

# Sleeve Advancement Anorectoplasty for Complicated Anorectal/Vaginal Fistula

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Transanal flap-advancement procedures for complicated anorectal or rectovaginal fistula may include vertically incised flaps, horizontal flaps, and tubal flaps. Anatomic and pathologic considerations affecting choice of the three major techniques are examined in the context of their historical development over the last century. Application of the tubal (or sleeve) advancement principle is described in a woman whose combined rectovaginal and cryptogenic fistulas encompassed more than one-third of her anal circumference, necessitating surgical modifications beyond those afforded by previously documented techniques. Obliteration of disease and preservation of sphincteric competence were the achieved objectives of the procedure. Rationale for the procedure and technical details of the sleeve advancement anorectoplasty are described, mindful of the surgical antecedents of this therapeutic option. [Key words: Anal fistula; Anal sphincter; Endoanal excision; Flap advancement; Rectal fistula; Rectovaginal fistula; Anorectoplasty; Crohn's disease; Rectal trauma; Surgical technique]

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Endoanal advancement procedures for advanced or complicated anorectal disorders have now experienced over a century's evolution, beginning with Whitehead's hemorrhoidectomy<sup>1</sup> and subsequently expanding to other conditions, including fistula. Current surgical literature for fistula suggests simple surgical fistulotomy for anorectal fistula of cryptogenic origin which is uncomplicated and in which surgical therapy is unlikely to threaten continence. Complicated or recurrent fistula and anterior fistula in women are often managed by endoanal flap advancement,<sup>2</sup> effectively obliterating (or removing) the internal (cryptogenic) opening and excluding it from its external communication by the "buffering" layer of a resurfaced anal canal. Low rectovaginal fistula of non-cryptogenic (*e.g.*, obstetric) origin is probably also best managed by mucosal flap advancement,<sup>3</sup> supplemented as needed by plication sphincteroplasty

if anal incontinence is present. Rothenberger *et al.*<sup>3</sup> suggest that rectovaginal fistula less than 2.5 cm in diameter is most appropriate for this technique.

Surgical principles that have evolved in the management of fistula by flap-advancement techniques (especially anterior defects) include technical fundamentals applicable to plastic, proctologic, and gynecologic surgery. First, viability of transposed tissue must be absolutely predictable, generally necessitating a flap whose basal dimension (width) is significantly greater than its resultant length after amputation of diseased tissue. Optimally, this ratio of base to length is 2:1 or greater. Proctologic fundamentals that have evolved include division of fistulous connections with the anorectal lumen, as initially suggested by Elting<sup>4</sup> and subsequently re-emphasized by Gallagher and Scarborough.<sup>5</sup> Furthermore, there is general agreement that excision of diseased crypt(s) should be performed, with construction of a flap that is thicker than only the mucosa, usually containing some of the circular muscle of the anal canal.<sup>2,3,5</sup> Moreover, with regard to rectovaginal fistula, closure of the vaginal side of the fistula is unnecessary<sup>5</sup> and possibly harmful in terms of potential restriction of postoperative drainage in a system whose gradient of pressure is clearly from rectum to vagina.<sup>5,6</sup> Finally, performance of colostomy is usually unnecessary as a part of the repair of even complicated fistulas managed by these techniques.

## MATERIALS AND METHODS

Recently, we encountered a 38-year-old woman who related multiple operations for recurrent fistulas, both cryptogenic and rectovaginal. Diseased tissue encompassed approximately one-third of her anal circumference, including multiple external openings. The patient complained of rectal pain, perianal drainage, and dyspareunia. She had been

