

# Practice Parameters for the Treatment of Perianal Abscess and Fistula-in-Ano (Revised)

Prepared by  
The Standards Practice Task Force  
The American Society of Colon and Rectal Surgeons

Mark H. Whiteford, M.D., John Kilkenny III, M.D., Neil Hyman, M.D.,  
W. Donald Buie, M.D., Jeffrey Cohen, M.D., Charles Orsay, M.D., Gary Dunn, M.D.,  
W. Brian Perry, M.D., C. Neal Ellis, M.D., Jan Rakinic, M.D., Sharon Gregorcyk, M.D.,  
Paul Shellito, M.D., Richard Nelson, M.D., Joe J. Tjandra, M.D.,  
Graham Newstead, M.D.

*The American Society of Colon and Rectal Surgeons is dedicated to assuring high-quality patient care by advancing the science, prevention, and management of disorders and diseases of the colon, rectum, and anus. The Standards Committee is composed of Society members who are chosen because they have demonstrated expertise in the specialty of colon and rectal surgery. This Committee was created to lead international efforts in defining quality care for conditions related to the colon, rectum, and anus. This is accompanied by developing Clinical Practice Guidelines based on the best available evidence. These guidelines are inclusive, and not prescriptive. Their purpose is to provide information on which decisions can be made, rather than dictate a specific form of treatment. These guidelines are intended for the use of all practitioners, health care workers, and patients who desire information about the management of the conditions addressed by the topics covered in these guidelines. It should be recognized that these guidelines should not be deemed inclusive of all proper methods of care or exclusive of methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding the propriety of any specific procedure must be made by the physician in light of all of the circumstances presented by the individual patient.*

## METHODOLOGY

These guidelines are built on the last set of The American Society of Colon and Rectal Surgeons

---

Correspondence to: Neil Hyman, M.D., Fletcher Allen Health Care, 111 Colchester Avenue, Fletcher 301 Burlington, Vermont 05401, e-mail: Neil.Hyman@vtmednet.org

Dis Colon Rectum 2005; 48: 1337-1342

DOI: 10.1007/s10350-005-0055-3

© The American Society of Colon and Rectal Surgeons

Published online: 17 May 2005

(ASCRS) Practice Parameters for treatment of fistula-in-ano published in 1996.<sup>3,4</sup> Pertinent information from the published literature through December 2003 was retrieved and reviewed. Organized searches of MEDLINE and the Cochrane Database of Systematic Reviews were performed. Keywords included: abscess, fistula, fistula-in-ano, anal, rectal, perianal, perianal, rectovaginal, seton, and Crohn's. Directed searches of the embedded references from primary articles also were accomplished.

Levels of Evidence and Grades of Recommendation<sup>1,2</sup>

Level	Source of Evidence
I	Meta-analysis of multiple well-designed, controlled studies; randomized trials with low false-positive and low false-negative errors (high-power)
II	At least one well-designed experimental study; randomized trials with high false-positive or high false-negative errors or both (low-power)
III	Well-designed, quasi-experimental studies, such as nonrandomized, controlled, single-group, preoperative-postoperative comparison, cohort, time, or matched case-control series.
IV	Well-designed, nonexperimental studies, such as comparative and correlational descriptive and case studies
V	Case reports and clinical examples
Grade	Grade of recommendation
A	Evidence of Type I or consistent findings from multiple studies of type II, III, or IV
B	Evidence of Type II, III, or IV and generally consistent findings
C	Evidence of Type II, III, or IV but inconsistent findings
D	Little or no systematic empirical evidence

## PERIANAL ABSCESS

## Treatment Recommendations

1. *Guideline: A perianal abscess should be treated in a timely fashion by incision and drainage. Level of Evidence: Class IV; Grade of Recommendation: B.* Most perianal abscesses arise from the occluded duct of an anal gland with subsequent bacterial overgrowth and abscess formation.<sup>5</sup> Lack of fluctuance should not delay timely drainage. Treatment goals should include incision and drainage of the abscess and the prevention of an acute recurrence by preventing the premature closure of the incision. This can be accomplished by an adequate incision or excision of the overlying skin, inserting a drainage catheter, or placement of a seton.<sup>6,7</sup> A seton often is used to control local sepsis before definitive repair of an anal fistula. Although many perianal abscesses are readily treated in an office setting, more complex infections often require examination under anesthesia to ensure adequate drainage. Serious infections, especially those occurring in compromised hosts, may require hospitalization.

