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CHEST-WALL RECONSTRUCTION USING THE EXTERNAL OBLIQUE MUSCLE

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Transposed muscle is invaluable material in the repair of chest-wall defects following resection. The strength of the muscle, its size and good blood supply make it suitable for pleural seal, stabilisation and mediastinal protection. The muscle provides an excellent surface for skin grafts and if more stabilisation of the chest wall is needed, a free bone graft can be inserted at the same time.

We report the use of the external oblique muscle in the reconstruction of the chest wall after resection of a large radionecrotic ulcer.

CASE REPORT

A 31-year-old woman with a 9-year history of nodular sclerosing Hodgkin's disease presented with chills, fever, loss of weight and an ulcer (8 × 14 cm) over the front of the left side of the chest. On separate occasions, she had received 3,200 rads to the right axilla and the left side of her neck, 3,800 rads to the mediastinum and 2,000 additional rads to the right axilla. After 6 years of remission, she developed enlarged glands in the left axilla and was given 4,200 rads to the left supraclavicular and left axillary regions, followed by chemotherapy. Eighteen months before her referral to the Mayo Clinic, a biopsy from a subcutaneous nodule on the left lower chest wall failed to confirm Hodgkin's disease. However, drainage from the biopsy site continued for 18 months, the wound did not heal and she developed a large ulcer which was considered to be a radionecrotic lesion (Fig. 1).

There was no clinical or radiologic evidence of recurrence of the original Hodgkin's disease.

OPERATION

Excision of the radionecrotic area involved the left border of the sternum, the xiphoid cartilage, all costal cartilages from T-4 to T-10 and portions of the fifth to the ninth ribs (Fig. 2A and B). Histological examination showed active Hodgkin's disease in the ribs and the mediastinum. The chest was closed by direct suture of the anterior diaphragm to the superior aspect of the bony defect. The chest-wall defect was repaired by mobilising the entire left external oblique muscle. The muscle was sharply divided from the left rectus muscle but a small portion of the rectus sheath was left attached to the inguinal ligament (Fig. 3A and B). A few perforating intercostal vessels were encountered piercing the internal oblique muscle close to the anterior axillary line; otherwise, the dissection between the external and internal oblique muscles was quick and easy. A distal back cut allowed the muscle to be rotated into the defect. The muscle was sutured to the sternal periosteum and intercostal muscles: the aponeurotic portion, which had been saved, provided excellent purchase for the interrupted stitches (Fig. 4).

The skin defect (10 × 16 cm) was much smaller than the underlying bony and muscular defect: it was closed by a local skin flap with a meshed skin graft to the secondary defect (Fig. 5A and B).

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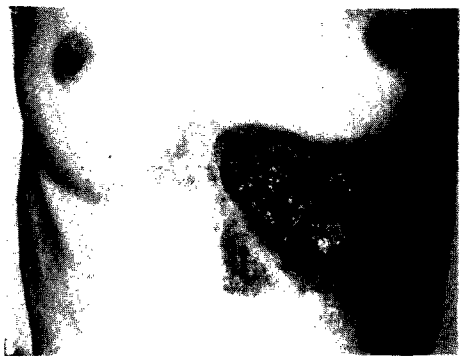

FIG. 1. Necrotic ulcer (14 × 8 cm) of the anterior chest wall.

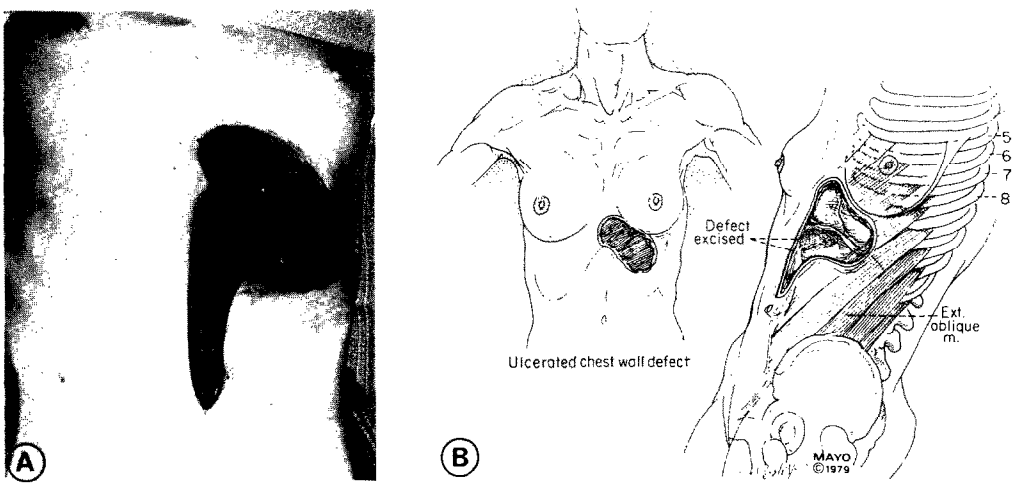

FIG. 2. A. The chest-wall defect after excision of the ulcer, including resection of the sternum, xiphoid cartilage, costal cartilages and ribs. B. Drawing to show the site of the lesion and the extent of the excision required.