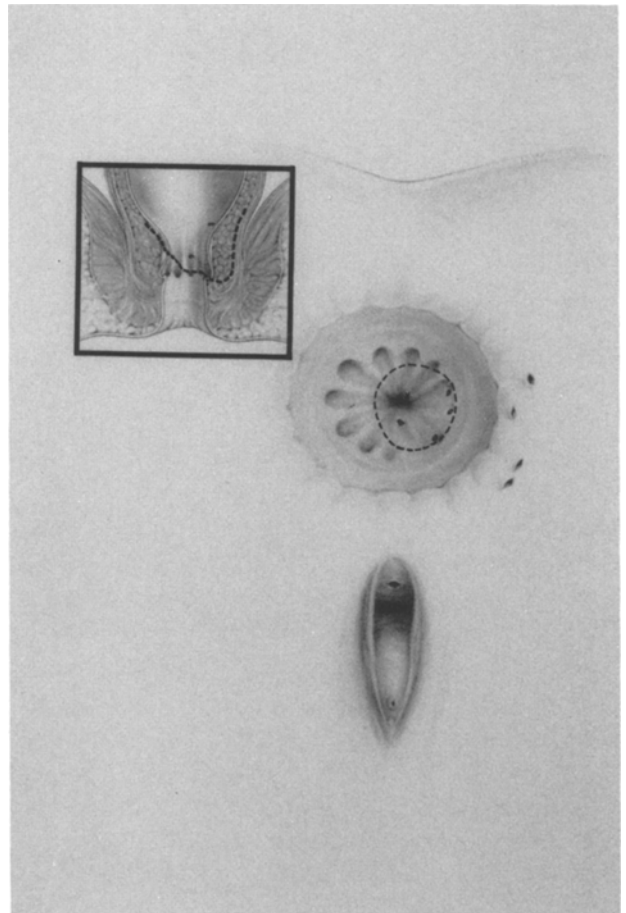
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operated upon four times previously and had recently been advised to have a colostomy. On physical examination, there was an anterior rectovaginal fistula, well epithelialized and approximately 1.0 cm in diameter, plus several additional internal and external openings on the right. There was considerable tenderness on pelvic examination. One additional internal opening, not appreciated preoperatively, was high in the rectum on the right, considerably above the dentate line, and possibly iatrogenic. Conventional flap-advancement techniques were clearly precluded in this patient by the geometric impracticality of a flap with satisfactory ratio of base to length with involvement of one-third of the anal circumference. Conventional fistulotomy techniques (with or without flap advancement) would almost certainly have resulted in incontinence. Use of setons would have necessitated an unwarranted additional extended course (also likely to predispose to incontinence), with which neither the patient nor her impatient husband would likely comply. For this reason, a tubal, sleeve advancement flap was devised to accomplish obliteration of all internal openings and appropriate mucosal resurfacing, without sphincteric disruption.

### TECHNIQUE

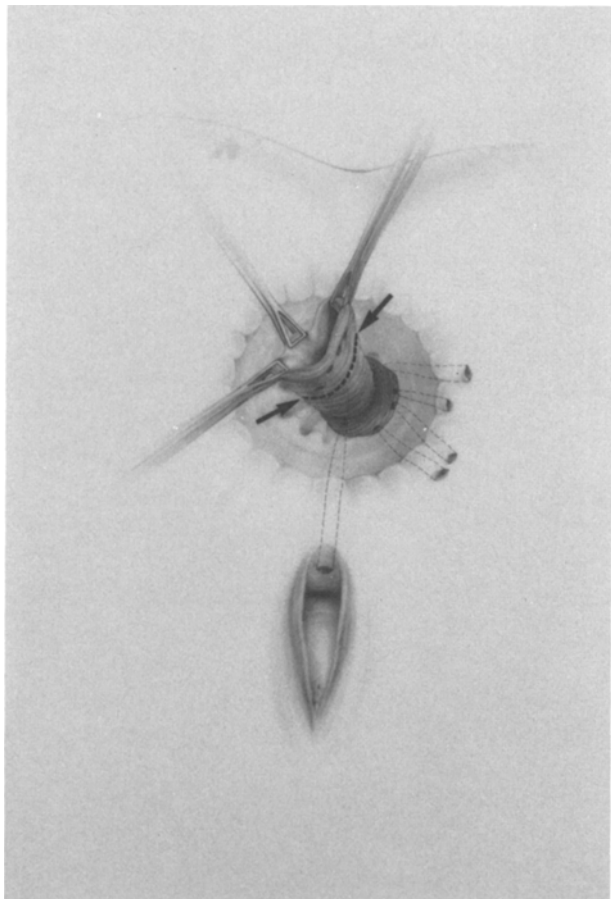
The patient was positioned in the prone jack-knife position, as for repair of conventional rectovaginal fistula, allowing comfortable visualization of the anorectum, especially of its diseased portion. A circumferential incision was made encompassing both the cryptogenic and rectovaginal openings within the anal canal, as shown in Figure 1. By definition, this lowest portion of the incision was therefore just below the dentate line and below the involved crypts anteriorly and to the patient's right. As the *uninvolved* tissue in the remaining two-thirds of the anal canal was circumscribed, the incision was made more cephalad, leaving a full 1.5 cm above the dentate line directly opposite the diseased right anterior segment. This "diagonal" incision is depicted in Figure 1.