2. *Guideline: Antibiotics are an unnecessary addition to routine incision and drainage of uncomplicated perianal abscesses. Level of Evidence: Class II; Grade of Recommendation: A.* The addition of antibiotics to routine incision and drainage of cutaneous abscesses does not improve healing times nor reduce recurrences and is therefore not ordinarily indicated.<sup>8-10</sup> These studies excluded patients with high-risk conditions, such immunosuppression, diabetes, extensive cellulitis, or prosthetic devices. In such situations, antibiotics should be considered.

In addition, the American Heart Association advises preoperative antibiotics before incision and drainage of infected tissue in patients with prosthetic cardiac valves, previous bacterial endocarditis, complex congenital heart disease, surgically constructed systemic pulmonary shunts or conduits, congenital cardiac malformations, acquired valvular dysfunction (*e.g.*, rheumatic heart disease), hypertrophic cardiomyopathy, and mitral valve prolapse with valvular regurgitation and/or thickened leaflets.<sup>11</sup>

## FISTULA-IN-ANO

Fistula-in-ano denotes the chronic phase of anorectal sepsis and is characterized by chronic purulent drainage or cyclical pain associated with abscess reaccumulation followed by intermittent spontaneous decompression. This is the natural history in up to 50 percent of perianal abscesses and is a result of persistent anal sepsis and/or an epithelialized track. The categorization of a fistula-in-ano is dependent on its location relative to the anal sphincter muscles according to Parks classification: intersphincteric, transsphincteric, suprasphincteric, or extrasphincteric.<sup>12</sup> The term "complex" fistula is a modification of the Parks classification, which describes fistulas whose treatment poses a higher risk for impairment of continence. An anal fistula may be termed "complex" when the track crosses >30 to 50 percent of the external sphincter (high-transsphincteric, suprasphincteric, and extrasphincteric), is anterior in a female, has multiple tracks, is recurrent, or the patient has preexisting incontinence, local irradiation, or Crohn's disease.<sup>13-15</sup>

The goals in the treatment of fistula-in-ano are 1) to eliminate the septic foci and any associated epithelialized tracks, and 2) to do so with the least amount of functional derangement. To initiate the most appropriate treatment, the etiology should be defined. This is usually cryptoglandular infection but may be related to Crohn's disease, trauma, radiation, or malignancy.

There is no single technique appropriate for the treatment of all fistulas-in-ano and, therefore, treatment must be directed by the surgeon's experience and judgment. One should keep in mind the progressive tradeoff between the extent of operative sphincter division, postoperative healing rates, and functional detriment.<sup>14</sup> Healing rates can be adversely affected by the presence of Crohn's disease or previous radiation therapy. Postoperative functional outcomes can be adversely affected by preexisting incontinence, previous mechanical sphincter injury, the amount of sphincter at risk, an anterior location in females, stool consistency, and the patient's tolerance of potential imperfections in their continence.

### Treatment of a Simple Fistula-in-Ano

1. *Simple anal fistulas may be treated by fistulotomy. Level of Evidence: Class II; Grade of Recommendation: B.* The fundamentals of fistulotomy include defining the entire fistula track from internal opening to external opening with identification and obliteration of primary and secondary tracks. Fistulotomy is preferable to fistulectomy. Despite similar recurrence rates, the latter results in larger wounds with a longer healing time and higher rates of incontinence.<sup>16</sup> Studies report great variability in the results of fistula surgery because of heterogeneous populations, differing definitions of fistula types and functional disorders, and length of follow-up. The recurrence rate for fistulotomy is generally between 2 and 9 percent with a functional impairment generally between 0 and 17 percent.<sup>17,18</sup> Any functional derangement will tend to improve for up to two years after surgery. One randomized, controlled trial reported faster healing and better preservation of anal squeeze pressures when anal fistulotomy wounds were marsupialized compared with simply laid open.<sup>19</sup>

2. *Simple anal fistulas may be treated with track debridement and fibrin glue injection. Level of Evidence: Class IV; Grade of Recommendation: B.* Fibrin glue is an easy and repeatable treatment for fistula-

in-ano with relatively few side effects and little to no risk of fecal incontinence. Successful healing rates from 60 to 70 percent can be achieved.<sup>20-26</sup> Risk factors for failure include Crohn's disease, rectovaginal fistula, human immunodeficiency virus, and short fistula length.

