Clinics in Surgery

Research Article
Published: 24 Apr, 2017

Does Time Till Surgery Affect the Outcome of Uncomplicated Acute Appendecitis: A Retrospective Cohort Study

*Zvi H Perry[1,2], Uri Netz[1], Solly Mizrahi[1], Shahar Atias[1], Leonid Lantsberg[1] and Boris Kirshtein[1]**

[1]Department of Surgery, Soroka University Medical Center, Israel

[2]Department of Epidemiology and Health Services Evaluation, Ben-Gurion University of the Negev, Israel

Abstract

Background: Laparoscopic appendectomy is the most frequent on-call surgery done as an emergency. We evaluated the outcome of extending the period from admission till surgery for un-complicated acute appendicitis in adults.

Methods: A retrospective study of all patients who underwent laparoscopic appendectomy in our department between 2000 and 2010 was conducted. The patients were operated upon by novice surgeons, chief residents, and senior surgeons. Pre-operative variables were compared, as well as surgical outcomes and complications.

Results: 887 patients were enrolled. Of these, 749 were uncomplicated acute appendicitis patients. An analysis of the 749 uncomplicated cases of acute appendicitis revealed no association between illness duration and time till surgery upon intra- and post-op complications, as seen in uni-variate analysis. When multi-variate analysis was conducted, the same results were attained. Gender and surgical duration were risk factors for further complications. By Adding the 77 patients who suffered from complicated appendicitis did not change the statistical outcome.

Conclusion: Delayed appendectomy for uncomplicated acute appendicitis in adults does not adversely affect 30-day outcomes.

Keywords: Acute appendicitis; Laparoscopy; Timing; Delay in surgery; Complications

OPEN ACCESS

***Correspondence:**
Boris Kirshtein, Department of Surgery, Soroka University Medical Center, POB 151, Beer-Sheva 84101, Israel. Tel: +972-8-640-0267, +972-50-749-8430; Fax: +972-8-640-3260; E-mail: borkirsh@bgu.ac.il

Received Date: *06 Feb 2017*
Accepted Date*: 17 Apr 2017*
Published Date*: 24 Apr 2017*

Citation:
Perry ZH, Netz U, Mizrahi S, Atias S, Lantsberg L, Kirshtein B. Does Time Till Surgery Affect the Outcome of Uncomplicated Acute Appendecitis: A Retrospective Cohort Study. Clin Surg. 2017; 2: 1428.

Introduction

Appendectomy is the most frequent procedure performed as an emergency procedure in general surgery [1]. The issue of timing for the appendectomy has been debated [2,3]. Green et al. showed no conclusive evidence to guide surgeons when to operate on un-complicated acute appendicitis [4,5].

Herein in a retrospective study we evaluated the effect of timing upon the outcome of un-complicated acute appendicitis.

Materials and Methods

Adult patients with suspected acute appendicitis who underwent a laparoscopic appendectomy or a diagnostic laparoscopy were enrolled. The medical records of patients who underwent a laparoscopic appendectomy for suspected acute appendicitis between 2000 and 2010 in Surgery A at Soroka University Medical Center, Beer Sheva, Israel, were reviewed retrospectively.

Patients who underwent incidental or elective appendectomy were excluded, as well as patients who were diagnosed as complicated appendicitis (frank peritonitis, sparkling fever, WBC>20000).

810 eligible subjects were admitted with suspected uncomplicated appendicitis. In 749 patients out of 810 we able to conduct a multi-variate analysis, due to missing variables.

After obtaining approval of our institutional review board, a retrospective cohort study using the records of all our patients who underwent laparoscopic appendectomy, with the principal exposure being time to operation. Regression models yielded probabilities of outcomes adjusted for patient and operative risk factors.

The retrieved data included patient demographics, preoperative laboratory and imaging data,

intra-operative findings and pathology results, operator experience, operative time, intra- and post-operative complications, surgery outcome, and length of postoperative hospital stay. Time to surgery was defined from admission to the emergency room till initiation of surgical procedure.

