

A COMPARATIVE STUDY ON SAFETY AND BENEFITS OF LAPAROSCOPIC VERSUS OPEN APPENDICECTOMY IN A TERTIARY CARE HOSPITAL

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ABSTRACT

BACKGROUND

Appendicectomy is the most common surgery done by a trainee general surgeon. Recent advances like laparoscopic appendicectomy is growing nowadays. We wanted to compare the parameters like operating time, post-operative pain and number of days it takes to come to back to work in patients who underwent laparoscopic and open appendicectomy and give significance of laparoscopic appendicectomy over open appendicectomy.

METHODS

120 patients aged between 13 to 60 years of age were studied prospectively under two groups; 60 cases under laparoscopic appendicectomy group and open appendicectomy group. Age distribution, sex distribution, operation time, conversion rate and post-operative pain, intraoperative and post-operative complications, post hospital stay and days to return to normal activity are studied and compared.

RESULTS

Mean operation time between the two groups is not significantly different between the two groups. Conversion rate was 3.3% for laparoscopic appendicectomy. Postoperative pain, duration of hospital stay and return to normal activity are significantly less in laparoscopic appendicectomy.

CONCLUSIONS

Laparoscopic appendicectomy is more advantageous to patients in terms duration of hospital stay and less post-op pain and requires less time to return to normal daily activity compared to open appendicectomy. But the learning curve for laparoscopy is the difficult part to the surgeon.

KEYWORDS

Laparoscopic Appendicectomy, Open Appendicectomy, Duration of Hospital Stay, Return to Normal Activity, Post-Operative Pain.

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BACKGROUND

Appendicitis is one of the most common acute abdominal diseases. It affects all age groups, though more frequently seen in early adulthood, with a male preponderance of 1.3:1. A decline from 100 cases per 1,00,000 populations to 52 per 1,00,000 population was demonstrated over a study period from 1975 to 1991.¹

Currently, 84 percent of all appendicectomies are performed for acute pathology.² However, at operation fewer than 70% of patients with right lower quadrant pain

actually have a form of appendiceal disease warranting removal.

The first appendicectomy was performed by Claudius Amyand in 1736.¹ Since then appendicectomy has remained the treatment of choice for appendicitis in all its forms. Appendicectomy is done as an emergency procedure wherever possible, the only exceptions being, poor general condition of the patient or already resolved acute attack.

For more than a century open appendicectomy has been the gold standard for acute appendicitis.³ It is considered safe & effective procedure for acute appendicitis with low morbidity, short hospitalisation and minimal post-operative discomfort. Variability in the inflammatory process and in the location of Appendix are the main causes of operative difficulties in open appendicectomy, besides providing only a limited space for abdominal exploration.

The introduction of concept of minimally invasive techniques for the diagnosis and treatment of surgical conditions, has castigated an era where such techniques are

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being applied to every possible clinical situation. Laparoscopic techniques hold a number of theoretical advantages over the traditional open operation described over 100 years ago. These include decreased incidence of wound infection, less pain for the patient, reduced hospitalisation, and a more rapid return to employment.

Laparoscopic appendectomy was first described by Semm in 1983 in Germany. Ever since its introduction, it has been scrutinized for its clinical application and has been described with certain advantages and disadvantages over the open technique of appendectomy. The special advantages attributed to laparoscopic appendectomy include-

- Thorough visualisation of the abdominal cavity leading either to the correct positive or differential diagnosis, localisation of an ectopic appendix, tactic flexibility and thorough peritoneal lavage.
- Reduction of post-operative pain and complication of incisional hernia.
- Decreased hospital stay and lay-off from activity.
- Better cosmesis.³

Although laparoscopic cholecystectomy is now the procedure of choice in the management of gall stone disease, laparoscopic appendectomy has not attained the same degree of popularity and acceptance. Since, its introduction and many retrospective and prospective reports later, a controversy still exists whether the acknowledged benefits of a minimally invasive approach warrants its preference over the conventional treatment, whether laparoscopic approach is capable of any amelioration of diagnostic and the operative difficulties encountered during open appendectomy and if the introduction of laparoscopy in the overall management of acute appendicitis has changed anything in practice.

