



**Breast cancer: Physiotherapy intervention from the
point of view of tissue anatomy.
The benefit of icoone[®] Medical technology.**

Jocelyne Rolland

Physiotherapist and Senologist, MSc In Sports Science.

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Jocelyne Rolland. Physiotherapist and Senologist, MSc In Sports Science. Founder of Rose Pilates® and AVIROSE®, Member of RKS (Breast Cancer Physiotherapy Network)

First publication in a french physiotherapy journal : Kiné Actualité, N°1593. 16/09/2021.
www.kineactu.com

Conflicts of interest: J. Rolland develops icoone® senology protocols (Company AllCare and i-Tech Industries Ltd).

When treating the breast, acknowledging that it is first and foremost an anatomical entity seems obvious. Understanding the effects from post-surgery and radiation therapy is only possible once the tissue-mammary gland relationship is recognised with utmost precision.

The teguments that cover the breast, the breast's specific surroundings that come into contact with the pectoralis major, close to the axilla and the shoulder, bring to light a unique area of interest that is often overlooked by physiotherapists accustomed to working on the musculoskeletal system. Dr Guimberteau, Reconstructive Surgeon, describes intratissular in vivo endoscopy work presenting new methods in understanding living matter: *"In order to clear the area for the surgeon to work, the surgeon must create a path via a network of collagen fibers whose organisation, appearing in a disorderly array, seems to surround and envelop all the internal organs and binds them together. Its purpose is more than connective, this all embracing and continuous network is also vital. The healing process does not shape it back to its initial and identical form but on the contrary, the reshaping often happens in a very crude manner¹".*

More than 58,000 new cases of breast cancer are diagnosed each year leading patients to seek care from physiotherapists (1% of men) requesting post-treatment assistance to manage the adverse events that create after effects that impact a patient's quality of life. Today's "Hands Off" trend also applies in this context² particularly to treat shoulder problems. However, the "Hands On" approach will not be overlooked. Myofascial pain syndrome associated with breast cancer treatments affects about half of all patients, regardless of the type of surgery. Its treatment deals with all causes of pain. Its therapeutic method focuses on tissue transformation³ requiring a direct, manual or instrument-assisted approach.

In this context, treating scar tissue is essential to ensure free joint movement, especially in the shoulder, but also to ensure that the visible scars are as discreet as possible. Loss of the integrity of a breast, or sometimes the breast as a whole, and then seeing it replaced with an often unsatisfactory result, are phases that are mentally, in addition to physically traumatic, for many women. Regardless of its size, the scar effect increases upon the appearance of these

¹ Guimberteau J-Cl, Armstrong C. *Architecture of the living human body. Intratissular endoscopy reveals the extracellular matrix, cells and fascia..* Sully Publications, 2016.

² Pace do Amaral MT, Freire de Oliveira MM, Ferreira Nde O, Guimarães RV, Sarian LO, Gurgel MS. Manual therapy associated with upper limb exercises vs. exercises alone for shoulder rehabilitation in postoperative breast cancer. *Physiother Theory Pract.* 2012 May;28(4):299-306.

³ Pinheiro da Silva F, Moreira GM, Zomkowski K, Amaral de Noronha M, Flores Sperandio F. Manual Therapy as Treatment for Chronic Musculoskeletal Pain in Female Breast Cancer Survivors: A Systematic Review and Meta-Analysis. *J Manipulative Physiol Ther.* 2019 Sep;42(7):503-513.

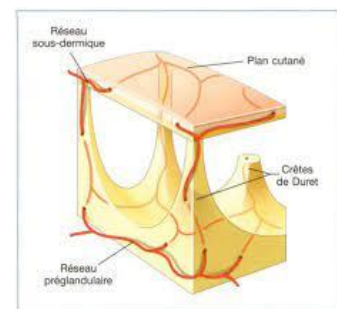
pathways, especially since they are visible to the patient.⁴ Massage therapy for scars is known for its effectiveness⁵ especially if it is performed early and supplemented with active or passive exercises⁶. Similarly, treating all scar areas, not just those that are visible, will help prevent the after effects to the greatest extent possible. Dr Guimberteau states: *“Scarring introduces a disarray into this visibly chaotic fibrillar organisation however also ensures flexibility and mobility via harmonious fibrillar motions. The resulting fibrillar adhesions are responsible for the loss of dynamic fibrillar conduct The surgeon restores the correct anatomical relationships, and the physiotherapist improves the flexibility and mobility of the scar, thus working together to ensure optimal integration of the scar tissue into the surrounding fibrillar network.”*

