

## **Laparoscopic Versus Open Appendectomy: Retrospective Comparison of 1000 Cases**

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**Background:** Controversy still continues about the advantages of laparoscopic appendectomy versus open appendectomy. It is not clear cut compared to laparoscopic cholecystectomy where it has replaced the open method.

**Objective:** The aim of this study is to compare laparoscopic and open appendectomy to determine the length of hospital stay and postoperative in-hospital morbidity.

**Design:** Retrospective study.

**Setting:** Surgical department, Salmaniya Medical Complex, Bahrain.

**Method:** Five hundred cases of laparoscopic appendectomy compared to 500 similar cases of open surgery between 1<sup>st</sup> January 2000 and 31<sup>st</sup> December 2006. The records of these patients were reviewed for personal characteristics, type of the procedure, operative time, length of hospital stay and in-hospital morbidity.

**Result:** Laparoscopic appendectomy (LA) group consisted of 502 cases and the open surgery (OA) group consisted of 500 cases. The average age was 24.4 years ranging from 5 years to 67 years. The length of hospital stay averaged 4.85 days ranging from 2 to 30 days. The average operative time for the laparoscopic group was 45 minutes but ranged from 20 to 90 minutes. The postoperative in-hospital morbidity included port-site wound infection in 5 cases, intra-peritoneal pus collection in 3 cases and one case of iatrogenic jejunal injury identified intra-operatively. The morbidity rate for this group was 1.8%. There were no registered mortalities after laparoscopic appendectomy.

In the open surgery group, the average age was 22.6 years ranging from 4 years to 63 years. The length of hospital stay averaged 5.4 days, ranging from 3 to 40 days. The average operative time for the open group was 40 minutes, ranging from 30 to 75 minutes. The postoperative in-hospital morbidity included wound infection in 15 cases, intra-peritoneal collection in 8 cases, enterocutaneous fistula in 3 cases and iatrogenic cecal injury in 3 cases which were repaired immediately. The morbidity rate for this group was 5.8%. There were two mortalities after open appendectomy.

**Conclusion:** Laparoscopic appendectomy has significantly lower morbidity and mortality rates compared to open surgery. However, there is no difference in length of hospital stay or operative time.

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Acute appendicitis is the most common surgical disease which requires immediate surgical intervention. The gold standard procedure was the conventional open method used for more than a century<sup>1</sup>. Recently with the advent of minimally invasive surgery, laparoscopic appendectomy was introduced in 1981<sup>2</sup>. The advantages claimed by several studies are the shorter hospital stay, decreased mortality rates, quicker return to work and lower hospital costs<sup>3</sup>. However, the controversy still continues about these advantages and laparoscopic appendectomy has not replaced the open method as laparoscopic cholecystectomy has done<sup>1,4-6</sup>.

Laparoscopic appendectomy was introduced in Salmaniya Medical Complex, Bahrain in 1996. The surgical expertise was limited at that time along with the instruments. Over the last decade, there has been significant improvement in the technical skills related to performing this procedure and the number of patients had increased.

The objective of this study is to compare laparoscopic and open appendectomy to determine the length of hospital stay and postoperative in-hospital morbidity. This is a retrospective case series of 1000 cases of acute appendicitis which had either laparoscopic appendectomy or open surgery.

## **METHOD**

Five hundred cases of laparoscopic appendectomy compared to 500 similar cases of open surgery between 1<sup>st</sup> January 2000 and 31<sup>st</sup> December 2006. The records of these patients were reviewed for personal characteristics, type of the procedure, operative time, length of hospital stay and in-hospital morbidity. All the laparoscopic cases were registered; however, the open surgery cases were selected within the same period of time and similar personal characteristics.