### Treatment of a Complex Fistula-in-Ano

The anatomy of most complex fistulas can be defined in the operating room without supplemental imaging studies. However, radiographic evaluation may be a beneficial adjunct to identify occult internal openings, secondary tracts or abscesses, or to help delineate the fistula's relationship to the sphincter complex. Magnetic resonance imaging and endorectal ultrasound with or without hydrogen peroxide injection are the studies of choice when radiologic assessment is deemed necessary.<sup>27-29</sup>

1. *Guideline: Complex anal fistulas may be treated with debridement and fibrin glue injection. Level of Evidence: IV; Grade: B.* As with simple fistula-in-ano, fibrin glue is an easy, repeatable treatment for a complex fistula-in-ano. Using this technique, healing rates from 14 to 60 percent have been achieved in small studies.<sup>20-22</sup> Incontinence rates, however, although theoretically low, have not generally been reported.

2. *Guideline: Complex anal fistulas may be treated with endorectal advancement flap closure. Level of Evidence: IV; Grade: B.* The use of an endorectal advancement flap is an attractive modality for the treatment of a complex fistula-in-ano. It obliterates the septic focus and closes the internal opening, does not divide the sphincter, is repeatable, has a smaller wound, and can be combined with overlapping sphincter reconstruction for anterior fistulas. Successful healing has been demonstrated in 55 to 98 percent of patients.<sup>14,15,30-35</sup> Although the sphincter mechanism is not divided during the construction of an endorectal advancement flap, minor incontinence has been reported in up to 31 percent of the patients and major incontinence in up to 12 percent.<sup>14,30,34,36,37</sup> Predictors of poor outcome include undrained sepsis, cancer or radiation etiology, rectovaginal fistula diameter >2.5 cm, fistula present fewer than 6 weeks, and active Crohn's proctitis.<sup>15,34,38</sup>

3. *Guideline: Complex fistulas may be treated by the use of a seton and/or staged fistulotomy: Level of Evidence: IV; Grade: B.* A seton is a flexible foreign body (e.g., suture material, silastic vessel loop) that is

placed through the fistula track and secured to itself. Setons may be used to induce perisphincteric fibrosis along the fistula track so that when the fistulotomy is eventually performed, or the seton gradually tightened, the muscular defect and amount of incontinence is limited.<sup>39,40</sup> A seton may also be utilized to facilitate staged fistulotomy. The seton is used to mark the external sphincter for later division after the subcutaneous components have healed. Although these two techniques have low recurrence rates (0–8 percent), the rates for minor (34–63 percent) and major incontinence (2–26 percent) are significant.<sup>39–45</sup>

### Treatment of Fistula-in-Ano With Crohn's Disease

The clinical course of perianal Crohn's disease is unpredictable; complete and permanent remission is rare. The recurrent nature of the disease, with its attendant potential for chronic diarrhea, places a premium on conservative, sphincter-sparing management. In addition, aggressive surgery may lead to poor healing and impaired continence, which may require a stoma.<sup>46,47</sup> Management of anorectal Crohn's disease may be further complicated by concurrent active colorectal and/or small-bowel disease. Desirable outcomes should not focus exclusively on complete healing and continence but should also include patient satisfaction, reduction in the number of septic events, and minimization of proctectomy rates. Medical management of active Crohn's disease should supplement the surgical management. Twelve to 39 percent of these patients will eventually undergo proctectomy for progressive intestinal disease or intractable perianal disease.<sup>48–51</sup>

1. *Guideline: Asymptomatic Crohn's fistulas need not be treated. Level of Evidence: IV; Grade: B.* Asymptomatic Crohn's fistulas may remain dormant and require no intervention. These patients, therefore, need not be subjected to the morbidity of operative intervention.<sup>49,51–53</sup>

2. *Guideline: Simple, low Crohn's fistulas may be treated by fistulotomy. Level of Evidence: IV; Grade: B.* Healing rates after fistulotomy or intersphincteric and low transsphincteric Crohn's fistulas range from 62 to 100% with reported minor incontinence rates of 0 to 12%.<sup>46,49–52,54–57</sup> These wounds may take up to three to six months to heal.<sup>48</sup>

