Is Mastectomy Still Justified – And if, in Which Patients?

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Breast surgery has evolved from simple to complex. Formerly, breast cancer was treated mainly by the radical Rotter-Halstedt operation, the most mutilating breast cancer surgery. Today, surgery has developed into an advanced and comprehensive treatment modality with many different options: mastectomy together with delayed or immediate reconstruction, quadrantectomy with axillary dissection and whole breast irradiation (QUART), skin-sparing mastectomy with immediate reconstruction or partial mastectomy.

The first step to more complexity was the mandatory addition of whole-breast radiotherapy (WBRT) in case of breast-conserving surgery (BCT) to reduce the local recurrence rate independently of oncological indications, such as lymph node involvement or tumor size. The evolution of radiation in 2006 reveals WBRT and partial breast radiotherapy (PBRT) together with better dosimetry and options of intraoperative radiotherapy (IORT) [1], applicator intracavity radiotherapy (TARGIT) [2] and brachytherapy [3] or intensity modulated radiotherapy [4]. Another step to more complexity was the addition of oncoplastic surgery to breast conserving surgery, un-influential in terms of local control but powerful in preserving function and cosmetic outcome.

Now that we have all these options, why still perform mastectomy? The justification of mastectomy is powered by the contraindication of breast conserving surgery, the current surgical standard for breast cancer, i.e. pregnancy, previous breast irradiation, larger breast cancer, multicentric disease, inflammatory cancer, an extended intraductal component, very small breasts, collagen vascular disease or poor compliance for radiation treatment and most recurrences after BCT. As well, late results in young patients (therapeutic clearing, salvage intervention), subgroups with risk factors (prophylactic risk reduction) are indications for mastectomy.

The available techniques are: modified radical mastectomy with skin closure favorable to the supply with epi-prosthesis

and reconstruction, skin-sparing mastectomy with different skin resection patterns, such as peri-areolar, tennis racket or inverted T, subcutaneous mastectomy with preservation of the nipple areola complex (NAC) and flap-supported mastectomy. To obtain wide chest tissue and skin resection together with safe defect closure in locally advanced breast cancer after prior chemotherapy and/ or radiation flap-supported mastectomy can be combined with thoraco-epigastric flap (TEF), latissimus dorsi flap (LDF) or rectus muscle abdominal flap (TRAM). In combination with skin-sparing mastectomy, the most important autologous tools for reconstruction are TRAM, LDF and free-flap, in particular deep inferior epigastric perforator flap (DIEP). In addition, implants have been improved as cohesive gel and memory shape devices.

But what about function of the breast, i.e. cosmesis, psychology, and patient satisfaction? We are all familiar and experienced with total mastectomy reconstruction and we know about delayed post-radiation partial breast reconstruction for deformities and distortions appearing in about 20% of the true QUART cases. Coupled reconstruction in form of oncoplastic surgery [5, 6] is the strategy behind up-front tumor specific partial breast reconstruction which improves cosmesis in these 20%. Oncoplastic surgery primarily has been developed to balance, even in cases with problems of relative tumor size and unfavorable anatomical tumor location, local control through clear margins and a cosmetic outcome.

So what can we currently offer our patients in terms of attempt at local control, function and cure? The straight-forward QUART is still considered simple and safe when targeted at loco-regional disease. With proper staging survival is comparable to modified radical mastectomy and to Halstedt. Compared to the easy and safe surgery of QUART or modified radical mastectomy with delayed reconstruction, skin-sparing mastectomy together with immediate breast reconstruction is difficult and bears surgical risks.

Table 1. Indications for skin-sparing mastectomy

Diagnosis	BRCA carrier or pure DCIS T1/2 + LCI	early stage = /<2 cm/ node negative / < 45 y	more advanced > 2 cm/ 3N+/ expected XRT or prior whole breast irradiation	prior partial or intraoperative breast irradiation
Options	SSM superior to SCM	avoid XRT		
Type of surgery	SSM/ Implant/ autologous tissue	SSM/ extended LAT/ DIEP/ implant	SSM plus immediate extended LAT/ temporary expander followed by implant or flap	SSM plus implant/ autologous tissue
Controversial	no	alternative to BCT for t the very young patient	immediate pedicled TRAM/ DIEP	no

BRCA: Breast cancer gene, DCIS: ductal carcinoma in situ, SSM: skin-sparing mastectomy, SCM: subcutaneous mastectomy, XRT: radiotherapy, LAT: latissimus dorsi flap, DIEP: deep inferior epigastric perforator, TRAM: transverse rectus abdominis muscle.

