MANAGEMENT OF CAPSULAR CONTRACTURE

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Abstract: *Capsular contracture is a late complication of breast augmentation, manifested as deformed, hard and painful breasts, usually appearing in patients after many years of having breast implants, specifically connected with latent infections, rapidly modifying breast size as in pregnancy and lactation and also related to breast implant characteristics and position. We have tried through this article to pin-point the specific management techniques in this pathology used in our clinic for the past 15 years. In esthetic interventions, the prevention of a complication is more desired than having to deal with a dissatisfied patient with complications. However, if they do appear, it is imperative to treat them with the utmost care to avoid their relapse.*

Cuvinte cheie: *contractură capsulară, prevenția contracturii capsulare, managementul contracturii capsulare, complicații după augmentare mamară, implante mamare din silicon*

Rezumat: *Contractura capsulară este o complicație tardivă a augmentării mamare, manifestându-se prin deformare, durere locală și consistență dură a sânilor, de regulă la câțiva ani de zile după introducerea implantelor. Este favorizată de infecții latente, variații rapide de volum ale sânului, de exemplu după sarcină și alăptare și este influențată și de caracteristicile și poziționarea implantului. Articolul prezintă tehnicile specifice folosite pentru prevenirea și tratamentul contracturii capsulare în clinica noastră în ultimii 15 ani. În chirurgia estetică prevenirea complicațiilor este deosebit de importantă; dacă totuși apar, ele trebuie tratate corespunzător pentru a preveni apariția recurențelor.*

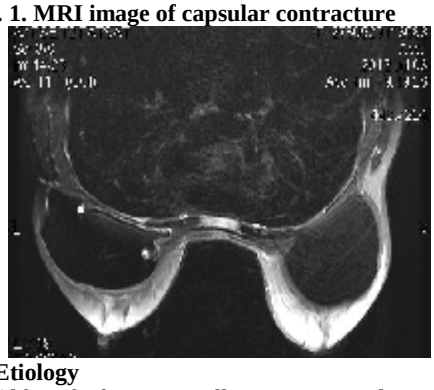
According to the Merriam Webster Dictionary, a capsular contracture is the "contracture" involving a capsule or capsule-shaped structure; *specifically:* shrinking and tightening of the mass of scar tissue around a breast implant that occurs especially with some silicone implants and may result in pain and in unnatural firmness and distortion of the breast. In a plastic surgeon's experience, it is the most dreaded late complication of breast implants that afflicts the cosmetics of the breast and causes the patient to have significant pain and discomfort.

Over many years of research on breast implants, we have learned a few lessons on this complication, that prevention is the best of cures. It is a usually late complication when the patient complains about the constantly hardening implants distorting into a more spherical form and painful on palpation. The fibrous capsule around the implants is shrinking constantly and, in time breasts develop in a more spherical shape. There is a clinical grading system according to Baker grades:

- **Grade I** - the breast is soft and appears normal and the capsule is flexible.
- **Grade II** - the breast looks normal, but is somewhat hard to touch.
- **Grade III** - the breast is hard with some distortions caused by contracture, or the breast becomes a rounded shape, or the implant is generally tilted upwards.
- **Grade IV** - similar to grade III, but with greater hardening of the capsule.

The grading system being fairly arbitrary, it is often accepted that the higher grades of patient discomfort and pain along with enhanced breast hardness requires treatment.

Figure no. 1. MRI image of capsular contracture



Etiology

Although there are still numerous unclear aspects, a fairly large amount of research has shown an interdependence of surgical technique, the type of breast implant surface, the breast implant contents, size and postoperative management by the surgeon, as well as the patient's particularities.

Management

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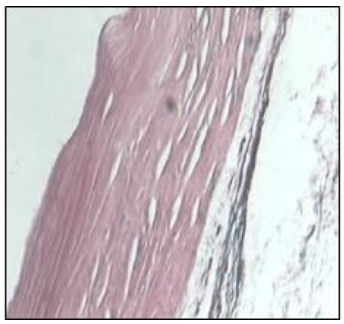
As to the surgical techniques, we can discuss different variables. First of all, the breast implant positioning has a serious role to play in capsular contracture. A submuscular pocket appears to have a positive impact, according to the hypothesis that serial contraction and relaxation of muscles, prevent the fibrotic deposition of collagen in restrained area, thus providing a more elastic pocket. Thus, although the scar tissue forms around the implant, the constant massage from the muscles, provide for a more elastic organization of collagen fibres.

