Eastern Journal of Medicine: 9 (2004): 63- 71

Original Article

Economic evaluation of Longo vs Ferguson technique in haemorrhoid treatment

Yousef Thwayeb[a], Gonzalez Hermoso[b], Abásolo Alessón [c]

[a]*Department of Surgery, San Juan de Dios Hospital, Santa Cruz de Tenerife, SPAIN.*

[b]*Professor of Surgery, Faculty of Medicine - La Laguna University, La Laguna, SPAIN.*

[c]*Senior lecturer, Faculty of Economic and Business Sciences - La Laguna University, La Laguna, SPAIN.*

Abstract. We performed a pragmatic economic evaluation of a randomized controlled trial comparing two alternative surgical techniques for haemorrhoid treatment: Longo *vs* Ferguson. The primary economic evaluation framework employed was cost-utility analysis. 40 patients with 3rd and 4th degree haemorrhoids were randomly assigned to either technique (20 each). Cost data were measured within and out with the trial, then were combined with quality-adjusted life years (QALYs) to obtain cost-per-QALY ratios. Mean cost of Longo technique was €3,637.49 compared with €4,509.36 for Ferguson technique. The extra **€**871.87 in Ferguson group was mainly indirect cost**s**. At 2 years post-intervention, Ferguson-treated patients gained a mean 1.8294 QALYs while Longo-treated patients gained a mean 1.5706 QALYs. This difference was not statistically significant ($P>0.05$) so we opted for analysis of cost minimization. We had three cases of anal fissures, twelve tenesmus, five recurrences and 80 % of the patients with fourth degree haemorrhoids were unsatisfied, complained of persistent skin tags and requested excision. The trade-offs between each procedure´s attributes providing monetary estimates of benefit for both techniques (trade-offs -willingness to pay €2,703; Longo and €2,395.5 Ferguson), showed that the costs were significantly higher than the benefit in both.

At three months all favoured Longo procedure, but at 3 years only third degree patients did so, while fourth degree patients favoured Ferguson procedure. The low benefit perceived in both procedures may be attributed to Health Service funding.

Keywords: Longo Technigue, Ferguson technique, haemorrhoid treatment

1. Introduction

Milligan – Morgan (1) described their surgical technique for haemorrhoid treatment in 1937. Since then many techniques have appeared, but none has been shown to be superior to the Milligan-Morgan technique which, together with Ferguson´s technique (2) described in 1957, remain the techniques of choice for the treatment of 3rd and 4th degree haemorrhoids. It is an extremely painful process involving prolonged hospitalization and long periods of incapacity. The recent appearance of Longo´s technique (3) generated much interest in both professionals and patients, since it promises reduced pain and hospitalization time.

*Correspondence to: Dr. Yousef Thwayeb (C Prolongacion Ramon y Cajal N º 5 - 4º - B 38003 - Santa Cruz de Tenerife Spain Telefax: 0034922284343 E-mail: thwayeb@comtf.es

Although essential data on effectiveness alone cannot be used to decide surgical policy, economic evaluation is also required to decide the place of each technique in health services. The consideration of cost-effectiveness becomes even more important when there is no clear evidence of the superiority of any particular technique. A number of recent trials have included only comparisons of the clinical outcome (4-6).

Reviewing the literature, we found no economic evaluation studies comparing the two techniques. We set out to throw some light on the economics of the two techniques, using cost- utility analysis, in a pioneer study in the literature.

This pilot study uses a prospective randomized design with the novelty respect to existing evidence of including a generic outcome measure, EuroQol-5D (EQ-5D) (7), from which quality-adjusted life years (QALYs) can be estimated. Since the QALY is a general measure of quality of life (QOL), its use in this study is an attempt to capture specific health outcomes within one

Table 1

The EQ-5D descriptive system

	Mobility
1	No problems in walking about
2	Some problems in walking about
3	Confined to bed
	Self-care
1	No problems with self-care
2	Some problems washing or dressing self
3	Unable to wash or dress self
	Usual activities
1	No problems with performing usual activities (e.g. work, study, housework, family or leisure activities)
2	Some problems with performing usual activities
3	Unable to perform usual activities
	Pain/discomfort
1	No pain or discomfort
2	Moderate pain or discomfort
3	Extreme pain or discomfort
	Anxiety/depression
1	Not anxious or depressed
2	Moderately anxious or depressed
3	Extremely anxious or depressed