3. *Guideline: Complex Crohn's fistulas may be well palliated with long-term draining setons. Level of Evidence: IV; Grade: B.* The goal of a long-term loose (draining) seton for Crohn's fistulas is to reduce the number of subsequent septic events by providing continuous drainage and preventing closure of the external skin opening. This goal can be achieved in 48 to 100% of such patients. Recurrent sepsis is seen approximately one-third of the time.<sup>41,46,51,53,58</sup>

4. *Guideline: Complex Crohn's fistulas may be treated with advancement flap closure if the rectal mucosa is grossly normal. Level of Evidence: IV; Grade: B.* Endorectal or anodermal advancement flaps also can be used in patients with complex fistulas from Crohn's disease. Active proctitis is considered a contraindication. Short-term success (generally 50–75%) is lower in patients with Crohn's disease and continues to diminish with longer follow-up, demonstrating the chronic relapsing nature of this disease. Short-term success rates for rectovaginal fistulas associated with Crohn's disease are even lower at 40 to 50%.<sup>14,31,32,48–50,52–63</sup>

---

*The practice parameters set forth in this document have been developed from sources believed to be reliable. The American Society of Colon and Rectal Surgeons makes no warranty, guaranty, or representation whatsoever as to the absolute validity or sufficiency of any parameter included in this document, and the Society assumes no responsibility for the use or misuse of the material contained.*

---

### REFERENCES

1. Cook DJ, Guyatt GH, Laupacis A, Sackett DL. Rules of evidence and clinical recommendations on the use of antithrombotic agents. *Chest* 1992;102(Suppl 4):305S–11S.
2. Sackett DL. Rules of evidence and clinical recommendations on the use of antithrombotic agents. *Chest* 1989; 95(Suppl 2):2S–4S.
3. Anonymous. Practice parameters for treatment of fistula-in-ano—supporting documentation. The Standards Practice Task Force. The American Society of Colon and Rectal Surgeons. *Dis Colon Rectum* 1996;39:1363–72.
4. Anonymous. Practice parameters for treatment of fistula-in-ano. The Standards Practice Task Force. The American Society of Colon and Rectal Surgeons. *Dis Colon Rectum* 1996;39:1361–2.

