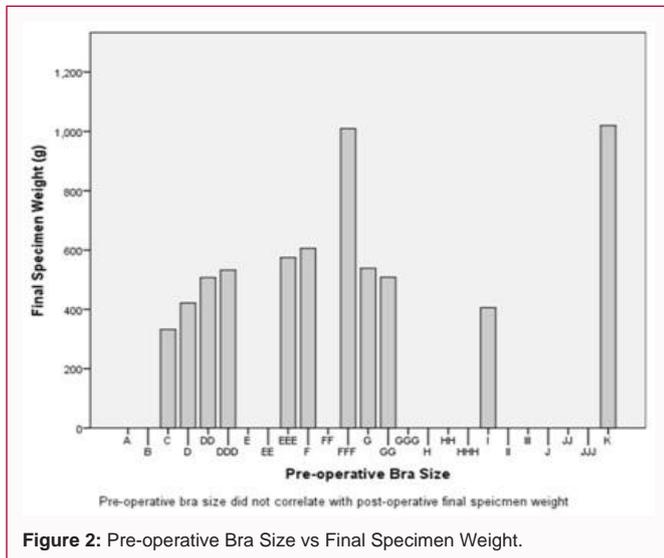


Figure 2: Pre-operative Bra Size vs Final Specimen Weight.

technique on NAC sensation. Studies that do exist show rates of unchanged nipple sensation ranging from 33% in one study to 98% in another [7,8]. In order to help fill a gap in the literature, this study will evaluate patients’ perceived nipple sensation following SPRM and evaluate whether nipple to sternal-notch (NN) measurements, pre- and post-operative bra size, and total resection volume affect this sensitivity.

Patients and Methods

A retrospective review of a prospectively maintained database of patients undergoing reduction mammoplasty at the University of Alabama, Birmingham was performed. SPRM was uniformly utilized in all patients undergoing reduction mammoplasty. The surgical procedures were performed by a single plastic surgeon⁶⁸ within an academic practice. Surgical technique was selected based on patients’ individual characteristics and surgeon preference; therefore, randomization was not a part of the study design. Exclusion criteria eliminated patients with a medical history of breast surgery, including biopsy that could have affected the sensory supply. The inclusion criteria were broadly based in order to include the wide range of breast reduction candidates, fulfilling our goal of developing sensory evidence for the expansive spectrum of breast reduction candidates.

Informed consent and photography consent forms were reviewed and approved by the Institutional Review Board, following Health Insurance Portability and Accountability Act (HIPAA) guidelines.

One hundred thirty-three patients met the initial inclusion criteria. Forty-eight patients with 96 Nipple Areolar Complexes (NAC) had complete documentation of their perceived NAC sensitivity. Pre- and post-operative NN measurements, bra sizes and specimen weights were analyzed.

Forty-eight patients completed preoperative and postoperative verbal questionnaires. Questionnaires queried reasons for seeking reduction, personal perceptions of baseline breast sensitivity and the importance of breast sensation to the patient. Questions regarding patient perceived changes in sensation of the breast and nipples after reduction mammoplasty were analyzed. Factors included in the analyses were nipple to sternal-notch distances, pre- and post-operatively reported cup sizes, patient weights, body mass indices (BMI), and reduction mammoplasty specimen weights.

Surgical Technique

The SPRM technique utilized herein has been previously illustrated [9]. Preoperative markings are placed, marking the sternal notch to nipple lines, chest midline, inframammary folds, each breast meridian, and the proposed skin resection pattern. The patient is brought to the operating room, intubated and prepared and draped in the usual sterile fashion. The *Mammostat* is placed after the breast is infiltrated with local anesthetic. Incisions are made and the dissection follows with medial superior pedicle de-epithelialization, followed by resection of breast parenchyma.

The inferior skin flaps are thinned and the pedicle/NAC are transposed superiorly and suture suspended to the pectoralis fascia [9]. The breast is then shaped through approximation of the medial and lateral vertical pillars of the breast using intraparenchymal pillar sutures and the skin is closed. Surgical skin adhesive is used on all the incisions. Patients are allowed to shower in 3 to 4 days and seen back in clinic within one week.

