Annals of Medicine and Surgery 34 (2018) 23–27

Contents lists available at ScienceDirect

Annals of Medicine and Surgery

journal homepage: www.elsevier.com/locate/amsu

# Establishing the need for clinical follow-up after emergency appendicectomy in the modern era: Retrospective case series of 145 patients

Robin Som*, Nicky Seymour, Sri G. Thrumurthy, Sophia Khattak, Shivani Joshi, Paolo G. Sorelli

*Lewisham and Greenwich NHS Trust, Department of General Surgery, Queen Elizabeth Hospital, Stadium Road, Woolwich, London SE18 4QH, United Kingdom*

ARTICLE INFO

*Keywords:*
Emergency appendicectomy
Follow-up
Post-operative
Outcomes

ABSTRACT

*Introduction:* Emergency appendicectomy (EA) is a commonly performed operation, with an increasing number of EAs being performed as day-case. The aim of this study is to establish if there is a need for post-operative follow-up and if this could prevent adverse outcomes.

*Methods:* A retrospective analysis of patients who underwent EA at multiple centres over a six-month period was undertaken. They were contacted by telephone and a standardised questionnaire was used to ascertain post-operative outcomes, including duration of analgesia use, duration before return to normal daily activity (ADLs), surgical site infection rates (SSI) and rates of re-presentation to medical services. Patients were stratified into those who underwent laparoscopic versus open appendicectomy, smokers versus non-smokers, and body mass index (BMI).

*Results:* A total of 145 patients were included in the study. Patients undergoing open surgery (vs. laparoscopic surgery) required analgesia for significantly longer periods, with a significantly longer return to ADLs. Smokers, when compared to non-smokers experienced a significantly longer return to work/school; and significantly higher risk of SSI and re-presenting to accident & emergency; as did patients with a BMI > 30 when compared to those with a BMI < 30.

*Conclusion:* Most patients do not need formal outpatient assessment after EA. However, there is clearly a subset of higher risk patients who may benefit from this – patients who are smokers or obese. They have prolonged recovery times, and are at greater risk of SSI. Earlier surgical outpatient follow-up of these patients could prevent adverse outcomes.

## 1. Introduction

Appendicitis is a common cause of acute abdomen, and appendicectomy is a commonly performed operation. Significant changes in recent years have occurred in the management of appendicitis, which has led to decreased post-operative morbidity in these patients, including antibiotics, imaging methods such as ultrasound and computed tomography which improves the diagnostic certainty, and laparoscopic appendicectomy (LA) [1].

Despite this, approximately 10–20% of patients undergoing appendicectomy have an adverse outcome, with wound infections accounting for most of these [2]. To increase the safety of appendicectomy and decrease adverse outcome rates, it is essential to identify surgical methods or subgroups of patients who are more likely to have poorer outcomes. Modern practice has moved towards early discharge following appendicectomy, and also outpatient/day case appendicectomy [3–5]. Most hospital trusts in the UK do not routinely follow-up patients undergoing appendicectomy in the outpatient department. Without this follow-up, it may be difficult to identify optimal surgical techniques and higher risk groups, as many adverse outcomes go unregistered. This has the potential to impact on the operating surgeons' own learning and opportunity to reflect.

There is limited, contemporaneous evidence for the mid-to long-term impact on a patient's life following appendicectomy. The literature on outpatient/day case appendicectomy focuses on feasibility and safety of the procedure, with most large volume studies focussing on outcomes such as complication rate of surgery [6–10], with follow-up periods of less than 6 months [1,11].

The aim of this study is to ascertain if there is a need for follow-up of patients undergoing EA in the modern era. With this, we assess whether such follow-up of patients would prevent post-operative adverse outcomes.

* Corresponding author. 31 Prince George Avenue, London, N14 4TL, United Kingdom.
*E-mail address:* rsom@doctors.org.uk (R. Som).

https://doi.org/10.1016/j.amsu.2018.08.014
Received 26 December 2017; Received in revised form 29 July 2018; Accepted 13 August 2018

**Table 1**
Patient telephone questionnaire.

1. Was your operation keyhole or open?
2. Were you told the findings of your operation?
3. If yes, were you told your appendix was normal, inflamed, perforated or necrotic?
4. Were you discharged with a course of antibiotics?
5. Did you experience pain following discharge home? (Severity scale 0–10: 0 = no pain, 10 = worst pain ever)
6. Were you sent home with pain relief?
7. For how long did you take pain-relieving medication?
8. Was there any infection at the wound site following your surgery?
9. Did you visit your GP with problems related to the operation within 12 months?
10. Did your GP prescribe you any antibiotics?
11. Did you attend A&E because of anything related to the appendicectomy within 30 days after the operation?
12. Were you re-admitted to a ward in any hospital within 12 months of your operation?
13. Did you have another operation relating to your appendicectomy?
14. Are you employed?
15. If yes, what kind of work do you do?
16. How many days were you off work/school after your operation?
17. How many days was it before you were back to normal activities after your operation?
18 Do you smoke now?
19. Did you smoke at the time of your appendicectomy?
20 Are you diabetic?
21. What is your height in cm?
22. What is your weight in kg?