Table 2

MEAN costs (euros) per technique (minimum – maximum)

Resource	Ferguson	Longo	P*
Hospital costs	407.74	629.07 [543.05 – 950.8]	
Pathological anatomy	60	60	
Home Medication	132.56 [95.89 – 246]	62.78 [24.39 – 243]	
Wound dressing	42.2 [16.68 –100.07]	14.05 [5.56 –77.83]	
Consultations	715.2 [540.91 – 1202.02]	626.32 [480.81- 1141.92]	
Transport	171.65 [129.82 – 288.49]	151.83 [115.39 – 274.06]	
Absenteeism or loss of earnings	1,987.29[632.68 –4,202.43]	1,138.49 [347.97–5,175.62]	
Companion (Earnings loss)	932.49 [632.68 – 1327.08]	661.66 [379.61 – 1,423.53]	
Total mean cost	4,509.36 [2,607.4–7,329.52]	3,637.49 [2,124.4 – 9,108.9]	0.008
Mean total cost excluding companion opportunity cost	3,576.86 [1,943.93 – 6,002.43]	2,918.23 [1,637.81 – 7,685.36]	0.0168
Mean total cost excluding all indirect cost	1,589.56 [1,311.25 – 2,364.51]	1,670.59 [1,289.41- 2,931.14]	0.1556

*Mann – Whitney U test

overall measure, providing a summary index of the impact of each technique on overall QOL. The inclusion of a generic measure in this economic evaluation is an attempt to provide information for policy-makers on the value of the different techniques for haemorrhoid treatment. By relating the costs of each type of surgery to any benefits arising, a judgement can be made as to whether any additional benefits are worth the extra costs. The objective of this study was to perform an economic evaluation comparing the Longo technique and the Ferguson technique in the treatment of 3rd and 4th degree haemorrhoids.

2. Material and methods

2.1.Design

This economic evaluation was part of a study which compared the Longo technique versus Ferguson technique. Forty patients with a 3rd and 4th degree haemorrhoids were randomly assigned to Longo (n = 20) or Ferguson (n = 20). Patients were recruited between May 1999 and May 2000. All patients were eligible unless they were medically unfit for anaesthesia, an uncorrected coagulation disorder, or were pregnant. All were informed about the study and signed the informed consent. The economic evaluation framework used in this study was a cost–utility analysis carried out from a health service perspective. However, the paper also relates costs to other outcomes, such as time taken to return to usual activities. In order to avoid possible variation between surgeons, all operations were performed by the first author.

2.2.Measurement of costs

Data on duration of operation, staffing and postoperative hospital stay for all trial, patients were collected prospectively on standard forms to record preoperative, operative and postoperative indices.

2.3.Operative costs

Theatre running costs were identified by obtaining estimates of the booked cost of a theatre hour, which reflected fixed and semi-fixed costs. This was then combined with variable operative costs. To obtain the most accurate data for resource use, operative costs relating to haemorrhoidectomy (equipment, consumables and sterilization) were identified and measured prospectively. A structured cost-questionnaire was completed during all operations. For items of equipment, an estimate of their lifespan was obtained as well as an approximation of the number of times used. From this, an annual equivalent cost was estimated and divided by the annual use to obtain a cost per patient. The staffing element of theatre costs was based on each theatre's specific 'team'. Where operative complications were identified from the trial data, clinicians assisted in compiling the costs of each event. These additional resources were attached to the respective patient's costs as a 'complication cost'.

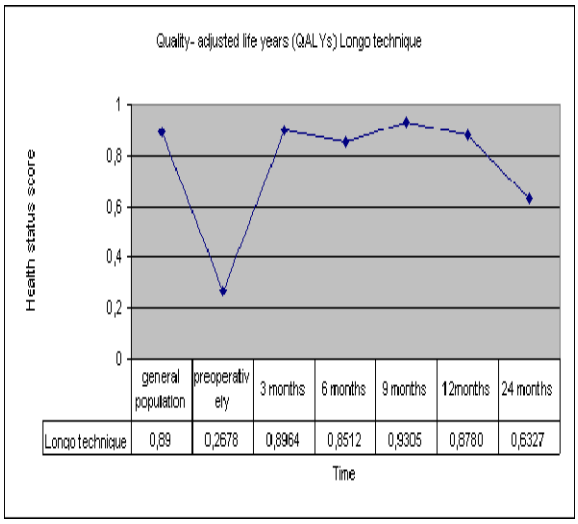

Figure 1. Longo technique. Comparison of the general population score with the score obtained from the outcome measure EQ – 5D, before operation, at 3, 6, 9, 12 and 24 months after operation. Values are mean.

