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Correction of tuberous breast with small volume asymmetry by using a new adjustable implant

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Abstract. – BACKGROUND: The tuberous breast syndrome is a rare anomaly of breast shape, which can be associated to volume breast asymmetry. We report our caseload in the correction of tuberous breasts with small volume asymmetry by using the Muti's technique associated to the implantation of a new adjustable implant.

AIM: Purpose of the study is to evaluate the efficacy of treating tuberous breast deformity with two different types of implants (a textured round high profile cohesive I implant in the larger breast and a Spectra™ implant in the smaller breast).

PATIENTS AND METHODS: Since May 2008, patients affected by tuberous breast combined to small breast volume asymmetry were enrolled in a prospective study. After gland deformity correction, the adjustable implant was positioned in the smaller breast. A textured round implant was positioned in the contralateral breast. Standard pictures were taken before surgery and during follow-up visits over one year. A visual analogue scale (VAS) scale was used to evaluate patients' and external physicians' judgment. Standardized objective measurements of breast and chest were also taken. Statistical significance of any value variation was assessed with the Wilconxon's rank sum test.

RESULTS: Eleven patients were treated with the proposed surgical approach. VAS scores from patients and external physicians were high. Deformity correction was obtained in all patients as evidenced by the significant modifications of objective measurements. No major late complications occurred.

CONCLUSIONS: The new adjustable implant provides a reliable corrective option for hypoplastic tuberous breasts with small volume asymmetry. This device allows intra-operative modification of implant volume according to breast volume discrepancy. Although our findings are satisfying, a longer follow-up is required to evaluate long term results.

Key Words:
Tuberous breast, Implant selection, Adjustable implant.

Introduction

The tuberous breast syndrome is a rare anomaly of breast shape presenting at the age of mammary development. This deformity was first described in 1976 by Rees and Aston[1]. Characteristics of tuberous breast are an enlarged areola, minimal breast tissue, sagging, higher than normal breast fold, and narrow base at chest fold; all features have a wide spectrum of expression.

According to the refined version of the classification described by Von Heimburg[2,3], tuberous breast is classified into four type: type I – hypoplasia of the lower medial quadrant of the breast; type II – hypoplasia of the lower medial and lateral quadrants of the breast; type III – hypoplasia of the lower medial and lateral quadrants, deficiency of skin in the subareolar region; type IV – severe breast constriction, minimal breast base.

Early presentation of signs may be observed in pre-pubertal and pubertal age when hormonal factors stimulate the gland and the entire breast growth, with the anterior projection of the nipple-areola complex and the peripheral expansion of the breast base[3].

The deformity is a source of profound psychological concern, thus leading to the necessity of surgical correction to improve the aesthetic appearance. If the tuberous breast deformity is associated to an evident volume asymmetry, surgical correction would involve additional risks.

Generally, the left tuberous breast is wider and more ptotic than the right one, without any areola or nipple difference, so that a certain grade of breast asymmetry is more common than the ones commonly diagnosed[1]. Several Authors proposed different surgical procedures for the management of tuberous breast asymmetry, even by using dif-

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ferent technique on each breast[4,5-9], but no definitive solution is defined, especially in cases of minor volume difference.

In these cases, when the initial asymmetry is minimal, it is indeed more difficult to obtain a good and stable correction[8,9]. Even if a great number of classifications and related surgical strategies are available[10], the simple small volume breast asymmetry has not still earned the right of a clinical interest because of the small entity of the defect on one side and the extreme difficulty to obtain a good aesthetical result for both the surgeon and the patient on the other side.

Recently, an intra-operative volume adjustable breast implant was introduced, named Spectra™ (Mentor Corporation, Santa Barbara, CA, USA). It consists of a round textured implant with an outer chamber filled with cohesive I silicone gel and an inner chamber filled intra-operatively with variable amount of saline solution.

In a prospective open label study, we assessed the effectiveness of the correction of tuberous breasts with small volume asymmetry by using the Muti's[11] technique associated to the implantation of this new adjustable implant on the smaller breast and a fixed volume implant on the contralateral breast.

