Evaluation of therapeutic reduction mammoplasty for management of intractable mastalgia in female patients with large breasts

Walid M.Abd El Maksoud[a], Wessam Z. El-Amrawy[b], Mohamed H. Sultan[c]

[a]Department of Surgery, Faculty of Medicine, King Khalid University, Abha, Saudi Arabia, Departments of [b]Anesthesia and Pain Management, [c]Experimental Surgery, Medical Research Institute, Alexandria University, Alexandria, Egypt

Correspondence to Walid M. Abd El Maksoud, MD, PhD, MRCS, Department of Surgery, Faculty of Medicine, King Khalid University, PO Box 641, Abha 61421, Saudi Arabia. Tel: +966174218500; e-mail: wabdulmksoud@kku.edu.sa

Received: 4 March 2023
Revised: 14 March 2023
Accepted: 19 March 2023
Published: 9 June 2023

The Egyptian Journal of Surgery 2023, 42:346–354

Aim
This study aimed to evaluate therapeutic reduction mammoplasty for the management of intractable mastalgia in female patients with large breasts in terms of improvement of the symptoms and patient satisfaction.
Patients and methods
This retrospective study included all female patients who had large breasts with intractable mastalgia and underwent reduction mammoplasty as the surgical management of their condition. Preoperative visual analog scale (VAS) was recorded for the mastalgia, back, and shoulder and was compared with VAS at 6 months postoperatively. Kyungpook National University Hospital Breast Reconstruction Satisfaction Questionnaire at 6 months was recorded to determine the postoperative patient satisfaction.
Results
The study included 50 female patients, with a mean age of 41.1±8.1 years. There was a significant improvement of mastalgia from the preoperative condition (mean of 6.0±1.1) compared with the condition at 6 months postoperatively (mean of 2.1 ±1.2). Furthermore, there was a significant improvement in the VAS score of both shoulder pain and back pain at 6 months postoperatively. A total of 44 (88%) patients showed satisfaction at 6 months postoperatively.
Conclusions
Reduction mammoplasty seems to be an effective procedure for the management of intractable mastalgia in patients with huge breasts. It had a significant relief of the mastalgia in addition to a significant improvement of both neck and back pain with good postoperative patient satisfaction. Smoking, use of oral contraceptive pill, high caffeine consumption, and high breast density had negative effects on postoperative patient satisfaction. Patients with these risk factors may need special preoperative counseling and abstention before surgery.

Keywords:
gigantomastia, intractable mastalgia, Kyungpook National University Hospital, reduction mammoplasty

Egyptian J Surgery 42:346–354

1110-1121

Introduction

Mastalgia is a pain in the breast tissue that affects 70–80% of women causing them to seek medical consultations throughout their lifetime [1,2]. The increased level of breast cancer awareness leads women to investigate mastalgia by examination and imaging for fear of breast cancer [3,4].

Cyclic mastalgia is the most common form in which the pain is related to the menstrual cycle. It usually occurs owing to increased water and edema of breast parenchyma in the luteal phase of the menstrual cycle with increased hormonal levels [5,6]. It occurs in younger women and usually is mild and resolves spontaneously without medications [6]. On the contrary, noncyclic mastalgia is a less common form of mastalgia that affects older women (40–50 years). It presents with sharp burning pain, is not related to the menstrual cycle, and may be unilateral and localized [7]. Premenopausal breast pain is more than in menopause due to higher estrogen levels in the premenopausal period [8]. Furthermore, mastalgia may be associated with irritability, anxiety, depression, fatigue, and other psychological conditions like posttraumatic stress disorder, panic disorders, eating disorders, chronic pelvic pain, irritable bowel syndrome, and a history of emotional abuse [9,10].

In most cases, symptoms are mild to moderate and hence usually resolve spontaneously after assurance, education, and conservative measures like diet, physical exercises, and wearing a well-fitting support bra [11–13]. Nevertheless, some patients may not respond to conservative measures and require

medical drug therapy. Oral and topical NSAIDs decrease the pain significantly without major adverse effects [14,15]. If severe pain persists, the patient may be directed to a breast specialist to prescribe endocrine or hormonal therapy including danazol and tamoxifen after discussing the benefits and the adverse effects [13,14]. Although both danazol and tamoxifen are effective in the management of mastalgia, still there are limitations to using them. The adverse effects of danazol such as menstrual irregularity, weight gain, hot flashes, and deepening of the voice may be irreversible even after its discontinuation, making it a less preferable treatment in the management of mastalgia [16]. Tamoxifen is more commonly used and is effective in reducing cyclic mastalgia in women by 71–96% pain and noncyclic mastalgia by 56%. However, it should not exceed 6-month duration [13]. In addition, it has serious adverse effects including deep venous thrombosis, osteoporosis, and endometrial cancer. Additional adverse effects include hot flashes, nausea, and weight gain [7,15].