Currently, the advances in surgery and the refinements in radiation open a more complex but less evidence-based supply of individual options of local treatment of breast cancer to our patients. The oncological safety of skin-sparing mastectomy was neither compared to modified radical mastectomy nor Halsted nor QUART through prospective validation. The Oxford Level of Evidence (LOE) for oncological outcome can only be scored as 3a based on systematic reviews with homogeneity or 3b calculated from individual case-control studies. Therefore the Oxford Grade of Recommendation (GR) can only be given as B, which means that this intervention has not shown validated benefit for patients and may be performed only in individual cases. According to the current knowledge a general recommendation cannot be given.

Subcutaneous mastectomy means leaving the NAC in place and removing the glandular tissue to an extend of 80–85%. This technique has also not been validated on a higher level of evidence, neither for cancer treatment nor for complete risk reduction. A prospective randomized trial on nipple-sparing mastectomy including IORT for the areola complex [7] is in progress; but radiotherapy (RT) is a ‘gift never forgotten’. The high number of the surgeons and gynecologists leaving the NAC behind in 73% on the basis of frozen section in the ‘management of skin-sparing mastectomy’ as a result of the survey of German hospitals [8] is surprising. This intervention should better be termed subcutaneous mastectomy than skin-sparing mastectomy. Both skin-sparing and subcutaneous mastectomy are inevitably linked to immediate reconstruction by means of implants, autologous tissue, or a combination. The oncological and cosmetic outcome of skin-sparing mastectomy has been well evaluated during the past 30 years. In contrast, the outcome of the so called ‘exchange mastectomy’ i.e. subcutaneous removal of the gland and volume replacement with an implant, an intervention, very much favored in the 1970s in Germany and the USA, was characterized by a high number of revisions, up to 10 interventions for correction over

10 years. The results were aptly labeled ‘subcutaneous mastectomy cripple’ [9].

Skin-sparing mastectomy plus immediate reconstruction by DIEP is the most advanced and demanding intervention which requires a skilled team in oncology and reconstruction. An upfront planning of the comprehensive approach is highly recommended. All prior therapies, in particular local treatment modalities such as lymph node dissection and radiotherapy as well as the type of reconstruction and potential risk factors must be taken into account.

The high number of LDF in the German survey [8] reveals a common experience. Because of its twofold – either simultaneous or successive – availability and its paired occurrence, in which the LDF resembles the breast, this tissue replacement is the most important and best suited tool for any composed surgical approach to the breast as well as for volume and skin replacement. Transferred tissue, allowing local radical surgery, is considered healthy and free of tumor cells. Generally, radiotherapy is not indicated but if there is a justification for RT from an oncological point of view and not being applied prior to surgery, radiotherapy can also take place after LDF quadrantectomy reconstruction or in case of skin-sparing mastectomy. Independently of the reported good results, the high percentage of LDF reconstructions seems to be the result of ‘one-eyed decision-making’ based on a limited repertoire of reconstructive techniques. In view of the life-long consequences of the intervention, particularly in young patients the best possible technique should be chosen. The offer of skin-sparing mastectomy plus DIEP, i.e. reconstruction with healthy autologous tissue, and the possibility to avoid RT for a ‘small’ breast cancer in younger patients [10] is a significant change in the treatment of early disease to avoid increased local recurrences and probably unnecessary mortality in the long run [11]. On the other hand, IORT restricted to the tumor bed could open a safer window for sequential skin-sparing mastectomy plus reconstruction in case of in-breast tumor recurrence or lack in

follow-up, because of the avoidance of radiotherapy strain to the skin.

We are still far from evidence-based guidelines but experts' opinion may allow a proposal for skin-sparing mastectomy as the 'gold standard' of breast removal (table 1). Prerequisites

are a breast center that should allocate routinely up-front true multidisciplinary meetings (MDMs) concentrating on oncologic surgery, radio oncology and specific reconstruction to obtain the most convenient patient-centered treatment plan together with data collection for validation.

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