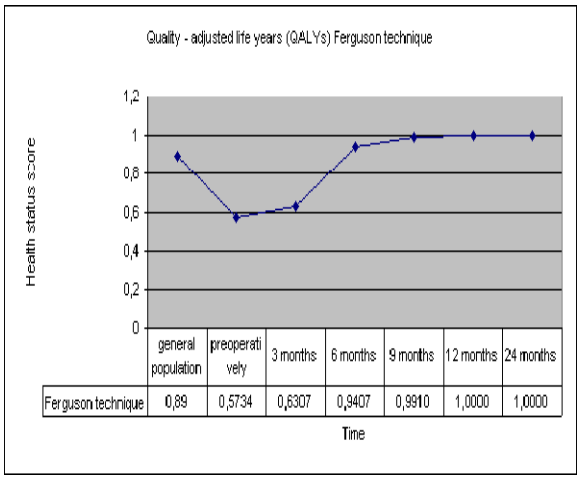

Figure 2. Ferguson technique. Comparison of the general population score with the score obtained from the outcome measure EQ – 5D, before operation, at 3, 6, 9, 12 and 24 months after operation. Values are mean.

2.4.Other healthcare costs

The specific cost of an inpatient day (including staffing, capital charges and overheads) on a general surgical ward was established. Where such marginal cost data were not available, the less specific mean cost per day at the centre was purged of elements already costed in the trial, such as staffing, equipment and supplies. For each patient, this cost was multiplied by the total inpatient stay obtained from trial data.

Postoperative complications requiring additional resources were also identified from trial data and costed accordingly. Valuation was carried out at 1999 prices (8).

We calculated the cost of post-operative time loss for both work and leisure, loss of production, visits to the specialist, and companion opportunity cost (days off work) using the mean national salary rate for December 1999.

Mean costs for the Longo and Ferguson groups were calculated using individual patient data refined with the additional, more detailed information from the operative cost-questionnaire. The cost data were analysed and compared using the Mann–Whitney *U* test.

Items of resource use were measured and valued in their naturally occurring units, e.g. per ampoule of drug or hour of staff time. Valuation was carried out at 1999 prices, using financial data of the centre, and where appropriate, annuitized using a 5 per cent discount rate, according to lifespan and use. The study lasted 36 months; however, potential future costs, such as those associated with recurrent haemorrhoids, were discounted and overheads and capital charges were allocated accordingly to the hospital in use. The data were analysed using Microsoft Excel and the statistical package SPSS. Sensitivity and threshold analyses were performed and are reported in this paper.

2.5. Measurement of health status

The EQ-5D questionnaire (7) was included for the economic evaluation to permit the calculation of quality adjusted life years (QALYs). These data were obtained at six time points: preoperative, 3, 6, 9, 12, and 24 months after the operation. The EQ-5D is a generic measure of health status that defines health in terms of five broad dimensions, each with three levels (9) (Table 1). Combinations of these dimensions and levels give rise to 243 health states. These health states were given quality of life (QOL) scores by a sample of the general Spanish public and a tariff compiled (10). For each patient, EQ-5D responses to each of the five dimensions were scored by multiplying the valuation of their health state by the duration of time spent in that state. Since only six time points of EQ-5D data were available, power curves were fitted to model the EQ-5D profiles for the Longo and Ferguson groups over the period from baseline to 24 months. Mean gains/loss in QALYs for each group during the two post-intervention years are compared. If statistically significant differences are found, then the cost-utility analysis of each technique is performed. If no such differences exist, a study of minimization of costs is performed to determine the best alternative from an economic point of view (11).

2.6. Survey at third year after the operation

We conducted a previously designed survey 3 years after the operation to see how patients valued, in monetary terms, the different outcomes. Comparing this value with the cost allows a cost-benefit analysis.

3. Results

3.1.Costs

The range of the costs collected during the trial is shown in Table 2. The mean cost of Longo technique was €3,637.49 compared with €4,509.36 for Ferguson technique. Mann-Whitney *U* test showed a significant difference ($P<0.05$) in mean total costs between the two techniques ($P=0.008$). Longo technique compared to the Ferguson technique did involve significantly lower mean cost. The extra €871.87 was due to indirect cost.

