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Cost-effectiveness of inguinal herniorrhaphy at a Tertiary Care Hospital

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Abstract

Background: To determine the cost-effectiveness of elective inguinal herniorrhaphy for various repair methods, and to compare between them in the context of reoperation.
Methods: Retrospective review of medical records from patients who underwent elective inguinal herniorrhaphy during the period between January 1998 and June 2014. The incremental cost-effective ratios (ICER) of hernia repairs were calculated by using the primary tissue repair as reference cost.
Results: There were 1,415 patients with 1,787 elective inguinal hernia repairs. Of the 1,787 repairs, 91.9% (1,643) were for primary and 8% (144) were for secondary hernias. Tissue repairs were performed in 64.9% (1,159) of all operations, open mesh repairs in 22.3% (399) and laparoscopic mesh repair in 16.7% (229).There were 137 reoperations (7.7% of 1,787),125 (7.6% of 1,643) for primary repairs and 12 (8.3% of 144) for secondary repairs. Differences in the reoperation rates were greatest for the first 3 years of an operation, after which all the rates tended to converge. According to the Cox regression model, risk factors significantly associated with higher reoperation rates included direct hernias, longer duration of operation, and older age. The average cost of reoperation for tissue repair, open mesh repair, and laparoscopic repair were 10,500 (350 US$), 17,307.00 (576.90 US$), 21,631.00 (721.03 US$) bath, respectively. The incremental cost-effective ratios of primary OM and LAP were 134.11 and 181.12, respectively**.** The incremental cost-effective ratios of secondary OM and LAP were 91.99 and 139.14, respectively.
Conclusions: Open mesh repair seem to be more cost-effective than laparoscopic hernia repair.
Keywords: Inguinal herniorrhaphy**,** Hernia, Inguinal hernia, Cost-effectiveness

1.Introduction

Inguinal hernia is one of the most common surgical problem. However, the best surgical procedures to perform continue to be a debate subject. Mesh repair has been developed and performed most of the surgeons because of it low recurrence rates in comparison to conventional non-mesh procedures[1].

Laparoscopic herniorrhaphy has been accepted as a comparable recurrence rate to open tension-free herniorrhaphy[2]. Surgical techniques and health technology assessment become more important and mandate the full explicit evaluation in cost-effectiveness.

The purpose of this study was to determine the cost-effectiveness of elective inguinal herniorrhaphy for various repair methods, and to compare between them in the context of reoperation.

2. Methods

Retrospective review of medical records from patients underwent elective inguinal herniorrhaphy (excluding femoral hernias) during the period between January 1998 and June 2014 at a tertiary-care institution was performed. Patients were excluded if their operative records were not available.

All patients who had laparoscopic herniorrhaphy received general anesthesia while open repairs (tissue or open mesh repairs) received either spinal or general anesthesia laparoscopic herniorrhaphy was done by standard three port technique of extraperitoneal repair that has been reported previously[3,4]. Foley catheter was placed in all patients after induction of anesthesia. The peritoneum was replaced to exclude the mesh after pulled back direct hernia or indirect hernial sac.

Polypropylene mesh (Prolene, Ethicon, New Jersey, USA) size 15x10 cm was placed and stapled in preperitoneal space open herniorrhaphy was done either by method of Lichentehstein[5] or tissue repair (Bassini and other repairs[6], i.e. Shouldice[7], Mcvay[8]). Secondary or recurrence inguinal hernias were defined as a new hernia at the site of a previous inguinal hernia repair. Reoperation was defined as one or more operations at the site of previous repair performed at the present institution. The first operation, in the present institution, for a patient with a recurrent hernia after a repair elsewhere was not considered a reoperation. The incremental cost-effective ratios (ICER) of hernia repairs were calculated by using the primary tissue repair as reference cost.

$$ICER = \frac{\text{Operation cost of OM (LAP) repair} - \text{Operation cost of tissue repair}}{\text{Reoperation rate of OM (LAP) repair} - \text{Reoperation rate of tissue repair}}$$

Bootstrap method (2,000 replicates of original sample sizes) was used to assess uncertainty in our cost-effective analysis. Calculations were made with SPSS® Statistics (version 19.0, 2010, SPSS, Chicago, IL)