In senology, the effectiveness of massage in scar management or in areas of fibrosis is no longer debated. Therefore, let's focus instead on a few specific points related to the anatomy of the breast for purposes of informed care.

Is the breast a connective structure?

The mammary gland, located inside the skin of the breast, is a whole, made up of fat, glands (lobules and ducts), lymphatic vessels, blood capillaries and connective walls. These lesser-known suspensory ligaments of Cooper, partition off the breast and extend from the pectoral fascia to the deep surface of the subcutaneous cellular tissue located under the dermis, forming the ridges of Duret. This peripheral area is well recognised by surgeons enabling to separate the gland from the skin, and also allows the subcutaneous and pre-glandular vascular networks to communicate.

Illustration borrowed from: Fitoussi A. Breast cancer surgery: conservative treatment, oncoplastic and reconstructive surgery. 2017. Elsevier Masson.



In the event of a partial mastectomy, the surgeon will peel the skin of the gland partially, or completely in the event of a total mastectomy. The passage of the scalpel through the ridges of Duret causes bleeding, lymphorrhea and destruction of the fibrillar and microvacuolar continuity which is detrimental to the restitutio ad integrum of these structures. More so, radiation therapy with capillaries injury and X-ray fibroblast aggression, adds other modifications risks. Radiotherapy destroys this fibrillar harmony by changing the intrinsic qualities of the fibers and generates post-radiation fibrosis made up of connective densification. This leads to venous and lymphatic stasis while creating the bed of the breast's excess fat and therefore achieving the well-known vicious circle of lymphedematous transformations. The pectoral muscle is subject to both localised apoptosis and loss of volume with both hypoextensibility and loss of contractility⁷.

⁴ Gass J, Mitchell S, Hanna M. How do breast cancer surgery scars impact survivorship? Findings from a nationwide survey in the United States. BMC Cancer. 2019 Apr 11;19(1):342.

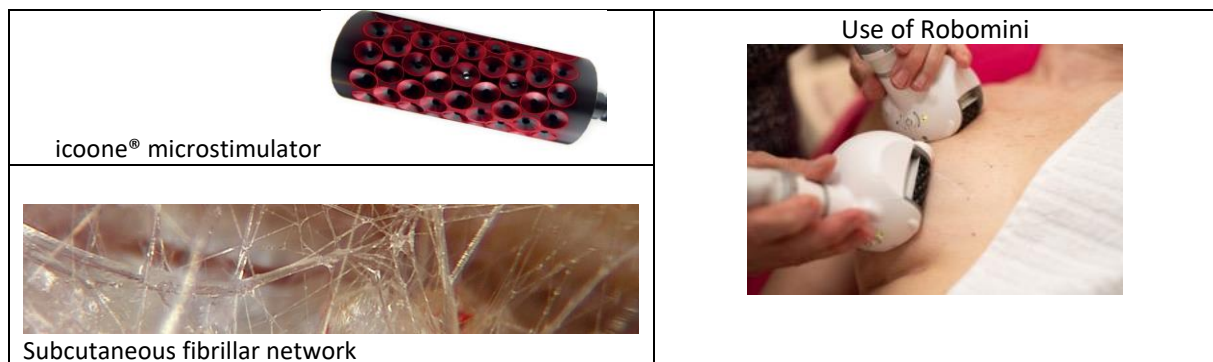
⁵ Shin TM, Bordeaux JS. The role of massage in scar management: a literature review. Dermatol Surg. 2012 Mar;38(3):414-23.

