

The financial considerations of inguinal hernia surgery: does the surgical approach matter?

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Abstract

Introduction Clinical differences between open and laparoscopic inguinal hernia repair and between Local and General anaesthetic are minimal in the majority of cases. This study aims to provide direct cost comparison data between the different approaches to facilitate a better understanding of the relative costs of providing inguinal hernia repair via different surgical approaches. This will facilitate a better understanding of the cost implications of running a comprehensive hernia service.

Methods Six UK reference centres provided mean index costs for Laparoscopic Trans abdominal preperitoneal repair (TAPP), Laparoscopic Transabdominal Extraperitoneal (TEP), open repair with General Anaesthetic (GA) and open repair with Local Anaesthetic (LA). Daycase versus overnight stay were also considered. Relative costs of the different approaches were calculated and a sensitivity analysis undertaken.

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Results

The least expensive option was open repair under LA as a day case.

Requirement of a GA increased the cost by approximately 75%.

Laparoscopic TEP repair was the most expensive option costing 2.5 times as much as open repair under LA. The average cost of an overnight bed was €332 (€181–€543), however there was considerable variation, as there was for Mesh and endoscopic equipment which ranged from 25–100% of list price depending on local procurement contracts.

Discussion Data from UK and Swedish registries suggest that there is capacity for increasing the proportion of inguinal hernias repaired under local anaesthetic. If remuneration is fixed (as it is in the UK), then service provision should be planned across the whole service to maximise LA daycase throughput, thus generating surplus income which may be directed to covering the cost of more expensive procedures where clinically indicated.

This article has been adapted for an international audience from one previously published in the UK.

Introduction

There have been many studies over the years comparing laparoscopic and open repair in terms of immediate cost and clinical outcomes [1,2]. These studies generally conclude that the clinical differences are minimal but that costs are generally higher for laparoscopic surgery. Nevertheless, there are situations when a laparoscopic approach is clearly of benefit (bilateral hernia or re-do surgery for example) which are correspondingly advocated in clinical guidelines [3]. Similarly there are instances when repair under a Local Anaesthetic (LA) is clearly clinically preferable to a General anaesthetic (GA). In the UK, current data indicates that of the 75,000 hernia repairs performed annually in the UK, 17% are performed laparoscopically and around 5% as an open repair under LA [4], therefore around three quarters are performed as an open repair under GA. This suggests that whilst there are sub-groups of patients for whom one surgical approach is clinically more appropriate than another, for the majority of patients, the approach makes little clinical difference.

With tightening health resources in austere times, should more consideration be given to the cost of provision than simply the clinical justifications when deciding which approach to take? This study aims to provide the data to enable meaningful consideration of this question by evaluating the comparative costs of providing inguinal hernia repair via different surgical approaches. An appreciation of these relative costs will facilitate a better understanding of the cost implications of running a comprehensive hernia service.

Methods

Six reference centres in the UK provided mean index costs for four different approaches to inguinal hernia repair. From these figures, the average costs for Laparoscopic Trans abdominal preperitoneal repair (TAPP), Laparoscopic Transabdominal Extraperitoneal (TEP), open repair with General Anaesthetic (GA) and open repair with Local Anaesthetic (LA) were calculated. In addition, centres provided an estimate of the cost of an overnight surgical bed.

To avoid over complication of the analysis, variation in operating time was not taken into consideration. For calculation purposes, it was assumed that 60 minutes of staff time would be required for all procedures including the anaesthetic. General hospital overheads have been excluded but are likely account for about 5% of remuneration.

During the data analysis, it soon became apparent that differences in staff costs and standard kit costs were negligible. The main cost differences between centres were due to variation in mesh costs and the variable use of endoscopic devices (staplers / balloon dissectors). Consequently, the average cost across the six centres of staffing and equipping a theatre for each given procedure was calculated and fixed so as to simplify the cost calculation. The variable costs of Mesh and endoscopic devices were analysed in their raw form. Therefore, the cost calculation used was:

Total Cost = Fixed Costs + Variable Costs + Overnight Stay

(A currency conversion rate for GBP to Euros of 1.207 has been used)

Table 1 Completed costing sheet example.