Mean hospital cost per patient of the Longo technique was €629.07 compared with €407.74 for Ferguson technique. The extra €221.33 was due to the cost of the stapling device used in the Longo technique (€300), which is only usable once, and the cost of treatment of the complications. This amount is partly offset by less operating time and lower consumption of medication in this group of patients.

Postoperative costs such as general practitioner appointments, hospital outpatient appointments and other appointments of Longo was €854.98 compared with €1,061.61 for Ferguson.

In the Longo group we observed differences between patients of third degree and fourth degree; all patients with third degree had excellent results, but 80 % of patients with fourth degree were unsatisfied, complained of persistent skin tags and requested excision; three patients had anal fissures, twelve tenesmus, and five recurrences required re-intervention. It must be pointed out that the re-intervention, was performed using the Ferguson technique. Total direct and indirect costs incurred by the treatment of the above-mentioned complications amounted to €13,835.73, representing 19% of the total cost of the 20 patients treated by Longo technique, which was €72,749.82.

Table 3

Mean QALYs gained by patients in Ferguson group and Longo group in the two post-operative years

	Ferguson	Longo	P*
QALYs gained (no discount rate applied)	1.8294	1.5706	0.078
[minimum – maximum values]	[1.6232-1.9783]	[0.6642-2.0000]	
QALYs gained (discount rate applied)	1.7817	1.5345	0.078
[minimum – maximum values]	[1.5756-1.9307]	[0.6603-1.9524]	
*Mann - Whitney U test			

Table 4

Time to return of activities and hospital costs, values are mean (range)

	Longo technique	Ferguson technique	Difference in means	Cost of an extra day
Able to enjoy usual social life (days)	2 (3–7)	14 (10–48)	12	€18.44
Able to enjoy usual interests or hobbies (days)	3 (2–10)	22 (14–65)	19	€11.64
Return to paid employment (days)	7 (3 - 15)	48 (20 - 115)	42	€5.27
Hospital costs	€629.07	€407.74	€221.23	

Table 5

Patient satisfaction

	Longo	Ferguson	P
Patient satisfaction (first year) all degrees	90 %	80 %	
Patient satisfaction 3rd degree (third year)	100 %	100 %	
Patient satisfaction 4th degree (third year)	20%	100 %	
Recurrence	5	0	
Trade-offs - willingness to pay	€2,703 [0–6,000]	€2,395.5 [60–6,000]	0.989

Indirect mean costs [cost of post-operative time, loss of both work and leisure time, and companion opportunity cost (days off work)] of the Longo group was €1,800.15 compared with €2,919.78 for Ferguson group.

3.2. Sensitivity analysis

A sensitivity analysis was performed to test whether results differed on excluding those costs which, by their nature, imply greater degrees of uncertainty. Excluding only companion opportunity cost, mean global cost for the Ferguson technique remained higher than for the Longo technique (€3,576.86 *vs* €2,918.23: $P = 0.0168$). Furthermore, the difference in mean costs between the two groups remained statistically significant ($P<0.05$).

However, on eliminating all indirect costs, the Ferguson technique cost slightly less than the Longo technique (€1,589.56 *vs* €1,670.59), and the difference was no longer statistically significant ($P>0.05$).

3.3. Health status

Longo´s operation is quicker to perform and achieves excision with simultaneous wound

closure, and near-perfect haemostasis is alleged, after firing the device, thereby eliminating potential contamination of the anal wound. However, we needed to add some suture to achieve perfect haemostasis in all cases. In the first post-operative week, we had no recurrent bleeding but we had anal abscess in two patients, despite the use of metronidazole 400 mg three times daily for 7 days. At three months our results suggest that Longo´s technique was an effective treatment for symptomatic haemorrhoids with significant advantages for patients over Ferguson´s technique. However, in the long term 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 80 % of patients with fourth degree were unsatisfied, 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.

None of the patients of either technique has suffered faecal urgency, incontinence of flatus, prolapse, anal stenosis, or suffered persistent pain. Length of hospital stay was not different between groups, since all patients were discharged within 24h.