Surgery may be the last choice for patients with intractable mastalgia who failed all medical treatments [14]. Symptoms that persist for more than 6 months without a response to medical treatment are indicated for surgery, especially for large-sized breast female patients (cup size ≥D or a bra size ≥18) [17,18]. Patients with large breasts may have additional symptoms: back, shoulder, and neck pain not responding to medical treatment after neurological consultation; dyspnea; recurrent intertrigo; and moist rash in both inframammary folds despite dermatological treatment [19].

For large-sized breast female patients with intractable mastalgia, surgical therapeutic reduction mammoplasty seems to be an appropriate treatment for both clinical problems. In the literature, there is a paucity of studies regarding the effect of reduction mammoplasty on intractable mastalgia [20,21].

Therefore, our study aimed to evaluate therapeutic reduction mammoplasty for the management of intractable mastalgia in female patients with large breasts in terms of improvement of the symptoms and patient satisfaction.

Patients and methods

This retrospective study was conducted at the Medical Research Institute, Alexandria University, Egypt, during the period from January 2017 to January 2021. It included all female patients who had large breasts (cup D and more) with intractable mastalgia and underwent reduction mammoplasty as surgical management of their condition. All patients had failed conservative, medical, and/or hormonal treatments and cognitive behavioral therapy for 6 months and were eligible for surgical management.

Exclusion criteria included patients aged less than 18 years and patients who were lost to follow-up.

The files of the patients were retrieved, and the following preoperative data were recorded: demographic data, preoperative BMI, smoking status, marital status, number of pregnancies and labors, the use of oral contraceptive pills (OCP), consumption of caffeine, having anxiety or stress, family history, recent breast trauma, period status, duration of symptoms, and preoperative visual analog scale (VAS) of the pain of mastalgia, associated back pain, and shoulder or neck pain if present. Operative data included the type of operation performed and any intraoperative or postoperative complications. Postoperative data included pain scores using VAS at 1, 3, and 6 months for the mastalgia, VAS for the back and shoulder pain at 6 months, and the patient satisfaction based on the Kyungpook National University Hospital (KNUH) Breast Reconstruction Satisfaction Questionnaire [22,23] at 6 months as per the protocol of our institution for any esthetic breast surgery. Patients were considered satisfied if their scores were more than or equal to 4.

Outcomes

Primary end points

The following were the primary end points:

(1) Detection of the effect of reduction mammoplasty on the mastalgia by comparing preoperative VAS with the postoperative VAS at 1, 3, and 6 months.
(2) Determination of the postoperative patient satisfaction based on the KNUH questionnaire at 6 months.

Secondary end point

The following was the secondary end point:

Detection of the effect of reduction mammoplasty on back pain and shoulder pain by comparing preoperative VAS with the postoperative VAS at 6 months.

Statistical analysis

Data processing was done using the Statistical Package for Social Sciences (IBM SPSS version 25; SPSS Inc.,

Chicago, Illinois, USA). Descriptive statistics were applied (frequency and percentage for categorical variables, in addition to mean and SD) for quantitative variables. The χ^2 test was used for categorized parameters, whereas for numerical data, a *t* test was used to compare two groups. A statistically significant difference was considered at *P* values less than 0.05.

Ethical approval

The study was approved by the Institutional Research Board of the Medical Research Institute, Alexandria University (IORG#0008812). The patients whose pictures were chosen for the research were communicated, and a written informed consent was taken to put their pictures in the study. All precautions were taken to conceal the identity of the patients.

Results

The study included 50 female patients who were diagnosed to have intractable mastalgia and were eligible for surgical management after the failure of all other measures to treat their condition. The age of the patients ranged from 24 to 57 years, with a mean of 41.1±8.1 years. All studied patients had large breasts (cup D 42%, cup E 44%, and cup F 14%). Only 16 (32.0%) patients were married with a mean age of marriage of 25.5±4.7 years. Approximately half of our patients (52.0%) were nonsmokers. The demographic and maternal data of the studied patient group are shown in Table 1.

Table 1 Basic demographic and maternal data of the studied patient group

Variables	*n* (%)
Age	
<45	31 (62)
>45	19 (38)
Range	24.0–57.00
Mean±SD	41.1±8.1
BMI	
Overweight	11 (22.0)
Obese	20 (40.0)
Morbid obese	19 (38.0)
Range	28.00–41.00
Mean±SD	33.5±3.3
Marital status	
Married	16 (32.0)
Single	34 (68.0)
Age at marriage	
Range	18.00–40.00
Mean±SD	25.5±4.7
Smoking	
No	26 (52.0)
Yes	16 (32.0)
Ex-smokers	8 (16.0)
Lack of exercise	29 (58.0)
Use of OCP	17 (34.0)
Number of previous pregnancies	
0	17 (34.0)
1–2	20 (40.0)
3–4	10 (20.0)
>4	3 (6.0)
Number of previous labors	
0	18 (36.0)
1–2	24 (48.0)
3–4	8 (16.0)
>4	0
Lactation	
No	24 (48.0)
Yes	26 (52.0)
If yes how many babies	
1–2	15 (30.0)
3–4	8 (16.0)
>4	3 (6.0)

OCP, oral contraceptive pill.