Figure no. 2. Histological aspect of capsule



Secondly, with reference to the breast pocket, a less traumatic, careful electrocautery dissection is proven to be associated with lesser capsular contractures. It has been studied that radiofrequency instead of usual electrocautery causes less extensive burns in perivascular tissues. It has been proven over time, that capsular contracture is more severe and occurs earlier if post surgical bleeding or hematomas, even of small sizes occur around the implant. The presence of blood may facilitate subclinical infections and a prolonged inflammatory response, which is translated into capsular contracture. The loose connective tissue underneath the pectoral muscle is very rich in microvascular network. If a blunt dissection is performed, the blood in small quantities may pool around the implant, which can cause capsular contracture. A large power of cautery also may cause very large areas of thermal assault, leading to more aggressive proliferation of fibroblasts in the area and higher quantities of serous fluid.

As to the implant characteristics, it can be said according to the research performed in this field, that a smooth textured saline filled implant is more predisposed to a higher grade capsular contracture. A number of studies have suggested that textured surfaces delay or decrease the rate of capsular contracture. In a prospective study by Hakelius and Ohlsen (6), the majority of patients with smooth devices had their implants removed or changed after 5 years because of breast hardening. Siggelkow et al. (5) have reported in their histological comparative study of smooth versus textured implants, that the number of inflammatory cells e.g. monocytes were more active in case of textured implants and that synovial like metaplasia was more frequent in textured implants, but the calcification and fibrotic proliferation was significantly lower. It has been suggested by the authors, that there is an initial proliferation of local monocytes, which become less numerous and proliferate less with time. It is thought to be transitional stage, transforming the inner layer of the implant capsule into a less active fibrotic structure. Initially, it was clinically proven that saline implants cause lesser capsular contractures as compared to silicon implants. The high complication rate was attributed to the silicon bleeds and the presence of silicon particles in the periprotetic capsule and macrophages. The more modern cohesive silicone gel has a larger molecule dimensions and it is found to prevent the so called implant bleeds, thus reducing the incidence of capsule formation.

The breast implant size has been studied less frequently as a contributing factor in the capsule formation. We consider that a larger implant has a more predisposition towards a capsular contracture. A larger implant produces higher stretch forces on the tissue, thus increasing the duration and severity of the inflammatory response. On the other hand, a too large breast pocket regarding the implant causes a bouncing effect of implants within the pocket. It can be hypothesised that the constant friction among the implant texture and pocket may cause microtraumas and higher inflammatory response. A higher inflammatory response is directly proportional to the higher Baker grades of capsule contractures. Thus, we recommend the use of smaller implants in adequate pockets to prevent capsule contracture.

Some surgeons recommend the early postoperative mobilization and even manual manipulation and movements of implants postoperatively, as a measure to prevent capsular contracture. In our opinion, a periprotetic capsule invariably forms as a reaction to foreign body. It can be used in proportional measures in our advantage too. The inflammatory response and the synovial proliferation can provide for microadherences to the ribs perichondrial surface, to minimize the rotation and juggling of implants in their pockets. The early post-operative mobilization of implants can cause the pocket to dilate unnecessarily, the implants will rub against the thin capsule, more serous fluid will be suffused and as a result, there will be a higher microtaruma and inflammation at the level of the capsule. On the other hand, we advise the patients to do moderate physical exertion and interdict the strong movements of arms and pectoral muscles. We rely on involuntary small contractions of greater pectoral muscle to soften the periprothetic capsule and use the villous synovial proliferation on the implant underside as glue for adherence to costal margins to provide us with form stability. A more comprehensive study of this hypothesis is required, but it is fairly improbable due to our reticence to lift off physical interdiction from a batch of our patients.

Taking into account other previous trails that suggested that capsular contracture may be related to subclinical infections as a result of biofilm formation, we take a number of measures to avoid this. During the insertion of implant, we apply the “no touch” technique, as well as the antiseptic irrigation of the pocket with betadine solution. Intraoperatively and for five days postoperatively, we provide antibiotic prophylaxis for all the patients with breast implants and we defer the surgery if our patient presents signs of subclinical infection at other site or lactorrhea, until these are resolved. Likewise, we discourage immunocompromised patients or patients with coagulopathies from getting breast implants. We also provide non steroidal anti-inflammatory drugs to patients for a period of 2 weeks but no longer to control the early aggressive inflammation postoperatively.

