Recurrent Abdominal Pain Before and After Appendectomy

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Abstract

Background: Patients with non-inflamed appendix have been reported to have had more hospitalizations and emotional disorders before and after the operation than patients with acute appendicitis.

Objectives: To compare abdominal pain characteristics, as well as demographic and psychosocial data in children with histologically confirmed appendicitis compared to non-inflamed appendices.

Methods: Charts of children with suspected appendicitis who had undergone appendectomy were retrospectively reviewed for relevant clinical and laboratory data. The patients or their parents were then contacted by phone and were asked to respond to a detailed questionnaire on abdominal symptoms as well as demographic and psychosocial data.

Results: The study group comprised 156 children: 117 with histologically confirmed appendicitis and 39 with normal appendices. Eighty-two patients (53.2%) were located and interviewed: 62 (54%) with appendicitis and 20 (51%) with normal appendices. Of the 82 children, 16 reported recurrent episodes of abdominal pain before or after surgery: 11 (17.7%) in the appendicitis group and 5 (25%) in the normal appendix group. Only six patients fulfilled the formal criteria for the diagnosis of recurrent abdominal pain: 5 (8%) from the appendicitis group and 1 (5%) from the non-inflamed appendix group (not significant). In addition, no significant statistical differences were found between the groups regarding school performance, behavior and social interaction with peers.

Conclusions: We could not demonstrate an increased incidence of recurrent abdominal pain, nor could we identify significant psychosocial morbidity in those children undergoing an appendectomy for a non-inflamed appendix.

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Despite advances in imaging technology (ultrasound and computed tomography) and computer-assisted decision-making models, accurate diagnosis of appendicitis in children can be difficult and perforation rates are reported to be as high as 20%. [1]. Most of the deaths from acute appendicitis are due to complications associated with delayed diagnosis [2]. To reduce the incidence of perforation, the surgical community traditionally accepts that approximately 15%–20% of appendectomies will yield a non-inflamed appendix [3]. While the numbers in certain populations may be as high as 40% [3], in two large series of appendectomies in children non-inflamed appendix was identified in up to 12% of the cases [4,5]. Consequently, surgical procedures are not infrequently performed in children with recurrent abdominal pain who may continue to suffer from abdominal pain following surgery [6,7].

RAP = recurrent abdominal pain

Childhood RAP, defined as at least three attacks of pain occurring over a period of 3 months that were severe enough to affect activities and for which no organic cause was identified [8], has been reported to occur in 10–15% of children between the ages of 4 and 16 years, and it is estimated that an equal number of children suffer from similar symptoms but do not request medical consultation [9]. Five years after the first presentation of abdominal pain, approximately one-third of children with RAP will have resolution of their pain, one-third will continue to complain of the same symptoms, and another third will have a different set of recurrent pain symptoms [10]. RAP is frequently related to emotional problems, and therefore it is feasible to assume that the characteristics of abdominal pain and psychosocial functioning would be different in children whose appendices are found normal as compared to children with acute appendicitis. The aims of this study were twofold: to compare the abdominal pain characteristics as well as the demographic data, school performance, behavior, and social interaction of children with histologically confirmed appendicitis to those with non-inflamed appendix; and to look for predicting factors for non-inflamed appendices and unnecessary surgical procedures, if differences between the groups were identified.

Patients and Methods

The charts of all children (under 18 years) with suspected appendicitis who had undergone appendectomy at the Bnei Zion Medical Center in Haifa from 1994 to 2001 were retrospectively reviewed for both clinical and laboratory data. Children with history of chronic illness or with post-surgical histological findings suggesting other pathologies were excluded. Following oral consent to be questioned on the phone, the patients or their parents were asked to respond to a detailed questionnaire regarding symptoms and demographic data as well as school performance and social adaptation of the patient [11]. The study was approved by the internal review board at the Bnei Zion Medical Center.