3.4.Quality-adjusted life years

The preoperative state of health was different between the groups, despite having been randomly assigned to either surgical technique (Longo or Ferguson). This did not prevent analysis and comparison of gains/loss in QALYs for each group. Intervention using both techniques resulted in significant improvement of patient health status. In particular, patients who underwent the Longo technique presented spectacular improvement in the first 3 months, reaching a health status of the general population [data for the general population 0.89 (10)]. However, after 12 months, the mean state of health worsened with respect to the general population (Figure 1). Patients who underwent the Ferguson technique improved progressively and reached general population levels at 6 months (Figure 2).

Table 3 shows mean QALYs gained by patients in each group during the two year follow-up. Ferguson-treated patients gained a mean 1.8294 QALYs while Longo-treated patients gained a mean 1.5706 QALYs. The difference in results was not statistically significant (P>0.05).

On applying a discount of 5% to those QALYs obtained in the second year, the difference in means remained statistically non-significant. The absence of a significant difference between the two groups meant that the economic evaluation centred on an analysis of minimization of costs.

3.5.Combining cost data with other clinical outcomes

A summary of the clinical outcomes can be seen in Tables 4 and 5. Using data on 'Usual activities' as the sole outcome, patients in the Longo group were able to enjoy usual social life after a mean of 2 days while those in the Ferguson group were not able to enjoy usual social life until 14 days after operation, a significant difference of 12 days. Using the hospital cost data, this equates to an extra cost of €18.44 per extra day's gain in usual social activities (€221.23 / 12). Using the cost data with the outcome 'Able to enjoy usual interests or hobbies', the Longo group returned to these activities 19 days earlier. Thus, the cost of an extra day's gain in usual interests or hobbies was €11.64 (€221.23 / 19). Using the cost data with the outcome 'Return to paid employment', the Longo group returned to employment 42 days earlier. Thus, the cost of an extra day's gain in return to paid employment was €5.27 (€221.23 / 42).

3.6.Survey at third year after the operation

Combined analysis was performed to establish the trade-offs between the attributes of each procedure providing monetary estimates of benefit or utility scores for both technique. The Longo group showed willingness to pay a mean €2,703 [€0 –€6000], while Ferguson group €2,395.5 [€60 – €6000]. The difference in results, was not statistically significant (P = 0.989).

4.Discussion

The mean hospital cost per patient of the Longo technique was €629.07 *vs* €407.74 for the Ferguson technique. This difference was due to the cost of the stapling device used in the Longo technique (€300), which is only usable once. This amount is partly offset by less operating time and lower consumption of medication in this group of patients. The mean total cost of the Longo technique was €3,637.49 compared with €4,509.36 for the Ferguson technique. The Ferguson-treated group consumed more

resources, with increased medication (especially analgesics), greater number of visits and, dependence on family members for attention, as well as the routine use of taxis for transport, and longer periods of incapacity.

A sensitivity analysis was performed to test whether results differed on excluding those costs which, by their nature, imply greater degrees of uncertainty. Excluding only companion opportunity cost, mean global cost for the Ferguson technique remained higher than for the Longo technique (€3,576.86 *vs* €2,918,23: P = 0.0168). Furthermore, the difference in mean costs between the two groups remained statistically significant (P<0.05).

However, on eliminating all indirect costs, the Ferguson technique cost slightly less than the Longo technique (€1,589.56 *vs* €1,670.59), and the difference was no longer statistically significant (P>0.05).

On separating patients according to haemorrhoid degree, we observed cost variation within the same technique. Fourth degree haemorrhoid treatment was more costly than third degree haemorrhoids. The cost difference is attributable In Ferguson group to the longer postoperative period. By contrast, the Longo technique involves the same postoperative period regardless of haemorrhoid degree, and the difference is due to the cost of the excision of skin tags and the treatment of the complication (three patients had anal fissures and five recurrence), all being of fourth degree.

All patients´ state of health was measured using the EQ-5D questionnaire. Despite random assignment to one or other surgical technique, differences were observed in pre-operative state of health. This is attributed to the small size of the total sample, which we suggest should be substantially larger for future studies. Although pre-operative comparative health status differed, we did not consider it sufficient to invalidate analysis and comparison of the results of the two techniques. In fact, as can be seen from our results, mean gains in health for the two groups were not significantly different, so that this problem did not prevent important conclusions being drawn from this pilot study.

The intervention with both techniques produced significant improvement in the patients´ state of health. In particular, patients who underwent the Longo technique presented spectacular improvement in the first 3 months, reaching a health status of the general population [data for the general population (0.89) (10)]. However, after 12 months, the mean state of health worsened with respect to the general population. Patients who underwent the Ferguson technique improved progressively and reached general population levels at 6 months.

