McCraw and Arnold's Atlas of Muscle and Musculocutaneous Flaps

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Publication

EXTERNAL OBLIQUE

ANATOMICAL CONSIDERATIONS

Surface Markings

The external oblique muscle encompasses the entire abdominal wall, extending from the midback to the lateral margin of the rectus abdominis muscle. It is easily palpated throughout its course.

Origin and Insertion

The muscle originates from the posterior aspects of the sixth to the twelfth ribs and runs obliquely downward to its broad attachment at the linea semilunaris and the inguinal ligament. The strength of the lateral abdominal wall musculature far exceeds that of the rectus abdominis muscles. This is probably the reason a ventral hernia is more common with a vertical incision than with a horizontal incision. Even though the external oblique muscle is functionally expendable, every attempt should be made to reestablish its muscular insertion.

Adjacent Muscles

The external oblique is the largest and the strongest of the flat abdominal wall muscles. It overlies the internal oblique muscle throughout its course and is partially covered by the latissimus dorsi and serratus anterior muscles posteriorly.

Vascular Pattern

The blood supply to the external oblique muscle arises from the multiple deep perforators from the sixth through the twelfth posterior intercostal vessels. These intercostal vessels enter the undersurface of the muscle near the posterior axillary line and diffusely arborize throughout the muscle. Because of this diffuse arborization it is possible to divide one or more of these major supplying vessels without harming the viability of the external oblique muscle flap. It is important to note that only a few inconsequential intercostal perforating vessels are seen anterior to the midaxillary line.

Motor Nerve

Sixth through twelfth intercostal nerves.

Sensory Nerve

Sixth through twelfth intercostal nerves.

USES

Since the external oblique muscle will "carry" all of its overlying skin, it is usually transposed to the lower anterior chest wall as a composite myocutaneous flap. This composite flap will easily reach the level of the inframammary fold and the ipsilateral fourth rib, which is the primary application of the myocutaneous flap. This not only provides an esthetic reconstruction of the lower chest wall but also provides innervated skin and muscle. The external oblique muscle flap can also be rotated inferiorly to close a hemipelvectomy defect in the absence of the ipsilateral thigh musculature.

REGIONAL FLAP COMPARISONS

When it is available, the latissimus dorsi muscle flap is the first choice for high and lateral chest wall defects. The opposite upper horizontal rectus abdominis myocutaneous (Psillakis) flap can also be used for lower anterior chest wall defects, but the rate of flap necrosis may exceed 20%, which is unacceptable for coverage of a full thickness chest wall defect. The lower horizontal rectus abdominis myocutaneous flap will predictably supply a large amount of skin to the chest wall and sternum, but it provides very little muscle bulk for the coverage of prosthetic material or exposed bone. The vertical rectus abdominis myocutaneous flap offers an excellent alternative for defects of the lower chest wall or sternum when the internal mammary vessels are intact. It can be rapidly elevated and carries a ten centimeter width of anterior rectus fascia for structural reconstitution. Although the extensive anterior rectus fascial donor site usually requires a prosthetic repair, the midline skin closure can be accomplished without undermining.

The external oblique muscle can also be directly transposed into the hemipelvectomy defect. This inferior rotation is accomplished by simply separating the external oblique muscle from its lower chest wall attachments and relocating its muscular insertion. Only the opposite inferiorly based rectus abdominis myocutaneous flap will provide comparable coverage in the absence of the ipsilateral leg musculature. When a colostomy is required, the inferiorly based rectus abdominis flap is not as desirable for the closure of a hemipelvectomy defect because prosthetic mesh is needed to repair the rectus abdominis donor defect.

DISADVANTAGES

The primary disadvantage of the external oblique flap is its limited arc of rotation, which restricts its usefulness. The multiplicity of the intercostal blood supply is more an apparent than a real disadvantage. It would be

difficult to harm these vessels unless the dissection is carried beyond the posterior axillary line. The donor site closure offers a potential site for hernia formation, but this has not been observed.