5. Parks A. Pathogenesis and treatment of fistula-in-ano. *BMJ* 1961;1:463-9.
6. Isbister WH. A simple method for the management of anorectal abscess. *ANZ J Surg* 1987;57:771-4.
7. Read DR, Abcarian H. A prospective survey of 474 patients with anorectal abscess. *Dis Colon Rectum* 1979;22:566-8.
8. Llera JL, Levy RC. Treatment of cutaneous abscess: a double-blind clinical study. *Ann Emerg Med* 1985;14:15-9.
9. Stewart MP, Laing MR, Krukowski ZH. Treatment of acute abscesses by incision, curettage and primary suture without antibiotics: a controlled clinical trial. *Br J Surg* 1985;72:66-7.
10. Macfie J, Harvey J. The treatment of acute superficial abscesses: a prospective clinical trial. *Br J Surg* 1977;64:264-6.
11. Dajani AS, Taubert KA, Wilson W, *et al.* Prevention of bacterial endocarditis. Recommendations by the American Heart Association. *Circulation* 1997;96:358-66.
12. Parks AG, Gordon PH, Hardcastle JD. A classification of fistula-in-ano. *Br J Surg* 1976;63:1-12.
13. Parks AG, Stitz RW. The treatment of high fistula-in-ano. *Dis Colon Rectum* 1976;19:487-99.
14. Kodner IJ, Mazor A, Shemesh EI, Fry RD, Fleshman JW, Birnbaum EH. Endorectal advancement flap repair of rectovaginal and other complicated anorectal fistulas. *Surgery* 1993;114:682-90.
15. Mizrahi N, Wexner SD, Zmora O, *et al.* Endorectal advancement flap: are there predictors of failure? *Dis Colon Rectum* 2002;45:1616-21.
16. Kronborg O. To lay open or excise a fistula-in-ano: a randomized trial. *Br J Surg* 1985;72:970.
17. Vasilevsky CA, Gordon PH. The incidence of recurrent abscesses or fistula-in-ano following anorectal suppuration. *Dis Colon Rectum* 1984;27:126-30.
18. van Tets WF, Kuijpers HC. Continence disorders after anal fistulotomy. *Dis Colon Rectum* 1994;37:1194-7.
19. Ho YH, Tan M, Leong AF, Seow-Choen F. Marsupialization of fistulotomy wounds improves healing: a randomized controlled trial. *Br J Surg* 1998;85:105-7.
20. Abel ME, Chiu YS, Russell TR, Volpe PA. Autologous fibrin glue in the treatment of rectovaginal and complex fistulas. *Dis Colon Rectum* 1993;36:447-9.
21. Buchanan GN, Bartram CI, Phillips RK, *et al.* Efficacy of fibrin sealant in the management of complex anal fistula: a prospective trial. *Dis Colon Rectum* 2003;46:1167-74.
22. Cintron JR, Park JJ, Orsay CP, *et al.* Repair of fistulas-in-ano using fibrin adhesive: long-term follow-up. *Dis Colon Rectum* 2000;43:944-50.
23. Lindsey I, Smilgin-Humphreys MM, Cunningham C, Mortensen NJ, George BD. A randomized, controlled trial of fibrin glue *vs.* conventional treatment for anal fistula. *Dis Colon Rectum* 2002;45:1608-15.
24. Patrlj L, Kocman B, Martinac M, *et al.* Fibrin glue-antibiotic mixture in the treatment of anal fistulae: experience with 69 cases. *Dig Surg* 2000;17:77-80.
25. Venkatesh KS, Ramanujam P. Fibrin glue application in the treatment of recurrent anorectal fistulas. *Dis Colon Rectum* 1999;42:1136-9.
26. Zmora O, Mizrahi N, Rotholtz N, *et al.* Fibrin glue sealing in the treatment of perineal fistulas. *Dis Colon Rectum* 2003;46:584-9.
27. Ratto C, Gentile E, Merico M, *et al.* How can the assessment of fistula-in-ano be improved? *Dis Colon Rectum* 2000;43:1375-82.
28. Orsoni P, Barthet M, Portier F, Panuel M, Desjeux A, Grimaud JC. Prospective comparison of endosonography, magnetic resonance imaging and surgical findings in anorectal fistula and abscess complicating Crohn's disease. *Br J Surg* 1999;86:360-4.
29. Schwartz DA, Wiersema MJ, Dudiak KM, *et al.* A comparison of endoscopic ultrasound, magnetic resonance imaging, and exam under anesthesia for evaluation of Crohn's perianal fistulas. *Gastroenterology* 2001;121:1064-72.
30. Aguilar PS, Plasencia G, Hardy TG Jr, Hartmann RF, Stewart WR. Mucosal advancement in the treatment of anal fistula. *Dis Colon Rectum* 1985;28:496-8.
31. Sonoda T, Hull T, Piedmonte MR, Fazio VW. Outcomes of primary repair of anorectal and rectovaginal fistulas using the endorectal advancement flap. *Dis Colon Rectum* 2002;45:1622-8.
32. Ozuner G, Hull TL, Cartmill J, Fazio VW. Long-term analysis of the use of transanal rectal advancement flaps for complicated anorectal/vaginal fistulas. *Dis Colon Rectum* 1996;39:10-4.
33. Lowry AC, Thorson AG, Rothenberger DA, Goldberg SM. Repair of simple rectovaginal fistulas. Influence of previous repairs. *Dis Colon Rectum* 1988;31:676-8.
34. Schouten WR, Zimmerman DD, Briel JW. Transanal advancement flap repair of transsphincteric fistulas. *Dis Colon Rectum* 1999;42:1419-23.
35. Ortiz H, Marzo J. Endorectal flap advancement repair and fistulectomy for high trans-sphincteric and supra-sphincteric fistulas. *Br J Surg* 2000;87:1680-3.
36. Gustafsson UM, Graf W. Excision of anal fistula with closure of the internal opening: functional and manometric results. *Dis Colon Rectum* 2002;45:1672-8.
37. Kreis ME, Jehle EC, Ohlemann M, Becker HD, Starlinger MJ. Functional results after transanal rectal advancement flap repair of trans-sphincteric fistula. *Br J Surg* 1998;85:240-2.
38. Garcia-Aguilar J, Davey CS, Le CT, Lowry AC, Rothenberger DA. Patient satisfaction after surgical treatment for fistula-in-ano. *Dis Colon Rectum* 2000;43:1206-12.
39. Williams JG, MacLeod CA, Rothenberger DA, Goldberg SM. Seton treatment of high anal fistulae. *Br J Surg* 1991;78:1159-61.

