

Early experience of stapled hemorrhoidectomy in a community hospital setting

Eric Touzin, MD;* Susan Hegge, MD;† Craig McKinley, MD*†‡

Background: Stapled hemorrhoidectomy was introduced as a new procedure for the surgical management of hemorrhoidal disease in 1993. We present a cohort longitudinal study performed in a community hospital setting where the short-term outcomes of stapled hemorrhoidectomy were compared with those of conventional hemorrhoidectomy. **Methods:** We compared 41 consecutive patients who underwent a conventional open diathermy (Ferguson) hemorrhoidectomy between September 1999 and September 2001 with 40 consecutive patients who underwent a stapled hemorrhoidectomy procedure between September 2001 and June 2004. We analyzed perioperative and postoperative complications, length of hospital stay, patient satisfaction and case costing for both groups. **Results:** The stapled hemorrhoidectomy group comprised 13 men and 27 women. The open hemorrhoidectomy group comprised 9 men and 32 women. There were no intraoperative complications in either group. In the stapled hemorrhoidectomy group, 3 patients presented with postoperative complications and 3 required admission. In the open hemorrhoidectomy group, 14 patients presented with postoperative complications and 11 required admission. At 2-week follow-up, 35 patients (88%) presented no complaints in the stapled hemorrhoidectomy group, versus 27 (66%) in the open hemorrhoidectomy group. The total cost calculated for the stapled hemorrhoidectomy procedure was \$716.38, whereas the total cost of the open hemorrhoidectomy procedure was \$760.00. **Conclusions:** The stapled hemorrhoidectomy technique is a safe alternative to the traditional open hemorrhoidectomy. It can be performed as an outpatient procedure, is well tolerated by patients and is no more expensive than conventional surgical therapy.

Contexte : L'hémorroïdectomie par cerclage a été lancée en 1993 comme nouvelle technique de traitement chirurgical des hémorroïdes. Nous présentons une étude longitudinale de cohortes réalisée dans un hôpital communautaire où l'on a comparé les résultats à court terme de l'hémorroïdectomie par cerclage à ceux de l'hémorroïdectomie classique. **Méthodes :** Nous avons comparé 41 patients consécutifs qui ont subi une hémorroïdectomie par diathermie ouverte classique (Ferguson) entre septembre 1999 et septembre 2001 à 40 patients consécutifs qui ont subi une hémorroïdectomie par cerclage entre septembre 2001 et juin 2004. Nous avons analysé les complications peropératoires et postopératoires, la durée de l'hospitalisation, la satisfaction des patients et le coût des cas chez les deux groupes. **Résultats :** Le groupe des sujets qui ont subi une hémorroïdectomie par cerclage comportait 13 hommes et 27 femmes. Le groupe des sujets qui ont subi une hémorroïdectomie ouverte comptait 9 hommes et 32 femmes. Aucun des patients n'a eu de complications intraopératoires. Trois des patients qui ont subi une hémorroïdectomie par cerclage ont eu des complications postopératoires et il a fallu en hospitaliser trois. Quatorze de ceux qui ont subi une hémorroïdectomie ouverte ont eu des complications postopératoires et il a fallu en hospitaliser onze. Au suivi à deux semaines, 35 des patients (88 %) qui ont subi l'hémorroïdectomie par cerclage n'avaient pas de plainte par rapport à 27 (66 %) de ceux qui ont subi l'hémorroïdectomie ouverte. On a calculé que l'hémorroïdectomie par cerclage coûtait au total 716,38 \$ tandis que l'hémorroïdectomie ouverte coûtait 760 \$. **Conclusions :** L'hémorroïdectomie par cerclage est une technique simple qui peut remplacer l'hémorroïdectomie ouverte traditionnelle. Il est possible de la pratiquer en service externe, les patients la tolèrent bien et la technique ne coûte pas plus cher que l'intervention chirurgicale classique.

From the *Division of General Surgery, Department of Surgery, University of Ottawa, Ottawa, the †North Bay District Hospital, North Bay, and the ‡Centre for Minimal Access Surgery, McMaster University, Hamilton, Ont.