Patients and Methods

Since May 2008, patients affected by tuberous breast with small volume asymmetry that were observed in our Institution, were informed about the indications to surgical correction and the possible complications. Before enrollment into the present study, patients signed a proper consent form. In relation to age and quality of mammary tissue, each patient was subjected to mammary ultrasound assessment and mammography. Every patient was given a form to identify the relational and psychological hardships that the condition could cause in daily life.

Then, patients underwent a two-step surgery. Firstly, the gland deformity was corrected with the Muti's technique.[11] Under general anaesthesia, disepithelialization of both periareolar and inferior pole was performed according to preoperative markings. Subsequently a glandular flap was overturned on lower pole of the gland as a finger flexes on its proximal join. Normal dimension of the breast base was restored. A careful haemostasis was performed[12].

With respect to volume adjustment, the second surgical step was characterized by a bilateral augmentation mammaplasty with prosthesis. Implant pocket was sub-muscular in seven cases and sub-glandular in four cases. Crucial point of this technique was that two different types of implant were positioned. In the larger breast a textured round high profile cohesive I implant (Mentor Corporation, Santa Barbara, CA, USA) was positioned in 9 cases, while a moderate plus profile cohesive I implant (Mentor Corporation, Santa Barbara, CA, USA) was used in the other 2 cases. A mastopexy was performed when it was necessary.

A Spectra™ implant (Mentor Corporation, Santa Barbara, CA, USA) with the same diameter of the fixed volume implant was positioned in the smaller breast. This adjustable implant has a textured surface; it consists in an external lumen with low-bleed, filled with cohesive I silicone gel and an inner chamber filled intra-operatively via the fill tube with saline. Once filled to the desired volume, the fill tube is removed, and the prosthesis remains in position as a breast implant. Its purpose is to provide volume flexibility and projection adjustability.

Follow-up visits were scheduled 1, 4 and 12 months after surgery. At follow-up end, a new form, designed to examine progress over time in psychological disorders, was given to patients to highlight the eventual self-agreement reached. Breast appearance was also subjectively evaluated by patients themselves one year after surgery with a Visual Analogue Scale (VAS) giving a score from 1 to 10 (1 = none correction of breast asymmetry, 10 = no residual difference between breasts). Also, the achievement of breast symmetry was evaluated by an external panel of physicians one years after surgery with the same VAS scale, comparing pre-op and post-op pictures.

The presence of capsular contracture was assessed during follow-up using Baker classification[13,14] and measuring the mammary compliance scores with the Anton Paar Mammacompliance system[15-16].

Before surgery and at each follow-up visit, jugular to nipple, hemiclavear to nipple, sternum to nipple, mid-armpit to nipple and submammary fold to nipple distances were taken. Also, breast bases were measured and digital photographic documentation taken focusing on minimal volume difference between each breast. Value differences between breasts were calculated in each

patient in order to evaluate symmetry achievement. Also, before surgery and at each follow-up visit, patients' chest circumferences were measured at the nipple level (NL) and at the inframammary fold (IF), with the lungs both full and empty of air. These measurements were used to detect any change in the size of the prostheses themselves over time.

Statistical Analysis

Objective value modifications over time were statistically analysed by using the Wilcoxon's matched pairs signed rank sum test. Statistical significance was set at $p < 0.05$.

Results

Eleven patients were enrolled in the study; the age ranged between 18 and 36 years (average: 27 years).

Gel volume of adjustable implants ranged between 260 and 355 ml, 15 to 25 ml smaller of the contralateral fixed volume prosthesis. The saline load ranged from 35 to 60 ml to reach symmetry.

The timing of post-surgical hospitalization was between 1 and 3 days (average of 1.65). The drains were removed 2-5 days after surgery (average: 3.55). A seroma occurred in one patient, but its immediate conservative evacuation and breast compressive dressing prevented its reformation. The complication didn't interfere negatively on achieving final breast symmetry. No major late complications occurred during the 1 year follow-up.

The patient form did not evidenced any modification in the psychological status of patients that remained stable. According to the VAS scale, patient satisfaction was high in all cases (score between 8 and 10, Figures 1 and 2).

Breast symmetry evaluation by the external panel of physicians gave high results in 9 cases (score between 8 and 10) and moderate improvement in 2 cases (score between 5 and 7).

No significant capsular contracture was detected, and the presence of two different implants did not result in any difference between the two breasts concerning implant softness and stability (Table I).