A total of 29 (58%) patients had cyclic mastalgia compared with 21 (42%) patients who had noncyclic mastalgia. The mastalgia was diffuse in 31 (62%) patients. More than half of our patients had anxiety and stress (60 and 66%, respectively). The duration of symptoms ranged from 8 to 42 months, with a mean of 19.04±8.86 months. Approximately 52% had a positive family history of mastalgia, 20% had recent breast trauma, and 10% were operated on for breast cancer before. The clinical data of the studied patient group are shown in Table 2.

Regarding the treatment received by our patients, all of the studied patients received analgesics. All of them received hormonal therapy in the form of tamoxifen in 76% of the patients and danazol in 24%. However, all the previous measures were not effective. All the patients were operated on by the same team of surgeons who were experts in the oncoplastic surgery procedures. The most common procedure was the inferior pedicle, which represented 64% of the performed procedures (Figs 1–4). Complications were encountered in 18% of our patients; however, they were all minor complications and were treated successfully by conservative measures. In our work, the volume of breast tissue excised from each side ranged from 1225 to 2980 g, with a mean of 1665.2±412.6 g. The treatment received by our patients is shown in Table 3.

Based on the KNUH questionnaire score, 44 (88%) patients showed satisfaction at 6 months postoperatively. On the contrary, six (12%) patients were dissatisfied. The KNUH questionnaire score

Table 2 Clinical data of the studied patients group

Variables	*n* (%)
Breast size	
Cup D	21 (42.0)
Cup E	22 (44.0)
Cup F	7 (14.0)
Duration of symptoms	
<15 months	18 (36.0)
15–20 months	14 (28.0)
>20 months	18 (36.3)
Range	8–42
Mean±SD	19.04±8.86
Anxiety	30 (60.0)
Stress	33 (66.0)
Caffeine consumption	
No	8 (16.0)
1–2	32 (64.0)
>2	10 (20.0)
Period status	
Regular period	18 (36.0)
Irregular period	18 (36.0)
Premenopausal	6 (12.0)
Menopause	8 (16.0)
Site of the pain	
Bilateral	16 (32.0)
Right	26 (52.0)
Left	8 (16.0)
Type of mastalgia	
Cyclic	29 (58.0)
Noncyclic	21 (42.0)
Radiation of mastalgia	
Diffuse	31 (62.0)
Localized	19 (38.0)
ACR breast density	
B	28 (56.0)
C	14 (28.0)
D	8 (16.0)
Positive family history	26 (52.0)
Recent breast trauma	10 (20.0)
Breast cancer	5 (10.0)
TAH±BSO	8 (16.0)

ranged from 2.38 to 4.88, with a mean of 4.1±0.5. Descriptive statistics of every KNUH item score of the studied patient group are shown in Table 4.

Regarding the mastalgia VAS score, there was a significant improvement of the mastalgia from the preoperative condition (mean of 6.0±1.1) compared with the condition at 6 months postoperatively (mean of 2.1±1.2). The improvement was noticed from the first postoperative month. Furthermore, there was a significant improvement in the VAS score of both shoulder pain and back pain 6 months postoperatively compared with the preoperative conditions (P=0.001 and 0.002, respectively). Comparison between preoperative and postoperative VAS scores of mastalgia, shoulder pain, and back pain is shown in Tables 5 and 6.

Univariate analysis revealed that smoking, the use of OCP, caffeine consumption, and more ACR breast density had a significant negative effect on postoperative patient satisfaction. Univariate analysis of different variables and the KNUH total scores for our patients is shown in Table 7.