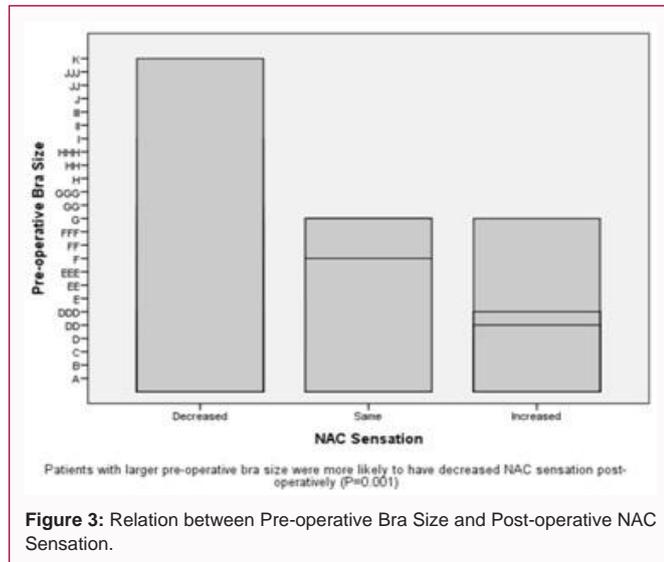
Statistical Analysis

Analyzed data included demographic information, pre- and post-operative breast measurements, patients’ perceived nipple and areolar sensation changes at one week and four weeks postoperatively, as well as presence of complications.

IBM SPSS Statistics (IBM Corporation Armonk, NY) was used to perform statistical analyses. A T-test was used to examine the relationship between surgical mammoplasty specimen mass removed and NAC sensation. Chi-squared testing was used to analyze the relationship between NAC sensation and pre-operative bra size. One-way ANOVA analysis was used to examine the relationship between pre-operative bra size and mammoplasty specimen mass.

Results

Forty-eight of 133 patients (96 NACs) that underwent SPRM during the study period qualified for the study and responded preoperative and postoperative questionnaires on their perceived nipple and areolar sensation. The mean age at the time of the reduction was 37 years of age. Thirty-six patients with 66 NACs, representing 68.7% of the study population, reported unchanged NAC sensation. Nine patients with a total of 16 NACs, representing 16.6% of the study population reported decreased NAC sensation and 7 patients



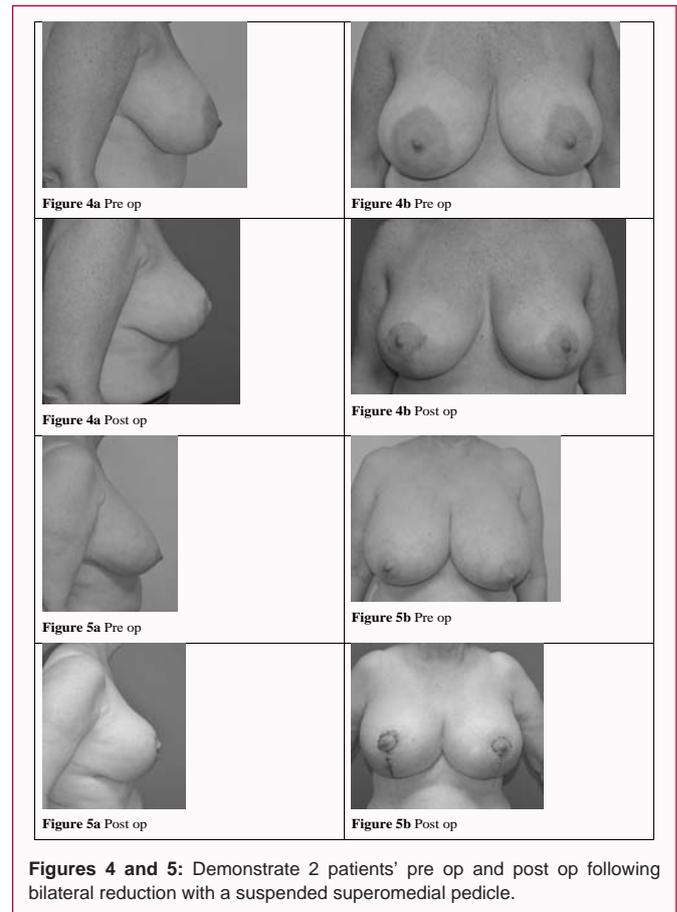
with a total of 12 NACs, representing 12.5% of the study population reported improved sensation postoperatively. Of note, even though two patients in the group of 133 had the complication of skin loss on the lower breast following infection, these patients had 100% survival of the NAC complexes. There was no loss of the NAC in this series of patients.