The effectiveness of both techniques measured by quality adjusted years of life (QALY) gained after the intervention did not reveal statistically significant differences (P=0.078). Ferguson-treated patients gained a mean 1.8294 *vs* 1.5706 QALYs gained by Longo-treated patients. On applying a 5% discount to QALYs gained in the second year of follow-up, we observed that the difference in mean values remained statistically non-significant (P=0.078).

There were five recurrences after Longo technique compared with none after Ferguson technique, which worsened the mean health status of the group as well as increased their mean cost required re-intervention. They were subsequently treated using the Ferguson technique. In order not to distort the results by not including health status after recurrence, the mean score of health for the Ferguson technique was computed for the post-recurrence months, since these patients showed an evolution similar to those of the Ferguson technique.

In the literature many authors have noted insufficient postoperative follow-up time to be able to report recurrence (5, 6). The present study has an important advantage in this respect. Our follow-up time of three years allowed detection of complications and changes in health status long after therapeutic intervention.

The results of the two interventions in terms of QALYs gained were not statistically different, so that the economic evaluation, the aim of this study, centred on the analysis of cost minimization (11).

Using data on ‘Usual activities’ as the sole outcome and using the hospital cost data as the sole cost, we observed that patients in the Longo group were able to enjoy usual social life 12 days earlier than the Ferguson group. This equates to an extra cost of €18.44 per extra day's gain in usual social activities (€221.23 / 12). The outcome ‘Able to enjoy usual interests or hobbies’, the Longo group returned to these activities 19 days earlier. Thus, the cost of an extra day's gain in usual interests or hobbies was €11.64 (€221.23 / 19). The outcome ‘Return to paid employment’, the Longo group returned to employment 42 days earlier. Thus, the cost of an extra day's gain in return to paid employment was €5.27 (€221.23 / 42).

The average wage per day in the Canary Islands in December of 1999 was €39 which demonstrates that the cost to return to the usual activity was less than the benefit.

Cost-benefit analysis was performed to establish the trade-offs between the attributes of each procedure providing monetary estimates of benefit or utility scores for both technique. The Longo group showed willingness to pay a mean €2,703 [€0 –€6,000], while Ferguson group €2,395.5 [€60 – €6,000]. The difference in results was not statistically significant (P = 0.989).

The mean total cost of the Longo technique was €3,637.49 [€2,124.4 – €9,108.9] and €4,509.36 [€2,607.4–€7,329.52] for the Ferguson technique. These data show that the costs were significantly higher than the benefit in each procedure. The low benefit perceived by patients in both procedures may be attributed to Health Service funding.

Recently, a number of papers have suggested techniques for stochastic cost-effectiveness analysis (12, 13). However, as yet, there is no agreement as to the preferred method. The present study concentrated on mean costs and mean benefits. The main uncertainty in this study was related to indirect costs, i.e. time loss for both work and leisure, loss of production, companion opportunity cost.

At three months, analysis of economic data shows a clear preference for the Longo procedure. However, at 3 years third degree patients in both groups favoured the Longo procedure, while fourth degree patients favoured the Ferguson procedure. However, the trade-offs between the attributes of each procedure providing monetary estimates of benefit for both techniques showed that the costs were significantly higher than the benefits in both procedures.

In most clinical reports, authors express concerns about rare, serious complications such as retroperitoneal sepsis (14), pain and faecal urgency (15), bleeding (16) and haemorrhoid recurrence. These concerns supported restricting the use of Longo technique to surgeons. Our only early complications consisted of anal abscess in two patients (despite the use of metronidazole 400 mg three times daily for 7 days), and we had no recurrent bleeding. Subsequently, 80 % of our patients with fourth degree were unsatisfied, complained of persistent skin tags and requested excision; three patients had anal fissures, twelve tenesmus, and five recurrence. None of the patients of either technique has suffered faecal urgency, incontinence of flatus, prolapse, anal stenosis, or persistent pain. From an economic perspective these rare events would influence costs.

Some studies have included estimates of indirect costs or productivity gains/loss used the human capital approach to estimate indirect costs and concluded that that was the most cost-effective strategy, provided that both direct and indirect costs were included. The human capital approach is no longer recommended automatically because of theoretical flaws (17**)** and the inclusion of indirect costs is also controversial. In recently published guidelines, the Washington Panel provided recommendations on how to incorporate productivity costs into cost-effectiveness analysis, using a QALY approach (18). This approach recommends incorporating productivity costs such as health effects in the QALY (19). Such an approach provides a starting point for valuation without entering the debate on the best way of calculating indirect costs.