Accepted for publication May 5, 2005

Correspondence to: Dr. Craig McKinley, 91 Champlain St., North Bay ON N1B 7M3; fax 705 475-9668; chris@cmasnorth.ca

Stapled hemorrhoidectomy was introduced in 1993 as an alternative to the Ferguson and Milligan–Morgan techniques for operative management of hemorrhoidal disease. This method, characterized by the transanal introduction of a circular stapler to excise redundant rectal mucosa, was described and refined by Longo.¹ The introduction of the stapled hemorrhoidectomy was received with much enthusiasm because it could offer patients a significantly improved postoperative comfort level. This is attributable to the fact that the mucosal incision and staple lines are positioned well above the dentate line, and the highly sensitive perianal skin is left intact. At least 8 randomized trials have demonstrated less postoperative pain and earlier return to work in patients having undergone stapled hemorrhoidectomy, compared with conventional surgical therapy.^{2–9}

The theoretical benefits of this intervention are threefold. First, the interruption of inflow from the superior hemorrhoidal arteries to the internal hemorrhoids may contribute to improvement of hemorrhoidal symptoms by relieving vascular congestion. Second, the partial excision of the hemorrhoidal cushions themselves reduces the size of the internal hemorrhoids. Third, the resection of rectal mucosa reduces the tendency to prolapse and restores the internal cushions to their normal physiological position.^{1,10}

The PPH™ (procedure for prolapse and hemorrhoids; Ethicon Endosurgery®, Cincinnati, Ohio) was introduced in Canada in the mid-1990s and to the United States in 1998. Experience with this technique has mostly been limited to large academic centres. We present the short-term outcomes of a prospective longitudinal cohort of patients treated with the stapled hemorrhoidectomy, compared with a group of patients treated with a conventional hemorrhoidectomy, performed in a community hospital.

Methods

Open hemorrhoidectomy technique

From September 1999 to September 2001, 41 consecutive patients presenting with grade II–III hemorrhoids underwent an elective conventional diathermy hemorrhoidectomy. Patients were instructed to self-administer a Fleet® (C.B. Fleet Company, Inc., Lynchburg, Va.) enema the evening before surgery and to repeat it the morning of the surgery. Patients were placed in the lithotomy position after induction of anesthesia. A Pilling Weck rectal speculum was used to demonstrate the extent of the internal hemorrhoids. The external and internal components were excised entirely from the apex to the base with electrocautery. The pedicle was suture-ligated, and necessary hemostasis was achieved with diathermy coagulation. One to 3 hemorrhoidal cushions were excised, and all wounds were closed with 2–0 Chromic Gut (Ethicon, Inc., Somerville, NJ). A Gelfoam® (Pharmacia and Upjohn, Kalamazoo, Mich.) packing was left in the anal canal. A perianal block was administered with 15 mL of 0.5% bupivacaine with 1:200 000 epinephrine. Patients were taken to the postanesthetic care unit for recovery. All surgeries were attempted on an outpatient basis. Patients were discharged home with a prescription for Tylenol No. 3 (acetaminophen/codeine, 300/30 mg, Ortho-McNeil Pharmaceutical Inc., Raritan, NJ) as needed, for a total of 50 tablets, and docusate 100 mg twice a day for 1 month. Follow-up at 2 weeks was arranged for an office visit, interview and perineal examination.

Stapled hemorrhoidectomy technique

From September 2001 to June 2004, 40 consecutive patients presenting with grade II–III hemor-

rhoids underwent an elective stapled hemorrhoidectomy. Patients were instructed to take a 4-L Colyte® (Schwarz Pharma, Milwaukee, Wis.) bowel preparation the evening before surgery, as well as ciprofloxacin 500 mg orally and metronidazole 500 mg orally at bedtime. Patients were given ampicillin 1 g, gentamycin 100 mg and metronidazole 500 mg intravenously in the operating room and were placed in the lithotomy position. The procedure was performed with the PPH™ (Ethicon Endosurgery®, Cincinnati, Ohio). The PPH kit consists of the 33-mm hemorrhoidal circular stapler, suture threader, circular anal dilator and obturator, and pursestring anoscope. The circular anal dilator was not used for the procedure. The pursestring anoscope was gently inserted into the anus to reveal the hemorrhoidal cushions. The gap in the anoscope was rotated around the circumference of the anus for the application of the pursestring stitch. This was done with a 2–0 Prolene® (polypropylene; Ethicon, Inc., Somerville, NJ) suture, and careful attention was paid to include only mucosa and submucosa in each bite. The pursestring was started and ended at the 6 o'clock (posterior) position, was placed 3–4 cm proximal to the dentate line and covered the entire circumference of the rectal mucosa. The pursestring anoscope was removed, and the pursestring stitch integrity was tested by inserting a finger into the rectum and applying traction to the loose ends of the suture. The opened circular stapler was then inserted in the anus and advanced, so that its anvil was proximal to the pursestring. The loose ends of the suture were pulled through the side holes of the stapler with the suture threader and held together with a hemostat. With gentle traction applied to the loose ends of the suture, the stapler was simultaneously advanced and closed, so that the redundant mucosa drawn into the lumen of the rectum was caught