Aims and Objectives

- To assess and compare the merits of laparoscopic appendectomy versus open appendectomy;
- To evaluate the time factor in each group.
- To evaluate the pain score at every postoperative day.
- To evaluate the post-operative complications in each group.
- To evaluate the duration of hospital stay.

METHODS

All the patients attending general surgery dept., S.V.R.R.G.G. Hospital with clinical features suggestive of appendicitis were taken up for study, over a period of one year, after approval of institutional ethical committee.

Inclusion Criteria

Patient clinically diagnosed as acute appendicitis and those willing for surgery were included after taking informed written consent.

Exclusion Criteria

- Appendicular mass.
- Appendicular abscess.

Statistical Software Methods

Percentages and mean were calculated. Statistical software mainly SPSS 11.0 and Systat 8.00 was used for the analysis of the data and Microsoft word and excel have been used to generate graphs and tables etc.

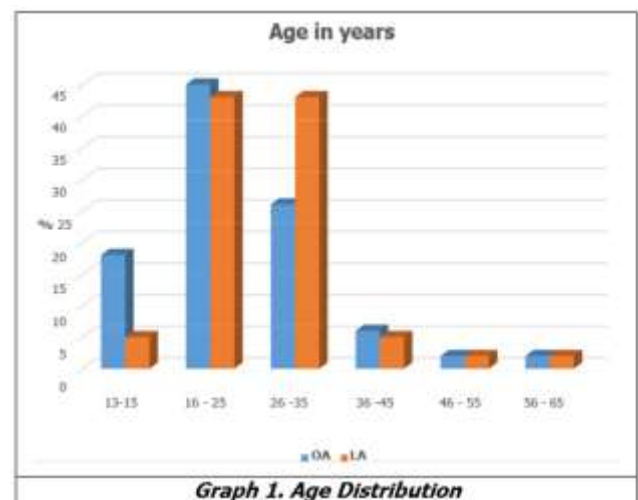
RESULTS

The present study was conducted on 120 cases aged between 13 to 60 years, which were studied prospectively under the following groups:

- Laparoscopic appendectomy – 60 cases.
- Open appendectomy – 60 cases.

Patient Characteristics

Age Distribution



Most of the patients were <35 years of age at presentation, the youngest being 13 years old and the oldest being 56 years. Among the patients who underwent open appendectomy the youngest was of 13 years age and the oldest of 56 years. The youngest laparoscopic patient was 14-year-old and the oldest 56-year-old.

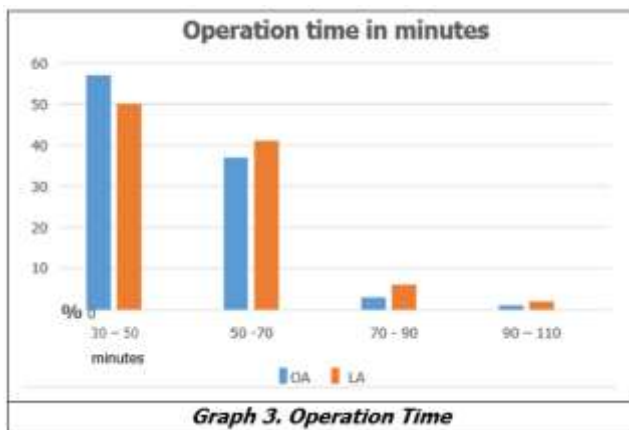
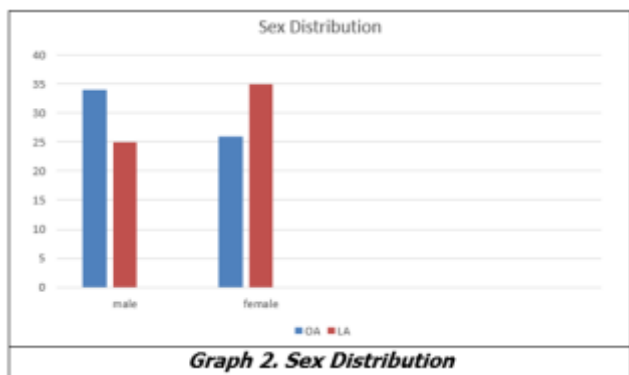
In Laparoscopic Appendectomy group 43.3% cases were in age groups 16-25 and 26 – 35 each, whereas in open appendectomy 45% cases were in age group 16-25 and 26.7% in age group 26-35. Mean age for OA was 23.93 ± 9.37 and for LA 26.68 ± 8.20 .