5. Conclusion

At three months, economic data show a clear preference for the Longo procedure. However, at three years this preference only applied to third degree haemorrhoids in both groups, but not fourth degree haemorrhoids.

Cost-benefit analysis showed that the cost of both procedures exceeded benefit. This we attribute to Health Service funding.

The literature reports rare serious complications which support restricting the use of Longo technique. From an economic perspective these events adversely influence costs.

The type of information provided in this paper can be used for decision-making purposes between differing specialty budgets, as well as for providing information on the relative cost-effectiveness of different techniques in the long-term.

This is a pioneering study that could be developed by increasing the sample size and distinguishing between third and fourth degree haemorrhoid patients.

References

1. Milligan ETC, Morgan CN, Jones LE, Officer R.: Surgical anatomy of the anal canal and operative treatment of haemorrhoids. Lancet ii1937;1119-1124.
2. Ferguson JA, Heaton JR.: Closed haemorrhoidectomy. Dis Colon Rectum 1959;2:176 – 179.
3. 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; 777 - 784.

4. Gravie JF.: Treatment of stage III and IV haemorrhoids by the Longo technique. Ann Chir. 1999;53(3):45-247.
5. Brian J Mehigan, John R T Monson, John E Hartley,: Stapling procedure for haemorrhoids versus Milligan - Morgan haemorrhoidectomy: randomised controlled trial, The Lancet, Vol 355, March 2000;4:782 –785.
6. Rowsell M, Bello M, Hemingway DM,: Circumferential mucosectomy (stapled haemorrhoidectomy) versus conventional haemorrhoidectomy: randomised controlled trial, Lancet, Vol 355 (9206), March 2000;4:779-781.
7. Kind P.: The EuroQol instrument: an index of health-related quality of life. In: Spiker B, ed. Quality of Life and Pharmacoeconomics in Clinical Trials. 2nd ed. Lippincott–Raven, Philadelphia, Pennsylvania 1996;191–201.
8. Victor Peisker: Vademecum Internacional, ed. Medicom, S.A. Madrid – Spain, 1999.
9. Dolan P, Gudex C, Kind P, Williams A. A Social Tariff for EuroQol: Results from a UK General Population Survey. Centre for Health Economics Discussion Paper 138. York: Centre for Health Economics, University of York, 1995.
10. Badia X, Roset M, Montserrat S, et al.: The Spanish version of EuroQol: a description and its applications. European Quality of Life scale, Med Clin (Barc) (Spain), 112 Suppl 1 p79-85, 1999.
11. Drummond M. Economic Analysis Alongside Controlled Trials. An Introduction for Clinical Researchers. York: Department of Health, Centre for Health Economics, University of York, 1994.
12. Briggs AH & Gray AM: Handling uncertainty when performing economic evaluations of health care interventions. Health Technology Assessment volume 3, number 2, 1999.
13. Briggs A & Fenn P.: Confidence intervals or surfaces? Uncertainty on the cost-effectiveness plane. Health Econ 1998;7:723–40.
14. Molloy RG, Kingsmore D. Life threatening pelvic sepsis after stapled haemorrhoidectomy. Lancet 355 (9206), Mar 2000;4:810.
15. Cheetham MJ, Mortensen NJ, Nystrom PO, Kamm MA, Phillips RK. Persistent pain and faecal urgency after stapled haemorrhoidectomy. Lancet 356 (9231), Aug 2000;26:730 – 733.
16. Shalaby R, Desoky A. Randomized clinical trial of stapled versus Milligan-Morgan haemorrhoidectomy. Br J Surg. 88 (8), Aug2001; 1049 – 53.
17. Drummond MF, O'Brien BJ, Stoddart GL, Torrance GW. Methods for the Economic Evaluation of Health Care Programmes. 2nd ed. Oxford University Press, Oxford, 1997.
18. Gold MR, Siegel JE, Russell LB, Weinstein MC. Cost-Effectiveness in Health and Medicine. Oxford University Press, Oxford, 1996.
19. McIntosh E, Donaldson C, Ryan M. Recent advances in the methods of cost–benefit analysis in health care: matching the art to the science. Pharmacoeconomics 1999;5: 357–67.