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Aesthetic Plastic Surgery

Surgical Reconstruction of Tuberous Breasts

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Abstract.
Background: Tuberous breast deformity is a rare entity affecting young women bilaterally or unilaterally. It requires surgical correction, depending on the severity of the clinical expression, because of its aesthetic appearance. Since the presentation of the malformation by Rees and Aston in 1976, many surgical procedures have been developed, but the deformity still is one of the most challenging congenital breast anomalies.
Methods: Between September 1999 and September 2005, eight patients with tuberous breast deformity underwent surgery in our department. A two-stage approach was used to manage 14 tuberous breasts. We used a combination of anatomic textured tissue expanders with magnetic injection sites and silicone gel implants. Other reconstructive procedures such as mastopexy, breast reduction, and areolar reduction can be considered.
Results: Our long-term results, with a maximum follow-up of 6 years, were satisfying. They have been uniformly good and compare favorably with those presented in the literature when the use of other methods.
Conclusion: This two-stage approach is a relatively simple, safe, and technically easy procedure that is easy to learn. The results achieved with this approach seem to be reliable and gratifying.

Key words: Surgical reconstruction—Tuberous breasts

Tuberous breast deformity is a rare unilateral or bilateral breast malformation, presenting at the age of mammary development [2,29]. First described in 1976 by Rees and Aston [23], the etiology is not known. The breast is located between the third and the fifth rib spaces and appears ptotic. In its full expression, the deformity is characterized by a small breast, a cylindrical rather than a conic shape, a relatively reduced base circumference both on the vertical and horizontal axes, a constricting ring that herniates the nipple–areola complex, areolar hypertrophy, hypoplasia of the lower mammary quadrants, and a submammary fold situated too high. The tuberous breast appears similar to Snoopy's snout (snoopy syndrome) [2,7,9,11,18,19,21,23,27–29,32]. On the basis of the classification by Von Heimburg et al. in 1996 [32], tuberous breast syndrome is categorized as type 1 (hypoplasia of the lower medial quadrant), type 2 (hypoplasia of the lower medial and lateral quadrants with sufficient skin in the subareolar region), type 3 (hypoplasia of the lower medial and lateral quadrants with deficiency of skin in the subareolar region), (or type 4 severe breast constriction with minimal breast base) (Table 1).

This deformity produces much psychological morbidity and presents a surgical challenge for the plastic surgeons. Rees and Aston [23], Williams [34], Vecchione [30], Bass [5], Teimourian and Adham [28], Dinner and Dowden [9], Elliot [10], Reynaud et al. [24], Azzolini and Parodi [4], Auclair and Mitz [3], Muti [20], Mandrekas et al. [16], Maillard [15], Puckett and Concannon [22], and Ribeiro et al. [26] are some of the authors who have described several techniques for the reconstruction of this deformity. Some authors have used periareolar mastopexy associated with the use of a mammary implant. Others have used skin expanders [14,27,29,31] and still others have to rearrange the inferior pole of the breast, using glandular plasty, cutaneous flaps, or z plasty [1,8,9,12,20,22,26].

We report a series of 14 tuberous breasts treated and followed up in the Plastic Surgery Department of Iasso Hospital from September 1999 to September 2005. The tuberous breasts were reconstructed with a two-stage approach using a combination of anatomic textured tissue expanders with a magnetic-injection site and silicone gel implants.

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Table 1. Classification of tuberous breasts

Tuberous breast deformities	
Breast base anomaly type	Mammary quadrant affected
1	Hypoplasia of lower medial quadrant
2	Hypoplasia of lower medial and lateral quadrants, sufficient skin in the subareolar region
3	Hypoplasia of the lower medial and lateral quadrants, deficiency of skin in the subareolar region
4	Severe breast constriction, minimal breast base

This report aims to present our approach to achieving a total correction of the deformity without leaving any additional scar or any reminder of its former presence, while at in the same time preserving the lactiferous ducts. We keep in mind the desires of our patient population. Women in Greece prefer large breasts, so additional volume usually is required. With our approach, the fibrotic ring at the base of the breast is loosened, allowing a widening of the base of the breast, especially in the case of severe deformities for which other techniques are difficult to perform and results may not be satisfactory. Our technique allows for an increase in local tissues. Progressively, the skin is spread and the inferior pedicle is stretched, thus resolving the ptosis. It lowers the inframammary fold and prevents the double crease deformity. Additional scars are avoided, and lactiferous ducts are preserved. The filling valve does not need to be removed under local anesthesia.