Sex Distribution

The male to female ratio in laparoscopic appendectomy group was 0.7:1 and in open appendectomy group was 1.3:1

Operation Time

Operation time was considered as the time from the point of making an incision to the time of closure of wound.



Operation time ranged 30-110 minutes for laparoscopic appendicectomy and 30-90 minutes for open appendicectomy, with a mean of 52.55 ± 17.24(LA) & 48.18 ± 16.82(OA).

The average operating time was more in laparoscopic appendicectomy as compared to the time taken in performing open appendicectomy. However, this difference did not reach the statistical significance with P value 0.160. It is to be noted that the cases of Laparoscopic Appendicectomy which were subsequently converted to open surgery were also the one which took longer time. The operating time in laparoscopic appendicectomy was prolonged mainly because of dense adhesions and learning curve.

While majority of open appendicectomy cases were done within 40 minutes, 2 cases took longer and required extension of incision and conversion to Rutherford Morrison muscle cutting incision.

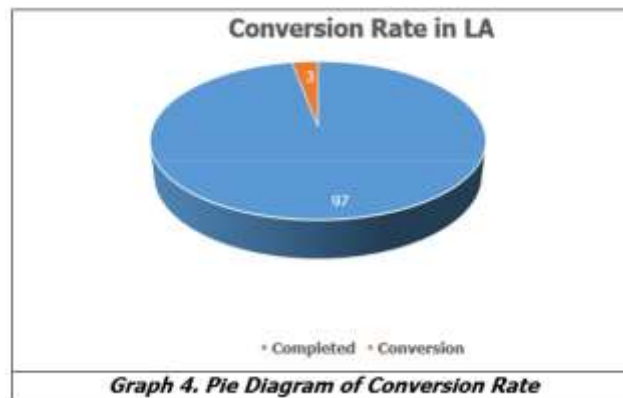
Conversion Rates

2 cases of total 60 laparoscopic appendicectomy cases were converted to open appendicectomy. Causes of conversion were:

1. Retro-caecal densely adherent appendix making dissection difficult in one case.
2. Grossly gangrenous appendix with oedematous mesentery, getting torn with manipulation leading to bleeding.

Two cases out of 60 cases of laparoscopic appendicectomy were converted into open appendicectomy, which is not statistically significant.

It appears that the more difficult cases in terms of severity of appendicitis or subsequent adhesions are the most unlikely to be completed with the laparoscopic approach.

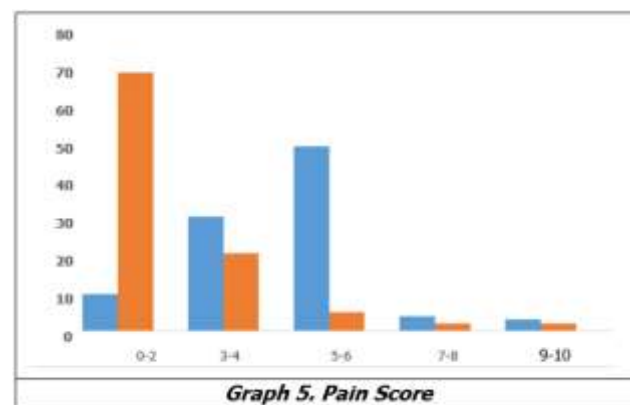


Postoperative Pain

All patients were given three doses of Inj. Diclofenac 75g IM in the postoperative period. Pain reading was taken after 24 hours of surgery and 6 hrs of last analgesic dose. Patient was asked verbally on the scale of 0-10 for level of pain during previous 24 hours.

As suggested by the following tables there was a significant difference between the two groups on pain in postoperative period.

Pain Score



Mean pain score for open appendicectomy is 4.44 and for laparoscopic appendicectomy was 1.92. Thus, post-operative pain is on an average more intense after open appendicectomy than laparoscopic appendicectomy.

Complications

Overall, there was no significant difference in the incidence of complications between the open and laparoscopic groups.

