Original Research Article

Is elective appendicectomy is a valuable option in children, with chronic undiagnosed right lower abdominal pain? A prospective study

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Received: 21 October 2016

Accepted: 18 November 2016

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ABSTRACT

Background: Chronic right lower abdominal pain in children is an enigma with both diagnostic and therapeutic controversies. There are no well-defined management protocols. In this study we have tried to define the role of laparoscopy and elective appendicectomy in these children.

Methods: It is a prospective study duration 2 years (2013-15), in which children with chronic right lower abdominal pain, after excluding infective causes of chronic pain all required investigations, children were selected for diagnostic laparoscopy and appendicectomy. Children were following up for relief of pain and complication related to procedure for minimum of 12 months.

Results: Total 22 patients were included in study. Male: Female-14:8, average age was 9.2 years. Average duration of symptoms was 12.8 months. Investigations were not helpful in establishing the cause of pain abdomen in these children. On laparoscopy, appendices were found macroscopically abnormal in 14/22 cases, of which 12 show chronic inflammatory changes of histopathology of which 11 showed complete improvement of symptoms in follow up. Eight cases in which appendix were found macroscopically normal, in 6 cases appendicectomy was done. There were no procedure related complications.

Conclusions: Laparoscopy in chronic right lower abdominal pain in children with persistent mesenteric lymphadenopathy is useful for both diagnostic and therapeutic purposes. Appendicectomy should be done even if it is macroscopically normal.

Keywords: Chronic right lower abdominal pain, Children, Laparoscopic appendicectomy

INTRODUCTION

Abdominal pain in school going children is one of the commonest clinical problems. Prevalence is estimated to be 10-12%.^{1,2} Some of them are straight forward cases where the history and/or the physical examination are indicative of a particular diagnosis and the treatment can be initiated immediately.

In some children a clear diagnosis emerges only after a battery of investigations is performed to pin point the diagnosis. However a group also exists in whom the diagnosis cannot be made accurately despite

investigations. This usually follows an ultrasound study (USS) of abdomen (which is done in almost all cases) that shows mesenteric lymphadenopathy (LAD) or nonspecific bowel wall thickening. At other times if conservative and medical management is not successful in ameliorating the symptoms, an appendicectomy is performed with a diagnosis of chronic appendicitis, especially when the symptoms are localized to the right iliac fossa. The issue of appendicectomy in such cases has been much debated and different opinions emerge from literature. Those who remove appendix routinely quote 50-100% improvement in clinical resolution of pain.

METHODS

The study was conducted in the Department of Pediatric Surgery at KGMU, Lucknow, Uttar Pradesh, India. The cases were chosen from patients seen in OPD with age range of 4-12 years of both sexes with clinical presentation of right lower abdominal pain. Informed consent was taken from all parents and children above 7 years of age.

Inclusion criteria

- One or more episodes of right lower abdominal pain, in age range 4-12 years from both sexes.
- Pain should be significant enough to hamper child's activities.
- Duration of pain should be > 6 weeks.
- No obvious diagnosis should have been made based on clinical history/ examination /routine investigations (haemogram, stool and urine analysis chest and abdomen X-ray and other relevant imaging studies).
- Children with right lower abdominal pain where a medical/surgical diagnosis could be made by clinical examination or by routine work up including radiology.

Exclusion criteria

- Contraindication of laparoscopy and non-availability of consent.

All procedures were performed under general anesthesia. After induction, a nasogastric tube was inserted to deflate the stomach. Bladder was emptied by suprapubic pressure / or catheter, if required. Using open technique a 10 mm optic trocar was inserted just above the umbilicus. Pneumoperitoneum with CO₂ was created and pressure was kept at 8-10 mmHg. A primary inspection of the peritoneal cavity was performed in all quadrants and the pelvis. Working ports (two or three) were placed according to the findings. Observation was specifically made for right iliac pathology, omentum adhesions, mesenteric lymph nodes, inguinal hernia sites, free fluid, pelvic structures ovaries and adnexa. A "gut walking" was done in every case. Gut was inspected for abnormalities of rotation and fixation. Liver surface, gall bladder and peritoneal surfaces were studied for any abnormalities.