The average preoperative sternal notch to nipple distance (NN) in those patients who reported decreased NAC sensation was 33.82 cm. Patients with improved NAC sensation had average preoperative NN of 31 cm while those with unchanged NAC sensation had an average NN of 32.6 cm. The average weight of the mammoplasty specimen across all patients was 538.11 g (201 g to 1226 g). The average weight of the mammoplasty specimen in the patients with reported decreased NAC sensation was 521.8 g, while those patients reporting an improved NAC sensation had an average specimen weight of 450.2 g. The patients who reported unchanged NAC sensation had an average resected weight of 567.5 g. Statistical analysis showed that neither NN ($p=0.52$) nor resected specimen weight ($p=0.2$) (Figure 1) significantly influenced the postoperative patient reported NAC sensation. Preoperative cup size was similar in the three groups of reported outcomes. The mean preoperative cup size was DD and DDD, ranging from C to K. This did not directly correlate with the weight of the removed specimen (Figure 2). Analysis with Chi Squared test showed that preoperative cup size positively influenced nipple sensation ($p=0.001$) (Figure 3) while postoperative cup size ($p=0.76$) had no influence on nipple sensation. The NAC sensation was preserved or improved in 80.2% of all the study population postoperatively. The patients exhibit good breast shape and projection postoperatively. Representative patient photos are shown in Figures 4 and 5.

The average follow up of our study was 24 months after breast reduction, ranging from 1 month to 32 months. The verbal assessment of the patients perceived sensation changes was performed during the first and second postoperative visits at 1 and 4 weeks.

Discussion

The SMP reduction mammoplasty is a safe and reliable technique for the management of macromastia. It preserves the integrity of the NAC keeping a full-thickness pedicle that rotates up into position with suture suspension from the pectoralis fascia without the need



Figures 4 and 5: Demonstrate 2 patients' pre op and post op following bilateral reduction with a suspended superomedial pedicle.

for subsequent thinning. This maintains the blood supply on the dominant medially based perforator vessels of the internal thoracic artery, reducing the risk of nipple necrosis and improves venous drainage of the NAC as well. The technique also carries a limited need to undermine the skin laterally and medially for a final result of a fuller shaped breast with improved long-term projection. The vertical pillar sutures used in this technique; act as additional support to the breast.

Loss of sensation of the nipple is well-known complication of reduction mammoplasty with some reduction techniques associated with a higher incidence of NAC sensation changes than others. In 1999, when describing the medial pedicle technique, Hall-Findlay concluded that the sensation of the NAC remained unchanged and compared favorably against the inferior pedicle technique [10]. Sensation of the NAC is difficult to determine in a routine clinical setting. Several studies using the PSSD method (Sensory Management Services, LLC, Baltimore, MD), have illustrated changes in NAC sensation very elegantly [4,11,12]. However, it is our belief that the patient's subjective report is most important. Published reports concerning potential alteration of breast sensitivity after reduction mammoplasty have produced conflicting results regarding the area of the breast that was most sensitive and whether breast size influences sensation. Many of these discrepancies may be attributed to the use of the Semmes-Weinstein tool, viewed by many as crude and unreliable [11-13].

The skin overlying the breast contains specialized sensory dendrites of the dorsal root ganglion cells. Sensory stimulation is conducted toward the spinal cord via the second to sixth intercostal