Intraoperative Complications

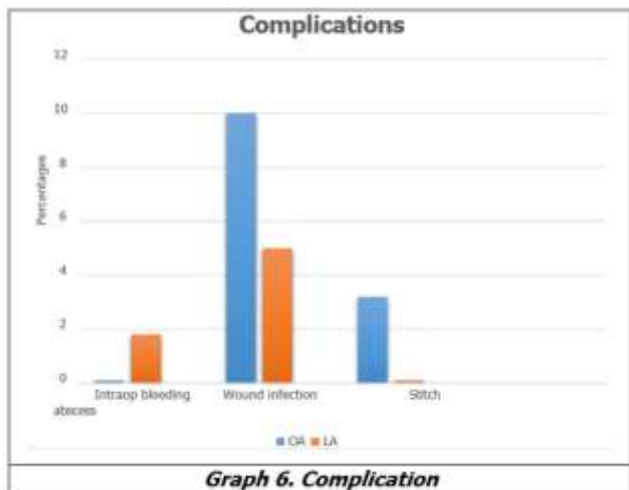
One case of laparoscopic appendicectomy had intraoperative complications of bleeding from mesoappendix, so was converted to open appendicectomy. 2nd case of laparoscopic appendicectomy had to be converted to open

appendicectomy because of dense retro-caecal adhesions, which made dissection of appendix difficult.

Postoperative Complications

One case of postoperative surgical emphysema was seen in laparoscopic group. Three cases of port site infection, one umbilical port and two cases RIF port infection seen. Gaping of wound present. Wound healed with regular dressing.

Six cases of open appendicectomy had wound infection and gaping and 2 cases had stitch abscess.



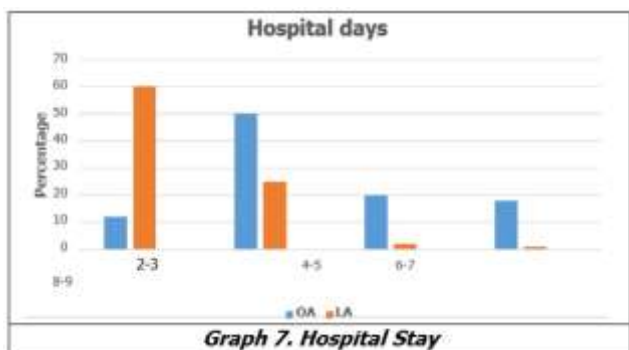
Post-Operative Hospital Stay

Duration of hospital stay was considered as the number of days after surgery (day 0 being the day of operation) spent in the ward.

Range of hospital stay was 2 days to 9 days. Patients with wound infection had a longer stay.

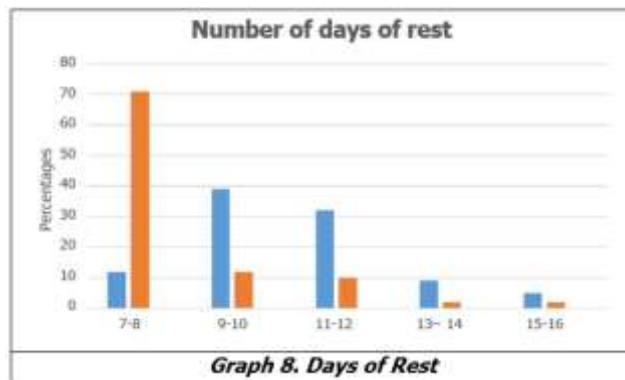
Mean postoperative stay in hospital in laparoscopic and open appendicectomy groups was 3.18 ± 1.69 and 5.43 ± 1.98 respectively.

Statistically significant difference was noticed in postoperative stay, with majority of patients who had laparoscopic appendicectomy being ambulatory quite early and thus discharged early.



Days of Rest

Mean number of days to return to work was 10.43 ± 2.22, 9.28 ± 8.45 respectively for open and laparoscopic appendicectomy. There is a significant statistical difference in these groups.



Observation in Obese Patients

Postoperative morbidity in obese patients in both groups suggested better cosmesis in laparoscopically operated cases and less wound infection in laparoscopic appendicectomy in obese group. Laparoscopic appendicectomy also offered relatively small scar in these patients.

Observation for Cost Factor

In our hospital set up the cost of laparoscopic appendicectomy was comparable to open appendicectomy.