3. Results

Patients demographic data was demonstrated in table1. There were 1,415 patients with 1,787 elective inguinal hernia repairs in the present analysis. Of the 1,787 repairs, 91.9% (1,643) were for primary and 8% (144) were for secondary hernias. Tissue repairs were performed in 64.9% (1,159) of all operations, open mesh repairs in 22.3% (399) and laparoscopic mesh repair in 16.7% (229).There were 137 reoperations (7.7% of 1,787), 125 (7.6% of 1,643) for primary repairs and 12 (8.3% of 144) for secondary repairs. Differences in the reoperation rates were greatest for the first 3 years of an operation, after which all the rates tended to converge. According to the Cox regression model, risk factors significantly associated with higher reoperation rates included direct hernias, longer duration of operation, and older age. The average cost of primary tissue repair, open mesh repair, and laparoscopic repair were 10,500 (350 US$), 20,692.32 (689.74 US$), 25,714.09 (857.14 US$) bath, respectively. The average cost of reoperation for tissue repair, open mesh repair, and laparoscopic repair were 10,500 (350 US$), 17,307.00 (576.90 US$), 21,631.00 (721.03 US$) bath, respectively. The incremental cost-effective ratios of primary OM and LAP were 134.11 and 181.12, respectively**.** The incremental cost-effective ratios of secondary OM and LAP were 91.99 and 139.14, respectively.

Table 1: Baseline characteristics, for subjects with complete operative history

Characteristics [a]	**Primary hernias N = 1,643**	**Secondary hernias N = 144**	**p-value**[b]
Sex (for individual subject)[c]			
Male: number (%)	1,502 (91)	141 (98)	0.065
Female: number (%)	141 (9)	3 (2)	
Age (years) for each hernia repair			
Mean (sd)	57.6 (16.5)	65.5 (13.6)	<0.001
Side of hernia: number (%)			
Left	763 (46)	58 (40)	0.186
Right	880 (54)	86 (60)	
Inguinal Hernia: number (%)			
Indirect type only	1,221 (74)	91 (63)	0.003
Direct only or with indirect type	422 (26)	53 (37)	
Defect size, largest diameter (cm.)			
Mean (sd)	4.6 (2.9)	4.6 (2.8)	0.988
Hernia operation: number (%)			
Bassini Repair	1,060 (64)	37 (26)	<0.001
Other tissue repair	59 (4)	3 (2)	
Open mesh repair	335 (20)	64 (44)	
Laparoscopic mesh repair	189 (12)	40 (28)	
Anesthesia: number (%)			
RA	894 (54)	55 (38)	<0.001
GA	749 (46)	89 (62)	
Surgeon: number (%)			
Trainee	881 (52)	31 (20)	< 0.001
Staff	813 (48)	123 (80)	
Operative time (mins)			
Mean (sd)	97.9 (40.0)	112 (52.2)	<0.001
Hospital stay (days)			
Median (range)	4 (2 to 41)	4 (3 to 27)	< 0.001
Follow-up time			
Median (range)	6 wks (2 days to 11 yrs)	16 wks (3 days to 9 yrs)	< 0.001
Number of recurrences	81	13	na

4. Discussion

We found that laparoscopic herniorrhaphy was more expensive than open tissue and open mesh repair. There were few minor operative complications in this study which were not power to detect differences between three groups. Open mesh repair seen to be more cost effective than laparoscopic repair in both primary and secondary repair.

Previous randomized double blind clinical trial reported[9] that demonstrated tension free repair significantly decreased care cost when compared to tissue repair.

Laparoscopic herniorrhaphy was not cost effective when compared with open repair [10]. Even when the mean incremental cost benefit of 1 day earlier return to normal activities, the laparoscopic herniorrhaphy was still not cost effective[11, 12]. Surgeon should be carefully considering patients in case-by-case basis according to patient specific benefits and risks of open versus laparoscopic repair.

Decision marker might be willing to pay different amount of less for an important in outcomes of laparoscopic repair. Considering of patient centered outcomes and cost rather than traditional surgical outcomes (morbidity, mortality) alone is important.

5. Conclusions

Neither significant differences in the reoperation rates between mesh-based and tissue-based hernia repairs, nor differences between primary and secondary repairs, could be detected. Open mesh repair seem to be more cost-effective than laparoscopic hernia repair.

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