



Use of the inferiorly based rectus abdominis flap for inguinal and perineal coverage—low venous pressure zone concept

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SUMMARY. The authors report 8 cases of coverage of the inguinal and perineal areas with the inferiorly based rectus abdominis myocutaneous flap. This flap seems to be the technique of choice for coverage of such defects. The design of the flap can be explained by the low venous pressure zone concept.

The rectus abdominis flap based on a distal pedicle was described by Taylor in 1983.¹ It can be used both as a pedicle flap and as a free flap.

We report here our experience using it as a pedicle flap for inguinal and perineal coverage.

Patients and methods

Eight patients with defects of the inguinal or perineal areas were included in this study. They were 3 females and 5 males with an age range of 16-73 years. The mean age was 45 years.

Surgical technique

The flap axis is in line with the tip of the scapula and the umbilicus (Fig. 1). Harvesting starts distally and includes the deep areolar tissue in contact with the

aponeurosis which contains a rich microvascular network. Dissection then proceeds to the lateral border of the rectus abdominis muscle. The superficial rectus sheath and the muscle belly are then divided distally. 1-2 cm of rectus sheath is spared both laterally and medially to facilitate abdominal wall repair (Fig. 2). The proximal rectus sheath is divided longitudinally to expose the muscle belly and the nutrient epigastric pedicle. The muscle is lifted from the deep rectus sheath proximally, being careful not to injure the areolar tissue posteriorly. The epigastric pedicle enters the muscle at a variable level² and this will determine the amount of muscle to be harvested under the skin. The pedicle is exposed down to its origin on the external iliac vessels. This flap has a rotation arc which allows it to reach the contralateral inguinal area and the upper third of the thigh easily.

Repair of the abdominal wall defect can be accomplished in different ways:

1. primary closure of the rectus sheath
2. synthetic mesh fabric
3. flipping over of the contralateral superficial aponeurosis, especially if septic complications are anticipated.

Results (Table)

This study included 8 patients. The flap was used to cover inguinal or inguinoscrotal defects in 5 patients, the proximal part of the thigh in 2 patients and the perineal area in 1 patient.

In 2 patients a contralateral flap was used because the epigastric artery was not available on the same side.

The largest flap measured 29 cm × 14 cm. There were no flap failures. The closure of the donor site was performed primarily in 2 cases, with aponeurosis plasty in 2 and with a synthetic mesh in 4.

Case reports

Case 3

31-year-old male with left inguinoscrotal necrosis following radiation therapy for metastatic epidermoid carcinoma of

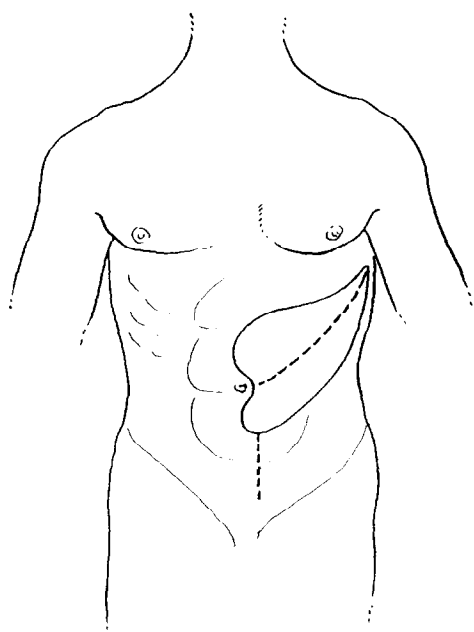


Fig. 1

Figure 1—Design of the flap.