The mean values and standard deviations of the patient's chest circumferences are summarized in Table II; the mean values and standard deviations of the difference in the breast measurements obtained are summarized in Table III.

Both implants maintained the initial volume. This was proved by the not statistical modification of breast circumference at the NAC level from 4 months to 12 months after surgery (Table II).

Satisfactory breast asymmetry correction was confirmed by the not statistical significance of the differences in the breast measurements among follow up visits after surgery over one year (Table III).

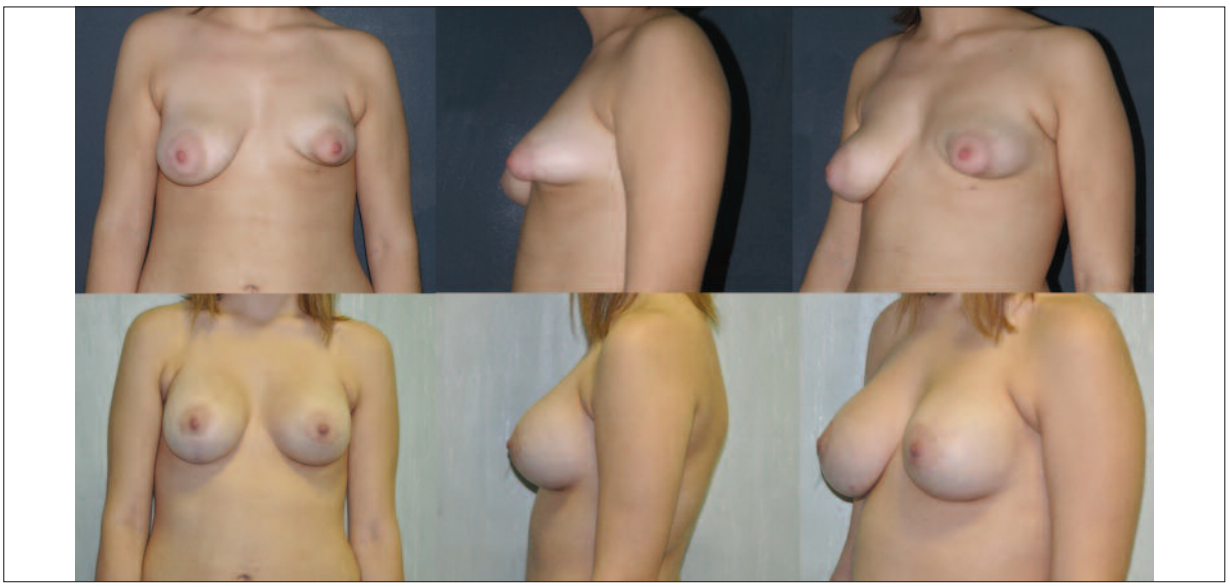

Figure 1. Above - Frontal, lateral and oblique views before tuberous breast deformity correction in case 1. Below - Frontal, lateral and oblique views of the same patient one year after surgery.

