Randomized Clinical Trial of Longo´s Technique Versus Ferguson's Haemorrhoidectomy; Follow-up Three Years

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Objective: **The introduction of a Longo´s technique for the treatment of haemorrhoids has the potential for less postoperative pain, a short operating time and an early return to full activity. The outcome of Longo´s technique was compared with that of current standard surgery in a randomized controlled study, and followed up three years.**

Method: **Forty patients were randomized to either Ferguson technique (n = 20) or Longo's techniques (n = 20).**

Each patient received standardized postoperative analgesic and laxative regimens, and completed a linear analogue pain score every 6 h during the first day after operation, after the first motion and daily until the end of the second week. Operating time, frequency of postoperative analgesic intake, hospital stay, time to return to normal activity and postoperative complications were also recorded.

Results: **The mean ages of patients in the Longo and Ferguson groups were [47(25-65) and 45(23-71)] years respectively. The Longo´s group had a shorter operating time, less frequent postoperative analgesia intake, and earlier return to normal activity. Length of hospital stay was not significantly different between the groups being discharged within 24 hours. In third degree haemorrhoid disease functional outcome was better in the Longo´s group.**

Conclusion: **Use of a Longo's technique in the treatment of third degree haemorrhoid disease was safe and effective, but not effective in fourth degree.**

Key words: *Haemorrhoidectomy, Longo, Ferguson*

Haemorrhoidectomy by conventional techniques such as Milligan - Morgan or Ferguson causes considerable postoperative pain because of wide external wounds in the innervated perianal skin (1).

Ferguson´s closed haemorrhoidectomy (2) is practised widely in the USA but less frequently in the UK because of concerns that preliminary dissection exposes the haemorhoidal wound to faecal contamination and this may result in a significant increase of wound infection (3).

Most patients need a 2 - 3 day postoperative stay, with a convalescence of up to 1 month.

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It was shown recently that the new technique of Longo, which uses an intraluminal circular stapling device to excise a circumferential column of mucosa and submucosa from the upper anal canal offers a simple, safe and effective method of closed haemorrhoidectomy through simultaneous excision and wound closure, without dissection (4). The objective of the present study was to compare both procedures and observe if the favorable initial results of the Longo's method persist throughout a lengthy follow-up time, three years that we consider is sufficient.

Material and Method

Forty consecutive patients with symptomatic third and fourth degree haemorrhoids were recruited from surgical outpatient clinics. For the trial, informed consent was obtained from all patients. They were randomized to undergo Ferguson´s technique (group 1, n = 20) or Longo´s technique (group 2, n = 20) haemorrhoidectomy. All patients were blinded before operation to the type of procedure performed as randomization (computer generated) was carried out in theatre, but this was revealed upon request at the first follow - up visit. Preoperative assessment included documentation of symptoms, proctoscopy to exclude other pathology in the anus and rectum and all patients received a phosphate enema in the morning of the day of surgery. Lactulose 20 ml was given twice daily for ten days and metronidazole 400 mg three times daily for 7 days, and Ketorolac tromethamine (10 mg) up to four times a day as needed. All operations were performed in the lithotomy position under spinal anaesthesia by the first author.

Data was collected on a standardised form.

Patients completed a pain score at 6, 12, 24 h postoperatively and every day for 14 days thereafter. The total pain score for each patient was calculated.

They were discharged home next day. The total analgesic consumption was recorded. Each patient was assessed at 5 days and weekly for effectiveness of symptom control until his/her incorporation to work, thereafter at 3,

6, 9, 12, 24, 36 months. Quality of life assessment (Each patient completed the EuroQol-5D questionnaire preoperatively and post operatively at 3, 6, 9, 12, 24 months).

Operative technique:

For Ferguson´s haemorrhoidectomy, a Park´s self - retaining retractor was positioned in the anal canal and diathermy haemorrhoidectomy commenced, following a radial elliptical incision encompassing the primary haemorrhoidal complex from just outside the anal verge, and extending to a point proximal to the dentate line (including any associated skintags). The resulting pedicle was transfixed with absorbable suture, and the wound closed with a continuous over - and - over technique terminating at the external skin edge. The anal canal was then lightly packed with gauze dressing impregnated with soft paraffin soaked in 2 % lignocaine gel, which was removed the following morning (5).