Appendix was inspected with specific attention to detail. A normal looking appendix was defined as: appendix with smooth external surface, normal color, no peritoneal or omental adhesions, no free fluid in right iliac fossa, no appendicolith, and normal mesoappendix. Abnormal looking appendix was defined as: thickened wall of the appendix, vascular congestion on surface, omental or peritoneal adhesions, fluid in the vicinity of appendix, presence of appendicolith, thickened mesoappendix.

Depending on operative findings the surgical procedure was tailored. If there was a definite pathology that could account for pain it was dealt with. If no pathology was found appendectomy was carried out. Appendectomy was done after taking down the mesoappendix with harmonic scalpel or direct ligation of the appendicular vessels with vicryl suture. Two endo-loop (catgut) were applied on the appendix on the cecal side and one distally and the appendix divided between them. The appendix was delivered out through the umbilical port. If large and inflamed it was put in an endo bag and the bag was removed from umbilical port. Excised appendix send for histo-pathological study.

First follow up was arranged after one week, when wounds were inspected, information on clinical resolution of pain gathered, persistent/new symptoms addressed. Histopathology reports were reviewed. If symptoms persist or new symptom developed, a pediatrician review was obtained. Further follow up was arranged after one month, 3 months and 6 months. Symptomatic improvement or persistence of symptoms was documented and reviewed.

RESULTS

Total of 22 patients in the age range of 4 -12 years were enrolled in the study. There were 14 boys and six girls. Duration of symptoms varied from 6 weeks to 6 years. Out of the 22 cases appendectomy was performed in 20 cases. In one case (case no. 19) there was a direct evidence of peritoneal / omental tuberculosis – accordingly biopsy from the peritoneum and omentum was taken. Appendectomy was, therefore, not done. In one case (case no 12) a small ovarian cyst was found, which was excised.

Figure 1: Fibrosis in the submucosa and muscularis propria (haematoxylin & eosin x 40).

Out of 22 cases, during laparoscopy, the appendix was outwardly looking abnormal (vascular congestion on surface, omental peritoneal adhesion to the appendix/ right iliac region) in 14 and normal in 8. On Histopathological examination inflammatory appendicular pathology was confirmed in 15. In 5 cases the appendix was histologically normal.

Out of the 8 normal looking appendices (on laparoscopy), 6 were removed and on histology three were found abnormal and the rest three were normal. Of 5 histologically normal appendices 3 were looking outwardly normal on laparoscopy, But 50% (3 out of 6) outwardly looking normal appendices were histologically abnormal. The data was tabulated and Fisher's exact test was applied, in none of the compared parameter p-value was found statistically significant.

Case no 3. External appearance of appendix on laparoscopy found normal, histology normal. Only partial improvement occurred. Symptoms are not particularly bothering the child and the family. A wait and watch policy is being employed. Case No 7, an 11 year old boy, presented with long standing pain in the epigastrium and

right lower abdomen for 12 months. He had no associated symptoms. He was reviewed by consultant Pediatrician and investigated. The appendix was found adherent to the lateral peritoneum. Laparoscopic appendectomy was done. Appendicular histology showed chronic inflammatory changes.

Patient did not improved symptomatically in post-operative follow up. He is a likely candidate for psychological evaluation. Case no 15. External appearance of appendix on laparoscopy found normal, on histology normal and no symptomatic improvement occurred. He is being followed up in Pediatrics department where a diagnosis of GERD has been made following an esophageal pH study.

Table 1: Statistical analysis between laparoscopic finding, appendectomy, appendicular histology and symptomatic improvement.