40. Garcia-Aguilar J, Belmonte C, Wong DW, Goldberg SM, Madoff RD. Cutting seton versus two-stage seton fistulotomy in the surgical management of high anal fistula. *Br J Surg* 1998;85:243–5.
41. Pearl RK, Andrews JR, Orsay CP, *et al*. Role of the seton in the management of anorectal fistulas. *Dis Colon Rectum* 1993;36:573–9.
42. Isbister WH, Al Sanea N. The cutting seton: an experience at King Faisal Specialist Hospital. *Dis Colon Rectum* 2001;44:722–7.
43. Dziki A, Bartos M. Seton treatment of anal fistula: experience with a new modification. *Eur J Surg* 1998;164:543–8.
44. Hamalainen KP, Sainio AP. Cutting seton for anal fistulas: high risk of minor control defects. *Dis Colon Rectum* 1997;40:1443–7.
45. Van Tets WF, Kuijpers JH. Seton treatment of perianal fistula with high anal or rectal opening. *Br J Surg* 1995;82:895–7.
46. Scott HJ, Northover JM. Evaluation of surgery for perianal Crohn's fistulas. *Dis Colon Rectum* 1996;39:1039–43.
47. McClane SJ, Rombeau JL. Anorectal Crohn's disease. *Surg Clin North Am* 2001;81:169–83.
48. Faucheron JL, Saint-Marc O, Guibert L, Parc R. Long-term seton drainage for high anal fistulas in Crohn's disease—a sphincter-saving operation? *Dis Colon Rectum* 1996;39:208–11.
49. Michelassi F, Melis M, Rubin M, Hurst RD. Surgical treatment of anorectal complications in Crohn's disease. *Surgery* 2000;128:597–603.
50. Sangwan YP, Schoetz DJ Jr, Murray JJ, Roberts PL, Collier JA. Perianal Crohn's disease: results of local surgical treatment. *Dis Colon Rectum* 1996;39:529–35.
51. Williams JG, Rothenberger DA, Nemer FD, Goldberg SM. Fistula-in-ano in Crohn's disease: results of aggressive surgical treatment. *Dis Colon Rectum* 1991;34:378–84.
52. Fry RD, Shemesh EI, Kodner IJ, Timmcke A. Techniques and results in the management of anal and perianal Crohn's disease. *Surg Gynecol Obstet* 1989;168:42–8.
53. White RA, Eisenstat TE, Rubin RJ, Salvati EP. Seton management of complex anorectal fistulas in patients with Crohn's disease. *Dis Colon Rectum* 1990;33:587–9.
54. Levien DH, Surrell J, Mazier WP. Surgical treatment of anorectal fistula in patients with Crohn's disease. *Surg Gynecol Obstet* 1989;169:133–6.
55. Marks CG, Ritchie JK, Lockhart-Mummery HE. Anal fistulas in Crohn's disease. *Br J Surg* 1981;68:525–7.
56. Sohn N, Korelitz BI, Weinstein MA. Anorectal Crohn's disease: definitive surgery for fistulas and recurrent abscesses. *Am J Surg* 1980;139:394–7.
57. van Dongen LM, Lubbers EJ. Perianal fistulas in patients with Crohn's disease. *Arch Surg* 1986;121:1187–90.
58. Takesue Y, Ohge H, Yokoyama T, Murakami Y, Imamura Y, Sueda T. Long-term results of seton drainage on complex anal fistulae in patients with Crohn's disease. *J Gastroenterol* 2002;37:912–5.
59. Makowiec F, Jehle EC, Becker HD, Starlinger M. Clinical course after transanal advancement flap repair of perianal fistula in patients with Crohn's disease. *Br J Surg* 1995;82:603–6.
60. Jones IT, Fazio VW, Jagelman DG. The use of transanal rectal advancement flaps in the management of fistulas involving the anorectum. *Dis Colon Rectum* 1987;30:919–23.
61. Hull TL, Fazio VW. Surgical approaches to low anovaginal fistula in Crohn's disease. *Am J Surg* 1997;173:95–8.
62. Joo JS, Weiss EG, Nogueras JJ, Wexner SD. Endorectal advancement flap in perianal Crohn's disease. *Am Surg* 1998;64:147–50.
63. Hyman N. Endoanal advancement flap repair for complex anorectal fistulas. *Am J Surg* 1999;178:337–40.