For Longo´s technique (4) an anal retractor was used and an endoanal purse-string sutured of 2 / 0 polypropylene was placed circumferentially 4 - 6 cm from the anal verge taking bites of mucosa and submucosa, voiding any obvious gaps in the suture and muscular layer of the rectum or anus. Either a CDH 33 circular stapling device or a PPH1 33 mm circular stapling device was introduced through the anus, the purse - string suture tied onto the shaft of the instrument, the head of the instrument closed onto the anvil incorporating the mucosal tissue in the purse string within the head of the gun, and the gun fired. This device fires a double staggered row of titanium staples through the tissue within the head of the device and a circular knife excises the redundant tissue. This tissue resembles a doughnut and comprises the mucosal tissue encompassed by the purse string. The gun is withdrawn and the staple line inspected for haemostasis before inserting an anal packed as in the Ferguson´s group. In women, the posterior vaginal wall was checked before firing the stapler to prevent entrapment.

The excised tissue was sent for histopathological examination.

Statistical analysis:

Serial measurements on linear analogue pain score were summarised by calculating the average pain over the period for each patients as a summary measure (6). The Mann-Whitney *U* test was used to establish the difference between groups 1 and 2 with respect to the duration and ease of operation, postoperative pain and overall satisfaction. Comparison of complication and wound healing was done with Fisher´s exact test. 95 % CIs were calculated by Analyse - it clinical laboratories statistics software for Microsoft Excel version 2000, and SPSS.

Results

Forty patients underwent haemorrhoidectomy during the trial period. All patients in the Ferguson´s group had all three major piles excised and all patients in the Longo´s group had one purse string only inserted. Under - running of the suture line was necessary to achieve haemostasis in all of the Longo´s group. No patients in either group breached the anaesthesia protocol. Characteristics of the patients randomised were similar in both groups. Table 1 summarizes the patients´ baseline demographic and clinical data. Outcome measurements for both techniques are presented in Table 2. The mean anaesthesia time was less for Longo´s group than for Ferguson´s group, median 20 [range 14-25] *vs* 25 [20-30] mins, p=0.007, Mann-Whitney U test). The distribution of pain scores is shown in Figure 1, for Longo´s group mean pain score 3,435 (0,3 - 7) *vs* for Ferguson´s group 5,585 (4,1 – 7,5), p=0.003. The mean total pain score was significantly lower in patients in Longo´s group during the first 24 h, at the time of the first motion and at 1 week after operation. On average patients having Ferguson´s haemorrhoidectomy consumed twice as many Ketorolac tromethamine tablets during first week as patients who underwent Longo´s technique, [Longo 16 (13– 18) *vs* Ferguson 34 (32 – 37)] . There was a trend toward earlier bowel motions in the Longo´s group with 12 (60 %) patients opening their bowels within 24 h of surgery in the Longo´s group and 7 (35 %) patients in the Ferguson´s group. Length of hospital stay was not significantly different between groups, all being discharged within 24 h. At the review after 4 weeks, in Ferguson´s group, symptoms had disappeared in 8 patients. Twelve patients had unhealed wounds, but were healed by a further review later (Table 3). Patients´ assessment of time to return to normal activity varied widely between patients. There was, however, a significantly earlier return in the Longo´s group *vs* Ferguson´s group [7 (3 - 15) *vs* 48 (20 - 115) days].

Table I. Patient characteristics

	Longo	Ferguson
Number of patients	20	20
Mean age Years (range)	47(25-65)	45(23-71)
M/F	11/9	12/8
Haemorrhoid degree 3/4*	8/12	7/13
Constipation	14	16
Bleeding	15	13
Discharge	4	6
Itching	8	6

**degree after Goligher (12)*

Histopathological examination: Skeletal muscle fibres (the Ferguson´s group five patients; Longo´s group, none), and smooth muscle fibres (Ferguson´s group two patients; Longo´s group sixteen) were identified histologically, but this did not result in incontinence. Patients who underwent Longo´s technique had mucosa, submucosa, muscularis propria in the excised tissue.

Earlier complications consisted of abscess in two patients in Longo´s group.