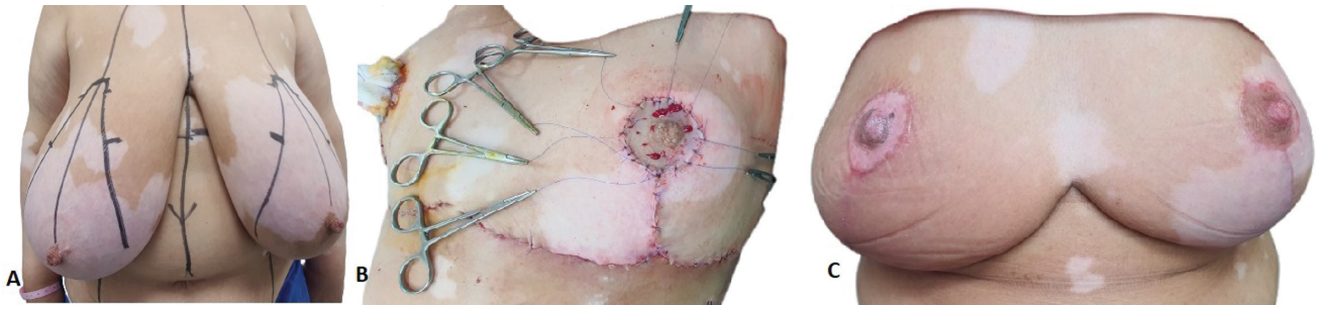
Discussion

Severe intractable mastalgia is a serious problem that may affect females throughout their lives, leading to several health problems and a bad effect on the quality of life [24]. Furthermore, if mastalgia is combined with huge breasts, other types of problems may be added such as back, neck, and shoulder pain directly due to breast weight. Large-sized breast leads to shoulder grooving marked by bra straps, intertrigo with inflamed red skin in the inframammary fold or even brown pigmented from recurrent inflammation, difficulty in finding suitable, fitting bra and clothes, difficulty in breathing in supine position, and

Figure 1

(a) Preoperative marking cup D breasts, (b) immediate postoperative view after bilateral inferior pedicle reduction mammoplasty and resection of 1700 g of each breast, and (c) 1-month postoperative view and complete wound healing.

Figure 2



(a) Preoperative marking cup F breasts, (b) immediate postoperative view after bilateral amputation mammoplasty and areola graft and resection of 2800 g of each breast, and (c) 6-month postoperative view with good uptake of the areola graft.

Figure 3

(a) Preoperative marking cup E breasts, (b) immediate postoperative view after bilateral superomedial pedicle mammoplasty and resection of 1800 g of each breast, and (c) 6-month postoperative view with good esthetic results.

Figure 4

(a) Preoperative marking cup D breasts, (b) immediate postoperative view after bilateral superior pedicle mammoplasty and resection of 1300 g of each breast, and (c) 6-month postoperative view with good esthetic results.

discomfort and pain in exercising owing to movement of heavy breasts [25,26]. Consequently, these patients lose confidence in their shape and may be subjected to depression, frustration, and emotional disturbance, especially after failed medical treatment [27]. In our study, despite the long duration of symptoms, 19.04 ±8.86 months (range, 8–42), all patients had unsuccessful trials of a variety of medical treatments in the form of analgesics, primrose oil, diet modifications, and hormonal therapy.

Breast reduction and mastectomy with simultaneous or delayed reconstruction were suggested to be the best option for the management of gigantomastia. Breast reduction usually has the advantage of being a one-step procedure with the preservation of breastfeeding [28]. Bariatric surgery could be accepted by some patients with BMI greater than 35; however, the large breast may not be related to obese females [29]. The American Society of Plastic Surgeons reported that level I evidence has shown reduction mammaplasty is

effective in treating symptomatic breast hypertrophy (gigantomastia) [30,31]. The American Society of Plastic Surgeons also excluded the volume or weight of breast tissue resection as a criterion for reduction mammaplasty. On the contrary, in the literature, there is a very limited role for surgery in the treatment of mastalgia. Aggressive surgeries were described for diffuse intractable mastalgia despite their poor functional outcomes [26,32]. In this study, surgical treatment in the form of reduction mammoplasty was offered to these patients with huge breasts having intractable mastalgia to treat both problems. Surgical management was the last opportunity for them to decrease the pain or have it completely resolved.

Several possible risk factors of mastalgia have been studied in this research The mean age of our patients was 41.1±8.1 years (range, 24–57). The age of the patients in this study matched with the results of Johnson *et al.* [9] (a series of 1219 patients), who reported that the age of women complaining of mastalgia was between 35 and 55 years. Mastalgia was found to be associated with regular caffeine consumption (84% of cases), smoking (32% of cases), and ex-smokers (16% of cases) among our patients. In the literature, although there is some controversy regarding the relationship between caffeine consumption and smoking, and mastalgia, coffee is the most often cited nutritional factor for cyclic mastalgia [11,33,34]. The relation between mastalgia and both increased caffeine consumption and smoking was proved by the work of Ader *et al.* [1] on 874 cases and Eren *et al.* [11] on 503 cases.

Increased breast density has been associated with increased mastalgia [35,36]. In our study, breast density ACR type B was the most common (56% of cases). Similar results were reported by Eren *et al.* [11] as type B was the most common type and represented 74% of cases.

Cyclic mastalgia was found in 58% of cases in our series and noncyclic mastalgia represented 42% of cases. Premenopausal mastalgia was found in 84% of cases, and postmenopausal mastalgia in 16% of cases. In the study of Kizilkaya *et al.* [37] including 1150 patients suffering from mastalgia, the rates of cyclic and noncyclic mastalgia were found to be 61.5 and 38.5%, respectively. Cyclic mastalgia was found in 73.4% of cases in the study by Eren *et al.* [11] compared with noncyclic mastalgia in 26.6% of cases. They also reported that premenopausal mastalgia was found in 82.4% of cases and postmenopausal mastalgia in 17.6% of cases. Hormonal irregularities in the form of increased estrogen levels, decreased progesterone, increased prolactin, and disturbed estrogen/progesterone ratio are associated with an increased incidence of mastalgia [36]. Estrogen level variation is responsible for the cyclic nature and symptoms of mastalgia as nodularity, lumpiness, tenderness, and cessation of these symptoms after menopause are related to decreased estrogen levels [38].