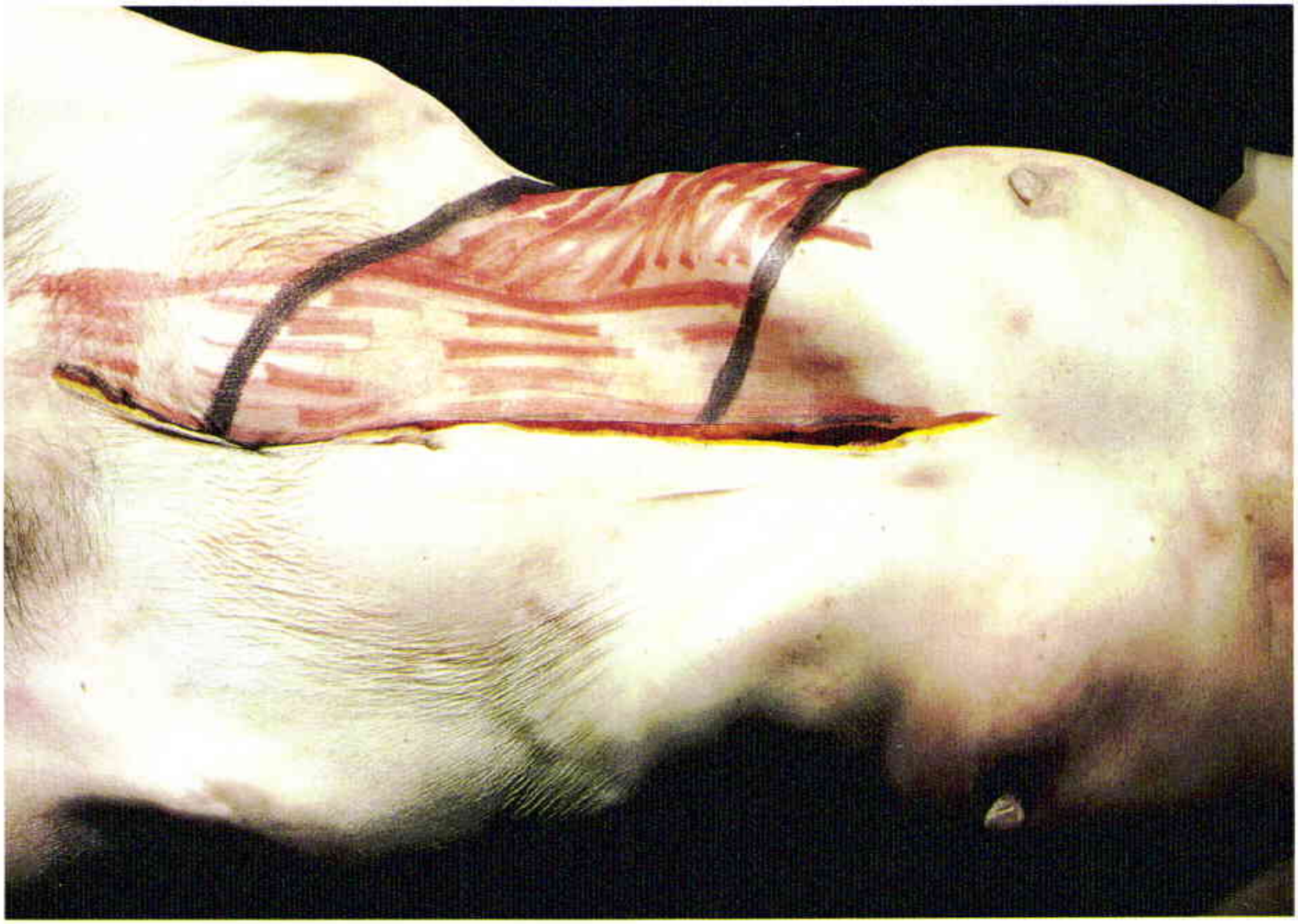
ADVANTAGES

The primary advantage of this flap is that it will close a significant lower anterior chest wall defect with skin of similar color and texture without distorting the level of the breast. This is a positive esthetic consideration in women. It is a thin musculocutaneous flap which maintains its sensation and motor capabilities.