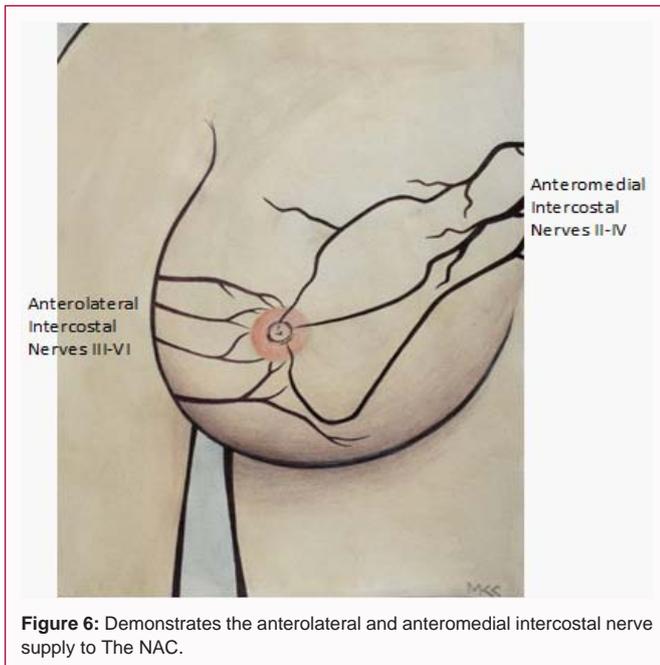


Figure 6: Demonstrates the anterolateral and anteromedial intercostal nerve supply to The NAC.

nerves. More specifically, the territory of the anterior branches of the lateral cutaneous nerves typically include the lateral breast skin while the medial branches of the anterior cutaneous nerves collect afferent messages from the skin over the medial breast territory. In addition, the medial, intermediate, and lateral branches of the supraclavicular nerves from the cervical plexus innervate the skin over the upper breast and the fourth intercostal nerve innervates the nipple-areola complex [14,15]. The deep branch of the lateral fourth intercostal nerve from the anterolateral intercostal nerve supplies the NAC and can actually be preserved with a medial pedicle [16], and there is additional nerve supply to the breast from the anteromedial intercostal nerves (Figure 6). Since the sensory nerve branches diverge away from the breast from several sources and directions, it seems reasonable to assume that the multiple surgical techniques used to perform reduction mammoplasty may alter breast skin sensation in different ways.

Using quantitative measures with the aid of the PSSD method, Spear et al. [17] reported that nipple sensitivity is uniquely conserved and returns to baseline by approximately 12 months after reduction mammoplasty, regardless of the pedicle used. This study reported that age was the only independent statistically significant factor in predicting the temporal sequence of return to baseline sensitivities and the degree of eventual NAC sensation. Patients older than 43 years of age showed a slower return to baseline. Previous reports [11,13] have theorized that middle-aged patients with hypertrophic breasts have experienced subclinical long-term trauma to the intercostal nerves perhaps due to the increased weight and increased pull by gravity which results in a chronic traction injury. Our study did not find age to be a factor that statistically influenced the change of NAC sensation in the early postoperative period.

In this academic practice, the overall breast reduction population showed a rate of preservation or improvement of the NAC sensation of 81.2% as reported by the patient during the early postoperative period. Spear also reported a discrepancy in the temporary return of NAC sensation as reported by the patient and measure by PSSD method, although they reported a final across-the-board improvement in general breast by 6 months postoperatively.

Our study found that NAC sensation, as reported by the patient, is decreased in the early postoperative period. We found that 81.2% of the patients, undergoing a SMP reduction mammoplasty have no change or experience improved sensation during the first and second postoperative visits, which in our practice are at 7 days and 4 weeks postoperatively. These findings correlate with previously published literature, which shows that sensation of the NAC slowly returns to baseline during the first 12 postoperative months in up to 98% of patients [17].

Schlenz, using the Semmes-Weinstein monofilament [18] evaluated breast sensation in 80 patients who underwent reduction mammoplasty using 5 different dermoglandular pedicle techniques [4]. This group reported that sensitivity of the NAC was significantly lower after a superior pedicle reduction than any of the other techniques. The investigators' further found that insensate nipples were only among the superior pedicle group (13%) with NAC sensation reported as unchanged or improved with the other techniques, 12 months after surgery. The authors further concluded that superior-based pedicle techniques were associated with a higher risk of injury to the nerve branches innervating the nipple-areola complex [4]. Our group has previously reported experience with SMP reduction mammoplasty for the management of gigantomastia, with a rate of preserved NAC sensation of up to 98%, on long term follow up [8]. It is our intention to continue the follow up of the currently reported cohort of patients and reevaluate their perceived sensation further along their postoperative period.