Table 3 Treatment options received by the studied group

Variables	*n* (%)
Analgesic consumption	
NSAIDs	24 (48.0)
Paracetamol	14 (28.0)
Others	12 (24.0)
Hormonal therapy	
Tamoxifen	38 (76.0)
Danazol	12 (24.0)
Type of the operation	
Superior pedicle	4 (8.0)
Inferior pedicle	32 (64.0)
Superior medial pedicle	9 (18.0)
Amputation mammoplasty	5 (10.0)
Postoperative complications	
No	41 (82.0)
Yes	9 (18.0)
Wound dehiscence	4 (8.0)
Partial areola ischemia	1 (2.0)
Hematoma	1 (2.0)
Seroma	1 (2.0)
Ecchymosis	2 (4.0)

Table 4 Descriptive statistic of each Kyungpook National University Hospital item score of the studied patient group

Items	Very unsatisfied [*n* (%)]	Unsatisfied [*n* (%)]	Neutral [*n* (%)]	Satisfied [*n* (%)]	Very satisfied [*n* (%)]
Symmetry of my breasts	0	0	4 (5.0)	28 (56.0)	18 (36.0)
Size of reconstructed breast	0	0	1 (2.0)	24 (48.0)	25 (50.0)
Shape of reconstructed breast	0	0	5 (10.0)	22 (44.0)	23 (46.0)
Feel of touch	0	1 (2.0)	6 (12.0)	31 (62.0)	12 (24.0)
Pain in my reconstructed breast	2 (4.0)	4 (8.0)	2 (4.0)	17 (34.0)	25 (50.0)
Scar of my breast	0	3 (6.0)	11 (22.0)	30 (60.0)	6 (12.0)
Self-confidence	1 (2.0)	1 (2.0)	7 (14.0)	28 (56.0)	13 (26.0)
Sexual attraction	1 (2.0)	1 (2.0)	8 (16.0)	33 (66.0)	7 (14.0)

Table 5 Comparison between preoperative and postoperative mastalgia based on visual analog scale

	Preoperative	1 month postoperative	3 months postoperative	6 months postoperative
Range	4.0–8.0	3.0–7.0	1.0–5.0	0.0–5.0
Mean±SD	6.0±1.1	4.9±1.0	2.9±1.0	2.1±1.2
P value		0.013*	0.001*	0.001*

Table 6 Comparison between preoperative and 6-month postoperative shoulder and back pain

	Preoperative	6-month postoperative	*t* test *P* value
Shoulder VAS			
Range	3.0–8.0	0.0–5.0	4.58
Mean±SD	5.3±1.3	2.3±1.1	0.001*
Back VAS			
Range	3.0–8.0	0.0–5.0	4.16
Mean±SD	5.3±1.4	2.6±1.2	0.002*

VAS, visual analog scale. *$p > 0.05$ is significant.

In our study, there was a significant improvement in mastalgia and neck and shoulder pain at 6 months postoperatively compared with the preoperative condition. This can be explained by resection of the highly dense glandular tissue, especially in the upper outer quadrant, which caused mastalgia, in most cases, with localized mastalgia found to be concentrated in the upper outer quadrant and radiating to the axilla. However, diffuse mastalgia in highly dense breasts (ACR D) seems to have lesser improvement of mastalgia, and subsequently, lesser satisfaction due to the persistence of symptoms related to residual highly dense breast tissue still causing mastalgia after reduction mammoplasty. Moreover, cases with the associated fibrocystic disease show better mastalgia improvement reduction mammoplasty owing to the resection of most tissues with fibro-adenosis and cysts. On the contrary, weight reduction of the large breasts after reduction significantly improves back, neck, and shoulder pain and ameliorates the posture of these patients. VAS score of mastalgia, shoulder pain, and back pain 6 months postoperatively significantly improved compared with the preoperative conditions (*P*=0.001, 0.001, and 0.002, respectively). Strong and Hall-Findlay [39] reported a symptomatic and greater improvement for larger resection in terms of severe mastalgia, back and shoulder pain, and poor posture. Mizgala and MacKenzie [40] confirmed a decline in complaints of severe pain from 41% to zero after the reduction mammoplasty; however, 16% of surgery patients complained of mild to moderate degree of pain after surgery. In addition, several studies revealed significant symptomatic relief of macromastia and consequently achieved the highest patient satisfaction [39,41,42].