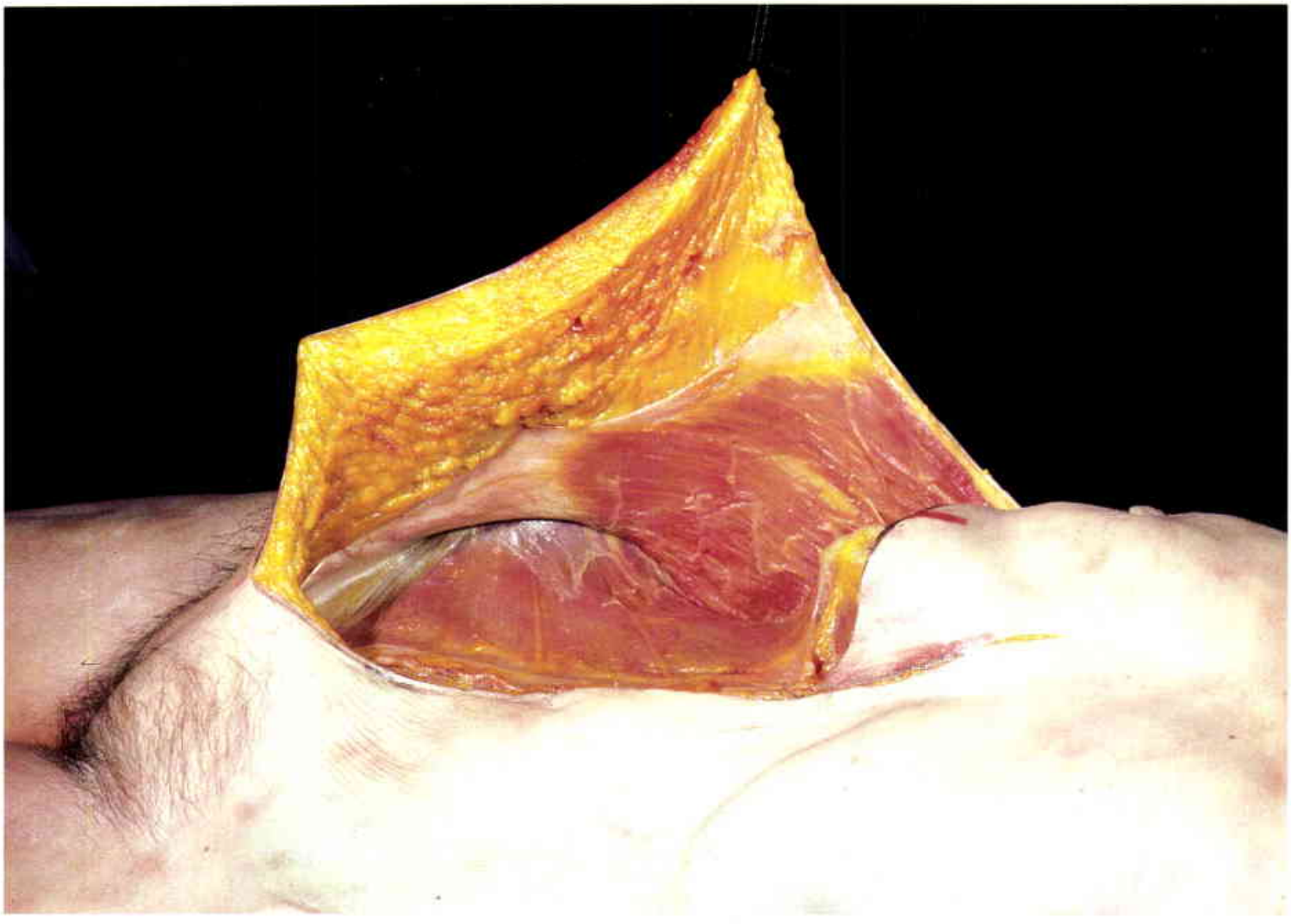
COMPLICATIONS, PITFALLS, AND DONOR SITE

The complications associated with the external oblique flap include those which can be expected from any extensive dissection: hemorrhage, infection, and seroma formation. If the external oblique muscle is separated from the overlying skin, it is important to leave the superficial fascia with the skin layer. This separates the musculocutaneous flap into a muscle flap and a fasciocutaneous flap. Inclusion of the fascia with the skin ensures the best possible blood supply to the skin. It is also helpful to include a small strip of anterior rectus fascia with the external oblique muscle flap. This provides a dense fascial layer for suturing this friable muscle.

The donor site can be closed in a V-Y fashion, but a small skin graft is also quite acceptable in the lower abdomen. Hernias have not occured with the simple transposition of the external oblique muscle flap, but great care must be exercised to avoid denervating the rectus abdominis muscle because this can result in a central abdominal weakness.

