Laparoscopic appendectomy using staplers vs. endoloops: A case-costing analysis

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INTRODUCTION

Laparoscopic appendectomy is currently the standard of care in the treatment of acute appendicitis. Compared to traditional open appendectomy however equipment costs and operating time are greater. There are 2 generally accepted techniques for closure of the appendiceal stump during laparoscopic appendectomy, use of an ENDO-LOOP or use of an ENDO-STAPLER

ENDO-LOOP

PRO

Inexpensive

Smaller port sites (5mm)

Resident teaching

CON

Increased operative time

More dissection required

Concern over appendix stump

ENDO-STAPLER

PRO

Faster operating time

Ease of use

Less handling of appendix

CON

Considerably more expensive

Larger port sites (12mm)

The medical literature suggests equipoise in outcomes such as length of stay, total peri-operative complication rate, and post-operative appendiceal abscess rates. The stapler however does have an advantage in reducing operative time by 5-9 minutes compared to the loop technique. In cases of appendicitis complicated by perforation or necrosis of the appendiceal base the consensus is less clear.

The department of surgery has undertaken initiatives to constrain budgetary expenditures. Currently the standard of practice among surgeons at the South Health Campus is to perform stapled appendectomy.

PROJECT OBJECTIVES

• Determine use rates of endo-loop vs endo-stapler for laparoscopic appendectomies at South Health Campus.
• Perform a case-cost analysis to determine the savings that would result from a transition to endo-loop use for a period of 1 fiscal year.
• Initiate a plan whereby it would be the goal to reduce use of laparoscopic staplers to 25% of total appendectomies
• Perform a follow up case-cost analysis
• Perform a pre and post clinical outcomes analysis

RESEARCH METHODS

A database query of the Operating Room Information System (ORIS) was undertaken to gather the following information on all laparoscopic appendectomies performed at the South Health Campus in the 2014-2015 fiscal year.

• Operating surgeon
• Date of operation
• Surgeon pick-list and cost
• Surgeon specific items and cost
  ▪ PDS/Vicryl Endo-loop
  ▪ Endo-GIA stapler
  ▪ Stapler cartridges/reloads

Statistical analysis was performed using MS Excel. For each individual case a total case cost was established from the sum total of all items on the surgeon pick-list. This was then subdivided into a base cost and a specific cost which was either the cost of laparoscopic staplers or endo-loop devices used in performing the case.

RESULTS

A total of 401 appendectomies were identified in the fiscal year of 2014-2015, of which 389 were laparoscopic appendectomies. Of these 55 lacked the needed financial data to perform the case cost analysis. Of the remaining 334 the distribution of endo-loop vs endo-stapler usage is outlined in Figure 1 and Figure 2.

Figure 1: Laparoscopic Appendectomies 2014-2015 (n=334)

Figure 2: Laparoscopic Appendectomies per Surgeon

The average base cost of an appendectomy was found to be $360.93. Average specific costs related to endo-loop were $108.21. Average specific costs related to laparoscopic staplers were $622.71. The difference in specific costs between endo-loop devices and laparoscopic staplers were $514.50 per case.

Figure 3: Total Equipment Expenditures on Laparoscopic Appendectomy 2014-2015

Figure 4: Average Equipment Expenditure Per Surgeon

Figure 5: Projected expenditure based on ratio of endo-loop to stapler – assuming 400 cases/yr

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RESULTS (cont)

Table: Equipment Expenditure

<table>
<thead>
<tr>
<th>Type</th>
<th>Cost 1</th>
<th>Cost 2</th>
<th>Cost 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endo-loop</td>
<td>$200</td>
<td>$400</td>
<td>$600</td>
</tr>
<tr>
<td>Endo-stapler</td>
<td>$800</td>
<td>$1200</td>
<td>$1600</td>
</tr>
</tbody>
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TOTAL PROJECTED SAVINGS: $92,070.76 (28.3%)

CONCLUSIONS AND FUTURE PLANS

1. Laparoscopic staplers were used in 68% of laparoscopic appendectomies in the 2014-2015 fiscal year.
2. Most surgeons used the stapler almost exclusively for all appendectomies.
3. The average case cost difference between an endo-loop and stapler was $514.50.
4. Staplers comprised greater than 50% of equipment expenditure for this procedure
5. By limiting stapler use to select cases of complicated appendicitis (~25%) a savings of $92,070.76 (28.3%) would be incurred on an annual basis, assuming constant case volume and equipment prices.

Follow-up cost analysis for the 2016-2017 fiscal year is planned to assess the change in practice and actual cost savings incurred. A pre and post outcomes analysis will also be carried out in order to assess whether the change in technique has brought about any change in rates of peri-operative complication rates

REFERENCES


CONTACTS/ACKNOWLEDGEMENTS

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