Inguinal Hernia - General Anaesthetic - Hospital A		
Pay / Non Pay	Details	Cost (€)
Pay	1 x ODP (60 mins)	24.14
	2 x Scrub - nurse & assistant (60 mins)	48.28
	1 x Circulating Nurse (60 mins)	24.14
	1 x Anaesthetist (60 mins)	90.53
	1 x Consultant Surgeon (60 mins)	90.53
Pay Sub-Total		277.62
Non Pay	20ml 5mg/ml Chirocaine	20.28
	Propofol, opioid analgesia, enflurane or sevoflurane	130.83
	General Basic Set	44.83
	Low Fluid Drape	5.81
	Hand held Diathermy (HCP-01 skintact)	1.74
	Smoke evacuation tubing (E3590 Valleylab)	6.84
	Light handle	1.29
	1 Pack of 10 x 7.5 swabs	0.42
	20ml Syringe	0.05
	Green Needle	0.01
	Discarder pad	0.41
	Suction tube	0.84
	Scalpel	0.76
	3/0 Monocryl (3207 Ethicon)	3.37
	0 and 2/0 Polysorb Suture	1.34
	Medium Mepore dressing	0.08
	Ultrapro hernia system mesh (Ethicon) or Flat Ultrapro Mesh	138.03
Non Pay Sub-Total		356.93
Grand Total		634.54

Results

The cheapest option was open repair under LA as a day case. Requirement of a GA increased the cost by approximately 75%. Laparoscopic TEP repair was the most expensive option costing 2.5 times as much as open repair under LA when performed as a day case. The average cost of an overnight bed was €332, however there was considerable variation (€181 – €543). If an overnight stay is required, the relative cost ratios are less. (Table 2)

The variation in cost of Mesh and endoscopic equipment ranged from 25–100% of list price depending on local procurement contracts. A sensitivity analysis was performed to evaluate the range of different centre costs taking into account the variation in overnight stay and equipment costs. This is illustrated in Figure 1.

Discussion

This current study has calculated a relative comparison cost index between the various approaches to inguinal hernia repair. It also

suggests benchmark costings for the different approaches calculated from UK data. Whilst there is likely to be some variation in absolute costs between countries, it is likely that the relative cost ratios between surgical approaches will be of similar proportions. LA repair is the most cost effective approach to hernia repair as it obviates the need for an anaesthetist and the associated drugs which accounts for around 40% of the cost of open repair under GA. Laparoscopic repair is the most expensive option due to the additional disposable equipment required, this is in agreement with other studies [5–7].

Of course, affordability of the different approaches cannot be decided without knowing the remuneration package for each procedure, which will be country dependant. In the UK, there has been a recent move to the “Best Practice Tariffs” model which pays a fixed remuneration tariff regardless of the method of hernia repair” [8,9]. Under such a fixed payment structure, provision should be weighted towards LA repair where possible to maximise surplus income. This surplus can then be directed to providing more expensive procedures to those patients in whom it is clinically indicated. Similarly, there is an increasing weight of evidence in favour of the daycase model for inguinal hernia repair on the basis of better patient experience,

Table 2 Average costings and relative ratios.

	Average cost of procedure (€)	Relative cost ratio	Average cost of procedure including overnight stay (€332)	Relative cost ratio
LA Open	335.62	1	667.54	1
GA Open	587.62	1.75	919.54	1.38
TAP	799.47	2.38	1,131.39	1.69
TEPP	843.28	2.51	1,175.21	1.76