This approach is effective for achieving augmentation of breast volume, especially in the case moderate and severe deformities (types 3 and 4). It is a relatively simple, safe, and technically easy procedure that is easy to learn. This is important for plastic surgeon when he is asked to solve a rare problem.

Materials and Methods

The records of eight patients with 14 tuberous breast deformities treated in the Plastic Surgery Department at IASSO Hospital between September 1999 and September 2005 were reviewed. The tuberous breasts were classified from preoperative evaluation and preoperative photographs by the authors. Six patients had bilateral deformities (75%), and two patients (25%) had unilateral deformities (Table 2). Their mean age was 18.6 years, (range, 17–23 years). Of the 14 treated breasts, 1 was type 1 (7.1%), 7 were type 2, (50%), 5 were considered type 3 (35%), and 1 was considered type 4 (7.1%). Asymmetry was present in all the patients (100%). Areolar prolapse was noted in 11 tuberous breasts (78.5%)(Table 3). There were no other anomalies present, and no family history of breast malformation was recorded. We used a two-stage approach combining anatomic textured tissue expanders with magnetic-injection sites and silicone gel implants.

Table 2. Presentation of deformities

Presentation	No. of patients
Unilateral	2
Bilateral	6
Total	8

In the first stage, with the patient under general anesthesia, the breast was infiltrated with 100 to 150 ml of xylocaine-adrenalin-saline solution. This aids hemostasis and ease of dissection. Through a periareolar incision, we made a full-thickness incision through the skin, the subcutaneous tissue, and the breast. We performed an incision through the pectoralis major muscle (PMM), aligning the intramuscular incision with the oblique fibers of the muscle, Dissection proceeded in the plane between the PMM and the chest wall. The PMM was dissected from the serratuss-rectus fascia, and the pectoralis minor muscle was encountered superiorly. The plane was developed between the PMM and pectoralis minor muscle so that the expander could be sited above the pectoralis minor muscle. The size of the pocket had to be significantly larger than the expander to be inserted. This entailed superior dissection to within several centimeters of the clavicle, medial dissection to the lateral border of the sternum, and lateral dissection to within several centimeters of the latissimus dorsi muscle. The pocket was created with the aid of a cautery and fiberoptic retractor. Meticulous hemostasis is vital to a successful outcome. We introduced the anatomic textured tissue expander with magnetic injection site, usually with a capacity of 500 ml, into the retromuscular pocket.

We sutured the PMM incision with sutures of Vicryl 3-0. The periareolar incision was sutured in layers with two or three deep subcutaneous sutures of Vicryl 3-0, and with interrupted U sutures of nylon 4-0. These sutures pass only through the dermis of the skin, thus avoiding suture marks in the skin. Inflation begins intra operatively and continues after healing at a weekly rate until the desired volume is exceeded. Overexpansion is a critical step. The expander is left

Table 3. Patient classification and breast pathology

Patient		Breast pathology					Implants	
Case	Age (yrs)	Left (type)	Right (type)	Asymmetry	Areolar prolapse left	Areolar prolapse right	Left (ml)	Right (ml)
1	18	2	2	Yes	No	No	265	265
2	17	4	2	Yes	Yes	Yes	335	265
3	23	3	1	Yes	Yes	No	295	200
4	19	3	4	Yes	Yes	Yes	295	335
5	20	3	2	Yes	Yes	Yes	295	265
6	18	Ptosis	2	Yes	No	Yes	Mastopexy	265
7	17	2	2	Yes	Yes	Yes	295	295
8	17	3	3	Yes	Yes	Yes	265	295

overexpanded for about 3 months. After a period of 6 months, depending on the expansion rate, reconstruction is completed at a second stage.

In the second stage via the same periareolar incision, with the aid of blunt retractors, the expander is exchanged for a silicone gel implant. After removal of the expander, a capsulotomy may be performed if judged to be necessary. We do not draw any reference lines preoperatively, neither in the first stage nor in the second stage. Some combination of dissection, internal suturing, and creation of a new fold may be necessary. The new inframammary fold is traced with reference to the contralateral fold (in unilateral lesions) to the width of the programmed implant or with the sixth rib used as a landmark.