Apart from this, we have noticed that in most instances, the patients that present in our clinic with higher grades of capsular contracture were after pregnancy and breast feeding. Similarly, a higher incidence of capsular contracture exists in patients who observed rapid changes in breast glandular volumes due to hormonal changes or pregnancies. So we have to take into account even the physiological dependence of this pathology.

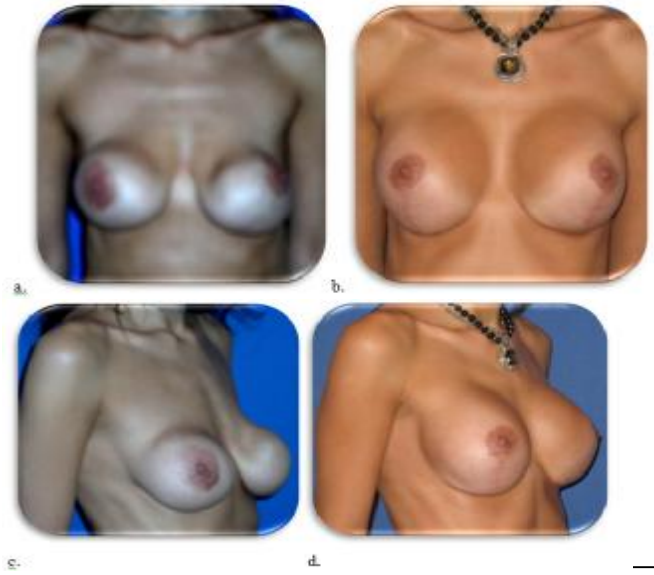
Treatment

In spite of very extensive measures for prevention, we have had capsular contractures in our patients in our practice of more than 16 years. We have to extend our service to patients who already present this complication whether operated initially

in our facility or otherwise. Our therapeutic conduct in case of Baker grade I/II contracture is the active monitoring with careful manipulation. We refer our patients to a physiotherapy and rehabilitation centre for ultrasound treatments and exercise to ameliorate the hardness of the breast and to try to make the capsule more elastic and spacious. We have no experience with the use of medications like accolade (zafirleukast) (13), Singulair etc. and we refrain from their use until sufficient literature proves their clinical efficacy. We have never performed closed capsulotomy in our clinical setting. We consider too high the patient's discomfort and pain. Secondly, the blunt procedure and without visual control may break the capsule and cause bleeding, which may not be controlled; the presence of blood in the cavity will resume the cycle of capsular formation and thickening. Thirdly, it is contraindicated in the manufacturer's manual for the type of implants we use in our practice, as blind capsulotomy can lead to the rupture of the implant. We prefer to observe the instructions of the manufacturer than to have the patient pay for new implants.

In cases of unrelenting discomfort or in case of Baker grade III/IV capsular contracture, we prefer to reintervene surgically. The surgery is performed under general anesthesia for the patient's comfort and consists of the incision on the initial insertion site (inframammary fold in majority of cases), removal of implant and inspection of the pocket. If we find significant quantities of fluid in the cavity, or fluid of modified viscosity, colour or texture or this one shows clear serous fluid, we obtain microbiological specimens from the fluid and we invariably change the implants. The possibility is always discussed with the patients before surgery. Whether we perform capsulectomy or capsulotomy, this decision is taken intraoperatively. If the capsule presents calcifications and is very thick, we prefer to perform complete capsulectomy or partial capsuletomy. As the resultant cavity is too large, we opt for slightly larger implants and we restrict the implant pocket by placing a vicryl 2-0 continuous interrupted suture at the anterior axillary line. Also, we almost all the time prefer round implants in such cases, because the larger cavity in such reinterventions increases the risk of anatomic implant rotation, but this is more of a guideline than a principal, and is decided along with the patient.

Figure no. 3. Baker Grade IV capsular contracture 10 yrs after 200cc subglandular saline implants (a, c) revision surgery with 345cc saline implants placed partial submuscular with inverted T mastopexy (b, d)



If the capsule is moderately thick and not calcified, we try to remove it only partially, preferably on its undersurface to provide more raw surface for implant adherence. Most of the capsule is removed, within the technical limits without jeopardizing the hemostasis, and the rest undergoes a radial scoring. Essentially hemostasis is vital in such reinterventions. If the same implants are chosen to be reimplanted, they are irrigated in antiseptic solution (betadine) and the implant pocket may be slightly shortened using a continuous suture on the anterior axillary line. Our ideal patient for this reintervention is the patient with capsular contracture on an implant placed in a subglandular pocket, because this leaves the retropectoral plain virgin for us and we can place the implants in the new pocket with better postoperative prognosis. In all instances, the periprotetic capsule harvested is sent for histological analysis and all our patients receive non-steroidal anti-inflammatory drugs for 2 weeks and prophylactic antibiotics for 5 days.