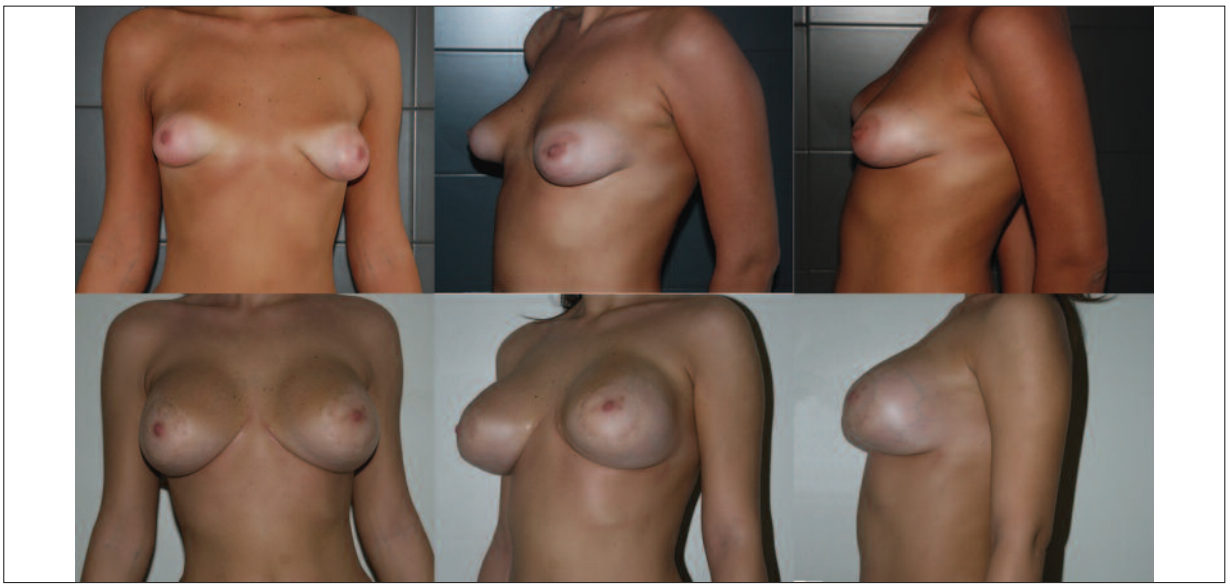

Figure 2. Above - Frontal, lateral and oblique views before tuberous breast deformity correction in case 2. Below - Frontal, lateral and oblique views of the same patient one year after surgery.

Discussion

The prevalence of tuberous breast deformity is not firmly established. DeLuca-Pytell et al[17] reported a prevalence of 73% in a retrospective analysis of 375 patients presented for mammoplasty. Zambakos et al[18] suggested that the actual percentage of tuberous breast is unknown and it is much lower (3%) than the one reported in DeLuca-Pytell's study[17]. Asymmetry in tuberous breast deformity is almost constantly present, but it usually shows up in a minor form. Minor forms of volume breast asymmetry are extremely difficult to be corrected and the final aesthetic result may be not satisfactory[8]. The presented surgical strategy proved to be effective to address the problem of small volume breast asymmetry in this type of condition.

The surgical technique used was quite standardized because of its common use in tuberous breast augmentation[11-19]. The periareolar access was used; mobilization was achieved by the preparation of gland flaps whose shape and amplitude varied in accordance to the initial anatomical situation[11]. Once the deformity was corrected and implant pockets created according to the residual soft-tissue in the upper pole, two different prostheses, having the same diameter but different volume and projection, were positioned. The difference in breast volume was easily corrected during surgery by changing the volume of the expandable prosthesis. The surgeon could gently and safely increase the volume of the adjustable prosthesis to achieve final symmetry.

The presented surgical strategy showed undoubted advantages. Specifically, the insertion of an implant in each breast leads to a similar aging effect, maintaining the same degree of ptosis over time. Furthermore, the envelope of the adjustable implant is identical to the one of the fixed volume prosthesis, explaining the same effect in capsular contracture development.

In the first year of follow up, the resistance of the housing and the efficiency of the valve for the adjustable implant remained unchanged. As an inevitable consequence, this device with a variable volume capability requires clinical trials with longer follow-up in order to evaluate the durability of the valve over time. However, as the saline inner chamber of the adjustable implant represents 15% of the entire implant volume, volume losses may be minimal compared to Becker's prostheses in which the inner saline chamber represent 65% of the total volume[3-21].

We believe that the final patient form, the VAS scores and the objective measurements are satisfying, supporting the good results obtained with this surgical strategy. To date, we observed that the use of the adjustable implant proved to be effective, free from any specific risks and complications, and with good aesthetic results.

Table I. Mammary compliance values and capsular contracture grade, as determined according to Baker's method of palpation.

	Spectra™ implant						Round implant					
	1 month		4 months		12 months		1 month		4 months		12 months	
	Compliance	Baker	Compliance	Baker	Compliance	Baker	Compliance	Baker	Compliance	Baker	Compliance	Baker
1	44.9	I	31.6	I	36.4	I	44.6	I	38.5	I	36.8	I
2	44.3	I	36.3	I	40.8	I	43.6	I	37.6	I	40.3	I
3	44.4	II	42.5	I	42.7	I	40.9	I	30.2	I	30.9I	
4	57.9	III	50.2	II	50.3	III	62.3	III	61.9	III	60.9	III
5	51.3	II	43.7	I	44.7	I	48.1	II	42.6	II	43.9	II
6	44.1	I	38.8	I	41.2	I	41.2	I	33.9	I	38.8	I
7	45.0	I	38.9	I	38.2	I	40.1	I	32.8	I	37.0	I
8	52.1	II	46.7	II	48.1	II	51.7	II	42.9	I	43.2	I
9	44.1	I	39.7	I	40.2	I	51.9	II	52.9	III	48.2	III
10	52.4	II	43.6	I	43.3	I	50.9	II	44.1	II	44.1	II
11	52.1	II	45.4	II	46.9	II	42.4	II	41.3	II	41.7	II
MEAN		48.41		41.58		42.98		47.06		41.70		42.34