⁶ Muñoz-Fernández MJ, Medrano-Sánchez EM, Ostos-Díaz B, Martín-Valero R, Suárez-Serrano C, Casuso-Holgado MJ. Preliminary Study on the Effect of an Early Physical Therapy Intervention after Sentinel Lymph Node Biopsy: A Multicenter Non-Randomized Controlled Trial. Int J Environ Res Public Health. 2021 Jan 31;18(3):1275.

⁷ Seo A, Hwang JM, Lee JM, Jung TD. Changes in Pectoral Muscle Volume During Subacute Period after Radiation Therapy for Breast Cancer: A Retrospective up to 4-year Follow-up Study. Sci. Rep. 2019 May 7;9(1):7038.

Therapeutic choices : The physiotherapist needs to pay particular attention to the connective structure of the mammary gland with a disorganised fibrillar network. After having readily highlighted the limitations of tissue clearing thanks to the effect of gravity on the breast or on the chest wall which shows the defects, the physiotherapist shall perform manual massage techniques from the skin to the pectoral muscle with tissue continuity in mind. The manoeuvres shall be supplemented if necessary by instrument-assisted techniques to complement the expert manual physiotherapy. Stress on the pectoralis major muscle throughout radiotherapy, both from stretching and external stroke eccentric contraction, will help it maintain its contractility.

In this context, the use of icoone® Multi Micro Alveolar Stimulation allows to mobilise the connective links that unite the surface of the skin to the depth of the breast up to the pectoral muscle; thanks to the twin heads, the bi-manual use offers extended coverage, encompassing the surface of the breast or the chest to increase the effectiveness of these stimulations. Unlike a simple fold formed between two mechanical structures, tridimensional microstimulation associated with maneuvers over a large area, aim to recover the best possible trophicity of the disturbed fibrillar framework.

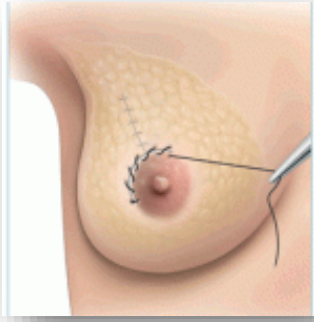


Tumorectomy and tumour location: appearances can be deceiving!

Conservative surgery for breast cancer meets two objectives: “oncological safety” on the one hand, that is no cancerous cell left behind by the surgeon and the “cosmetic effect” on the other hand, with the most discreet scar possible, an acceptable shape of the breast, reduced of the removed tumour with a margin of healthy tissue.

Regardless of the area, the surgery begins by detaching the skin from the glandular tissue mass over several centimeters at the periphery of the lesion in the plane of the ridges of Duret; the areola-nipple plaque is detached if necessary to avoid fibrillar adhesions, especially due to radiotherapy. The tumour area is then detached from the deep pectoral level and then the lumpectomy is performed in a healthy area. Thus the monobloc resection of the cancer will take away a much wider breast part than the initial size of the cancer .

Illustration borrowed from: Fitoussi A. Breast cancer surgery: conservative treatment, oncoplastic and reconstructive surgery. 2017. Elsevier Masson.



To remodel the mammary gland traced on the contralateral breast, the glandular pillars are brought together with sutures. Remodelling is performed with the patient being in a semi-seated position in order to take into account the already existing degree of ptosis. We still see it here, there are numerous detachments, resulting in a risk of disruption of fluid exchanges and a decrease in the overall dynamics of the breast. The glandular tissue scar, prerogative of young breasts (mature breasts with fatty tissue will not be remodelled), adds an extra hit to these deficits that should not be neglected

when the subject of discomfort or pain that is unfortunately and inevitably felt by patients due to cancer treatments.

Therapeutic choices : The physiotherapy diagnostic assessment will determine the action on the scar, which is visible, without omitting the one into the gland, which is invisible, often palpable due to the densification of the healing process. When generating pain from heavy pressure on the chest, spontaneously or in the form of a sudden electric shock, this deep fibrosis will be treated at every session. Additionally, breast mobilisation advice is offered to the patient on a daily basis, for example when staying under shower, the chest is slightly tilted forward allowing to more easily grasp the breast. The mobilisation techniques of the physiotherapist and the patient will thus focus on all planes, from the skin to the pectoralis major muscle. In the event of a mastectomy, mobilisation techniques are complemented by stretching and relaxation of the pectoralis major muscle, performed every day in particular for people with overly sedentary lifestyles.