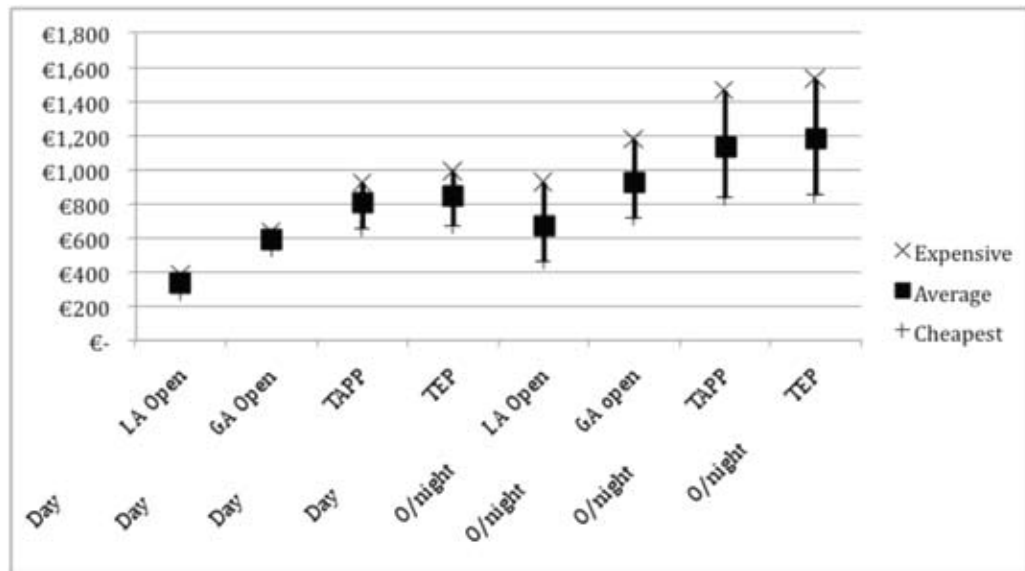


Figure 2 Sensitivity analysis of potential range of costs by procedure type.

improved cost effectiveness and equivalent clinical outcomes [10]. In the UK, the Best Practice Tariffs payment structure incentivises daycase surgery by paying a €360 lower tariff for an overnight stay [11]. The hospital will also incur the cost of providing the overnight bed for which there is no further remuneration.

The simple calculation used in this study (Total Cost = Fixed Costs + Variable Costs + Overnight Stay) can be used by hospitals to identify unnecessary expense in the system based on local protocols. For example, the cost of laparoscopic surgery could be reduced by adopting novel techniques to safely perform the same procedure without the requirement for expensive disposables [12], driving down the associated “variable costs” component of the calculation. Thus the exact cost of surgery can only really be evaluated at a local level according to local expertise available and the procurement contracts in place. However, within these limitations, this study provides the best estimate currently available of the cost of providing hernia services on a case-by-case basis, and in particular the relative cost differentials of the various options.

Other weaknesses of this study are in the assumptions that were necessarily made and the consequent impact on the precision of cost calculations. We have assumed that all cases take the same amount of time. It is unhelpful when planning a service to think in terms of minutes per case, it is however useful to think in terms of how many procedures can be undertaken on a given list. It may be that on a half-day list three open repairs could be performed versus only two laparoscopic ones. This would of course have a considerable impact on cost calculations. We have not attempted to include this in the calculation as it introduces too much variability. Similarly we have assumed that a consultant surgeon and anaesthetist will undertake the list; hernia lists are often run by middle grade surgeons and anaesthetists with lower pay rates. Even within the Consultant grade

there is considerable variation in pay levels.

Assuming that daycase repair under LA is the most cost-effective approach to inguinal hernia repair, how much capacity is there for increasing the number of LA procedures? Published data from the Swedish Hernia Register suggests that 16% of inguinal hernias are performed under LA in that country [13]. Information from NICE suggest that around 5% are performed under LA in the UK [4]. Similarly 8% were performed as laparoscopic operations in Sweden versus 17% in the UK. This would suggest that around 75% of hernia repairs are performed as open procedures under GA (or regional block) in both countries. Given that there are relatively more contraindications to GA than LA, predominantly on anaesthetic grounds, and that there are numerous studies reporting equivocal safety and satisfaction rates for LA hernia surgery [14–16] it does not seem that this discrepancy can be explained on clinical grounds alone. Arguably there appears to be significant capacity to increase the proportion of cases performed under LA with consequent cost benefits.

In inguinal hernia surgery there is no one-size-fits-all solution. Not all patients are clinically suitable for daycase surgery, and some patients will be better suited to laparoscopic repair. It is therefore the responsibility of providers to plan delivery across a whole service rather than on an individual case basis. Overnight stays and laparoscopic surgery can be accommodated by offsetting these higher costs against more cost effective open daycase procedures under LA. Beyond the case-by-case cost calculation, service planners will also need to take account of other variables such as unanticipated overnight admissions, and readmissions. Hospital overheads should also be taken into account.

The findings of this study suggest that a cost-effective hernia

programme requires maximum day surgery throughput with use of LA where possible. Quality care, however, requires a clinician overview to allocate the appropriate patient to the appropriate technique. It is important that all those involved in service planning and delivery understand the local remuneration structure and the cost implications of differing surgical techniques. Surgeons and managers can then work together to organise services to maximise returns by careful list booking and workforce planning. This will enable clinicians to provide more expensive services to those patients who need them whilst maintaining solvency in these increasingly austere times.

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