Table II. Mean values, standard deviations and statistical significance of the patients' chest circumferences.

	Nipple-areola complex		Inframammary fold	
	Maximum inspiration M ± SD	Maximum expiration M ± SD	Maximum inspiration M ± SD	Maximum expiration M ± SD
Preop (T0)	84.42 ± 2.002	80.57 ± 1.587	77.76 ± 1.553	72.03 ± 1.866
1 month after surgery (T1)	92.11 ± 2.075	88.45 ± 1.720	78.10 ± 1.577	72.14 ± 1.927
4 months after surgery (T2)	91.66 ± 2,055	88.01 ± 1.738	77.72 ± 1.553	71,79 ± 1.921
1 year after surgery (T3)	91.70 ± 2.068	88.00 ± 1.732	77.78 ± 1.515	72.01 ± 1.93
Wilcoxon test	**Maximum inspiration *p*-value**	**Maximum expiration *p*-value**	**Maximum inspiration *p*-value**	**Maximum expiration *p*-value**
Preop (T0) - 1 month after (T1)	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Preop (T0) - 4 months after (T2)	< 0.0001	< 0.0001	> 0.05	> 0.05
Preop (T0) -1 year after (T3)	< 0.0001	< 0.0001	> 0.05	> 0.05
1 month after (T1)- 4 months after (T2)	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1 month after (T1) -1 year after (T3)	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4 months after (T2) -1 year after (T3)	> 0.05	> 0.05	> 0.05	> 0.05

M: mean; SD: standard deviation; *p*: probability.

Table III. Mean values, standard deviations and statistical significance of the difference in the breast measurements.

	Nipple-jugular M ± SD	Mid-clavicular to nipple M ± SD	Sternum to nipple M ± SD	Mid-armpit to nipple M ± SD	Inframammary fold to nipple M ± SD
Preop (T0)	0.858 ± 0.3773	1.091 ± 0.372	0.658 ± 0.3174	0.433 ± 0.2494	1.003 ± 0.8055
1 month after surgery (T1)	0.041 ± 0.0493	0.083 ± 0.068	0.058 ± 0.0640	0.075 ± 0.092	0.141 ± 0.1255
4 months after surgery (T2)	0.050 ± 0.050	0.108 ± 0.086	0.0750 ± 0.0721	0.091 ± 0.095	0.150 ± 0.1384
1 year after surgery (T3)	0.058 ± 0.064	0.116 ± 0.089	0.0666 ± 0.0745	0.091 ± 0.1114	0.150 ± 0.1258
Wilcoxon test	**Nipple-jugular *p*-value**	**Mid-clavicular to nipple *p*-value**	**Sternum to nipple *p*-value**	**Mid-armpit to nipple *p*-value**	**Inframammary fold to nipple *p*-value**
Preop (T0) - 1 month after (T1)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Preop (T0) - 4 months after (T2)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Preop (T0) -1 year after (T3)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1 month after (T1)- 4 months after (T2)	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05
1 month after (T1) -1 year after (T3)	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05
4 months after (T2) -1 year after (T3)	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05

M: mean; SD: standard deviation; *p*: probability.

Conclusions

Our study showed the efficacy, the reproducibility and the ease of the surgical strategy proposed to correct tuberous breast with small volume breast asymmetry. The main advantage of the Spectra implant is the possibility to finely adjust prosthesis volume intra-operatively to balance breast size, with all the benefits and product quality of gel implants. Because almost all the patients affected by tuberous breast deformity presents a simultaneous asymmetry, the use of this adjustable implant could gain more users if the benefits will be sustained by wider experience. However, initial volume maintenance over time needs to be confirmed by a longer follow-up and further studies.

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