Intraoperatively, local examination, with the patient in a half seated position, is essential for selecting the position of the new inframammary fold. In unilateral cases, projection of the contralateral breast is also helpful. The width of the submuscular pocket intended for placement of the prosthesis is designed in accordance with its volume and always oversized. To achieve a correct and aesthetically valid mammary outline, the pectoral muscle is widely dissected from the thoracic cage along any direction. Part of the sternal and all of the costal insertions are divided. A 3-cm incision is then made along the free margin of the muscle perpendicular to its fibers to reduce the compression on the inferior pole of the prosthesis and enhance the "drop" shape of the breast. The surgeon, with his or her finger in the pocket, should be certain that the pocket is generous, and that the implant is seated properly. If the pocket is tight, further dissection should be performed.

The choice of the final prosthesis, preferably a round, cohesive, silicone gel-textured option, is critical to obtain the correct volume. The decision concerning the size of the breast implant usually is discussed with the patient at the preoperative consultation. An areolar reduction was performed if a nipple-areola complex herniation was present. Other reconstructive procedures such as mastopexy and breast reduction can be performed. At the end, a stiff plaster corset was placed and kept in position by elastic banding for 5 days.

Results

All the patients were treated with our two-stage approach (Figs. 1–4). All the patients underwent a weekly follow-up assessment for the first 35 days, after which they were assessed at 3 months, 6 months, and 1 year, then successively each year thereafter. The maximum follow-up period was 6 years. We evaluated the shape, volume, symmetry, quality, size of the scars obtained, areola size, double-bubble deformity, and mammary projection. The surgical team assessed these criteria (Table 4).

We also assessed subjective criteria such as satisfaction (if the patient was satisfied from the resulting breast) and psychological impact from correction of the deformity (whether the psychological impact of the correction was positive and whether any increase in self-esteem or any progressive normalization of social activities occurred) (Table 5). These parameters were scored by the patients. Responses were scaled as 0 (poor) 1 (sufficient) 2 (good) and 3 (very good) for each of the parameters mentioned.

There were no complications in this series of eight patients, All the cases had very good overall results with a high grade of satisfaction by the patients. The resulting breasts had a natural shape, a volume matching the contralateral breast, correct symmetry and barely visible scars, a norma1-sized areola, no evidence of the "double-bubble" deformity, good mammary projection, and resolved ptosis (Table 4). Regarding the psychological impact from correction of the deformity, all the patients stated that an increase in their self-confidence and a real improvement in their social lives took place (Table 5).

Discussion

With the development of many successful techniques in both reconstructive and aesthetic breast surgery,