Harbo also evaluated 10 women who had reduction mammoplasty with an inferior pedicle and found breast sensation improved or unchanged 1 year after surgery [19]. Ferreira evaluated the NAC sensation in 25 patients before and 6 months after medial pedicle reduction mammoplasty and found that all 25 women had a statistically significant decrease in NAC sensation [20]. Reports continue to be conflicting on the best surgical approach to preserve NAC sensation after reduction mammoplasty; however, our study found that in the immediate postoperative period, patients that undergo SMP reduction mammoplasty have preserved and in some instances improved NAC sensation in 81.2% of the cases. The specific surgical approach has traditionally been based on the preference of the surgeon with or without patient input, breast characteristics, and concern for cosmetic appearance and placement of incisional scars. Not until recently, the outcome-based evidence concerning sensitivity and the best surgical technique for reduction mammoplasty has become an issue. SMP mammoplasty is a safe technique for all sizes of reduction, as previously showed by our group. In our experience, patients will have a preserved or improved sensation in 81.2% of the cases in the immediate postoperative period.

Studies show that most women seek reduction mammoplasty to relieve pain in the back, shoulders, and neck, a finding consistent with the literature [21,22]. Our findings correlate with those of Spear [17] who reported that, when queried nearly 1 year after their breast reduction, most patients remembered changes in NAC sensation in the immediate postoperative period which recovered with time. It is encouraging to report, that in our experience that change of sensation occurs in less than 20% of the surveyed patients undergoing SMP reduction mammoplasty. Our follow up period extended out to an average of 24 months, however postoperative NAC sensation was interrogated only in the early postoperative period, thus we are unable to provide a more extensive outlook of the longer term sensation changes.

Our study design plan included a single surgeon with a standard technique, preoperative and postoperative management which provided homogeneity in our sample size and eliminated confounding variables.

The authors acknowledge limitations of this study. Our survey method was embedded in the postoperative care of the patient as part of the routine carried by the senior author⁸⁶, with its documentation in our electronic medical record. The surveys were only performed and documented early in the postoperative course (one and four week follow up), preventing us from having a long-term assessment of NAC sensation changes after SMP reduction mammoplasty. Nevertheless, our group's previously published cohort of SMP reduction mammoplasty for gigantomastia support reports of others [13,19,23,24].

Our study was unique in evaluating the patient perceived sensation changes. Spear [17] studied the temporal recovery pattern for breast sensation following reduction mammoplasty with reproducible data using the PSSD method to quantitatively evaluate specific changes and after reduction mammoplasty. While this sort of study has great merit, we believe that the strength of our study is that it evaluates the perception of the patient and their satisfaction, in an era and a surgical subspecialty which values patient satisfaction holding it to the greatest standards. Our data suggest that NAC sensation after SMP reduction mammoplasty is decreased in the immediate postoperative period in less than 20% of the patients. Our previously published data on SMP reduction mammoplasty for the management of gigantomastia suggests that sensation returns to its baseline or improves through the postoperative course [8]. Our data further suggest that physicians must continue to strive on educating or informing patients seeking reduction mammoplasty on early postoperative changes in sensation of the NAC.

Conclusion

Patients that underwent SMP reduction mammoplasty had 81.25% preserved or improved NAC sensitivity in the early postoperative period. Preoperative NN, postoperative NN and final specimen weight did not impact NAC sensitivity changes. Larger preoperative cup size correlated with decreased postoperative NAC sensation after SPRM.

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The artist's drawing in figure 6 is by Matthew K. Collawn. Permission was obtained to use his artwork in this paper.