In this context, the use of icoone® Multi Micro Alveolar Stimulation combining lifting and stretching in order to recreate the breast's countless spaces and sliding ways, will complete the manual technique if insufficiently effective due to a shorter session caused by lack of time or administrative constraints.

At the end of the session, whether on visible skin scars or invisible glandular tissue scars, Kinesio® Tape will help to preserve the restored mobility of the tissues. Kenzo Kase, Chiropractor, explains the effect of his technique as follows: "When lifting the top layers of the skin, extra space is created in the underlying tissues; compression of the tissues lightens, fluids begin to circulate more freely and the dispersed stagnant blood and lymph enables the tissues to rejuvenate. Dr Guimberteau's description of the structure of the tissue provides wonderful insights into how these therapeutic benefits occur.⁸".

Nipple-areola skin : taking advantage of nipple telotism.

The nipple-areolar skin is a contractile structure. Its surface is irregular; there are small protrusions, Morgagni's glands, which during pregnancy and then breastfeeding become Montgomery's tubercles.

Adhering to the mammary gland as it is devoid of the underlying fat in its depth, an areolar muscle is responsible for the erection of the nipple, called telotism, with tightening of the areola.

⁸ Guimberteau J-Cl, Armstrong C. *The architecture of the living human body. Intratissular endoscopy reveals the extracellular matrix, cells and fascia.*. Sully Publications, 2016.

For partial mastectomies, periareolar pathways are increasingly used because they are discreet, and once remodelled are appreciated by patients. However, some adhesions spoil the result. Sometimes the plaque remains inert as if stunned by the surgery, which leaves women wondering about the return of sensations coming from this erogenous area. Adhesive, with naturally low mobilisation, this periareolar scar may not achieve the expected result in terms of discretion. Revival is a reason for optimism whether the reason is aesthetic or sexual. Equally preserved (*nipple sparing mastectomy*) during a total mastectomy because it has been shown that this support does not have an impact on survival⁹, interest in the nipple-areola skin is therefore strong, provided it is performed in full knowledge of events.

Therapeutic choices : When the physiotherapy assessment shows an inert areola skin and/or an adhesive scar, the manoeuvres are applied to the whole breast to then gradually focus on the areola skin. Manual stretching along the longitudinal axis of the periareolar scar, centimeter by centimeter, will stretch scar tissue fibers while recreating optimal tissue mobility. Lightly handling the scar with a gentle pinch-lift will restore the bonds between the superficial and deep connections. The patient will be asked, upon consent, to check as often as possible the contractility of the plaque and of her areolar muscle, stunned by the surgery which is sometimes likely to awaken. This view of triggering nipple telotism can be an opportunity to request assistance from the companion to restore the injured breast. The use of alveolar microstimulation will complement manual techniques; the power of the icoone® technology isn't important here, but on the contrary its lightness is praised. The stimulations will safely embrace the border area between the skin and the areola, thus as much as possible accounting for the traces left by the passage of the scalpel while removing any blockages of fluids or influxes.

Other actions in senology

Many cases in senology will benefit from this knowledge. In the event of reconstruction, whether by implant (retro or antepectoral) or flap (pedicled or free), initial or secondary, whether the request is a "flat reconstruction" or a non-reconstruction, whether the lipofilling is either localised, or constitutive of a breast, this knowledge of anatomical relationships is essential.

The axillary procedure (sentinel lymph node biopsy or axillary dissection) shall not be ignored and may also benefit from the endoscopic view of related tissues.

In any event, even if the original harmonious fibrillar function is not fully restored, seeking optimised tissue dynamics is one of the objectives of the physiotherapist specialising in senology.

⁹ Mesdag V, Régis C, Tresch E, Chauvet MP, Boulanger L, Collinet P, Giard S. Nipple sparing mastectomy for breast cancer is associated with high patient satisfaction and safe oncological outcomes. J Gynecol Obstet Hum Reprod. 2017 Oct;46(8):637-642.