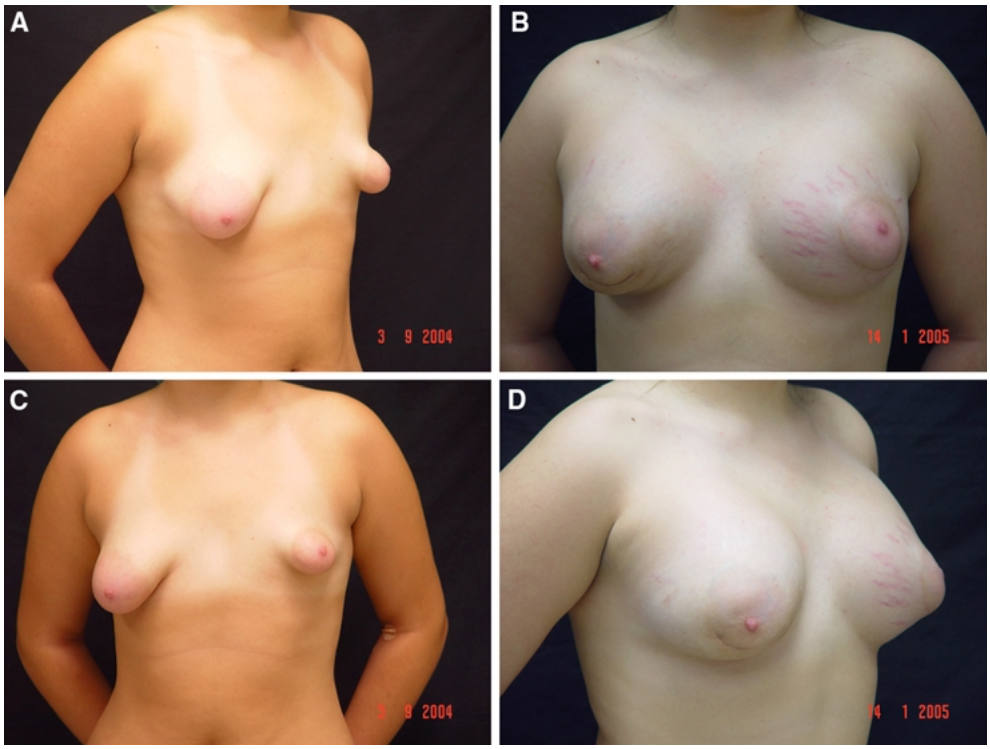

Fig. 1. Preoperative view (*left*), postoperative view (*right*).

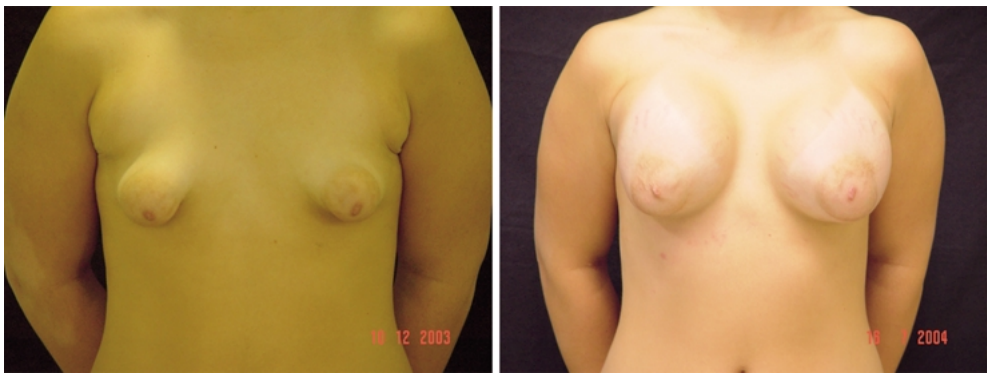

Fig. 2. Preoperative view (*left*), postoperative view (*right*).

an increasing number of patients with developmental anomalies are presenting for treatment.

Tuberous breast deformity was first described in 1976 by Rees and Aston [23]. Since then, several authors have attempted to describe, classify, and correct the problem by using different methods, with varying results [1–5,8–17,19–35] Williams [34] described the reduction of the areola by excision of a doughnut-shaped piece of skin with two triangular extensions on either side. Rees and Aston [23] used a similar approach, except that for breasts with a deficiency in the base in the vertical axis, they made radial incisions in the breast from beneath through an inframammary incision. Vecchione [30] described a method of recontouring the domed nipple. Bass [5] reported a technique emphasizing the herniation of the nipple–areola complex. Teimourian and Adham [28] used two incisions (areolar and submammary) with an implant. Dinner and Dowden [9] and Elliot [10] used flaps from the submammary fold. Reynaud et al. [24], Azzolini and Parodi [4] and Auclair and Mitz [3] performed other incisions in addition to the periareolar one, using implants or tissue expanders. Muti [20] used the same procedure, but always used implants. Panettiere et al. [21] described a combination of periareolar mastopexy additive mastoplasty, and gland base enlargement by cross incision. Ribeiro et al. [25,26] described dividing the breast into two portions, making an inferiorly based flap, to reshape the lower mammary quadrants. Dinner and Dowden [9] used a full-thickness incision through skin, subcutaneous tissue, and breast to release it, followed by transposition of a skin and subcutaneous tissue flap. Mandrekas et al. [16] described the division of the constricting ring, thus creating two breast pillars.