SigmaStat for Windows version 3.0 (SyStat software, Richmond, California, USA) was used for data analysis. The *t*-test was used for continuous variables, and chi-square test and calculation of odds ratio for categorical variables.

Results

The study group comprised 156 children who underwent appendectomy between 1994 and 2001 at the Bnei Zion Medical Center,

a primary care hospital serving a mixed population from northern Israel: 117 with histologically confirmed appendicitis and 39 with normal appendices. Two children from the inflamed appendix group were excluded, one suffering from familial Mediterranean fever and the other from nephrotic syndrome. Eighty-two patients of the 154 (53.2%) were located and interviewed: 62 of the original 115 positive appendectomies (54%) and 20 of the original 39 normal appendectomies (51%). All of them consented for the interview. Table 1 shows the demographic features, emphasizing that there were significantly more girls in the normal appendix group and more boys in the inflamed appendix group. The age at operation and time from surgery to the telephone survey were similar for both groups.

Table 1. Demographic data

	Inflamed appendix (n=62)	Normal appendix (n=20)	*P*
Male	39 (63%)	7 (35%)	0.03*
Female	23(37%)	13 (65%)	
Age at surgery (yrs)	12.03 ± 3.45	12.55 ± 3.17	NS**
Time course from surgery (mos)	68.75 ± 30.56	73.3 ± 25.54	NS**

* Chi-square

** *t*-test

Table 2. Abdominal pain and RAP versus appendicitis

	Acute appendicitis	Normal appendix	Total
Abdominal pain present	11 (17.7%)	5 (25%)	16 (19.5%)
Abdominal pain absent	51 (82.3%)	15 (75%)	66 (80.5%)
Total	62 (100%)	20 (100%)	82 (100%)
RAP present	5 (8%)	1 (5%)	6 (7.3%)
RAP absent	57 (92.0%)	19 (95%)	76 (92.7%)
Total	62 (100%)	20 (100%)	82 (100%)

Table 3. Social and behavior parameters of the two groups

	Inflamed appendix (n=62)	Normal appendix (n=20)	*P*
Immigration status			
Parents born or more than 30 years in Israel	(83.8%) 52	(70%) 14	NS
Academic achievements			NS
Excellent students	(36%) 22	(30%) 6	
Good students	(43%) 26	7 (35%)	
Mediocre students	(13%) 8	6 (30%)	
Weak students	5 (8%)	1 (5%)	
Social interaction with peers			NS
Socially active children	(33.8%) 21	6 (30%)	
Socially accepted children	(61.2%) 38	11 (55%)	
Socially introverted children	14 (22.5%)	3 (15%)	
Behavior			
Hyperactivity	2 (3%)	0 (0%)	NS

Of the 82 children, 16 reported recurrent episodes of abdominal pain before or after surgery: 11 (17.7%) in the appendicitis group and 5 (25%) in the normal appendix group (OR = 0.65, NS) [Table 2]. In 4 patients the abdominal pain commenced after the operation – 3 (5%) from the appendicitis group and 1 (5%) from the non-inflamed appendix group. Only 6 patients fulfilled the formal criteria for the diagnosis of RAP: 5 (8%) from the appendicitis group and 1 (5%) from the non-inflamed appendix group (OR 1.67, NS) [Table 2]. Eight of the 11 children (73%) in the inflamed appendix group reported resolution or improvement of their abdominal symptoms following the appendectomy, whereas 3 of 5 (60%) in the non-inflamed group reported improvement in symptoms (NS). Of the six children who fulfilled the criteria for the diagnosis of RAP before surgery five reported resolution or improvement of their abdominal symptoms following the appendectomy. We further compared the children from both groups regarding school performance, behavior and their social interaction with peers [Table 3]. No significant statistical differences were found between the groups.

Discussion

In this study we compared the abdominal pain characteristics in post-appendectomy children with histologically confirmed appendicitis to those who had a non-inflamed appendix, with special emphasis on the diagnosis of recurrent abdominal pain. Our results are contradictory to previously reported studies.