Regarding patient postoperative satisfaction at 6 months, based on the KNUH questionnaire score, 44 (88%) patients showed satisfaction compared with six (12%) patients who showed dissatisfaction. Patient satisfaction after breast reduction in our patients was related in part to symptomatic relief of macromastia, and in another part to the esthetic outcomes of breast size, shape, and symmetry of the breasts, which consequently had a positive effect on self-confidence and stress relief. As a result, central sensitization, which lessens pain perception, may decline. Breast reduction in patients with intractable mastalgia improved their quality of life as the main purpose was breast pain relief. Furthermore, the added benefits of weight reduction improved back, neck, and shoulder pain and corrected poor posture. Lonie *et al.* [43] used BREAST-Q, with an overall satisfaction rate of 90.3%. Other studies reported satisfaction ranged from 76.0 to 95.0%, and relative rates of improved physical quality of life ranged from 48.15 to 90.61% [44–47].In our study, caffeine consumption, smoking, and use of OCPs have been directly related to patient dissatisfaction after reduction mammoplasty due persistence of the cause after surgery and the long duration of intake before surgery. The methylxanthine present in caffeine is related to increased fibrocystic disease and density of the breast due to increased catecholamine levels that activate the adenylate cyclase system. The abstention of caffeine causes relief of mastalgia [33]. Nicotine causes vasoconstriction and aggravates fibrocystic disease of the breast. OCP intake for a long duration has been significantly associated with dissatisfaction as they were not stopped after surgery [11].

Conclusion

Reduction mammoplasty seems to be an effective procedure for the management of intractable mastalgia in patients with huge breasts. It had a

Table 7 Univariate analysis of different variables and the Kyungpook National University Hospital total score

	Dissatisfied (<4) (*N*=6) [*n* (%)]	Satisfied (≥4) (*N*=44) [*n* (%)]	Test of significant	*P* value
Age (years)	42.50±5.28	40.86±8.39	*t*=0.214	0.645
BMI	33.50±3.73	33.55±3.32	*t*=0.001	0.975
Age at marriage	24.50±3.27	25.59±5.22	*t*=0.246	0.622
Marital status				
Married	2 (33.3)	14 (31.8)	χ^2=0.006	0.635
Single	4 (66.7)	30 (68.2)		
Smoking				
No	0	26 (59.1)	χ^2=9.16	0.01*
Yes	5 (83.3)	11 (25.0)		
Ex-smokers	1 (16.7)	7 (15.9)		
Use of OCP				
No	2 (33.3)	31 (70.5)	χ^2=3.24	0.039*
Yes	4 (66.7)	13 (29.5)		
Site of pain				
Bilateral	2 (33.3)	16 (36.4)		
Right	3 (50.0)	22 (50.0)	χ^2=056	0.973
Left	1 (16.7)	6 (13.6)		
Type of mastalgia				
Cyclic	3 (50.0)	26 (59.1)	χ^2=0.179	0.499
Non cyclic	3 (50.0)	18 (40.9)		
Radiation of mastalgia				
Diffuse	4 (66.7)	27 (61.4)	χ^2=0.063	0.588
Localized	2 (33.3)	17 (38.6)		
ACR breast density				
B	0)	28 (63.6)	χ^2=35.79	0.001*
C	0	14 (31.8)		
D	6 (100.0)	2 (4.5)		
Number of previous pregnancies	2.3±2.3	1.50±1.40	*t*=1.68	0.201
Number of previous labors	1.50±1.38	1.16±1.08	*t*=0496	0.485
Lactation				
No	3 (50.0)	21 (47.7)	χ^2=0.011	0.625
Yes	3 (50.0)	23 (52.3)		
Number of babies	0.83±1.07	0.8±0.90	*t*=0.19	0.825
Positive anxiety	5 (83.3)	25 (56.8)	*t*=0.381	0.217
Positive stress	4 (66.7)	29 (65.9)	*t*=1.0	0.674
Caffeine consumption				
No	1 (16.7)	7(15.9)		
1–2	2 (33.3)	30 (68.2)	χ^2=6.33	0.046*
>2	3 (50.0)	7 (15.9)		
Positive family history	4 (66.7)	22 (50.0)	χ^2=0.60	0.373
Period status				
Regular period	1 (16.7)	17 (38.6)		
Irregular period	2 (33.3)	16 (36.4)	χ^2=3.30	0.346
Premenopausal	2 (33.3)	4 (9.1)		
Menopause	1 (16.7)	7 (15.9)		
Duration of symptoms	18.00±10.26	19.18±8.79	*t*=0.092	0.763
Positive recent breast trauma	2 (33.3)	8 (18.2)	*t*=0.758	0.344
Positive breast cancer	0	5 (11.4)	χ^2=1.0	0.513
Type of the operation				
Superior pedicle	1 (16.7)	3 (6.8)	1.336	0.721
Inferior pedicle	4 (66.7)	28 (63.6)		
Superior medial pedicle	1 (16.7)	8 (18.2)		
Amputation mammoplasty	0)	5 (11.4)		

χ^2, χ^2 test; OCP, oral contraceptive pill; *t*, Student *t* test.*P* value was significant if less than or equal to 0.05.*Significant difference.

significant relief of the mastalgia in addition to a significant improvement of both neck and back pain with good postoperative patient satisfaction. Smoking, use of OCP, high caffeine consumption, and high breast density had negative effects on postoperative patient satisfaction. Patients with these risk factors may

need special preoperative counseling and abstention before surgery.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References

1 Ader D, South-Paul J, Adera T, Deuster P. Cyclical mastalgia: prevalence and associated health and behavioral factors. J Psychosomat Obstetr Gynecol 2001; 22:71–76.