## **RESULT**

Laparoscopic appendectomy (LA) group consisted of 502 cases and the open surgery (OA) group consisted of 500 cases. In the laparoscopic group, there were two-hundred and thirty-three male patients and two-hundred and sixty-nine females. The average age was 24.4 years ranging from 5 years to 67 years. The length of hospital stay averaged 4.85 days ranging from 2 to 30 days. The average operative time for the laparoscopic group was 45 minutes but ranged from 20 to 90 minutes. The operative time decreased with increasing number of patients done. The postoperative in-hospital morbidity included port-site wound infection in 5 cases, intra-peritoneal pus collection in 3 cases and one case of iatrogenic jejunal injury identified intra-operatively. The morbidity rate for this group was 1.8%. There were no registered mortalities after laparoscopic appendectomy.

In the open surgery group, there were three-hundred and thirty-eight male patients and one-hundred and sixty-two females. The average age was 22.6 years ranging from 4 years to 63 years. The length of hospital stay averaged 5.4 days, ranging from 3 to 40

days. The average operative time for the open group was 40 minutes, ranging from 30 to 75 minutes. The postoperative in-hospital morbidity included wound infection in 15 cases, intra-peritoneal collection in 8 cases, enterocutaneous fistula in 3 cases and iatrogenic cecal injury in 3 cases which were repaired immediately. The morbidity rate for this group was 5.8%. There were two mortalities after open appendectomy.

## DISCUSSION

Minimally invasive surgery is becoming a vast field; however, the benefits of each of these procedures need to be evaluated to prove undoubtedly that there are advantages over the open method. With laparoscopic cholecystectomy, there is a clear benefit which has allowed this method to replace the open surgery.

Acute appendicitis has been surgically removed by the open technique since McBurney introduced this surgery in 1894 and has been the gold standard management for this disease<sup>7</sup>. Laparoscopic appendectomy is another option which appears to have advantages over the open method since it uses smaller incision for access to allow clearer and wider vision with a camera. Although the incision is smaller, the benefits are still not clear and this method has not replaced the conventional open appendectomy.

Both groups in this retrospective study had similar personal characteristics. The average age for LA group was 24.4 years and for OA group was 22.6 years; it is the most common age for acute appendicitis. The male to female ratio in the LA group was 1:1 and in the OA group was 2:1. The operative time between each was not significantly different but it was noticed that the time in LA group was decreasing with increasing number of patients done. This pattern could be attributed to the surgeons' learning curve. Most studies showed that LA had a longer operative time to open surgery<sup>3,8</sup>. In regards to hospital stay, there was no difference between both groups. The literature shows contradictory results. Although some recent retrospective cohort studies found LA associated with significantly shorter hospital stay, other retrospective studies reported non-significant differences<sup>9-17</sup>. Even meta-analysis studies had controversial findings. Sauerland and associates summarized the results of 28 randomized controlled trials, almost 3000 patients and reported a significant decrease in length of hospital stay in patients undergoing LA<sup>3</sup>.

In this study, the morbidity rate for LA group was significantly lower (1.8%) than open appendectomy group (5.8%). Most of the morbidities were due to infection, such as wound infection and intraperitoneal pus collections. Recent reviews have found that laparoscopic appendectomy for perforated appendicitis is associated with a higher rate of postoperative intra-abdominal abscess formation<sup>18</sup>. However, some smaller studies found no difference in the intra-abdominal abscess formation rate between open and laparoscopic appendectomy<sup>19</sup>. Technical issues that may impact on intra-abdominal abscess formation after LA include aggressive manipulation of the infected appendix and increased use of irrigation fluid, possibly producing greater contamination of the peritoneal cavity<sup>20</sup>. In this study, the intra-abdominal abscess formation was higher in the open appendectomy group (8 cases) than laparoscopic appendectomy (3 cases) probably because there were more perforated appendices in OA group. In addition, wound infection rate in the open surgery group was higher than LA group. Cecal injuries were found to be more in the open surgery group due to

difficult dissection of a mass-forming appendix. Enterocutaneous fistulas were only seen in the open surgery group probably due to friable infected tissue of the bowel in the complicated appendicitis cases.

There were two mortalities registered in the open appendectomy group compared to the laparoscopic group and the cause of death was due to the infectious complication of the disease rather than the procedure itself.

## CONCLUSION

**Laparoscopic appendectomy has significantly lower morbidity and mortality rates compared to open surgery. However, there is no difference in length of hospital stay or operative time.**

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