To ensure viable tissue for coverage of the diseased area, thickness of the tube was made greatest where the disease was greatest, including the mucosa, submucosa, and a portion of the circular muscle of the rectum. Anteriorly, this would include a portion of the internal anal sphincter.



**Figure 1.** Outline of incision for sleeve advancement anorectoplasty. The difference in incisional depth (thickness) on the involved (right) and uninvolved (left) sides is graphically shown in the inset.

Higher dissection was performed with scissors or an electrocoagulation scalpel, holding the left index finger within the rectum as a guide to dissection depth. As the tube was dissected from contralateral (uninvolved) tissues, the tube was allowed to become thinner, including mainly the mucosa and submucosa opposite the diseased area (Fig. 1, inset). Midline anterior dissection was largely performed by scalpel incision, crossing the fibrous scar until soft tissue above the rectovaginal fistula was encountered and sufficient circumferential mobility was attained to advance the entire sleeve distally, well beyond the point of initial incision. Care was taken to avoid entry into the vagina, the left index finger now being inserted into the vagina as a guide to this portion of the dissection. Figure 2 illustrates the tubal flap during dissection, showing the thickest portion of the tube anteriorly and to the right.

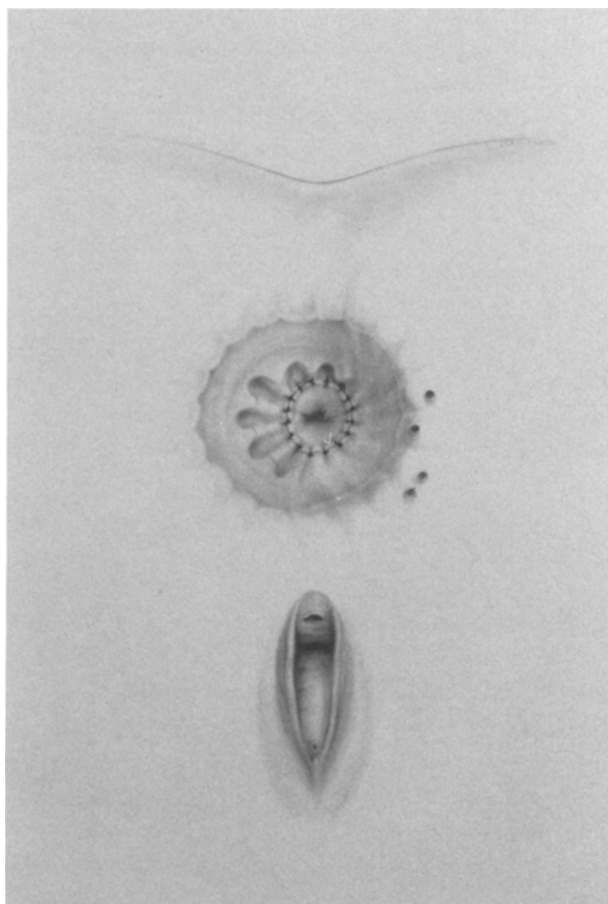


**Figure 2.** Sleeve advancement dissection shown prior to amputation. Illustration shows thickness of flap, detached vaginal and external tracts, and the line for amputation proximal to the diseased tissues (arrows).

Confirmation of division of all fistulous tracts was made by demonstration that all fibrous tissue between the rectal lumen and the periphery had been divided and that probed external openings showed no further communication with the rectal lumen. The high rectal tract above the dentate line was also divided by scissors dissection, performed blindly, using the index finger within the rectum as a guide to dissection. Transection of this tract was confirmed by subsequent failure of the probe to pass into the rectal lumen. After separation of the internal opening in this fashion, the internal opening was closed within the rectal lumen with a full-thickness, 3-0, synthetic, biodegradable mattress suture.