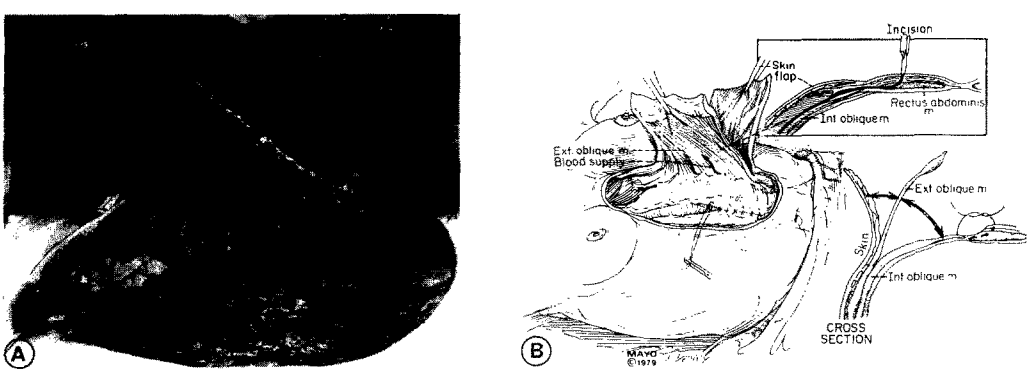

FIG. 3. A. External oblique muscle detached from the rectus sheath and inguinal ligament ready for rotation into the defect of the chest wall, showing the neurovascular pedicles. B. Drawing to show the design of the muscle flap.

FIG. 4. The external oblique muscle flap sutured into position to close the defect of the chest wall.

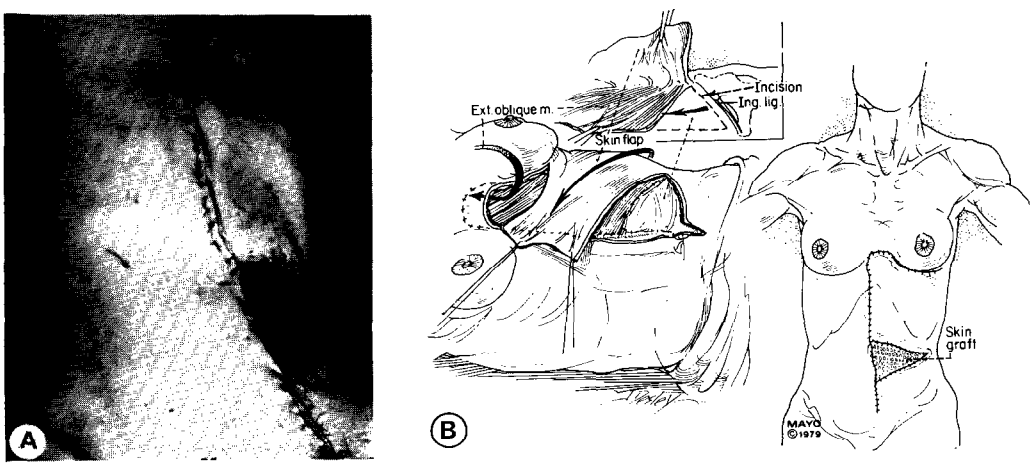

FIG. 5. A. Abdominal skin flap transposed to close the skin defect. B. Drawing to show the detail of the skin closure.

Convalescence was uneventful. At follow-up 4 months later the patient presented a well-healed wound, a stable chest wall and no distortion of the breast (Fig. 6).

DISCUSSION

Resection of the chest-wall is usually required in the treatment of malignant disease involving the thorax or the excision of radionecrotic ulcers.

Often these defects can be closed quite safely and satisfactorily with large local skin flaps, based on the lateral thoracic, intercostal, acromioclavicular, and internal mammary vessels. The split-breast technique described by Schepelmann (1924) is another reliable but mutilating procedure.

FIG. 6. Postoperative result 4 months later.

Omentum has been used during the last decade to reconstruct the chest wall (Dupont and Menard, 1972; Jurkiewicz and Arnold, 1977; Woods *et al.*, 1979), but its main disadvantage is that it requires a laparotomy and a separate thoracic skeletal reconstruction if the full thickness of the chest wall is removed.

Various muscles has also been used in chest wall reconstruction. To repair manubrial and upper sternal defects, the pectoralis major muscles may be transposed either singly or together (Brown *et al.*, 1977); Arnold and Pairolero, 1979) and may incorporate the overlying skin as a compound myocutaneous flap (Hueston and McConchie, 1968).

For defects of the upper portion of the chest, the latissimus dorsi muscle, on its own or as a myocutaneous flap, has been used. (Campbell, 1950; McCraw *et al.*, 1978). The use of the serratus anterior muscle with split ribs has been described by Pers and Medgyesi (1973) and other muscles such as the rectus abdominus and trapezius have been used as pedicle muscle flaps.

The abdominal wall muscles are large, flat structures with a multisegmental vascular supply: the external oblique muscle, being the largest and most superficial, is ideal for transposition into defects below the fourth rib. Its value has been known for many years: indeed Hershey and Butcher in 1964 reported the closure of large upper abdominal and chest-wall defects as well as lower abdominal wall defects utilising this muscle.

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