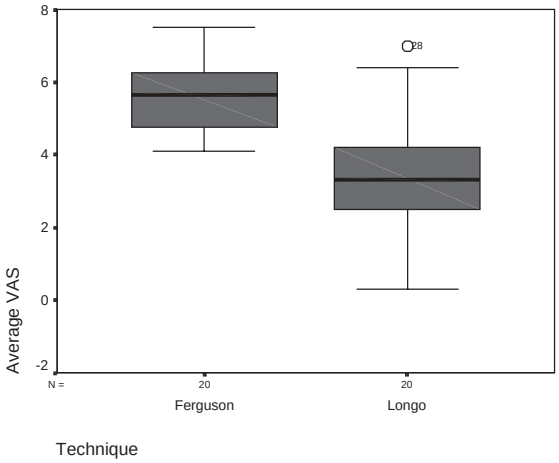

Figure 1. Mean pain: The distribution of values is displayed by the box and whiskers diagram. The points indicate the minimum and maximum values, the whiskers indicate the 25th and 75th percentiles, the median is located in the center of the box, and the mean is depicted by the horizontal line within each box.

Figure 2. Longo technique. Scores obtained from the outcome measure EQ – 5D before operation, at 3, 6, 9, 12 and 24 months after operation. Values are mean.

Figure 3. Ferguson technique. Scores obtained from the outcome measure EQ – 5D before operation, 3 , 6, 9, 12 and 24 months after operation. Values are mean.

Follow - up:

In Longo´s group we observed differences between patients of third degree and fourth degree; all patients with third degree had excellent results, but all patients with fourth degree complained of persistent skin tags, and requested excision, three patients had anal fissures, twelve tenesmus, and five recurrence. In Ferguson´s group no difference in satisfaction was observed between the third and fourth degree patients, with no complications reported.

Euro Qol 5 D results demonstrated that the patients of Longo´s group expressed a higher level of satisfaction than the patients of Ferguson´s group in the first year, but by two years, patients of fourth degree of Longo´s group had worsened, with only 20 % being satisfied (Fig. 2,3).

Discussion

Conventional haemorrhoidectomy with excisional technique such as the Milligan - Morgan (1), Ferguson´s techniques (2) or diathermy dissection (7), are accepted as the most effective techniques for prolapsing third or fourth degree haemorrhoids compared with techniques such as rubber band ligation (8), infrared coagulation (9), cryotherapy (10) and laser excision (11).

Most patients experience considerable postoperative pain, especially while defaecating, which limits their resumption of normal activities. In addition, the perianal skin wounds are slow to heal, which may prolong bleeding and discomfort for weeks (12) .

This study was designed to investigate if Longo´s technique confers any clinical advantage over the Ferguson´s technique.

Longo´s operation was quicker to perform and achieves excision with simultaneous wound closure and near - perfect haemostasis, after firing the device, thereby eliminating potential contamination of the anal wound (4). However, it emerged from this study that preliminary dissection, ligation of the vascular pedicle, securing haemostasis from the bleeding mucosal edges (despite use of cutting diathermy) and wound closure added to the duration of the operation. The surgeon occasionally encountered difficulty in manoeuvring the stapling device in the anal canal with especially large confluent haemorrhoids, which might explain why there was no significant difference in perception of ease of operation between the groups (13). We did not encounter any difficulty in manoeuvring the stapling device, but we needed to add some suture to achieve perfect haemostasis.

There are relatively few reports that compare Longo´s operation with surgical haemorrhoidectomy; published data suggest that use of the Longo´s operation is less time consuming and is associated with less postoperative pain. In the present study the results in the first year are comparable with previous data (14, 15) . Healing time for haemorrhoidectomy varies from 3 to 8 weeks (3), in the present study, the mean time for healing of the anal wound in the Longo´s group was less than that in the Ferguson´s group. Healing of the anal wound was assessed in both groups by proctoscopic examination during follow-up. After Longo´s operation, some authors reported severe retroperitoneal sepsis (16), and suggested routine antibiotic prophylaxis with this procedure. In this study, we had anal abscess in two patients, in spite of the use of metronidazole 400 mg three times daily for 7 days. Use of the sigmoidectomy stapled device is known to result in

Table II. Postoperative outcome

	Longo	Ferguson	*P**
Anaesthesia time (min)	20 [14-25]	25 [20-30]	0.007
Visual pain score	3,435 (0,3 - 7)	5,585 (4,1-7,5)	0.003
Bowel motions within 24 h	12 (60 %)	7 (35 %)	
Postoperative analgesia (first week)	16 (13– 18)	34 (32 – 37)	
Return to full activity (days)	7 (3 - 15)	48 (20 - 115)	
Patient satisfaction (first year) all degrees	90 %	80 %	
Patient satisfaction 3*rd* degree (third year)	100 %	100 %	
Patient satisfaction 4*th* degree (third year)	20%	100 %	