2 Hocaoğlu Ç. What is mastalgia?. J Breast Health 2007; 3:2.

3 Morrow M. The evaluation of common breast problems. Am Fam Physician 2000; 61:2371.

4 Yıldırım AC, Yıldız P, Yıldız M, Kahramanca Ş, Kargıcı H. Mastalgia-cancer relationship: a prospective study. J Breast Health 2015; 11:88.

5 Barbieri RL. The endocrinology of the menstrual cycle. Methods Mol Biol. 2014; 1154:145–69. doi: 10.1007/978-1-4939-0659-8_7. PMID: 24782009

6 Smith RL, Pruthi S, Fitzpatrick LA. Evaluation and management of breast pain. Mayo Clin Proc. 2004; 79(3):353–72. doi: 10.4065/79.3.353. PMID: 15008609..

7 Salzman B, Fleegle S, Tully AS. Common breast problems. Am Fam Physician 2012; 86:343–349.

8 Prior J. Progesterone for symptomatic perimenopause treatment-progesterone politics, physiology and potential for perimenopause. Facts Views Vis Obgyn 2011; 3:109.

9 Johnson KM, Bradley KA, Bush K, Gardella C, Dobie DJ, Laya MB. Frequency of mastalgia among women veterans: Association with psychiatric conditions and unexplained pain syndromes. J Gen Intern Med 2006; 21(S3):S70–S75.

10 Kanat BH, Atmaca M, Girgin M, Ilhan YS, Bozdağ A, Özkan Z, *et al.* Effects of mastalgia in young women on quality of life, depression, and anxiety levels. Indian J Surg 2016; 78:96–99.

11 Eren T, Aslan A, Ozemir IA, Baysal H, Sagiroglu J, Ekinci O, *et al.* Factors effecting mastalgia. Breast Care 2016; 11:188–193.

12 Genç A, Çelebi MM, Çelik SU, Atman ED, Kocaay AF, Zergeroğlu AM, *et al.* The effects of exercise on mastalgia. Phys Sportsmed 2017; 45:17–21.

13 Hafiz SP, Barnes NL, Kirwan CC. Clinical management of idiopathic mastalgia: a systematic review. J Primary Health Care 2018; 10:312–323.

14 Groen J-W., Grosfeld S, Bramer WM, Ernst MF, Mullender MM. Cyclic and non-cyclic breast-pain: a systematic review on pain reduction, side effects, and quality of life for various treatments. Eur J Obstetr Gynecol Reprod Biol 2017; 219:74–93.

15 Iddon J, Dixon JM. Mastalgia. BMJ 2013; 347:f3288. doi: 10.1136/bmj.f3288. PMID: 24336097.

16 Pleasant V. Management of breast complaints and high risk lesions. Best Pract Res Clin Obstetr Gynaecol 2022; 83:46.

17 Dundas K, Atyeo J, Cox J. What is a large breast? Measuring and categorizing breast size for tangential breast radiation therapy. Australas Radiol 2007; 51:589–593.

18 Hernanz F, Fidalgo M, Muñoz P, Noriega MG, Gómez-Fleitas M. Impact of reduction mammoplasty on the quality of life of obese patients suffering from symptomatic macromastia: a descriptive cohort study. J Plast Reconstr Aesthet Surg 2016; 69:e168–e173.

19 Singh KA, Losken A. Additional benefits of reduction mammaplasty: a systematic review of the literature. Plast Reconstr Surg 2012; 129:562–570.

20 Horch R, Jaeger K, Stark G. Quality of life after breast reduction-plasty. Handchir Mikrochir Plast Chir 1999; 31:137–42.

21 Tahir MT, Shamsudeen S. Mastalgia. InStatPearls [Internet] 2021 Dec 20. StatPearls Publishing (Tampa, Florida, United States).

22 Lee JW, Kim MC, Park HY, Yang JD. Oncoplastic volume replacement techniques according to the excised volume and tumor location in small-to moderate-sized breasts. Gland Surg 2014; 3: 14.

23 Khang D, Rim H-D., Woo J. The korean version of the body image scale-reliability and validity in a sample of breast cancer patients. Psychiatry Investig 2013; 10:26.

24 Hernanz F, Santos R, Arruabarrena A, Schneider J, Fleitas MG. Treatment of symptomatic macromastia in a breast unit. World J Surg Oncol 2010; 8:1–6.