All excluded tracts, including the rectovaginal tract, were now vigorously curetted, disrupting and removing epithelialized or granulation tissue. External openings were enlarged with small elliptical

excisions to ensure postoperative drainage. Like the external cutaneous openings, the vaginal opening was left open after curettage. Hemostasis was ensured in the areas of dissection by pinpoint electrocoagulation, followed by copious irrigation. The distal diseased tube was then amputated above (cephalad to) the vaginal opening (Fig. 2). The rectal wall was anastomosed full thickness to the anus and anoderm along the line of the initial incision, using 3-0, synthetic, biodegradable sutures (Fig. 3); no drains or packs were used. Intraoperative and postoperative intravenous antibiotics were given, followed by bowel-holding medications, but otherwise nothing was given by mouth until spontaneous passage of flatus three days postoperatively. The patient's postoperative course was entirely uneventful, with resumption of normal bowel function, continence, and excellent healing.



**Figure 3.** Restoration of anorectal anatomy by full-thickness anastomosis, following the lines of the initial incision. The anal transition zone has been retained on the uninvolvement (left) side. Curretted vaginal and external tracts are left open for drainage.

Painless intercourse and absence of recurrence continued 13 months postoperatively, to the time of this writing. Normal resting sphincter pressure and sluggish rectoanal inhibitory reflex one year postoperatively were unchanged from preoperative values.

**DISCUSSION**

Flap-advancement techniques for resurfacing anorectal defects have evolved in three main directions (Fig. 4). These include vertically incised ("tongue") flaps, semilunar or horizontally incised ("lip") flaps, and tubal ("sleeve") flaps. The initial tube-flap concept should probably be credited to Whitehead,<sup>1</sup> whose circumferential excision of hemorrhoids was reported in 1882. Delorme's<sup>10</sup> transrectal excision of prolapsing rectal mucosa in 1900 provided a basis for the author's adaptation of this technique<sup>14</sup> and its modification for this unfortunate patient. Parkinson<sup>11</sup> also advocated circumferential muscular advancement in 1959 but described the advancement as a form of traction intussusception, unaccompanied by tubal dissection beyond

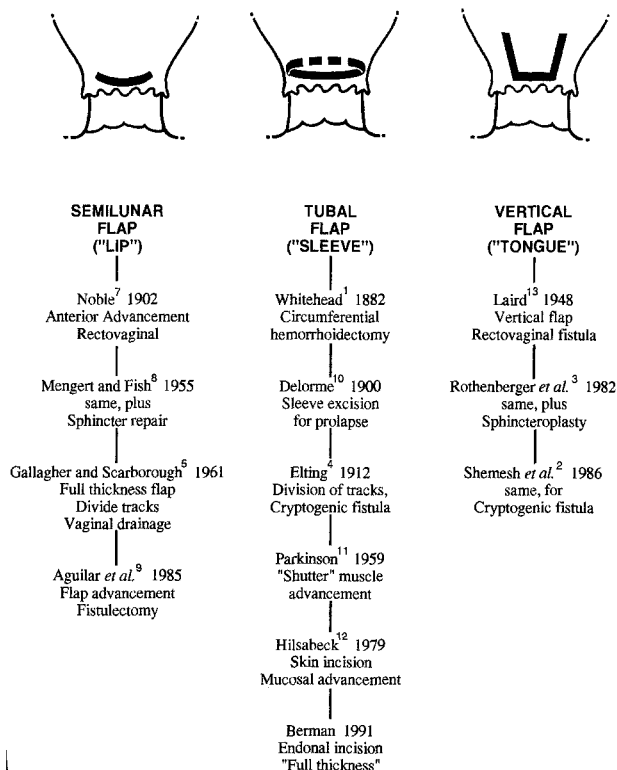
that necessitated for excision of diseased tissue. More recently, Hilsabeck<sup>12</sup> described anodermal incision, with circumferential tubal advancement comprising only the mucosa, for vaginal fistula. The technique described herein is thus a synthesis of elements of all of these authors, using endoanal incision and resulting in an amputative advancement anorectoplasty in tubal configuration.