We measured thirty-day overall morbidity and serious morbidity/mortality events.

We evaluated the outcomes and complication rate in patients who underwent surgery from onset of abdominal symptoms and those from hospital admission.

A standard laparoscopic appendectomy via three ports had been carried out in all cases. A diagnosis of acute appendicitis [6] was based only on the pathological findings of the appendix. Complicated appendicitis was defined by the intra-operative finding of gangrene or perforation, as well as the presence of an intra-abdominal abscess. Patients with a histologically normal appendix or patients with intra-operative findings of other intra-abdominal pathologies were classified as a "negative" appendectomy.

Postoperative complications were defined as SSI (surgical site infection) when post-operative fever, intra-abdominal abscess or phlegmon, wound infection, urinary tract infections, or pneumonia were present after surgery.

Statistical analysis and sample size calculation

The data were coded and stored using a Microsoft Office Excel program, and analyzed with SPSS 18.0 (SPSS, Chicago, IL). Data are reported as mean±SD.

The comparison of groups was conducted using Pearson Chi square for categorical variables and Fisher's exact tests for dichotomous variables when applicable. Comparison of quantitative variables was done using parametric (e.g., t-test) and a-parametric (e.g., Mann-Whitney test) tests.

Differences were considered statistically significant at $p<0.05$. After univariate analysis we conducted a multivariate analysis including regression models. Sample size was computed using the WINPEPI computer program (http://www.brixtonhealth.com/pepi4windows.html), using the COMPARE function (simple proportions study) with the following assumptions: Odds Ratio of 3 or less was considered negligible, power was set at 80%, and $\alpha=0.05$. The proportion assumed as baseline was 6%, and a ratio of 1:1 was defined. With these assumptions, the minimal sample size needed is 151 in each group or 302 in total. After continuity correction, the minimal number needed was set at 342. The number of patients surveyed was in fact 887.

Results

In the study population of 887 patients, 293 were males (33.0%). Median ASA was 1, and average age at operation was 37.6±16.2. Of 887 patients enrolled, 555 (62.6%) were admitted with the diagnosis of acute appendicitis. Sixteen cases (1.8%) were converted to an open procedure. One hundred seven patients (12.1%) had suffered from surgical complication (intra-operative, early or late post-procedural complications). Ninety-four patients (10.5%) had been defined during surgery as complicated appendicitis (gangrene, perforation or abscess).

Compared patients who suffered from complications during or after surgery.

The main difference between patients who suffered from complications differed in their leukocyte count and temperature only, and without clinical relevance.

The logistic models to discern whether delay in surgery is a risk factor for complications. The length of pre-hospital and in-hospital illness was not significant risk factors for complications.

Being a female seemed to have a protective statistical effect against complications, whereas surgical duration was found to be a risk factor for complication.

749 patients with uncomplicated appendicitis were re-analyzed for the effect of time till surgery upon post-op complications. We found no significant difference.

When trying to find an optimal duration between admissions till surgery, no significant cut off period was detected.

Comments

The aim was to see whether a delay in performance of an appendectomy for suspected acute appendicitis is a risk factor for post-op complications. Our results have shown that a delay in surgery had no deleterious effect on patients' health, complication rate, or long-term morbidity or mortality.

In contrast to patients who require urgent surgery (i.e. peritonitis, sparkling fever or elevated white count), we found uncomplicated appendicitis patients who have equivocal findings and the issue of surgery is not clear cut, the delay in surgery does not inflict any grave consequences. We have seen that hospital duration and the pre-hospital duration had no significant effect on intra or post-op complications, whereas the length of surgery was a significant risk factor (OR=1.026, $p=0.012$), as shown in previous studies [3-5,7,8].