*Values are mean (s.d). *Mann - Whitney* U *test*

Table III. Wound healing time

Procedures	2 weeks	3 weeks	4 weeks	>4 weeks
Longo	7	5	8	0
Ferguson	0	3	5	12

P < *0.001 (Longo* versus *Ferguson, Fisher´s exact test)*

disordered continence as a result of internal sphincter injury (17), and this has raised some concerns regarding its use for haemorrhoids. Although damage of the internal anal sphincter has been reported with conventional haemorrhoidectomy, Longo´s procedure did not cause any injury to the internal anal sphincter (18). However, Cheetham et al. (19) reported that 31 per cent of patients developed pain and faecal urgency. They stated that the cause of this phenomenon is unclear, although incorporation of muscle in the doughnut may have a role. Alternatively it may result from placing the purse - string suture too close to the dentate line with accidental stapling of the sensitive anoderm and muscle impingement.

Histological identification of skeletal muscle fibres in 5 excised specimens in the Ferguson´s group seemed alarming, but is not unusual in that the subcutaneous external sphincter muscle may occupy the terminal portion of the anal canal. Moreover, it was not entirely surprising that smooth muscle fibres were demonstrated in the excised specimens in both groups because they cross the plane of resection from the internal sphincter to the anal cushion (20). There remains controversy about whether these smooth muscle fibres are indeed subepithelial in origin or originate from the internal anal sphincter, as they are difficult to distinguish histologically. An important deduction from this observation is that the histological presence of muscle fibres in excised haemorrhoidal tissue by the Ferguson´s or Longo´s technique does not necessarily render the patient incontinent of faeces, but may result in transient incontinence of flatus. Normal continence to flatus returned within 3 months of surgery, possibly owing to compensation from the external sphincter following haemorrhoidectomy (21). No patients of either group of our study had faecal urgency, nor incontinence of flatus.

Regardless of the technique used, long term symptom control and functional outcome after surgical haemorrhoidectomy vary from patient to patient, and recurrent haemorrhoidal symptoms are not uncommon (22). In one study, thirty - three per cent of patients who underwent Longo´s technique had recurrent bleeding, prolapse, anal stenosis (23). Beatti et al. (24) stated that staple - line stenosis can occur, if an inadequate width of mucosa is resected. In this study, there was no anal stenosis.

In addition, we observed that Longo´s procedure is associated with less postoperative pain, and patients´ acceptance and satisfaction for the operation were high as that reported by other authors (13 -15, 23, 25 - 27).

In Ferguson´s group, the area denuded of epithelium following dissection may still contribute to painful anal spasm and sepsis, even after wound closure (28)

It would appear from the data presented that the potential avoidance of wound contamination by the Longo´s technique aided faster wound healing.

All patients randomised to the Longo´s technique had effective symptom control (prolapse, bleeding, discharge) at 6 weeks follow-up. Further long term follow-up of these patients is planned to determine whether these initial results are durable and to detect any long term sequelae.

Our results suggest that Longo´s technique is an effective treatment for symptomatic haemorrhoids with significant advantages for patients over conventional haemorrhoidectomy, and in this we coincide with other authors (14, 28, 29). However, after three years, 80 % of patients with fourth degree treated with Longo´s technique were unsatisfied and complained of persistent skin tags, and requested excision; three patients had anal fissures, 12 tenesmus, and 5 recurrence.

In conclusion, Longo´s technique confers clinical advantage over the Ferguson´s technique, only in third degree haemorrhoids.

References

1. Milligan ETC, Morgan CN, Jones LE, Officer R: Surgical anatomy of the anal canal and operative treatment of haemorrhoids. Lancet 1119- 1124, 1937