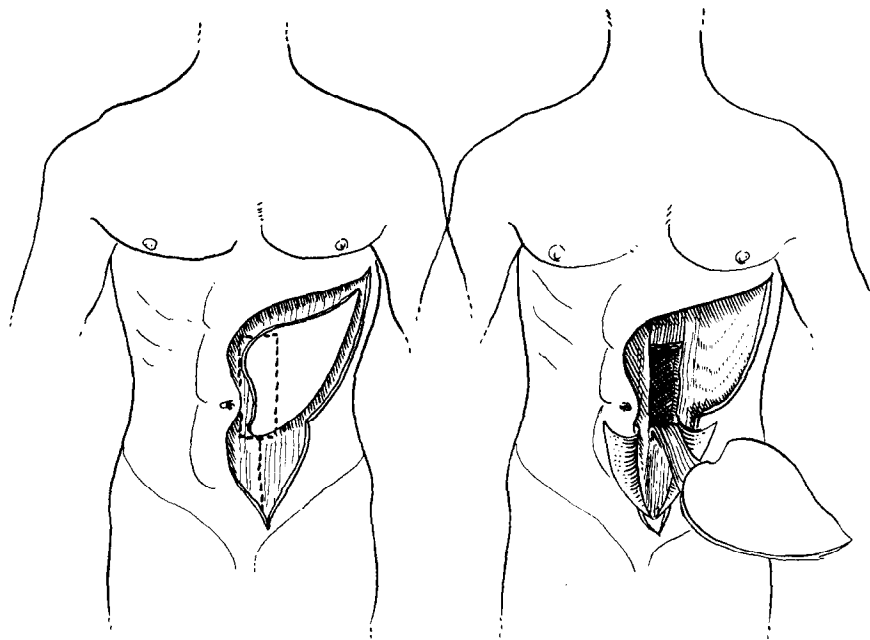


Fig. 2

Figure 2—Harvesting of the flap.

Table Results

Sex	No.	Age	Aetiology	Region	Side	Size flap (cm)	Side	Closure of the donor site
F	1	36	Radionecrosis	Inguinal	R	17 × 14	L	External oblique skin graft
M	2	44	Dermatofibrosarcoma	Proximal thigh	R	23 × 13	R	Synthetic mesh
M	3	31	Radionecrosis	Inguino-scrotal	L	18 × 12	R	Rectus sheath
F	4	55	Radionecrosis	Inguinal	L	16 × 10	R	Primary closure
M	5	16	Scarring	Inguinal	L	29 × 14	L	Synthetic mesh
F	6	35	Neurofibrosarcoma	Inguinal	L	25 × 7	L	Synthetic mesh
M	7	70	Sarcoma	Proximal thigh	L	22 × 12	L	Synthetic mesh
M	8	73	Radionecrosis	Perineal	L	16 × 10	L	Primary closure

the glands (Fig. 3). An 18 × 12 cm right sided flap was used to cover the defect (Figs 4, 5).

The donor site was closed with the inverted rectus aponeurosis from the opposite side.

Case 5

A 16-year-old male with post traumatic scarring of the left inguinal area with secondary lymphoedema (Fig. 6). An ipsilateral flap (29 × 14 cm) was used to cover the excised area and a synthetic mesh to close the donor site (Fig. 7).

Case 6

A 35-year-old female was seen after multiple procedures on the left inguinal area for neurofibrosarcoma. A large skin excision was needed (25 × 12 cm). A portion of the femoral artery and vein was also resected and reconstructed with a saphenous autograft. The defect was filled with a left sided flap (25 × 7 cm). The donor site was closed using the rectus aponeurosis reinforced with synthetic mesh.

Case 8

This 73-year-old male was operated on for a recurrent spinocellular epithelioma of the base of the penis and

received radiation therapy (Fig. 8). The soft tissue defect included the genital area down to the pubic bone and the ischiopubic rami. A 16 × 10 cm left sided flap with proximal muscular extension was used to fill the cavity (Fig. 9).

The aponeurotic portion measured 8 × 5 cm with preservation of two musculocutaneous perforators arteries. The inferior pedicle was muscular. The donor site was primarily closed.

Discussion

Taylor described the inferiorly based rectus abdominis myocutaneous flap in 1983.¹ This flap is vascularised by the inferior epigastric vessels and the para umbilical myocutaneous perforators. Boyd *et al.*³ showed that the inferior epigastric arteries supply the skin over most of the anterior abdominal wall. The myocutaneous perforators are mostly in the para umbilical area and have anastomoses with their adjacent cutaneous territories: inferior superficial epigastric artery, superficial iliac circumflex artery, superior epigastric artery and intercostal arteries. The latter are the most important. The most reliable flap follows an axis between the umbilicus and the tip of the scapula,