Observation for Histopathology

All appendicectomy specimens were sent for HPE study. Majority of the reported biopsy were of mild appendicitis, few cases of gangrenous appendicitis and some were reported to be of chronic inflammation and fibrosis.

DISCUSSION

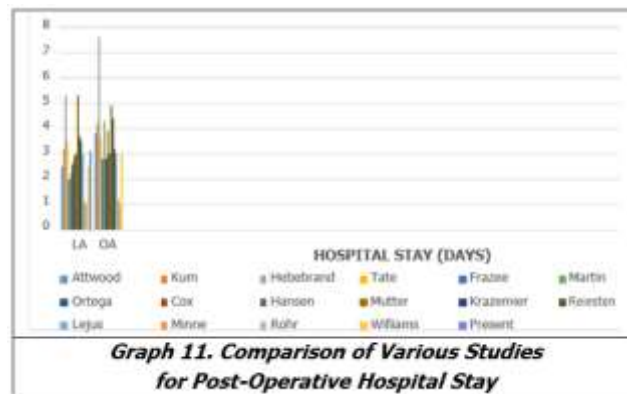
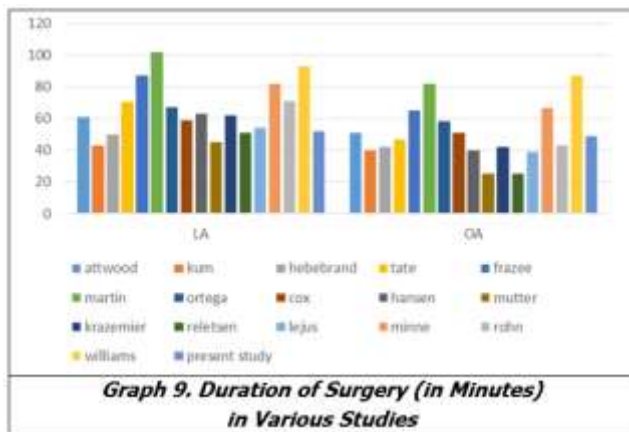
Laparoscopic and open appendicectomy has been compared several times, since the introduction of minimally invasive technique as a diagnostic as well as a therapeutic measure, in an effort to establish the supremacy of one above the other. Our study compared a total of 120 cases (60 open appendicectomies and 60 laparoscopic appendicectomies) to evaluate the safety and efficacy of the laparoscopic appendicectomy and open appendicectomy and our results reviewed with those of other reported studies.

Duration of Surgery in LA/OA

We demonstrated a range of 30-110 minutes for laparoscopic appendicectomy and 30-90 minutes for open appendicectomy.

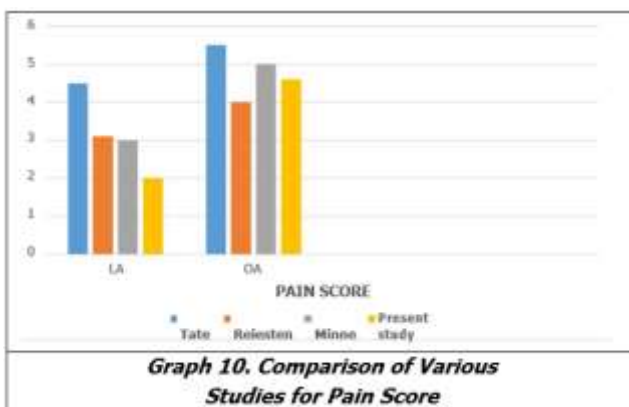
With mean being 52.55 ± 17.24 & 48.18 ± 16.82 minutes for LA & OA respectively, laparoscopic appendicectomy operating time was increased in cases with dense adhesions, oedematous highly inflamed appendix and mesentery and also due to learning curve.

We could achieve a mean operating time of 48.18 / 52.55 minutes for OA/LA. In comparison, the various studies under review had shown a mean operating time as varying as 102/81.751 to 43/40 minutes. Hellberg⁴ studies showed around 15 minutes lesser time in the laparoscopic group.



Postoperative Pain

Use of verbal scoring as end points to study the post op of pain is ethically criticisable. However, the patient himself is the best judge for the degree of his pain, with extreme points of 0 and 10 being fixed as no pain and pain, which the patient had at the start of his treatment. The difference in the degree of pain between laparoscopy and open appendicectomy was statistically significant in our study with mean pain score 4.44/1.92 in OA/LA respectively.