2. Ferguson JA, Heaton JR: Closed hemorrhoidectomy. Dis Colon Rectum 2: 176-179, 1959.
3. Ho YH, Seow-Choen F, Tan M, Leong AFPK: Randomized controlled trial of open and closed haemorrhoidectomy. Br J Surg 84: 1729-1730, 1997.
4. Longo A: Treatment of haemorrhoidal disease by reduction mucosa and haemorrhoidal prolapse with a circular stapling device: A new procedure - 6th World Congress of Endoscopic Surgery. Mundozzi Editor 1998, pp: 777-784.
5. Khubchandani I: Operative haemorrhoidectomy. Surg Clin North Am 68: 1411-1416, 1988.
6. Mathews JNS, Altman DG, Campbell MJ, Royston P: Analysis of serial measurements in medical research. BMJ 300: 230-235, 1990.
7. Andrews BT, Layer GT, Jackson BT, Nicholls RJ: Randomised trial comparing diathermy with scissor dissection Milligan - Morgan operation. Dis Colon Rectum 36: 580-583, 1993.
8. Murie JA, Sim AJW, Mackenzie I: Rubber band ligation versus haemorrhoidectomy for prolapsing haemorrhoid: A long term prospective clinical trial. Br J Surg 69: 536-538, 1982.
9. Leicester RJ, Nichols RJ, Mann CV: Infrared coagulation: A new treatment for haemorrhoids. Dis Colon Rectum 24: 602, 1981.
10. Smith LE, Goodreau JJ, Fourty WJ: Operative haemorrhoidectomy versus cryodestruction. Dis Colon Rectum 22: 10-16, 1979.
11. Roe AM, Bartolo DCC, Vellacott KD, Lock Edmonds J Mortenson NJ: Submucosal versus ligation excision excisional haemorroidectomy: A comparison of anal sensation , sphincter annometry and postoperative pain and function. Br J Surg 74: 948-951, 1987.
12. Goligher J: Surgery of the anus, rectum, and colon. 5th ed. London: Bailliere Tindall, 1984.
13. Khalil K. H., O´Bichere A, Sellu D: Randomized clinical trial of sutured *versus* stapled closed haemorrhoidectomy. BJS 87: 1352-1355, 2000.
14. Rowsell M, Bello M, Hemingway D M: Circumferential mucosectomy (stapled haemorrhoidectomy) versus conventional haemorrhoidectomy: Randomised trial. The Lancet 355: 779- 781, 2000.
15. Mehigan BJ, Monson JR, Hartley JE: Stapling procedure for haemorrhoids versus Milligan-Morgan haemorrhoidectomy: Randomised controlled trial. Lancet 355 :782-785, 2000.
16. Molloy RG, Kingsmore D: Life threatening pelvic sepsis after stapled haemorrhoidectomy. Lancet 355: 810, 2000.
17. Ho YH, Seow-Choen F, Tsang C, Eu KW: Randomized trial assessing anal sphincter injuries after stapled haemorrhoidectomy. Br J Surg 88: 1449-1455, 2001.
18. Altomare DF, Rinaldi M, Sallustio PL, Martino P, De Fazio M, Memeo V: Long-term effects of stapled haemorrhoidectomy on internal anal function and sensitivity. Br J Surg 88: 1487-1491, 2001.
19. Cheetham MJ, Mortensen NJ, Nystrom PO, Kamm MA, Phillips RK: Persistent pain and faecal urgency after stapled haemorrhoidectomy. Lancet 356: 730–733, 2000.
20. Loder PB, Phillips RKS: Haemorrhoidectomy. Curr Pract Surg 5: 29-35, 1993.
21. Read MG, Read NW, Haynes WG, Donnelly TC, Johnson AG: A prospective study of the effect of haemorrhoidectomy on sphincter function and faecal continence. BJS 69: 396-398, 1982.
22. Ho YH, Foo CL, Seow- Choen F: Prospective randomized controlled trial of a micronized flavonidic fraction to reduce bleeding after haemorrhoidectomy. Br J Surg 82: 1034-1035, 1995.
23. Shalaby R, Desoky A: Randomized clinical trial of stapled versus Milligan-Morgan haemorrhoidectomy. Br J Surg 88: 1049-1053, 2001.
24. Beattie GC, Loudon MA: Stapled haemorrhoidectomy offers substantial benefits. BMJ. 322 (7281): 303, 2001.
25. Keighley MR. Pain after stapled haemorrhoidectomy. Lancet 356 (9248): 2189; discussion 2190: 23-30, 2000.
26. Longo A. Pain after stapled haemorrhoidectomy. Lancet 356 : 2189- 2190, 2000.
27. Seow-Choen F: Stapled haemorrhoidectomy: Pain or gain. Br J Surg 88: 1- 3, Jan, 2001.
28. Smyth EF, Baker RP, Wilken BJ, Hartley JE, White TJ, Monson JR: Stapled versus excision haemorrhoidectomy: Long-term follow up of a randomised controlled trial. Lancet 361: 1437-1438, 2003.
29. Ganio E, Altomare DF, Gabrielli F, Milito G, Canuti S: Prospective randomized multicentre trial comparing stapled with open haemorrhoidectomy. Br J Surg 88: 669 – 674, 2001.

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