## 2. Methods

The study followed a cohort of patients who were retrospectively followed up. In August 2014, all patients who underwent appendicectomy from May to November 2013 were identified using electronic databases at two hospital sites in one South London hospital trust. Such patients are not routinely followed up as outpatients at either site. They were all contacted by telephone. In total, 145 patients were contactable and consented to answer a questionnaire (see Table 1). The questionnaire was used to determine incidence of surgical site infection (SSI), as defined by the Centres for Disease Control [12], analgesia requirement, the need for medical attention (at either their general practitioner, or an accident and emergency department, or hospital) and impact on return to school, work and activities of daily living (ADL), patient body mass index (BMI) and smoking status at the time of appendicectomy, and their current smoking status. The questionnaire covered their post-operative course for up to 12 months. The patient interviews began in August 2014.

Histology findings were taken from the hospitals' electronic pathology results system.

This work has been reported in line with the 'Strengthening the Reporting of Cohort Studies in Surgery' (PROCESS) criteria [13].

### 2.1. Calculation

Statistical analysis was performed using StatsDirect 2.5.7 software (StatsDirect, Altrincham, UK). The outcomes measures highlighted above were compared between procedural (i.e. open versus laparoscopic) and patient sociodemographic (i.e. smoking and BMI status) subgroups using a combination of the paired *t*-test, Wilcoxon signed rank test, chi-squared test and Fisher's exact test. Relative risk data are expressed with corresponding 95% confidence intervals below.

## 3. Results

145 patients were consented and questioned, including 64 males and 81 females. The age range was 6 years–78 years (median = 29) (Table 2).

**Table 2**
Patient characteristics.

| Patient characteristic | | | |
|---|---|---|---|
| Age (years) | | Median | Range |
| | | 29 | 6–78 |
| Gender (n) | | Male | Female |
| | | 64 | 81 |
| Smoking at time of appendicectomy (n) | | Smokers | Non-smokers |
| | | 28 | 117 |
| Body mass index (n) | | BMI < 30 | BMI > 30 |
| | | 122 | 23 |
| Patients' employment/ education status (n) | Employed | Unemployed/ retired | Full time education |
| | 94 | 29 | 22 |

### 3.1. Surgical technique, histology and analgesia use

Table 3 demonstrates surgical technique, histology and analgesia use. Five laparoscopic cases were converted to open surgery, and that data is included in the tables under open appendicectomy (OA).

The average pain score for all patients on discharge was 4.7/10 and 75% patients reported being given analgesia on discharge. For all patients, analgesia was taken for an average 12.2 days (median = 7 days).

### 3.2. Re-presentation to medical services

Table 4 shows how many patients re-presented to medical services and why. One patient underwent appendicectomy and the histology demonstrated inflamed appendix, but there was clinical suspicion of caecal cancer during that admission, which was confirmed with further investigations.

One patient underwent appendicectomy and the histology was normal, but there was clinical suspicion of renal tumour during that admission, and this was later confirmed.

One patient underwent appendicectomy and the histology was normal. There was no clear evidence of any other pathology during the admission. However, the patient continued to experience a range of symptoms and was eventually diagnosed with Crohn's disease, and needed surgery for it.

We assessed relative risk of SSI and re-presenting to medical services amongst smokers and against body mass index (Table 5). The number of patients who were smokers, and the breakdown of patients by BMI is shown in Table 2. Twelve patients who smoked required follow-up post-appendicectomy.

The average BMI was 23.7 (range 18–39.3). Nine patients with a BMI > 30 had post-operative complications that required GP follow-up, A&E visit or hospital readmission.

### 3.3. Return to school/employment and ADL

Table 2 shows the number of patients employed part/full time, unemployed/retired, and in full time education.

For the entire cohort, the average time to return to normal activity was 27.6 days (median = 14 days). Table 6 shows how return to school/employment depended on surgical approach, smoking status, and BMI.

## 4. Discussion

The aim of this study was to ascertain if there is a need for follow-up of patients undergoing EA in the modern era; and with this, whether such follow-up could theoretically prevent post-operative adverse outcomes. This study is one of few, longitudinal studies conducted recently. The focus is on the mid-to long-term impact on a patient's life following appendicectomy.