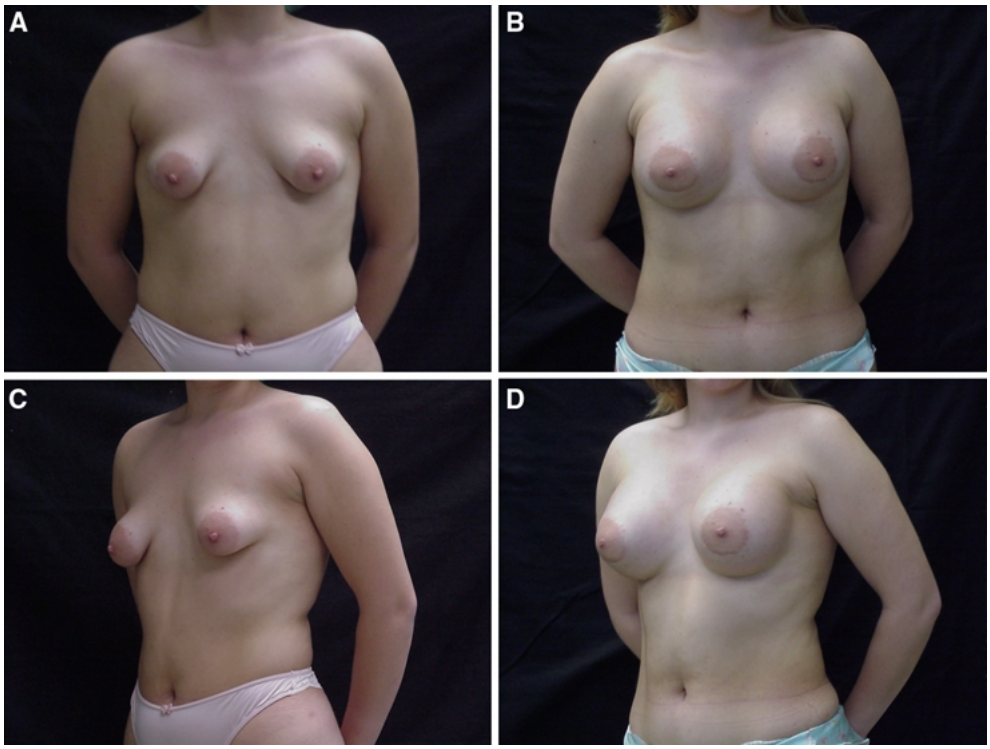

Fig. 3. Preoperative view (*left*), postoperative view (*right*).

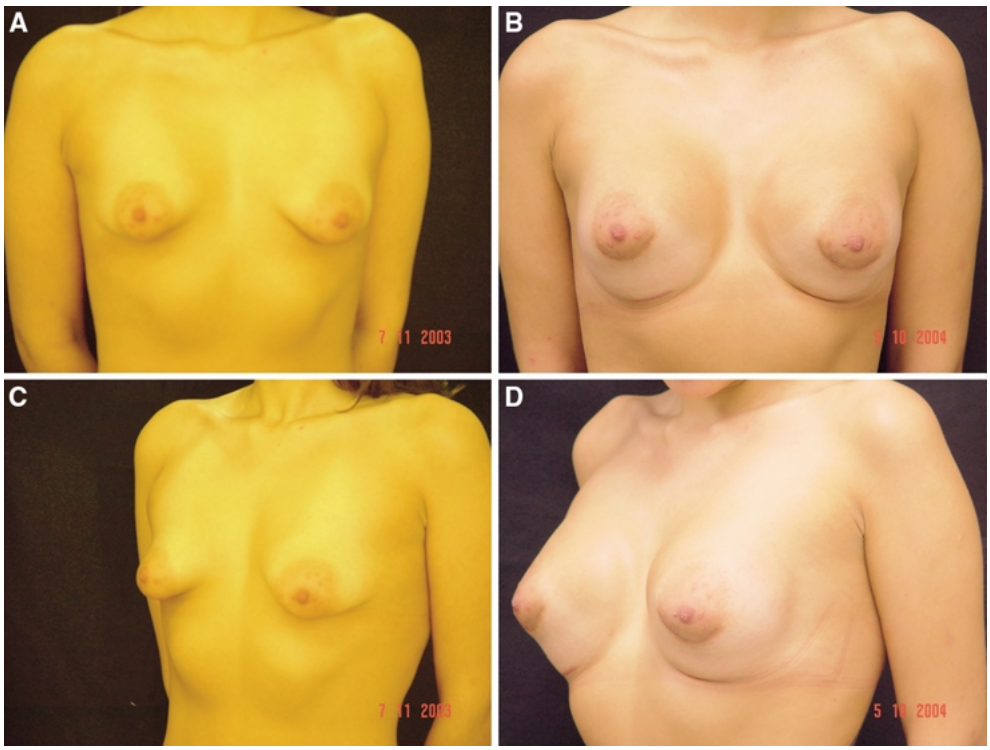

Fig. 4. Preoperative view (*left*), postoperative view (*right*).

