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Research Article

What is negative about negative appendicectomy rates? An experience from a district general hospital

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ABSTRACT

Background: Negative appendicectomy rate is an important outcome measure following appendicectomy and there is a huge disparity on the quoted rates amongst various institutions globally. Our aim is to explore the outcomes following appendicectomy especially in relation to the histologically normal appendix and establish the clinical implications.
Methods: Data was collected from the OPCS database from 2010-2012 of all emergency appendicectomies (open and laparoscopic) and retrospective review of all consecutive negative appendicectomies were carried out in that period with particular emphasis on per-operative findings, pathology reports and the clinical outcome.
Results: 550 open and 118 laparoscopic appendicectomy operations were performed in the study period with age ranging from 4 to 92 years. There were 319 male and 349 female patients in the study group. The length of stay varied from 2 days to 10 days with an average of 3.0 days. Of the patients who had negative histology for appendicitis, 66 had alternate findings at pathology. There was no 30- day readmission recorded for these patients from the negative appendicectomy group and their post-operative pain score was significantly lower ($P < 0.001$).
Conclusions: Although the negative appendicectomy rates are declining globally with the use of imaging modalities, arguments for removing a macroscopically normal appendix still exists. With varied pathology noted in a macroscopically normal appendix it is reasonable to remove it especially with resultant better clinical outcome and perhaps probe the need for achieving lower negative appendicectomy rates.

Keywords: Acute appendicitis, Laparoscopy, Negative appendicectomy, Alternative pathology, Clinical outcome

INTRODUCTION

Acute appendicitis is a common reason for emergency admission regardless of the age group. Open appendicectomy is an important training procedure for junior surgeons and on average more than 50000 procedures are performed annually in the UK.[1] Negative Appendicectomy Rates (NAR) have served as a quality marker traditionally and ultrasound scan and CT imaging modalities have contributed in keeping the NAR at a minimum with the rates ranging from 12 to 18%.[2] Despite the decreasing rates of NAR globally, the morbidity associated with these procedures has been on the rise including prolonged length of stay, wound-related complications and death.[3] Our aim was to analyse the outcomes following appendicectomy of all patients who

had macroscopically normal appendix and establish the clinical implications from a district general hospital.

METHODS

Data was collected from the OPCS database of all emergency appendicectomy operations carried out at our hospital. The local clinical effectiveness unit approved our study. A two year period was defined for the study (2010 to 2012) and those with a clinical diagnosis of acute appendicitis (image-aided or pure clinical diagnosis) were included in the study. Incidental appendicectomy as part of right-hemicolectomy or any other procedure were excluded from the study. Clinical suspicion for acute appendicitis varied in such scenarios in comparison to the study group which had a strong clinical diagnosis of acute appendicitis based on consultant or senior trainee review (ST6 or above) including re-assessment. The main outcomes were negative appendicectomy rates, 30 day re-admission rates and clinical outcome following negative appendicectomy. For the study, a negative appendicectomy was classed as one where the appendix looks macroscopically normal at operation and confirmed by histology with no evidence of transmural inflammation suggestive of acute appendicitis. An audit proforma was used to collect relevant demographic data as well as ASA status, pre-op imaging, consultant presence, operating surgeon's comment about the appendix and the length of stay. Histopathology reports were collected on all the patients and analysis of the negative appendicectomy reports were carried out in conjunction with clinical outcomes. All complications and/or further interventions were recorded including 30-day readmissions or re-attendance at A&E from the BIMS (blueberry inpatient management systems).

Mean with one standard deviation was computed for the relevant data and statistics calculated using student t test and fishers exact analysis. A P value of <0.05 was considered significant.

RESULTS

668 consecutive appendicectomy operations (550 open and 118 laparoscopic) were included in the study period between Jan 2010 to May 2012. The age ranged from 4 years to 87 years with an average age of 27 ±16.1.

There were 309 male and 241 female patients in the open appendicectomy group and 11 male and 107 female patients in the laparoscopic appendicectomy group. American society of anaesthesiologists grading ranged from 1 to 3. Consultant presence was noted in 38 of the 118 laparoscopic and 16 of the 550 open appendicectomy operations of which 12 patients were under 6 years of age.

A macroscopically normal looking appendix was noted at 121 open and 51 laparoscopic appendicectomy operations (25.7% in total) but nevertheless had an appendicectomy performed as per our departmental policy. Histopathological analysis of these 172 patients confirmed no evidence of acute appendicitis (negative appendicectomy) in 150 patients (106 in open appendicectomy and 44 in laparoscopic group) whilst the remaining had microscopic evidence of appendicitis. (12.7%) 66 of the negative appendicectomy group (44%) had alternate findings as per histopathology in the appendix (Table 1).

Table 1: Histological analysis of negative appendicectomy cases: (macroscopically normal appendix; histologically no evidence of appendicitis).