Hospital Stay

Minne et al reported a median hospital stay of LA 1.1 vs. OA 1.2 days⁵ compared with a mean of 5.3 vs. 7.6 days for Hebebrand et al in Germany⁶ and 5.3 vs. 4.9 for Mutter et al in France.⁷ This underscores that this parameter may be affected by hospital or cultural biases rather than reflecting differences due to technique itself. Interestingly, Lejus et al showed significant differences in the postoperative course concerning pain, analgesic requirements and time to normal walking when complicated versus un-complicated appendicitis were analysed independent of the technique¹⁷. In our study, difference in the postoperative stay in the hospital was between the laparoscopic and open appendicectomy groups, open appendicectomy patients on an average taking more time than laparoscopic group. Mean hospital stay for OA was 5.43 ± 1.98 and for LA 3.18 ± 1.68 with p value <0.001.

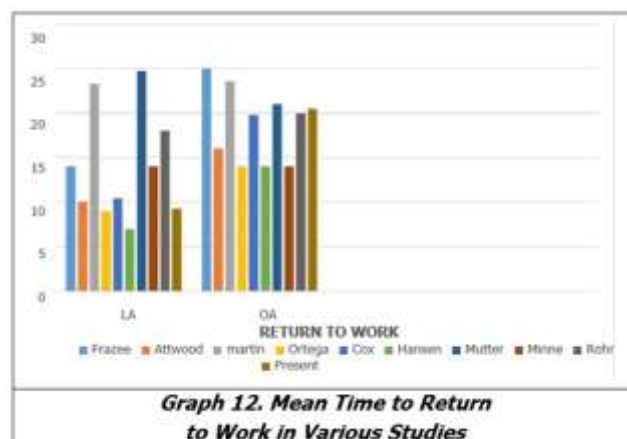
Complications

The diagnosis of postoperative infective complications is highly dependent on the follow up of these patients. Wound infection has been reported as late as 3 months after operation. Similarly, it is difficult to define a wound complication. In literature, it has been mentioned varyingly as 'purulent discharge' to 'oedema' or 'redness'. Another point of bias is that surgeon may not consider redness or soreness of a small laparoscopic wound in the same way as a longer open appendicectomy wound. Thirdly, the postoperative wound complication may be more related to presence of gangrenous or perforated acute appendicitis rather than the technique used for its removal. Of further concern, high rates of postoperative deep abscess have been found with laparoscopy, 3.5% by Ortega et al⁸ and 3.7% by Martin et al.⁹ Fortunately enough we did not have to deal with any post laparoscopic deep abscess.

One retrospective study⁴, has suggested that the rate of intra-abdominal abscess may be increased post operatively for laparoscopy over that for open appendicectomy performed for perforated appendicitis.

Return to Full Activity or Work

The mean time to return to normal activity was 10.43 ± 2.22, 9.28 ± 8.45 in laparoscopic and open appendicectomy group respectively P value <0.001. Our study demonstrates a significantly earlier return to full activity for laparoscopic than open appendicectomy. This is similar to the results shown by other research workers in most of studies that were reviewed.^{7,8,10,11,12}



CONCLUSIONS

1. The two groups were similar to each other in terms of age distribution but incidentally more number of female patients underwent laparoscopic appendectomy.
2. Mean operation time was not significantly different between the two groups.
3. Conversion rate was 3.3% for laparoscopic appendectomy. Two out of total 60 laparoscopic appendectomies done had to be converted to open. Cases with dense adhesions were the most difficult to complete laparoscopically.
4. Significant difference was seen in postoperative pain and duration of hospital stay. Postoperative pain is on an average more intense after open appendectomy. Thus, laparoscopic appendectomy has a significant edge over open appendectomy.
5. The time to return to normal activity and work was significantly more for open approach as compared to the laparoscopic approach.
6. Laparoscopic approach is more beneficial in cases of milder appendicitis and where the diagnosis is uncertain.
7. Laparoscopic appendectomy is better in obese cases as it results in less postoperative wound dehiscence.
8. Laparoscopic appendectomy is thus safe, simple and efficient technique for treatment of acute appendicitis.
9. Laparoscopic appendectomy also serves as an excellent base for surgical resident training.

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