The large number of articles published on the subject demonstrates the psychological morbidity the deformity can cause. Even if the results are not perfect, the psychological impact of the surgical correction is very positive, with a resulting increase in self-esteem and a progressive normalization of social activities.

The treatment of such a condition is a real surgical challenge [6,14]. The main goals are to restore the mammary base dimensions, correct the hypoplasia of

Table 4. Outcomes[a]

Surgical team							
Case	Shape	Volume	Symmetry	Quality—size of scars	Areola size	Double-bubble deformity	Mammary projection
1	3	3	3	3	3	3	3
2	3	3	2	3	3	3	3
3	3	3	3	3	3	3	3
4	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3
6	3	3	2	3	3	3	3
7	3	3	3	3	3	3	3
8	3	3	3	3	3	3	3

[a] 0, poor; 1, sufficient; 2, good; 3, very good.

Table 5. Outcomes[a]

Patient		
Case	Satisfaction	Psychological impact
1	3	3
2	3	3
3	3	3
4	3	3
5	3	3
6	3	3
7	3	3
8	3	3

[a] 0, poor; 1, sufficient; 2, good; 3, very good.

the lower quadrants, reposition the inframammary salcus, correct the ptosis and cylindrical shape, reduce the areolar dimensions (correcting nipple–areola complex herniation if present), and provide good symmetry and volume matched to the contralateral breast and the patient's wishes.

The surgical reconstruction of the tuberous breast using a two-stage technique with a combination of tissue expanders and silicone implants is not new. In our experience (all cases were managed by two operating surgeons, the authors), the anatomic textured tissue expander with a magnetic injection site truly enlarges the mammary base without any additional scars and prevents the double-crease deformity [14,27]. Base restoration is obtained with incision of the fibrous ring and dissection of the lower mammary segment to the new position of the inframammary salcus, providing an effective and predictable result. It is our impression that the aesthetic outcome in breast reconstruction after mastectomy is better with a two-stage procedure using an expander followed by a permanent prosthesis than with double-lumen prosthesis incorporating both. Moreover, our experience has shown us that it is a safer procedure with less possibility of leakage or poor positioning of the expander. It also avoids any possible tension in the inflation tube that limits the physical activity of the patient as well as a possible additional scar from removal of the fill port (usually it is removed with the patient under local anesthesia). The strong magnet contained in the device is contraindicated where the magnetic field may affect other polarized devices (e.g., pacemakers). Adjustments in the breast volume of the tuberous breast are based on achieving symmetry with the contralateral breast and on the request of the patient. It should be noted that occasionally a reduction or mastopexy on the contralateral breast is necessary to obtain better symmetry.

Morphologic anomalies of the breast can cause considerable psychological distress, particularly among adolescent girls [20]. In our view, surgical correction of the tuberous breast anomaly is mandatory and should be performed as soon after puberty as possible. Although our experience has been limited in number of cases, we have been pleased with the postoperative results from this two-stage approach combining anatomic textured tissue expanders with magnetic injection sites and silicone gel implants. We believe that this approach is simple and technically easy, yielding consistently good results. It offers the major advantage of not leaving any obvious scar.

Conclusion

Tuberous breast deformity must be regarded as a significant malformation that can negatively influence the psychic and psychophysical well-being of a woman. Many techniques for its correction are not always completely successful. There is no one method for correction of the tuberous breast. Although the results are sometimes not perfect, the psychological impact of such treatment is extremely positive, suggesting that the requests of adolescent girls for this type of surgery should be honored. The two-stage

approach combining anatomic textured tissue expanders with magnetic injection sites and silicone gel implants is a simple and technically easy approach. The results achieved with this approach seem to be reliable and gratifying.

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