Subcutaneous mastectomy is defined as the complete removal of all breast tissue while leaving the nipple–areola complex intact. Dissection on the gland leaves more breast tissue than strict subcutaneous dissection (removal of 90% vs. 95–98%). In our view, removal of the nipple–areola complex in prophylactic surgery is not justified, since the resulting aesthetic compromise outweighs any gain in oncological safety.

The introduction of silicone gel implants in the 1960s and early 1970s helped popularize the notion of complete removal of all vulnerable breast tissue, followed by implant reconstruction. Widespread use of the technique was based on the belief that the resulting breast had a natural appearance and feel. Over time, however, it became evident that inadequate soft-tissue coverage of the implant could lead to major surgical complications—resulting in poor or even disastrous cosmetic outcomes, with the associated psychological distress.

The goal of the operation as originally defined—removing as much at-risk tissue as possible, while at the same time recognizing the aesthetic and psychosexual importance of the breast—also proved unattainable. Resection leads to impaired sensation in the breast skin and complete denervation of the nipple. Subsequent implant reconstruction often involves complications such as capsular contracture, a foreign-body sensation, coldness, and displacement, and the corresponding loss of natural appearance. Subcutaneous mastectomies are therefore being carried out less and less often.

However, the value of this technique was confirmed in a study by Hartmann (1999), who confirmed that the risk of developing cancer declines in direct proportion to the amount of breast tissue removed—which in clinical terms is logical. In high-risk patients, the likelihood of developing breast cancer could thus be reduced by 90% by prophylactic mastectomy. This possibility had long been viewed skeptically, and the study confirmed the oncological effectiveness of subcutaneous mastectomy.

In view of the increasing incidence of breast cancer and the identification of gene mutations that can lead to it, the issue of preventive mastectomy is currently being reassessed. In addition, the development of autologous tissue reconstruction has been a major step forward in avoiding the complications associated with implants.

**Indications**

From the physician’s point of view, there is no medical reason for performing subcutaneous mastectomy. Malignant changes or intraductal atypia have to be managed with a breast-conserving operation or by mastectomy. Lobular carcinoma in situ—one once considered a classic indication for subcutaneous mastectomy—is no longer viewed as necessarily precancerous, and treatment thus consists of clinical observation without immediate surgical implications. Surgery is also no longer indicated for atypical intraductal or lobular hyperplasias, which were previously viewed as precancerous lesions.

Surgical treatment of the very rare cases of diffuse papillomatosis (with or without atypia) should be discussed with the patient on the basis of the individual case.

Ultimately, it is the patient’s personal decision whether subcutaneous mastectomy is appropriate. All the potential drawbacks of this surgical procedure have to be clearly explained and thoroughly discussed.

Factors that argue in favor of subcutaneous mastectomy in individual patients range from psychological distress in patients with cancer phobia to detection of a BRCA1 or BRCA2 gene mutation. A family history of breast cancer can also be an indication for prophylactic mastectomy, particularly if the tissue concerned is difficult to examine using routine surveillance procedures. In the United States, prophylactic mastectomy is often considered to be indicated in patients who have cancer in the contralateral breast.

**Surgical Technique**

It should be mentioned initially that there is no surgical standard of care for subcutaneous mastectomy. Generally speaking, surgery only makes sense in conjunction with reconstruction. This increases the degree of variation, however, since the choice of reconstruction can also influence the type of resection.

Some surgeons carry out subcutaneous mastectomy in the same way as a modified radical mastectomy. A long transverse incision is made across the breast, for wide surgical exposure, and the nipple–areola complex is resected. In our opinion, this procedure should no longer be used. Instead, aesthetic factors should also be given due consideration in prophylactic surgery, as they can help minimize physical and psychological damage.

Some surgeons prefer to dissect a thicker flap of skin and glandular tissue (particularly in combination with implant reconstruction). However, this reduces the effectiveness of the procedure. Dissection on the glandular tissue achieves a 90% reduction of breast tissue. Extensive subcutaneous mastectomy, using strict subcutaneous dissection similar to a total mastectomy, removes 95–98% of breast tissue.
Fig. 8.5a–d The skin reduction technique in subcutaneous mastectomy.

**a, b** The vertically and inferolaterally pedicled flap is exposed and the periareolar region is de-epithelialized. The corners that are to be united are marked. To facilitate transposition of the nipple, the inferior periareolar dermal layer is incised, while the lateral dermal layer is spared to supply nourishment.

**c** The medial and inferior wound margins are joined after the nipple has been sutured into position.

**d** After the wound margins have been joined.
Fig. 8.6a–d Intraoperative illustrations of skin reduction mammoplasty with simultaneous subcutaneous mastectomy.

a The incision lines have been marked.
b The entire gland, including the Cooper ligaments, is resected from the subcutaneous tissue; the nipple is hollowed out and a thin layer of dermal fat remains.
c After de-epithelialization, the dermal layer is transected 2 cm below the corners of the superiorly pedicled flap. The lower dermal layer is used for additional protection of the implants after submuscular placement.
d Following submuscular placement of the implant, the nipple is moved superiorly after transection of the upper corners.
9 Modified Radical Mastectomy

Indications
Breast-conserving surgery is now regarded throughout the world as being the standard procedure for the treatment of breast cancer. However, if it is contraindicated, or if the patient so wishes, a modified radical mastectomy has to be performed. A modified mastectomy rate of 30% can be expected.