Several reports have been published on the association between emotional problems in non-inflamed appendix patients both pre- and post-appendectomy. Barker et al. [12] argued that the clinical presentation of acute abdominal pain without clear underlying pathology may represent a behavioral syndrome with poor prognosis in terms of long-term utilization of hospital resources. Table 4 summarizes six studies showing more psychiatric and psychological morbidity as well as more abdominal pain and more admissions in the non-inflamed appendix groups.

Studies on the surgical findings in patients with RAP [7] found that approximately 20% of their 161 RAP patients underwent surgical (8.7%) or medical treatments of doubtful necessity. A recent multivariable analysis found that patients with irritable bowel syndrome had three times more cholecystectomies, twice the number of appendectomies and hysterectomies, and 50% more back surgery than other subjects without irritable bowel syndrome [6].

Walker and colleagues [19] showed that patients with RAP reported significantly higher levels of functional disability, school absence, and clinic visits for abdominal distress. Among patients with RAP, higher levels of irritable bowel syndrome symptoms were associated with significantly greater functional disability, more clinic visits, more life stress, higher levels of depression, and lower academic and social competence [19].

With these background data, it was tempting to assume that patients with non-inflamed appendix would have a higher percentage of RAP and its later consequences such as depression

OR = odds ratio

Table 4. Studies looking at outcome of patients with normal compared to inflamed appendix

Study	Population	Percent of normal appendix	Main psychological findings compared to inflamed appendix	Other findings compared to inflamed appendix
Harding [13]	239 girls aged 11–20 years	62%	Psychological factors contributed significantly to the clinical presentation	
Creed [14]	119 patients aged 17–30 years	47%	Behavioral pattern similar to that found in depression (not noted in the inflamed group).	Abdominal pain persisted and was most common in those with normal appendix (58% vs. 23.5%)
Joyce [15]	153 patients aged 10–40 years	35%	Patients were more likely to be readmitted with suicidal behavior. (8 vs. 2 patients)	More unexplained pain
Vassilas [16]	552 young women	33%	More parasuicide in the non-inflamed group (15% vs. 5%)	
Dummett [17]	456 (201 children, 255 adults)	50% (matched cases)	3.6 times more deliberate self-harm and 2.6 times higher psychiatric attendances	1.9 times longer hospital stay
Tingstedt [18]	3230 adults	23% (65% women)		3.4 times more admissions. More non-specific abdominal pain (52% vs. 23.1%).

and personality disorders [20-23] than those with confirmed acute appendicitis.

Our results demonstrated surprisingly lower rates of RAP in children with normal appendix than might have been anticipated according to previous studies. Only one girl with a non-inflamed appendix met the criteria for RAP and her symptoms resolved following appendectomy. This was also true for the group with abdominal pain not meeting the formal criteria for RAP. We also could not demonstrate differences regarding school performance, behavioral problems and social interactions between the groups that might have been expected according to previous studies. The explanation for this finding is not clear and may be partially related to the fact that the number of patients with non-inflamed appendices (25%) was relatively high compared to other studies in the literature [4]. Both groups were similar with regard to age at operation, percentage of responders and time course after surgery, so we presume that type B recall bias does not significantly affect the results.

The major limitation of the study is that our data are based on a telephone questionnaire and not on objective assessment, and the fact that only about 50% of the original group could be recruited for the study; however, the recruitment percentage was similar in both groups and therefore probably unbiased. Although we did not use the Rome II criteria [24], our study group met the commonly used classical criteria for childhood functional RAP [8,25] without further subgrouping for specific gastrointestinal complaints suggested by the Rome II criteria.

We therefore conclude that in our study we could not demonstrate any relationship between a normal appendix on histological examination and higher incidence of RAP. We were also unable to verify the purported association of a non-inflamed appendix with psychosocial morbidity. According to our results, neither abdominal pain characteristics nor the patients' psychosocial background could predict non-inflamed appendices or a different postoperative course.

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