between the 2 jaws of the stapler. In female patients, a finger was inserted in the vagina to ensure that the posterior wall was not drawn into the head of the stapler. The stapler was fired and held closed for 3 minutes to provide hemostasis. The jaws were opened and the stapler removed. The specimen was retrieved from the stapler and was examined to ensure that a complete ring of mucosa was obtained. A digital rectal exam was performed to verify that the staple line was circumferential. The purse-string anoscope was reintroduced and rotated to visualize the staple line for proper hemostasis. If present, bleeding points were oversewn with a figure-of-8 stitch with a 3-0 Vicryl® (polyglactin 910; Ethicon, Inc., Somerville, NJ) suture. The anal canal was packed with Gelfoam® (Pharmacia and Upjohn), and a perianal block was administered with 15 mL of 0.5% bupivacaine with 1:200 000 epinephrine. Patients were taken to the postanesthetic care unit for recovery. All surgeries were attempted on an outpatient basis. Patients were discharged home with a prescription for Tylenol No. 3 (Ortho-McNeil Pharmaceutical Inc), as needed, for a total of 50 tablets and docusate 100 mg twice a day for 1 month. Follow-up at 2 weeks was arranged for an office visit, interview and perineal examination.

Case costing

We performed a cost analysis to determine whether there was a significant difference in hospital costs between the methods. We obtained a cost per unit of operating room time from the administration department of the North Bay Hospital. The value was estimated at \$10.00 per minute. Also, the cost of 1 day of hospital stay on an acute care surgical unit was estimated at \$1000. We obtained the exact cost of the preoperative prophylactic antibiotics administered in hospital from the pharmacy department. We included the cost of all disposable

instruments, including the PPH stapler, in this calculation. These costs are specific to our institution.

Results

Forty-one patients underwent a conventional hemorrhoidectomy from September 1999 to September 2001. The group comprised 9 men and 32 women, with a mean age of 52 years (range 32–79 yr). All patients were diagnosed with hemorrhoids of Milligan–Morgan class II–III (Table 1). Mean operative time was 25 minutes. There were no intraoperative complications. Thirty patients (73%) had the procedure performed as outpatients. Of the 11 patients who required admission to hospital postoperatively, 10 were admitted for pain control and 1 for urinary retention. Mean length of hospitalization for the entire group was 0.51 days (range 0–7 d) (Table 2). A total of 14 patients (34%) presented with postoperative complications, which included severe pain (10), urinary retention (2) and significant bleeding

(2) (Table 3). At 2-week follow-up, 27 patients (66%) were satisfied and had no complaints about the surgery and its results. Fourteen patients were not completely satisfied. Complaints included pain and/or burning at defecation (7), bleeding (2), fecal urgency (3) and mild fecal incontinence (2).

Forty patients underwent a stapled hemorrhoidectomy during September 2001 to June 2004. We excluded one patient from the study because of the presence of grade IV hemorrhoids. No patients refused the stapled hemorrhoidectomy procedure.

The group comprised 13 men and 27 women, with a mean age of 50 years (range 33–73 yr). All patients were diagnosed with hemorrhoids of Milligan–Morgan class II–III (Table 1). Mean operative time was 26 minutes and there were no intraoperative complications. A total of 37 patients (93%) had the procedure performed as outpatients. Of the 3 patients who required admission to hospital postoperatively, 2 were admitted for

Table 1

Patient demographics and severity of disease for conventional and stapled hemorrhoidectomy

Characteristics	Treatment group; no. (and %)*	
	Stapled hemorrhoidectomy (n = 40)	Conventional hemorrhoidectomy (n = 41)
Men	13 (32)	9 (22)
Women	27 (68)	32 (78)
Mean age (and range)	50 (33–73)	52 (32–79)
Grade II	9 (22)	7 (17)
Grade III	31 (92)	34 (83)

*Unless otherwise indicated

Table 2

Operative time, admission rate and length of hospital stay for conventional and stapled hemorrhoidectomy

Characteristics	Stapled hemorrhoidectomy (n = 40)	Conventional hemorrhoidectomy (n = 41)
Average operative time, min.	26	25
Outpatient procedures (%)	37 (93)	30 (73)
Admissions (%)	3 (7)	11 (27)
Mean length of stay (and range), d	0.10 (0–2)	0.51 (0–7)

significant bleeding and 1 for urinary retention. Mean length of stay for the entire group was 0.10 days (range 0–2 d) (Table 2). Three patients (9%) presented with postoperative complications, which included significant bleeding (2) and urinary retention (1) (Table 3). There was no postoperative course complicated by significant pain in this group. At 2-week follow-up, 35 patients (88%) were satisfied and had no complaints about the surgery and its results. Four patients were not completely satisfied. Complaints included pain and/or burning at defecation (2), mild fecal incontinence (2) and recurrent bleeding.