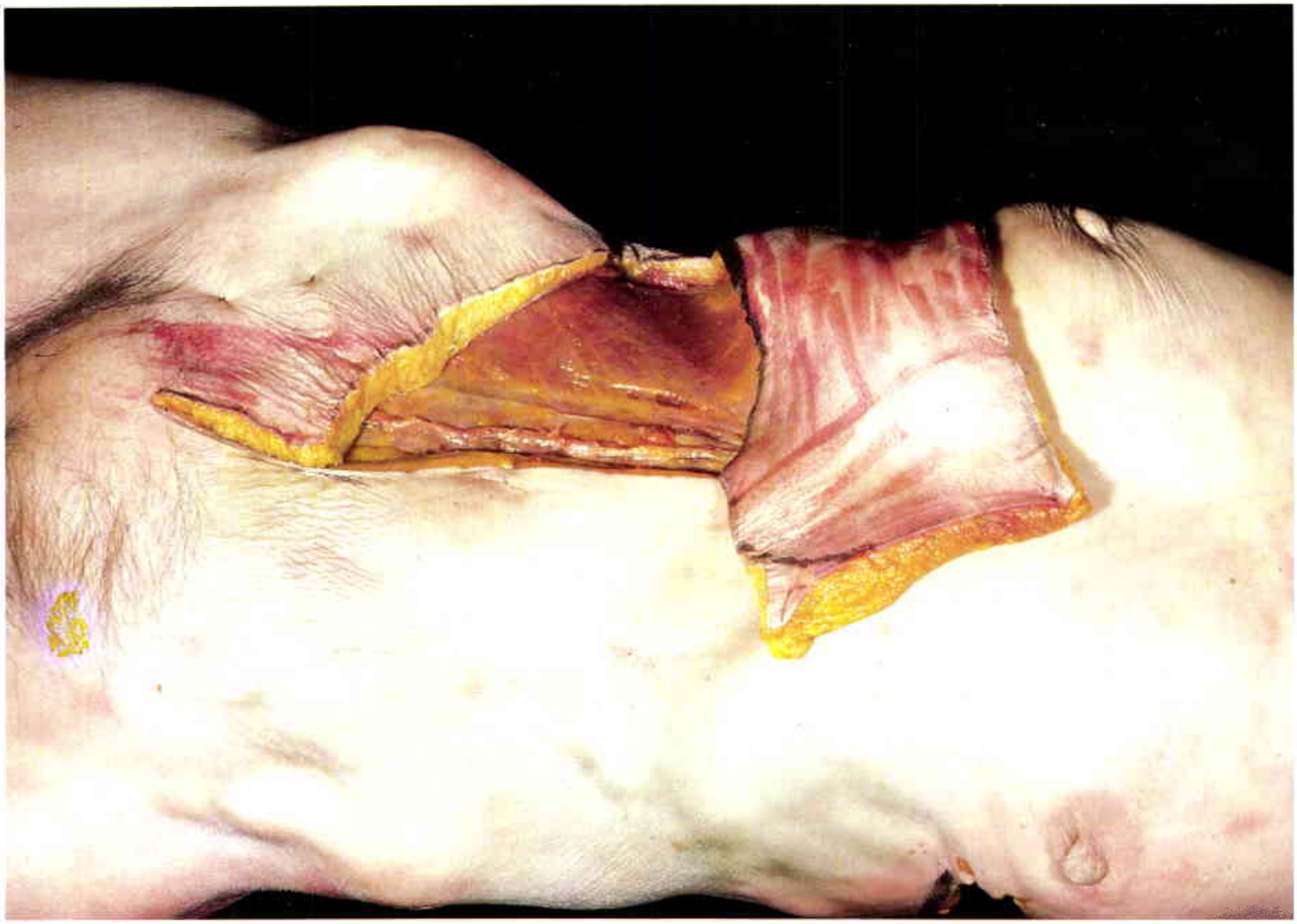


1
The fibers of the right external oblique muscle are marked in red and outlined in black. The vertical fibers of the right rectus abdominis muscle are also marked in red.



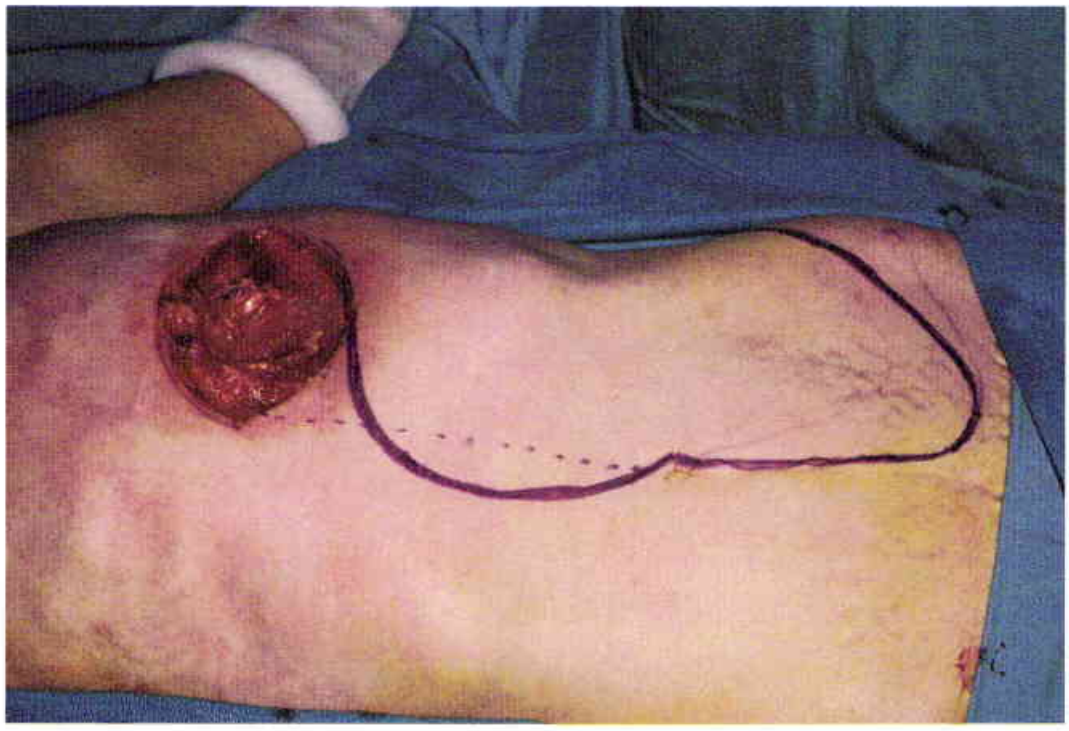
2
Elevation of the musculocutaneous flap is begun at the midline. The external oblique muscle has been elevated away from the internal oblique muscle after the semilunaris ligament has been detached. Note the easy plane of dissection between the external and internal oblique muscles.