Postoperatively, we have to explain to our patients the possibility that capsular contracture may recur and that they must take specific measures to avoid the recurrence; they are encouraged to present to our facility, as soon as they detect any early symptoms like changes in breast consistency, likewise they are advised not to breast feed if possible and to treat any other infection that may be hematogenously spread to the implant location.

Prognosis

Usually, the prognosis of this pathology is fairly good. In our clinic, we have not had any recurrences till present date. We believe that with newer implant generations and more accurate surgical skills, with more modern equipment in association with patient education and temporal monitoring, we may significantly reduce the number of capsular contractures in future.

REFERENCES

1. Huang CK, Handel N. Effects of Singulair (montelukast) treatment for capsular contracture. Aesthet Surg J. 2010;30(3):404-8.
2. El-Sheikh Y, Tutino R, Knight C, Farrokhyar F, Hynes N. Incidence of capsular contracture in silicone versus saline cosmetic augmentation mammoplasty: A meta-analysis. Can J Plast Surg. 2008;16(4):211-215.
3. Prantl L, Schreml S, Fichtner-Feigl S, Pöppl N, Eisenmann-Klein M, Schwarze H, et al. Clinical and morphological conditions in capsular contracture formed around silicone breast implants. Plast Reconstr Surg. 2007;120(1):275-84.
4. Wyatt LE, Sinow JD, Wollman JS, Sami DA, Miller TA. The influence of time on human breast capsule histology: smooth and textured silicone-surfaced implants. Plast Reconstr Surg. 1998;102(6):1922-31.
5. Siggelkow W, Faridi A, Spiritus K, Klinge U, Rath W, Klosterhalfen B. Histological analysis of silicone breast implant capsules and correlation with capsular contracture. Biomaterials. 2003;24:1101-1109.
6. Hakelius L, Ohlsen L. Tendency to capsular contracture around smooth and textured gel-filled silicone mammary implants: a five-year follow-up. Plast Reconstr Surg. 1997;100(6):1566-1569.
7. Barnsley GP, Sigurdson LJ, Barnsley SE. Textured Surface Breast Implants in the Prevention of Capsular Contracture among Breast Augmentation Patients: A Meta-Analysis of Randomized Controlled Trials. Plast Reconstr Surg. 2006;117(7):2182-90.
8. Wong C-H, Miny S, Tan B-K, Song C. Capsular Contracture in Subglandular Breast Augmentation with

Textured versus Smooth Breast Implants: A Systematic Review. Plast Reconstr Surg. 2006;118(5):1224-36.
9. Handel N, Gutierrez J. Long-term safety and efficacy of polyurethane foam-covered breast implants. Aesthetic Surgery Journal. 2006;26(3):265-74.
10. Mladick RA. "No-Touch? Submuscular saline breast augmentation technique. Aesthetic Plastic Surgery. 1993;17(3):183-92.
11. Adams WP, Haydon MS, Raniere J, Trott S, Marques M, Feliciano M, et al. A Rabbit Model for Capsular Contracture: Development and Clinical Implications. Plastic and Reconstructive Surgery. 2006;117(4):1214-9.
12. Planas J, Cervelli V, Planas G. Five-Year Experience on Ultrasonic Treatment of Breast Contractures. Aesthetic Plastic Surgery. 2001;25(2):89-93.
13. Schlesinger S, Ellenbogen R, Desvigne MN, Svehlak S, Heck R. Zafirlukast (Accolate): A new treatment for capsular contracture. Aesthetic Surgery Journal. 2002;22(4):329-36.
14. Scuderi N, Mazzocchi M, Fioramonti P, Bistoni G. The Effects of Zafirlukast on Capsular Contracture: Preliminary Report. Aesthetic Plastic Surgery. 2006;30(5):513–20.
15. Silver Harold. Reduction of Capsular Contracture with Two-Stage Augmentation Mammaplasty and Pulsed Electromagnetic Energy (Diapulse Therapy). Plastic and Reconstructive Surgery. 1982;69(5):802-8.