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Treatment of muscular contraction deformities with botulinum toxin type A after latissimus dorsi flap and sub-pectoral implant breast reconstruction

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Summary Unusual and probably underestimated complications following breast reconstruction with a latissimus dorsi (LD) flap and sub-pectoral implant are the LD muscle twitching and the breast contour deformities from pectoralis major (PM) muscle contraction. Surgical muscle denervation is usually indicated for these complications. Botulinum toxin A (BTX-A) infiltration has been described in reducing breast contour deformity in sub-pectoral implant after breast augmentation or reconstruction. Between January 2002 and April 2006, 71 consecutive patients underwent delayed unilateral breast reconstructions with LD flap and sub-pectoral implant after mastectomy. All patients reporting discomforting signs and symptoms from muscle contraction in the reconstructed breast were included in this prospective study. Thirteen patients (18.3%) were selected and treated with BTX-A percutaneous local injections. Signs and symptoms were evaluated, after 4, 8 and 12 months, by the patients and by a panel of three physicians not involved in the study, using a five-point scale. During the study period all patients reported a decrease or disappearance of the signs and symptoms. After 12 months, 11 patients received three BTX-A infiltrations, demonstrating considerable improvements compared to the pre-treatment status. Wilcoxon matched pairs rank sum test showed a statistical difference between pre-treatment and post-treatment scores after 14 days ($P < 0.01$) and 12 months ($P < 0.001$). Our experience shows that muscular contraction deformities after breast reconstruction with a LD flap plus implant are not uncommon complications. The use of BTX-A infiltrations is an effective, not surgical, low cost and low risk procedure to treat these complications. It is an easy procedure to be performed on an outpatient basis with a temporary effect but safely repeatable and reproducible; it avoids hospitalisation or further surgical procedures and demonstrates tolerable latency with satisfactory outcomes.

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The combined use of the latissimus dorsi (LD) flap and the sub-pectoral implant is a very common and reliable technique for breast reconstruction.[1–3] Unusual complications following this procedure can include muscular twitching in the mammary region[4] and muscular contraction breast contour deformities.[5] These complications are due to contraction of the LD or pectoralis major (PM) muscles.

Several authors have suggested the intraoperative resection of the thoracodorsal nerve to avoid the involuntary LD muscle twitching after breast reconstruction. This surgical procedure is not always successful and there is a risk of flap pedicle injury and muscular atrophy leading to poor outcomes.[4,5]

Early breast deformities with high riding, tethering, bands formation and implant dislocation are reported in cases of sub-pectoral implant placement after breast augmentation or after immediate breast reconstruction. These complications are due to the voluntary contraction or prolonged spasm of the PM muscle and sometimes are accompanied by a painful sensation. Denervation of the PM muscle is advocated as successful surgical treatment.[6–12]

The use of botulinum toxin A (BTX-A) has been already employed in reducing breast deformity or pain after PM myospasm in sub-pectoral implant breast augmentation or reconstruction, causing a temporary paralysis of a portion of the PM muscle.[9–13]

Little is published regarding these uncommon complications and their treatment after breast reconstruction, particularly with the combined use of a LD flap and implants.[14]

The authors report their experience using BTX-A percutaneous muscle infiltrations in the treatment of LD muscle twitching and breast contour deformity caused by PM muscle contraction after breast reconstruction with a LD flap and sub-pectoral implants.

Materials and methods

From January 2002 to April 2006, we performed 71 consecutive delayed unilateral breast reconstructions with a LD flap and PM sub-muscular insertion of anatomical implants after modified mastectomy. Forty-two patients underwent radiotherapy before reconstruction. In cases of post-mastectomy radiotherapy or chemotherapy, reconstruction was delayed for 6 months after medical treatment (52 patients, range: 7 to 32 months). In the other cases, reconstruction was always performed after early cancer stage histological confirmation (≤IIa stage) (19 patients, range: 3 to 18 months).

Forty-four patients were reconstructed with silicone cohesive gel anatomic breast prostheses ranging from 145 to 370 cc and 27 patients were reconstructed using Becker's permanent expander/implant, ranging from 145 to 465 cc.

The surgical procedure involved the detachment of the infero-medial insertions of the PM muscle, the sub-pectoral implant placement and the use of a LD flap to fill the skin defect and to cover the inferior portion of the implant.[1–3,6,15] Thoracodorsal nerve resection has been never performed. Postoperative complications were collected and divided into flap, prosthesis and donor site complications (Table 1).

Table 1 Flap, donor site and prosthesis complications

Complications	No. of patients[a]	%
LD flap complications	6	8.4
Flap haematoma	4	5.6
Flap infection	3	4.2
Partial flap loss	4	5.6
Muscle twitching	2	2.8
LD donor site complications	14	19.7
Donor site haematoma	3	4.2
Donor site infection	1	1.4
Donor site seroma	14	19.7
Partial wound dehiscence	4	5.6
Prosthesis complications	19	26.7
Prosthesis infection	1	1.4
Prosthesis seroma	5	7
Capsular contraction	8	11.2
PM contracture breast deformity	11	15.5

PM, pectoralis major muscle.
[a] 15 patients had more than one complication.

Over the study period, the patients were followed up at regular time intervals (1, 3, 6 and 12 months). All patients reporting signs and symptoms of involuntary or voluntary muscle contraction in the reconstructed breast, with or without breast deformity, underwent assessment of capsular contracture grade, according to Baker's method of palpation for breast augmentation and reconstruction prostheses,[16] and measurement of mammary compliance with the Antoon Paar Mammacompliance System (Table 2).[17–19]

All patients in whom the presence of capsular contracture was excluded were evaluated by a panel of three physicians not involved in the study who used a five-point self-assessment scale to assess the grade of breast deformity due to muscle contraction or twitching. Namely, point 0 indicated the absence of signs and symptoms; point 1 indicated discomforting sensation from muscular twitching or contraction; point 2 indicated clinical evidence of light breast deformity (Figure 1c); point 3 indicated clinical evidence of moderate breast deformity (Figure 1d): point 4 indicated clinical evidence of severe breast deformity (Figure 1b). All patients presenting signs and symptoms of involuntary or voluntary muscle contraction in the reconstructed breast (points 1 to 4 in the scale) were included in this prospective study. Also, voluntary or involuntary muscle contraction deformities in the mammary region were clinically differentiated and related to the muscle involved.

The selected patients were offered BTX-A (Botox®, Allergan, Inc., Irvine, CA, USA) percutaneous injections to treat signs and symptoms of muscular twitching or contraction. This off label indication of BTX-A was explained to patients who fully consented to it.

After the BTX-A infiltrations, this group of patients was followed up at regular intervals of time (14 days, 4 months, 6 months, 8 months, 12 months) using clinical examination, digital photography, and the five-point scale.