3
The external oblique musculocutaneous flap is elevated to the level of the anterior axillary line.

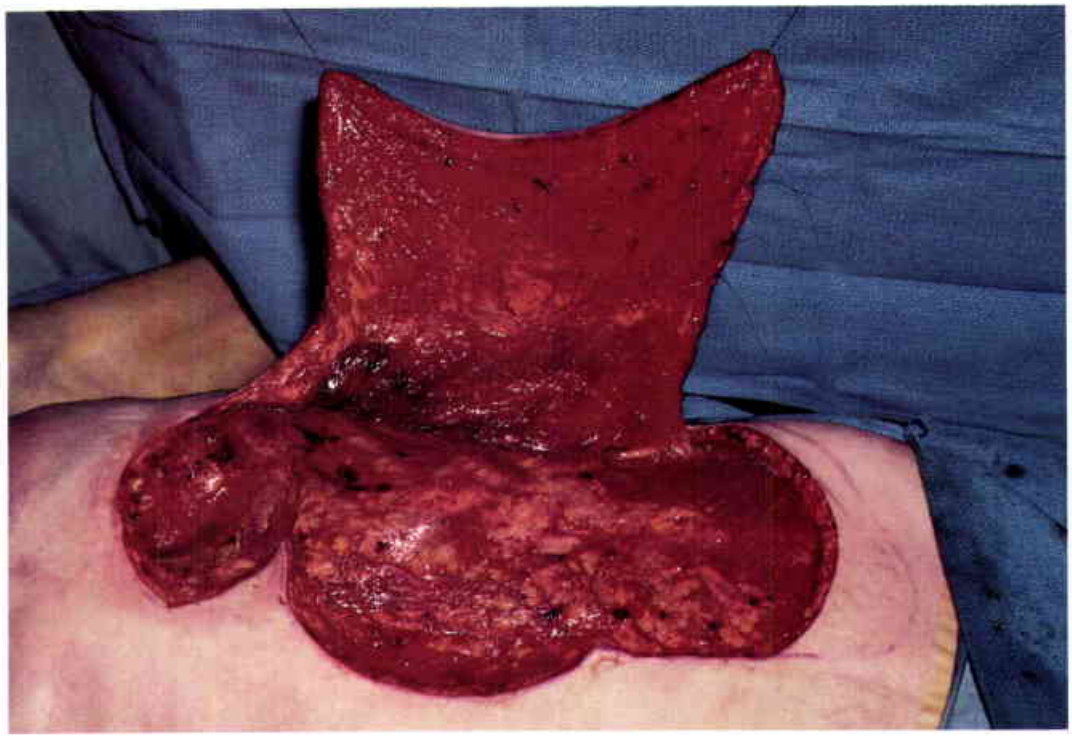


4
Musculocutaneous flap rotated superiorly to the level of the inframammary fold. Note the coverage of the lower sternum.

5
Sixty-two-year-old female following a wide excision of a radiation ulcer of the lower chest wall. The patient had previously undergone a bilateral mastectomy and irradiation therapy. (Case of P.G. Arnold)