References

- Kalliainen LK; ASPS Health Policy Committee. ASPS clinical practice guideline summary on reduction mammoplasty. *Plast Reconstr Surg.* 2012;130(4):785-9.
- Gonzalez MA, Glickman LT, Aladegbami B, Simpson RL. Quality of life after breast reduction surgery: a 10-year retrospective analysis using the Breast Q questionnaire: does breast size matter? *Ann Plast Surg.* 2012;69(4):361-3.
- Riccio CA, Zeiderman MR, Chowdhry S, Brooks RM, Kelishadi SS, Tutela JP, et al. Plastic Surgery of the Breast: Keeping the Nipple Sensitive. *Eplasty.* 2015;15:e28.
- Schlenz I, Rigel S, Schemper M, Kuzbari R. Alteration of Nipple and Areola Sensitivity by Reduction Mammoplasty: A Prospective Comparison of Five Techniques. *Plast Reconstr Surg.* 2005;115(3):743-51.
- Spear SL, Davison SP, Ducic I. Superomedial pedicle reduction with short scar. *Semin Plast Surg.* 2004;18(3):203-10.
- Siy R, Khan K, Izaddoost S, Brown R. The Superomedial Pedicle Wise-Pattern Breast Reduction: Reproducible, Reliable, and Resilient. *Semin in Plast Surg.* 2015;29(02):94-101.
- McCulley SJ, Schaverien MV. Superior and superomedial pedicle wise-pattern reduction mammoplasty: maximizing cosmesis and minimizing complications. *Ann Plast Surg.* 2009;63(2):128-34.
- Lugo LM, Prada M, Kohanzadeh S, Mesa JM, Long JN, Torre JDL. Surgical Outcomes of Gigantomastia Breast Reduction Superomedial Pedicle Technique. *Ann Plast Surg.* 2013;70(5):533-7.
- Smithson MG, Collawn SS, Mousa MS, Bramel CM. A Formula for Planning and Predicting Postoperative Mammoplasty Results. *Ann Plast Surg.* 2017;78(6S Suppl 5):S343-46.
- Hall-Findlay EJ. A simplified vertical reduction mammoplasty: shortening the learning curve. *Plast Reconstr Surg.* 1999;104(3):748-59.
- Kuzbari R, Schlenz I. Reduction mammoplasty and sensitivity of the nipple-areola complex: sensuality versus sexuality? *Ann Plast Surg.* 2007;58(1):3-11.
- Hamdi M, Blondeel P, Van de Sijpe K, Van Landuyt K, Monstrey S. Evaluation of nipple-areola complex sensitivity after the latero-central glandular pedicle technique in breast reduction. *Br J Plast Surg.* 2003;56:360-4.
- Slezak S, Dellon AL. Quantitation of sensibility in gigantomastia and alteration following reduction mammoplasty. *Plast Reconstr Surg.* 1993;91(7):1265-9.
- Courtiss EH, Goldwyn RM. Breast sensation before and after plastic surgery. *Plast Reconstr Surg.* 1976;58(1):1-13.
- Farina MA, Newby BG, Alani HM. Innervation of the nipple-areola complex. *Plast Reconstr Surg.* 1980;66(4):497-501.
- Hall-Findlay EJ, Shestak KC. Breast Reduction. *Plast Reconstr Surg.* 2015;136(4):531e-44e.
- Spear M, Nanney L, Phillips S, Donahue R, Rogers KM, Wendel JJ, et al. The Impact of Reduction Mammoplasty on Breast Sensation. An Analysis of Multiple Techniques. *Ann Plast Surg.* 2012;68:142-9.
- Mofid MM, Dellon AL, Elias JJ, Nahabedian MY. Quantitation of breast sensibility following reduction mammoplasty: a comparison of inferior and medial pedicle techniques. *Plast Reconstr Surg.* 2002;109:2283-8.
- Harbo SO, Jørum E, Roald HE. Reduction mammoplasty: a prospective study of symptom relief and alterations of skin sensibility. *Plast Reconstr Surg.* 2003;111(1):103-10.
- Ferreira MC, Costa MP, Cunha MS, Sakae E, Fels KW. Sensibility of the breast after reduction mammoplasty. *Ann Plast Surg.* 2003;51(1):1-5.
- Chadbourne EB, Zhang S, Gordon MJ, Ro EY, Ross SD, Schnur PL, et al. Clinical outcomes in reduction mammoplasty: a systematic review and meta-analysis of published studies. *Mayo Clin Proc.* 2001;76:503-10.
- O'Blenes CA, Delbridge CL, Miller BJ, Pantelis A, Morris SF. Prospective study of outcomes after reduction mammoplasty: long-term follow-up. *Plast Reconstr Surg.* 2006;117(2):351-8.
- Santanelli F, Paolini G, Bittarelli D, Nofroni I. Computer-assisted evaluation of nipple-areola complex sensibility in macromastia and following superolateral pedicle reduction mammoplasty: a statistical analysis. *Plast Reconstr Surg.* 2007;119:1679-83.
- Nahabedian MY, Mofid MM. Viability and sensation of the nipple-areolar complex after reduction mammoplasty. *Ann Plast Surg.* 2002;49(1):24-31.