The total hospital cost of an open diathermy hemorrhoidectomy was calculated at \$760.00, whereas the total cost of the stapled hemorrhoidectomy was \$716.38.

Discussion

Stapled hemorrhoidectomy has been shown to be a safe and effective procedure for the treatment of hemorrhoidal disease. This study demonstrates that the previously published favourable results from tertiary care centres can be reproduced in smaller community hospitals.

There was no mortality or intra-operative complication in either arm of the study. The postoperative complication rate was much lower in the stapled hemorrhoidectomy group, which resulted in a lower admission rate in this group of patients.

One case of severe sepsis following hemorrhoidal stapling has been reported in the literature.¹¹ From this report stemmed the idea of antibiotic prophylaxis for patients undergoing the procedure, but this remains

controversial. In our study, all patients in the stapled hemorrhoidectomy group received antibiotic prophylaxis. Patients in the conventional hemorrhoidectomy group did not receive antibiotic prophylaxis. There were no cases complicated with sepsis in our study.

During the study period, one patient presented with grade IV hemorrhoids and was offered a conventional diathermy hemorrhoidectomy. We excluded this patient from our study, because this did not represent an elective surgery. Also, the stapled hemorrhoidectomy is not offered for grade IV disease because of the difficulty in visualizing the anal canal and introducing the stapler.

Of the 2 patients in each group with postoperative courses complicated by bleeding, none required transfusion. One patient in the stapled hemorrhoidectomy group had an uneventful postoperative course, until she experienced significant passage of fresh blood per rectum 1 week postoperatively. This required admission to a hospital out of town, where the patient was visiting. Because no site of active bleeding was visualized at anoscopy, a colonoscopy was performed, which demonstrated no actively bleeding site in the colon and confirmed the presence of fresh blood up to the level of the cecum. A subsequent esophagogastroduodenoscopy showed no sign of bleeding in the upper gastrointestinal tract. The symptoms resolved spontaneously, and the patient required no further investigation or intervention. It is therefore unclear whether this episode of bleeding can be attributed to the surgical procedure itself or to another process elsewhere in the gastrointestinal tract.

The rates of short-term urinary retention were similar in both groups. The patient from the stapled hemorrhoidectomy who presented with this complication was treated with in-and-out catheterization in the emergency department and was discharged home the same evening. The

Table 3

Postoperative complications and follow-up complaints for conventional and stapled hemorrhoidectomy		
Complications and complaints	Stapled hemorrhoidectomy (n = 40)	Conventional hemorrhoidectomy (n = 41)
Postoperative complications		
Bleed	2	2
Urinary retention	1	2
Pain	0	10
Total	3	14
Complaints at follow-up		
Incontinence	2	2
Urgency	0	3
Bleed	1	2
Pain/burning	2	7
Total	5	14

Table 4

Hospital cost* comparison of conventional and stapled hemorrhoidectomy		
Costs	Stapled hemorrhoidectomy	Conventional hemorrhoidectomy
Preoperative costs		
Antibiotics	11.05	0.00
Operative costs		
Disposable equipment	345.33	0.00
Operating room time	260.00	250.00
Postoperative costs		
Length of stay	100.00	510.00
Total	716.38	760.00

*All costs in Canadian dollars.

2 patients from the open diathermy hemorrhoidectomy group who presented with this complication required admission and intermittent catheterization for 1 and 3 days.

The most common postoperative complication in the open diathermy group was severe pain. In this study, we defined severe pain as requiring admission or parenteral analgesics for adequate control. All 10 of these patients required admission to hospital for symptom control. There is a possibility that some of these readmissions could have been avoided with the use of more potent narcotics or a combination of analgesic modalities, including NSAIDs. To ensure comparability of results, however, both groups were given the same analgesic regimen. None of the patients in the stapled hemorrhoidectomy group presented with significant pain requiring admission. This advantage, which results in easier outpatient feasibility of the procedure, has popularized the use of this technique.

The systematic follow-up of every patient at 2 weeks postoperatively revealed that satisfaction with the results of the surgery was substantially higher in the stapled hemorrhoidectomy group. Specifically, there were fewer complaints of pain and/or burning sensation, and there was no complaint of urgency at 2 weeks. Incidence of mild fecal incontinence at 2 weeks was similar in both groups.