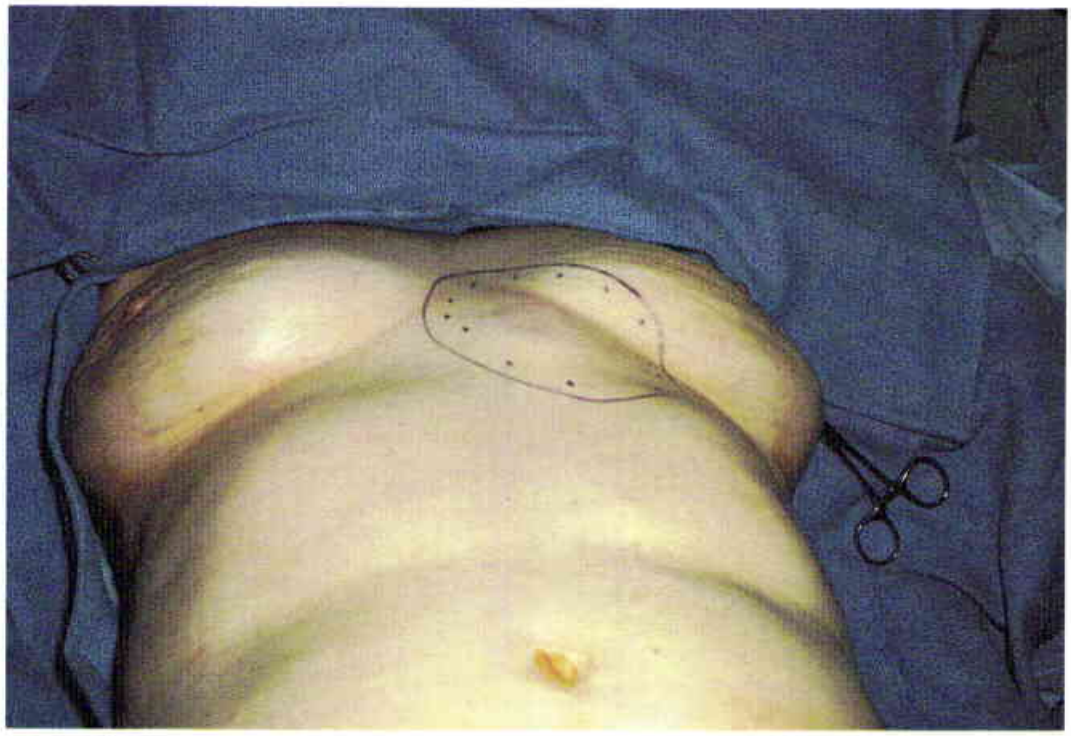


6
Outline of an external oblique myocutaneous flap which extends past the midline.

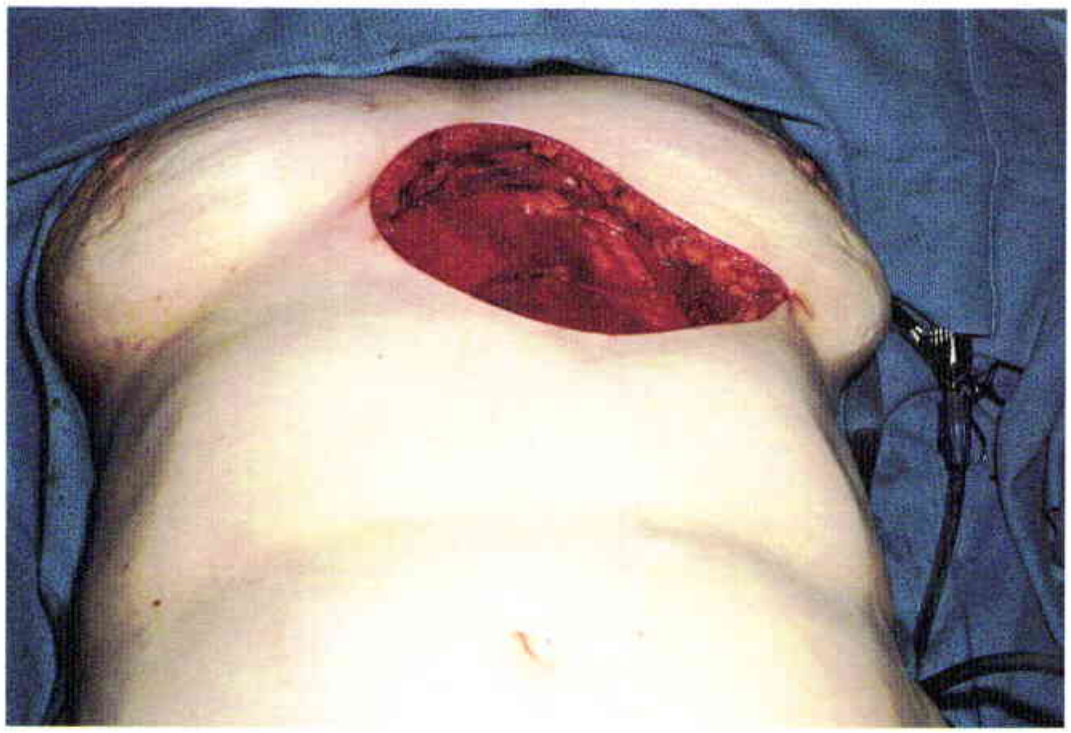


7
External oblique flap elevated to the level of the midaxillary line.

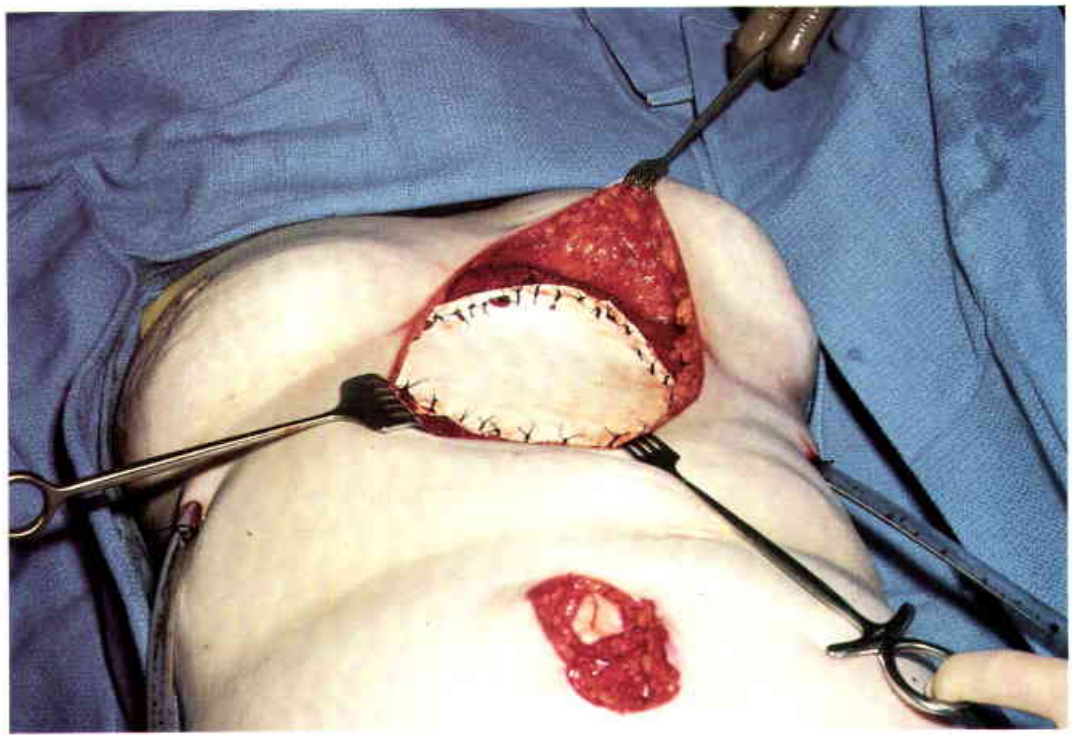
8
Postoperative view at three weeks. Healing skin graft on the internal oblique muscle.



9
Forty-year-old female with a biopsy proven desmoid tumor of the lower chest wall. The extent of the lesion is marked in blue. (Case of P.G. Arnold)