The indications for modified radical mastectomy include factors related to tumor biology, such as multicentric growth, extensive ductal carcinoma in situ, and signs of inflammation. A modified radical mastectomy may also be indicated if there is an unfavorable relation between breast and tumor size. Finally, the patient’s inability to undergo postmastectomy radiotherapy (e.g., due to a funnel-chest deformity) or difficult radiological follow-up may also be indications.

The term “modified radical mastectomy” is derives from Patey (1948), who found in comparative studies that preserving the pectoralis major—in contrast to the radical mastectomy operation using Halsted’s technique (1882)—did not compromise local tumor control. Auchincloss (1963) modified the procedure to preserve the pectoralis minor and level III nodes. The procedure is still carried out in this fashion today.

Modified radical mastectomy is defined as a total mastectomy—that is, complete removal of the mammary gland, including the nipple–areola complex. The skin envelope, including the pectoralis fascia, is preserved for primary wound closure. Level I and II axillary lymph nodes are dissected. It remains to be seen whether the nomenclature will change following the introduction of sentinel lymph-node dissection.

Surgical Technique
The skin incision in a modified radical mastectomy is oriented around the tumor site and nipple–areola complex. The advent of skin-sparing mastectomy, usually performed in conjunction with immediate breast reconstruction, has altered the concept of modified radical mastectomy (see Chapter 11). In rare circumstances, if the tumor has not infiltrated the skin, a periareolar incision can preserve the entire skin envelope. Resection with healthy margins must be ensured.

In mastectomies performed without planned reconstruction, it is necessary to resect a larger area of skin with the nipple in order to obtain good wound closure.

The preferred incision is transverse or oblique, and extends from superolateral to inferomedial. Resection of tumors high in the superomedial quadrant is challenging, in that the scar may extend into the cleavage area. Ultimately, the primary concern is local tumor control.

Grasping the superior and inferior skin flaps with ring forceps facilitates subcutaneous dissection of the gland by keeping the skin taut. Care should be taken to remove all of the glandular tissue from the subcutaneous tissue. The technically challenging steps are subcutaneous dissection and exposure of the borders of the gland. Dissection of the glandular tissue off the pectoralis muscle and resection of the pectoralis fascia (following the course of the lymphatic vessels) is technically easier, as it constitutes an anatomically well-defined layer.

Subcutaneous dissection of glandular tissue continues into the periphery—namely, from the second intercostal space into the inframammary fold and from alongside the sternum into the anterior axillary line. The glandular tissue is then dissected from medial to lateral off the chest wall or underlying muscles. Subcutaneous dissection can be performed well with scissors; for dissecting the breast tissue off the chest wall, a scalpel or electrocautery knife is recommended. There is an increased risk of bleeding near the parasternal arterial perforators and from superficial veins traveling diagonally through the upper pole of the breast. Bleeding from larger vessels entering from lateral also has to be controlled.

In modified radical mastectomy, classic axillary dissection is performed en bloc. Dissection is carried from the peripheral projections of the breast tissue over the lateral border of the pectoralis directly into the axillary adipose tissue. Further exposure is carried out as described in the section on axillary dissection in Chapter 10 (p. 227).

Sentinel lymph-node dissection can be performed through the mastectomy skin incision. After opening of the preaxillary fatty tissue, the “hot” lymph node or nodes are removed with the aid of a gamma probe.

Use of tumescent infiltration can help minimize bleeding during dissection. However, infiltration of the subcutaneous tissue should not extend to the area immediately around the tumor. Also, in high-risk patients (smokers, diabetics, and those with thin subcutaneous tissue), the epinephrine dosage should be kept low enough to avoid skin necrosis.

The functional complaints once associated with modified radical mastectomy (restricted arm motion, chronic pain due to a lack of soft-tissue coverage) are now very uncommon. However, the operation leaves a contour defect on the chest wall, which may be an even greater burden psychologically than functional impairment. Every patient should be informed about the option of immediate breast reconstruction (Chapter 11).
Fig. 9.3 a–d
a A horizontal or diagonal ellipse is incised around the nipple–areola complex and the anterior wall of the mammary gland is exposed after dissection of subcutaneous adipose tissue.

b The peripheral projections of breast tissue and the Cooper ligaments are shown here with slight exaggeration, as complete resection at this level is necessary.
c The entire gland is dissected, including the pectoralis fascia.

d Optimal exposure of the axillary region with this relatively small incision is made possible by the extensibility of the skin. The intercostobrachial nerve becomes visible after dividing the superficially coursing thoracoepigastric vein. The thoracodorsal vessels are found in the deep tissue, and the lateral pectoral artery and vein in the interpectoral region.

1 Thoracoepigastric vein ("dissection vein")
2 Thoracodorsal artery, nerve, and vein
3 Intercostobrachial nerves
Fig. 9.4a–c  The intraoperative site in a modified radical mastectomy.

a  The horizontal elliptical incision around the nipple–areola complex, with sufficient skin for tension-free wound closure.

b  The gland with resected pectoralis major fascia.

c  View of the lateral thoracic wall after modified radical mastectomy, with exposure of the border of the lateral pectoralis major, serratus anterior, and axillary region.