Mounting evidence has shown that delayed appendectomy for acute un-complicated appendicitis had no real implications on morbidity and mortality, some institutions in the world do not subject the uncomplicated appendicitis patients for surgery any more. Thus, Eko et al. [3] have concluded that the timing of surgery had no effect on complications such as perforation.

Giraudo et al. [9,10] have shown that performing appendectomy as long as 24 h from presentation does not increase the length of hospital stay or rate of complications and Gopte et al. [11] have concluded that it is better to wait in cases with doubtful initial diagnosis of appendicitis on admission in order to decrease negative appendectomy rates, and that this policy has not increased complications rates. In view of all these studies, we feel that our results stand on mounting scientific evidence that delaying the performance of an appendectomy for a few hours had no real implications on morbidity or mortality.

The delay of appendectomy for acute appendicitis in adults does not appear to adversely affect 30-day outcomes.

As for the limitations of our study there are some points need to be further evaluated, such as a larger sample size, as well as the need for a multi-center study may solidify our conclusions.

To conclude, we suggest that a delay of appendectomy for suspected acute appendicitis in adults does not appear to adversely affect 30-day outcomes. As well as a delay-either in diagnosis or surgical treatment thereafter-is acceptable as long as the patient is under the proper surgical supervision.

References

1. Perry ZH, Netz U, Mizrahi S, Lantsberg L, Kirshtein B. Laparoscopic appendectomy as an initial step in independent laparoscopic surgery by surgical residents. J Laparoendosc Adv Surg Tech A. 2010;20(5):447-50.
2. Faryniuk AM, Hochman DJ. Effect of an acute care surgical service on the timeliness of care. Can J Surg. 2013;56(3):187-91.
3. Eko FN, Ryb GE, Drager L, Goldwater E, Wu JJ, Counihan TC. Ideal timing of surgery for acute uncomplicated appendicitis. N Am J Med Sci. 2013;5(1):22-7.
4. Papandria D, Lardaro T, Rhee D, Ortega G, Gorgy A, Makary MA, et al. Risk factors for conversion from laparoscopic to open surgery: analysis of 2138 converted operations in the American College of Surgeons National Surgical Quality Improvement Program. Am Surg. 2013;79(9):914-21.
5. Papandria D, Goldstein SD, Rhee D, Salazar JH, Arlikar J, Gorgy A, et al. Risk of perforation increases with delay in recognition and surgery for acute appendicitis. J Surg Res. 2013;184(2):723-9.
6. Verhaak RG, Hoadley KA, Purdom E, Wang V, Qi Y, Wilkerson MD, et al. Integrated genomic analysis identifies clinically relevant subtypes of glioblastoma characterized by abnormalities in PDGFRA, IDH1, EGFR, and NF1. Cancer Cell. 2010;17(1):98-110.
7. Daley BJ, Cecil W, Clarke PC, Cofer JB, Guillamondegui OD. How slow is too slow? Correlation of operative time to complications: an analysis from the Tennessee Surgical Quality Collaborative. J Am Coll Surg. 2015;220(4):550-8.
8. Qin C, de Oliveira G, Hackett N, Kim JYS. Surgical duration and risk of Urinary Tract Infection: An analysis of 1,452,369 patients using the National Surgical Quality Improvement Program (NSQIP). Int J Surg. 2015;20:107-12.
9. Kirshtein B, Perry ZH, Mizrahi S, Lantsberg L. Value of laparoscopic appendectomy in the elderly patient. World J Surg. 2009;33(5):918-22.
10. Kirshtein B, Domchik S, Mizrahi S, Lantsberg L. Laparoscopic diagnosis and treatment of postoperative complications. Am J Surg. 2009;197(1):19-23.
11. Gupta A, Regmi S, Hazra NK, Panhani ML, Talwar OP. Clinically monitored delay-A valid option in cases with doubtful diagnosis of acute appendicitis. Indian J Surg. 2010;72(3):215-9.