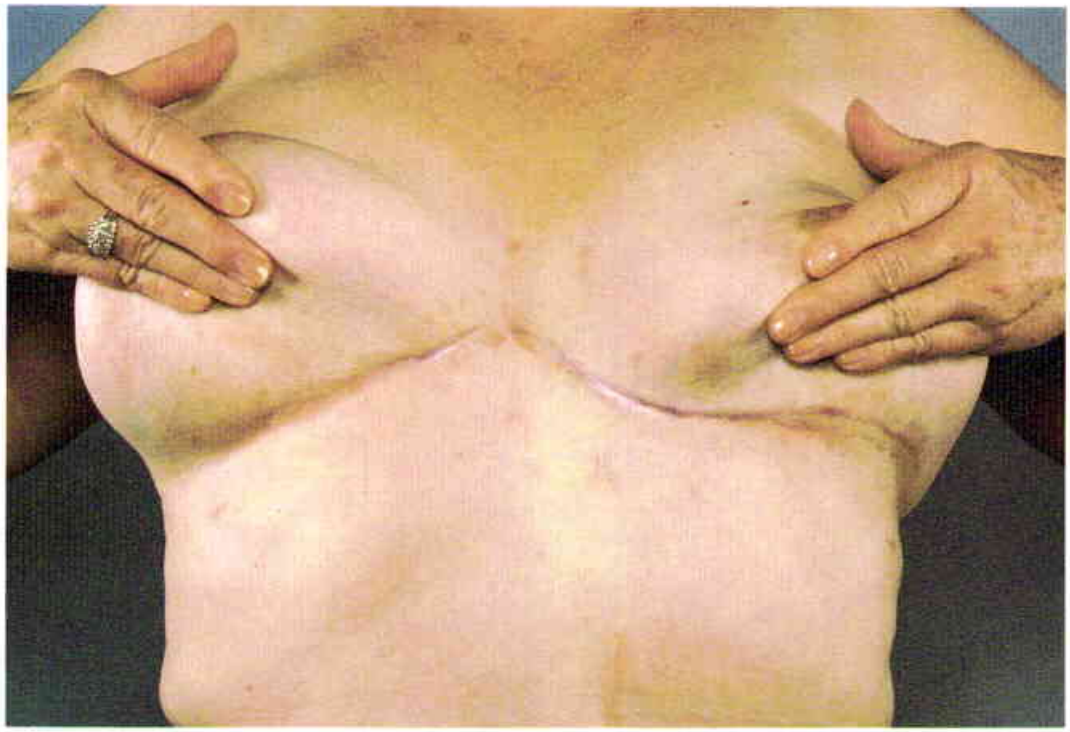


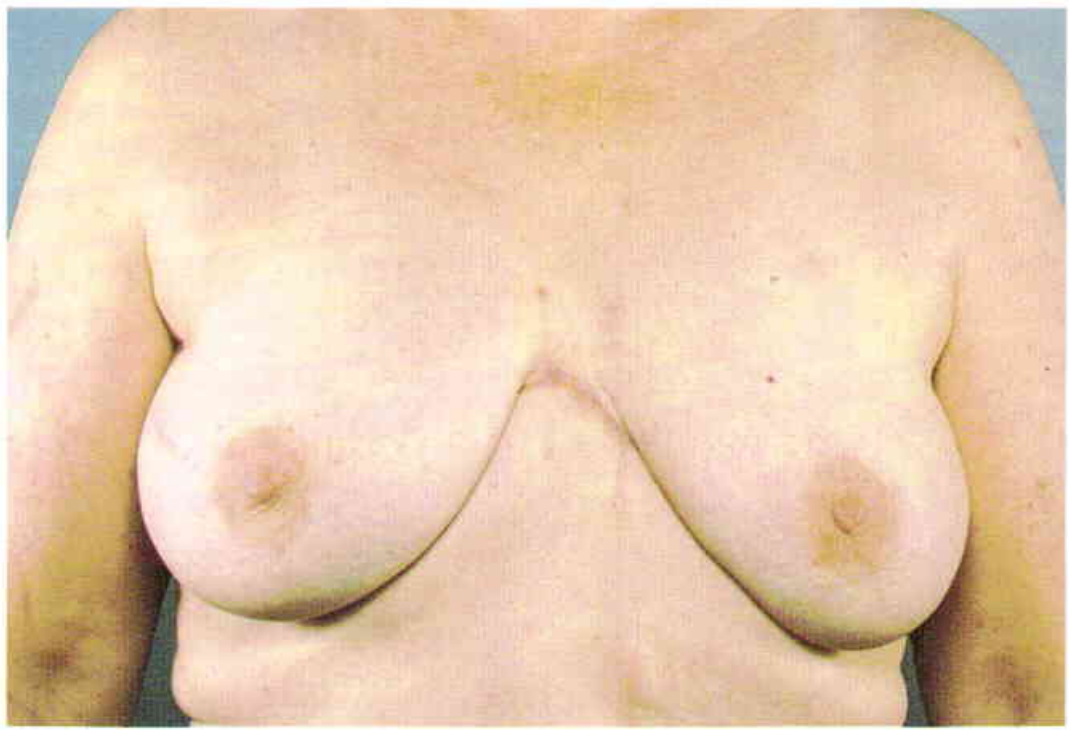
10
Defect following the wide excision of the lesion including the chest wall.



11
The chest wall defect was reconstructed with a Gortex® patch.

12
Bilateral external oblique musculocutaneous flaps were advanced superiorly for a distance of seventeen centimeters and closed as a "reversed" abdominoplasty.