The average operative time calculated was almost identical in both techniques. We also found the calculated total institution costs for both procedures to be similar. It seems apparent from examining Table 2 and Table 4 that the higher rate of readmission for symptom control in the conventional group renders the costs of both groups equivalent. In fact, the cost of readmissions in the conventional group more than compensates the cost of the disposable instruments (PPH kit) in the stapled group. The length of stay in hos-

pital only takes into account re-hospitalizations, because the length of stay for the primary procedure is equal for both groups. The rate of admission and the average total length of hospital stay calculated in our study are well within the range of published results from similar studies in the literature.^{4,7,9,12-16}

These case costing results are very different from those published by Ho and colleagues,⁴ who found the stapled hemorrhoidectomy to be more expensive than conventional therapy in their series. These results were obtained from a tertiary care hospital in Singapore and are therefore expected to differ from ours.

Conclusion

This study supports the evidence that stapled hemorrhoidectomy is a safe and effective technique for the operative management of hemorrhoidal disease that can be performed on an outpatient basis. This procedure does not produce additional costs compared with traditional therapy. We have shown that the previously reported positive results, with regard to the stapled hemorrhoidectomy, can be reproduced in smaller community centres.

Competing interests: None declared.

References

1. Longo A. Treatment of hemorrhoidal disease by reduction of mucosa and hemorrhoidal prolapse with a circular suturing device: a new procedure. Sixth World Congress of Endoscopic Surgery, Rome, Italy. Bologna: Monduzzi Publishing Co.; 1998. p. 777-84.
2. Rowsell M, Bello M, Hemingway DM. Circumferential mucosectomy (stapled hemorrhoidectomy) versus conventional hemorrhoidectomy: randomized controlled trial. *Lancet* 2000;355:779-81.
3. Mehigan BJ, Monson JRT, Hartley JE. Stapling procedure for haemorrhoids versus Milligan-Morgan haemorrhoidectomy: randomized controlled trial. *Lancet* 2000; 355:782-5.
4. Ho YH, Cheong WK, Tsang C, et al. Stapled hemorrhoidectomy: cost and effectiveness. Randomized controlled trial including incontinence scoring, anorectal manometry, and endoanal ultrasound assessments at up three months. *Dis Colon Rectum* 2000;43:1666-75.
5. Khalil KH, O'Bichere A, Sellu D. Randomized clinical trial of sutured versus stapled closed haemorrhoidectomy. *Br J Surg* 2000;87:1352-5.
6. Kirsch JJ, Staude G, Herold A. The Longo and Milligan-Morgan hemorrhoidectomy. A prospective comparative study of 300 patients. *Chirurg* 2001;72:180-5.
7. Ganio E, Altomare DF, Gabrielli F, et al. Prospective randomized multicentre trial comparing stapled with open haemorrhoidectomy. *Br J Surg* 2001;88:669-74.
8. Boccasanta P, Capretti PG, Venturi M, et al. Randomized controlled trial between stapled circumferential mucosectomy and conventional circular hemorrhoidectomy in advanced hemorrhoids with external mucosal prolapse. *Am J Surg* 2001;182: 64-8.
9. Hetzer FH, Demartines N, Handschin AE, et al. Stapled vs excision hemorrhoidectomy: long term results of a prospective randomized trial. *Arch Surg* 2002;137:337-40.
10. Singer MA, Cintron JR, Fleshman JW, et al. Early experience with stapled hemorrhoidectomy in the United States. *Dis Colon Rectum* 2002;45:360-9.
11. Molloy R, Kingsmore D. Life threatening pelvic sepsis after stapled haemorrhoidectomy. *Lancet* 2000;355:810.
12. Racalbuto A. Hemorrhoidal stapler prolapsectomy vs. Milligan-Morgan hemorrhoidectomy: a long-term randomized trial. *Int J Colorectal Dis* 2004;19:239-44.
13. Bikhchandani J. Randomized controlled trial to compare the early and mid-term results of stapled versus open hemorrhoidectomy. *Am J Surg* 2005;189:56-60.
14. Goulmaris I. Stapled haemorrhoidectomy compared with Milligan-Morgan excision for the treatment of prolapsing haemorrhoids: a prospective study. *Eur J Surg* 2002;168:621-5.
15. Cheetham MJ. A randomized, controlled trial of diathermy hemorrhoidectomy vs. stapled hemorrhoidectomy in an intended day-care setting with longer-term follow-up. *Dis Colon Rectum* 2003;46:491-7.
16. Shalaby R. Randomized clinical trial of stapled versus Milligan-Morgan haemorrhoidectomy. *Br J Surg* 2001;88:1049-53.