The semilunar or transversely incised (lip) flap technique probably began with Noble's<sup>7</sup> description in 1902, which justly should be credited as the first application of such resurfacing techniques to fistulous communications. Mengert and Fish<sup>8</sup> reported a similar technique in 1955, adding anal sphincter repair where needed. Gallagher and Scarborough's<sup>5</sup> description in 1962 stressed the importance of full-thickness advancement, division of fistulous tracts, and leaving the vagina open to drain in cases of rectovaginal fistula, principles still valid in current surgical practice. A similar advancement technique was later combined with formal fistulectomy by Aguilar *et al.*,<sup>9</sup> with few recurrences but occasional problems with continence.

The concept of a formal, vertically fashioned tongue-type flap is appropriately credited to Laird,<sup>13</sup> who described his vertical advancement technique for rectovaginal fistula in 1948. This technique was later embellished by Rothenberger *et al.*,<sup>3</sup> with the addition of sphincter plication and perineorrhaphy as needed. Shemesh *et al.*<sup>2</sup> subsequently amplified upon the vertical advancement flap, applying it to cryptogenic fistula. Both of the latter series have reported excellent results and remain the staples of current surgical management for most complicated or anterior fistulas.

Vertically incised (tongue) advancement flaps are clearly most appropriate for a single fistula or where diseased tissue does not encompass a significant percentage of luminal circumference. Semilunar, transversely incised flaps may be sufficient when only minimal advancement is required. In our patient, involvement of approximately one-third of the circumference by disease necessitated a "reinvention of the wheel" to effect a predictable single-stage procedure for multiple fistulas at multiple levels. Fortunately, the transition was not difficult.

Contemporary surgical experience among colon and rectal surgeons with rectal mucosectomy for ileoanal pouches, intersphincteric proctectomy for colitis, and perineal procedures for prolapse makes



**Figure 4.** Chronologic development of the three major endoanal flap-advancement categories.

tubal advancement a fairly predictable option from a technical standpoint. In this patient, retention of a rim of over 50 percent of normal mucosa in the anal transitional zone (1.5 cm above the dentate line), while theoretically desirable, may or may not have contributed to her excellent postoperative continence and relatively normal perception regarding flatus and feces. The rectoanal inhibitory reflex was present but sluggish both preoperatively and postoperatively. Nonetheless, when challenged by diarrhea, fecal urgency has been a definite problem for her. Optimally, to whatever extent possible, initial incision should be placed *within* the anal canal, a principle equally valid for Delorme's procedure<sup>14</sup> and for the distant forerunner of these procedures, the Whitehead hemorrhoidectomy.<sup>15</sup>

Endoanal flap-advancement techniques are usually applicable primarily to patients in whom conventional techniques are likely to fail or to predispose to worsening anorectal continence. Anterior fistula in parous women, whether rectovaginal or cryptogenic, is therefore eminently suited to these techniques. Application of the tubal advancement concept is likely most applicable to rectovaginal or cryptogenic fistulas that encompass more than 2.0–2.5 cm of the luminal circumference or are more than 2.5 cm above the dentate line, or to patients with multiple internal openings. Additional applications may include multiple fistulas in patients with Crohn's disease during rectal quiescence and cases of advanced or complicated rectal trauma in which epithelial loss has been significant. Anorectal fistula in association with other benign mucosal lesions may afford a more remote indication for sleeve advancement anorectoplasty. As suggested by Rothenberger *et al.*,<sup>3</sup> repair of rectovaginal (or other traumatic) fistula should always be deferred until well after local inflammation resulting from injury has completely subsided.

### SUMMARY

Endoanal rectal mucosal flap advancement for advanced or complicated anorectal/vaginal fistula has evolved in three principal directions, simply described as tongue flaps (vertical), lip flaps (semilunar), and circumferential flaps (sleeve or tubal). Indications for application of flap-advancement techniques include fistula or other mucosal defects

in which conventional surgical techniques are likely to predispose to failure, recurrence, diminished continence, or prolonged surgical recovery. A tubal advancement amputative anorectoplasty is described as applied to a woman with multiple fistulas, both cryptogenic and rectovaginal, involving one-third of the circumference of the anal canal. Rationale and details of this sleeve-advancement technique are outlined, including other possible indications for its use when conventional surgical remedies are either impossible or inappropriate.

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