25 DeGeorge JrBR, Colen DL, Mericli AF, Drake DB. Reduction mammoplasty operative techniques for improved outcomes in the treatment of gigantomastia. Eplasty 2013; 13:PMC3807584.

26 Salgado CJ, Mardini S, Chen H-C. Mastodynia refractory to medical therapy: is there a role for mastectomy and breast reconstruction?. Plast Reconstr Surg 2005; 116:978–983.

27 Spencer L, Fary R, McKenna L, Jacques A, Lalor J, Briffa K. The relationship between breast size and aspects of health and psychological wellbeing in mature-aged women. Womens Health 2020; 16:1745506520918335.

28 Qin F, Si L, Zhang H, Zhang M, Zeng A, Long F, *et al.* Management of gestational gigantomastia with breast reconstruction after mastectomy: case report and literature review. J Int Med Res 2020; 48:030006 0520920463.

29 Resende JHC, Guimarães ALP, Perillo BA, Maluf ACM, da Costa LR, Bernardes RCG, *et al.* Obesity: Body Relief Surgeries before Bariatric Surgery for Risk Reduction. Modern Plastic Surgery, 2020; 10:31–37.

30 Kalliainen LK, Committee AHP. ASPS clinical practice guideline summary on reduction mammaplasty. Plast Reconstr Surg 2012; 130:785–789.

31 Kimia R, Magee L, Caplan HS, Low DW, Jackson OA, Butler PD. Trends in insurance coverage for adolescent reduction mammaplasty. Am J Surg 2022; 224:1068–1073.

32 Kataria K, Dhar A, Srivastava A, Kumar S, Goyal A. A systematic review of current understanding and management of mastalgia. Indian J Surg 2014; 76:217–222.

33 Chase C, Wells J, Eley S. Caffeine and breast pain: revisiting the connection. Nurs Women's Health 2011; 15:286–294.

34 İdiz C, Çakır C, Ulusoy Aİ, İdiz UO. The role of nutrition in women with benign cyclic mastalgia: a case-control study. Eur J Breast Health 2018; 14:156.

35 Kumar S, Rai R, Agarwal G, Dwivedi V, Kumar S, Das V. A randomized, double-blind, placebo-controlled trial of ormeloxifene in breast pain and nodularity. Natl Med J India 2013; 26:69–74.

36 Tejwani PL, Srivastava A, Nerkar H, Dhar A, Hari S, Thulkar S, *et al.* Centchroman regresses mastalgia: a randomized comparison with danazol. Indian J Surg 2011; 73:199–205.

37 Kızılkaya MC, Erözgen F, Kocakuşak A, Tatar C, Akıncı M, Tüzün S, *et al.* Mastalgia in daily practice. J Breast Health 2013; 9:4.

38 Carranza-Lira S, Garduno-Hernandez M, Caisapanta D, Aparicio H. Evaluation of mastodynia in postmenopausal women taking hormone therapy. Int J Gynecol Obstetr 2005; 89:158–159.

39 Strong B, Hall-Findlay EJ. How does volume of resection relate to symptom relief for reduction mammaplasty patients?. Ann Plast Surg 2015; 75:376–382.

40 Mizgala CL, MacKenzie K. Breast reduction outcome study. Ann Plast Surg 2000; 44:125–133. discussion 33.

41 Ahmad J, McIsaac SM, Lista F. Does knowledge of the initial technique affect outcomes after repeated breast reduction?. Plast Reconstr Surg 2012; 129:11–18.

42 Mistry RM, MacLennan SE, Hall-Findlay EJ. Principles of breast re-reduction: a reappraisal. Plast Reconstr Surg 2017; 139:1313–1322.

43 Lonie S, Sachs R, Shen A, Hunter-Smith DJ, Rozen WM, Seifman M. A systematic review of patient reported outcome measures for women with macromastia who have undergone breast reduction surgery. Gland Surg 2019; 8:431.

44 Cabral IV, da Silva Garcia E, Sobrinho RN, Pinto NLL, Juliano Y, Veiga-Filho J, *et al.* Use of the BREAST-Q^{TM} survey in the prospective evaluation of reduction mammaplasty outcomes. Aesthetic Plast Surg 2018; 42:388–395.

45 Cogliandro A, Barone M, Cassotta G, Tenna S, Cagli B, Persichetti P. Patient satisfaction and clinical outcomes following 414 breast reductions: application of BREAST-Q. Aesthetic Plast Surg 2017; 41:245–249.

46 Derby BM, Grotting JC, Redden DT. Vertical sculpted pillar reduction mammaplasty in 317 patients: technique, complications, and BREAST-Q outcomes. Aesthet Surg J 2016; 36:417–430.

47 Menéndez-Cardo A, Guillen-Grima F, Hontanilla B. Analysis of satisfaction after breast reduction comparing vertical scar versus inverted T-shaped technique using the Breast-Q questionnaire. Is patient satisfaction influenced by the amount of tissue removed?. J Plast Surg Hand Surg 2017; 51:414–419.