	Open appendicectomy group (n=106)	Laparoscopic appendicectomy group (n=44)
Faecoliths	11	6
Fibrous obliteration	16	5
Parasites	6	2
Non-specific congestion	4	1
Lymphoid hyperplasia	3	1
Crohn's disease involving appendix	1	1
Carcinoid	1	2
Serositis	1	
Peritonitis from other pathology (sigmoid diverticulitis & tubo-ovarian abscess.)		5

The NAR from our study was 19.27% in the open and 37.2% in the laparoscopic appendicectomy group. The NAR was slightly higher in the female population compared to male patients both in the laparoscopic and open appendicectomy groups.

The length of stay varied from 2 days to 10 days with an average of 3.8 days. Pain score analysis revealed a significant decrease in pain score for the negative appendicectomy group compared to their pre-operative score. None of the patients in the negative appendicectomy group needed re-admission.

16 patients in the negative histology group developed a wound infection which settled with conservative management. 17.8% of patients in open and 27.5% of patients in the laparoscopic group who had macroscopically normal appendix were subsequently found to have histological evidence of appendicitis.

DISCUSSION

This study proposes a persuasive case for probing the description of negative appendicectomy and the focus to achieve lower negative appendicectomy rates. With the

varied findings observed on histology reports of a macroscopically normal looking appendix, it is reasonable to remove the normal-looking appendix. From our study, we note that intra-operative assessment of the appendix may not be reliable in laparoscopic as well as in open operations. A significant proportion of patients with a normal-looking appendix macroscopically will show histological evidence of appendicitis.[4]

Subgroup analysis of patient demographics revealed a comparable age between those with a normal appendix (range 5-92 years with an average of 27 ± 16.1) and histological evidence of acute appendicitis (Range of 4 - 89 with an average of 28 ± 16.2; P = 0.425).

Postoperative pain score based on the Verbal Numerical Rating Scale (VNRS) as well as the faces pain scale compared favourably with negative appendicectomy group. The pain score 24 hrs post op in those with normal appendix was 4.0±1.0 (2-7) whereas in those with histological evidence of appendicitis was 6.3 ± 1.3 (3-9); this was statistically significant - P <0.000.

Following appendicectomy the length of stay was significantly reduced in those with normal appendix 2.5 ± 0.7; range 2-6 days. The average length of stay in those with appendicitis was 3.1 ± 1.1 (2-10); P <0.0001. Amongst the laparoscopic group, female patients had less postoperative pain score when compared to open appendicectomy regardless of the pathology of the appendix and the length of stay was also significantly less 2.6 ± 0.7 days (P <0.0001).

U. G¨uller et al. and Flum et al. in their papers have reported significant reduction in morbidity and mortality as well cost savings achieved with a reduction in negative appendicectomy rates.[3,5] From our study, there was no mortality involved in the whole group (n=668) and 16 of the 150 patients had wound-related infection which settled with antibiotics. 4 patients (2.8%) in the negative appendicectomy group and 38 (7.2%) of those with appendicitis on histology had readmission (P = 0.08); whilst none from the negative appendicectomy had operative intervention, 9 patients from the appendicitis group had percutaneous drainage of a collection under radiology guidance. Flum et al. in their study, quoted a significantly lower negative appendicectomy rate of 15.5% which was based on North American data and involved open appendicectomy. From our study, the negative appendicectomy rate was higher in the laparoscopic group at 37.2% (n=118) whilst 19.27% (n=550) had no evidence of appendicitis from the open appendicectomy group. There are several studies which report a similar high NAR.[6] Proportion of females with normal appendix was much higher than those with pathological appendix and this was statistically significant (P <0.001). Similar findings were reported by A. Bhangu et al. from their UK based multicentre study of appendicectomy.[7] A high index of suspicion and accurate clinical diagnosis does not always equate to a lower NAR.[5] Is this due to variations in clinical judgement especially as a result of the shift pattern of on-call involving multiple handovers? - It is debatable.

Limitation

A limitation of this study was that for the majority of patients in the negative appendicectomy group, pre-operative imaging was either not undertaken, or it was not useful in influencing the clinical decision when utilised. Few other studies have also shown no reduction in negative appendicectomy with use of CT.[8] More recently a multicentre study from the National Surgical Research Collaborative suggested increased use of CT imaging to reduce negative appendicectomy rates. However about 9% of patients in their study had normal appendicectomy despite CT imaging.[8] Equally, others have reported reduced negative appendicectomy with use of CT scan and/or ultrasonography.[10,11]

These studies and several others have focussed on negative appendicectomy rates as an important outcome and various measures to keep this at a minimum. In our study we find it difficult to justify the term negative appendicectomy as an outcome measure where a number of various, nevertheless significant pathological findings, were observed in the macroscopically normal-looking appendix. This perhaps has greater significance when corroborated with the improved patient outcome with minimal morbidity as observed in our study and hence the focus should not necessarily be for striving to achieve lower negative appendicectomy rates. A large scale analysis of all the negative appendicectomy patients from multiple centres may shed more light and establish better standards of care.

Key message

- Higher negative appendicectomy rates does not equate to poor performance or adverse clinical outcome.
- Laparoscopic approach favoured in female population and better tolerated.
- Reduced length of stay with minimal morbidity in the negative appendicectomy group.

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