Fig. 3



Fig. 4

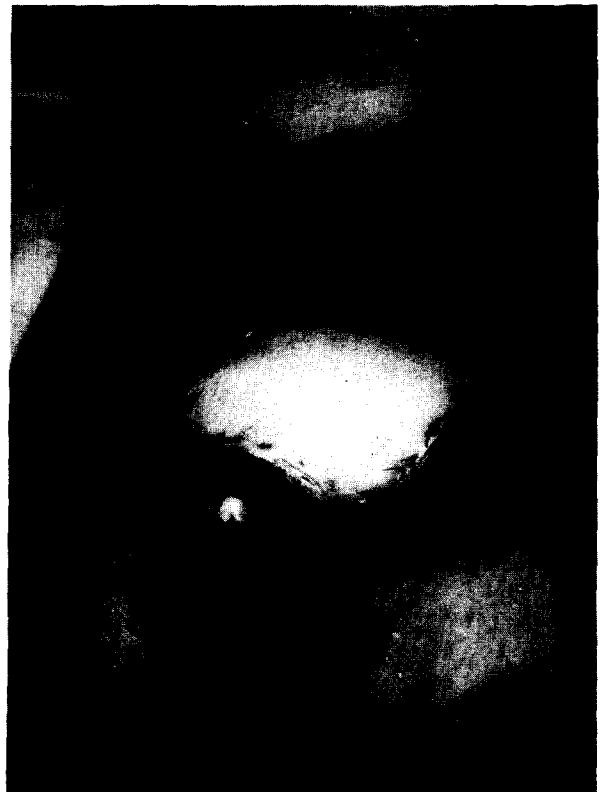


Fig. 5

Figure 3—Case 3. Preoperative view. Figure 4—Case 3. Design of the flap. Figure 5—Case 3. Postoperative view.

but variations based on the para umbilical perforating network are also possible.² The lateral edge of the flap can reach the mid-axillary line and the flap can

measure up to 30×20 cm.^{4,5} Among the various myocutaneous flaps, the rectus abdominis flap has ideal qualities: a large cutaneous area with minimal



Fig. 6



Fig. 7

Figure 6—Case 4. Preoperative view. Figure 7—Case 4. Postoperative view.



Fig. 8



Fig. 9

Figure 8—Case 5. Preoperative view. Figure 9—Case 5. Postoperative view.

skin muscle interface. Blood flow initially destined to the muscle belly is redistributed to the skin, extending to the adjacent cutaneous networks. This is done predominantly proximally and laterally towards the intercostal system. Servant and Revol^{6,7} have used the low venous pressure zone concept to explain this phenomenon. They define low venous pressure zones (axillary, xyphoid, inguinal areas) where the venous return flows directly in large calibre veins. In these zones, cutaneous and subcutaneous venous networks are poorly developed. Away from these zones, the cutaneous and subcutaneous networks are more developed and have more interconnections. The Taylor flap follows this principle: the cutaneous portion of the flap can be extended the furthest away from this low venous pressure zone (Fig. 10).

For inguinal area coverage, other methods may be used. An inferiorly based rectus abdominis flap can be lifted with a longitudinal strip of skin overlying the muscle belly.^{8,9} This flap is less appealing to us because

of the excessive amount of aponeurosis harvested, making abdominal wall repair more difficult. The fascia lata flap is more difficult to position and the donor site cannot always be closed primarily. The gracilis flap is not very reliable and comes with a limited amount of skin. The sartorius flap can be used only for relatively small defects.¹⁰ A contralateral inguinal flap can also be used.

The inferiorly based rectus abdominis flap is the technique of choice for coverage of inguinal soft tissue losses: raising it is simple, reliability is excellent and the skin is available in significant amounts.

When lifted free on its pedicle (vascular island), the extensive rotation arc allows easy positioning of the flap over the inguinal or perineal defect.

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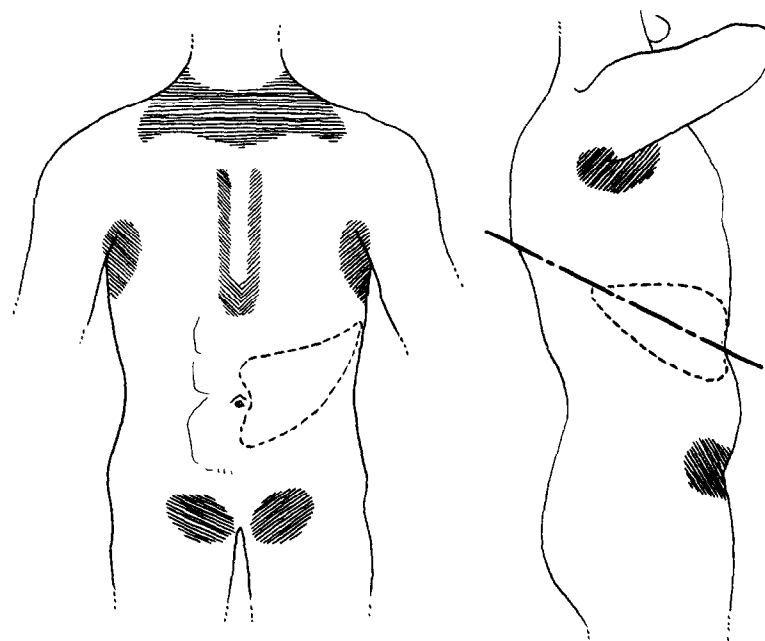


Fig. 10

Figure 10—Low venous pressure zones.

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