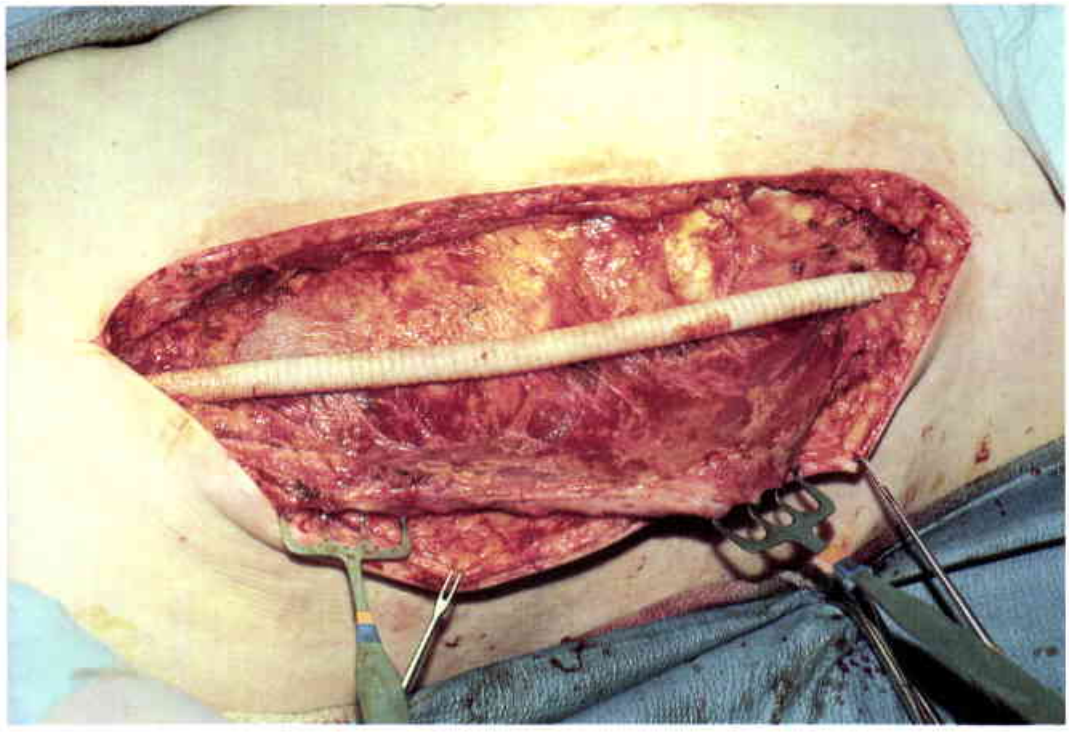




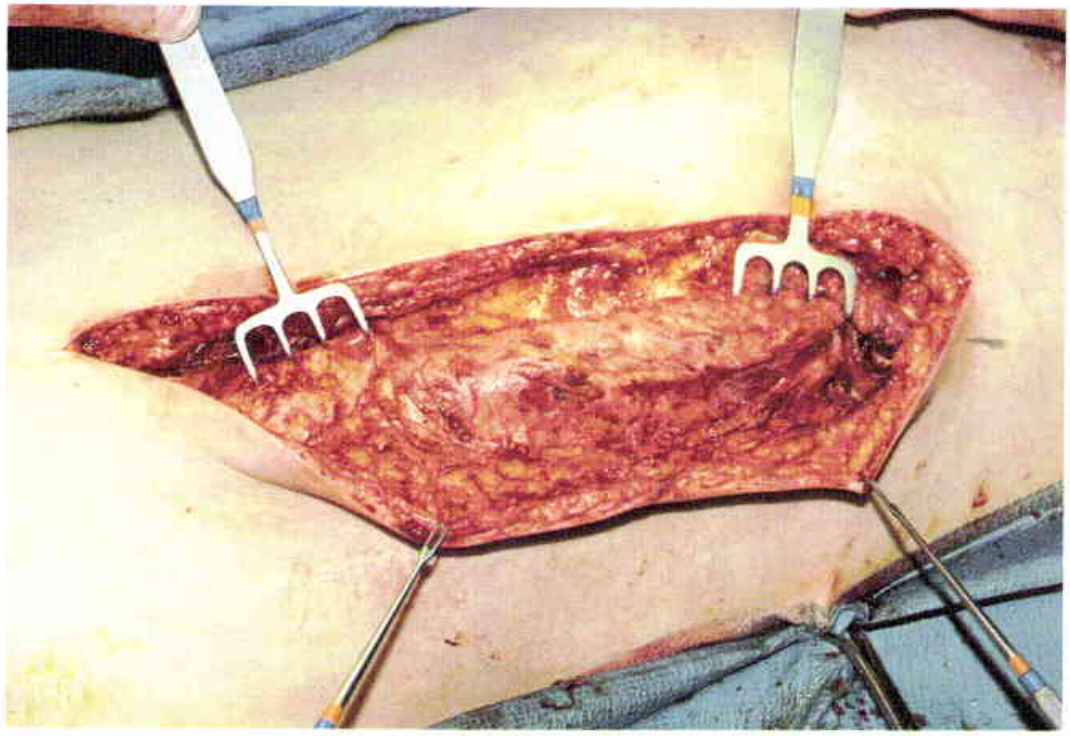
13, 14

Appearance of the patient one year later demonstrating the inframammary closure and the undisturbed breast contour.

15
Infected axillo-femoral bypass graft. A thrombectomy incision site is draining in the midportion of the graft. (Case of J.B. McCraw and R.T. Gregory, Jr.)



16
The pseudosheath was completely excised and the wall of the Dacron® graft was found to be uninfected. The vascular graft was then transposed from a subcutaneous location to a submuscular location beneath the external oblique muscle, which is retracted.



17
Demonstration of the external oblique muscular coverage of the midportion of the graft.

18
Healed incision at three months. The axillo-femoral graft was salvaged for a period of three years.

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