		Appendicular histology		Fisher's exact test	p-value
		Abnormal	Normal		
Laparoscopic finding	Abnormal	13	4	2.369	0.274
	Normal	2	3		
		Symptomatic improvement		0.347	1
		Yes	No		
Appendectomy	Done	17	3		
	Not done	2	0		
		Symptomatic improvement		1.945	0.227
		Yes	No		
Appendicular histology	Abnormal	14	1		
	Normal	5	2		

Table: 2. Comparing literature on role of surgical intervention, appendicular pathology, pain relief in chronic pain abdomen in children.

Authors	Country	No of patients	No of cases in which appendix removed	Positive findings on laparoscopy	Abnormal histology of appendix	Pain relief
Stylianios S et al ⁶	New York, USA	15	13 (two cases had previous open appendectomy)	11/15	46%	66%
Stringel G et al ⁷	Valhalla, USA	13	13	12/13	46%	77%
Stevenson et al ¹²	Cincinnati, Ohio, USA	50	50	Retrospective study	86%	98%
DeCou JM et al ¹⁶	Greenville, USA	30	30	20/30	70%	89%
Panchalingam et al ¹⁷	Aberdeen, Scotland	11	11	Not clear	82%	72%
Kolts RL et al ⁸	Marshfield, USA	44	44	20/44	72%	70%
Joshi AV et al ¹⁸	Mumbai, India	33	17	28/33	100%	90%
Zampieri N et al ¹⁹	Verona, Italy	76	76	54/76	79%	77%
Charlesworth P et al ²⁰	Brighton, U K	16	16	8/16	56%	81%

DISCUSSION

Abdominal pain is a major cause of morbidity in children. The quality of life in patients with abdominal pain is poorer than that of general population.³ In literature there is no evidence in favor of predictive value of extensive laboratory test and radiological evaluations for diagnosing the causes of abdominal pain in absence of alarming signals.⁴ Gorenstein et al studied 26 children with recurrent right lower quadrant pain.⁵ These children underwent appendectomy with symptomatic resolution in 88%, even though only 30% appendices showed positive histology. The fact that 70% appendices were normal and still there was pain relief suggests either a placebo effect of surgery or more subtle nature of appendicular histology. Our study has shown that laparoscopy is an accurate method for evaluation and treatment of children with chronic and recurrent abdominal pain. Similar views have been echoed in other studies addressing this issue.⁶⁻⁸

Gorenstein series has clearly shown that in a significant number of cases the pain subsides even if the removed appendix is normal on histology.⁵ In our series 5 cases had a normal appendix on histology. Three of them had complete pain relief (50%). One case had partial relief. One case showed no improvement at all. The normal appendicular pathology in patients with relief of pain may be due to more subtle pathology which may not be diagnosed on routine histology, or intermittent nature of appendicular pathology such as appendicular colic.⁹⁻¹¹ Alternatively it could be the placebo effect of surgical intervention. Stevenson RJ and Schisgall R studies support the partial or complete obstruction of the lumen of appendix as a possible cause of recurrent crampy right lower abdominal pain.^{12,13}

Our study has shown ratio between laparoscopic external appearance of appendix, histological finding and pain relief (14 abnormal looking appendices on laparoscopy, 12 of them histologically abnormal, and pain relief in 13 out of 14). These figures support our conclusion that appendectomy is justifiable if appendix is looking abnormal on laparoscopy, as it is likely to be confirmed on histology.

The other controversial issue in literature is whether laparoscopically normal looking appendix should be removed or not? Stevenson RJ, Stylianos S, Stringel et al have supported appendectomy of a normal looking appendix whereas Teh SH et al, Schleef J et al, Thanapongsathron W et al have opposed the removal of appendix in such cases.^{6,7,11,12,14,15} Our study has shown that half of these patients (3 out of 6) are likely to have appendicular pathology on histology even though the external appearance was normal. Also it is noted that 4 of these patient benefited from appendectomy (three completely and one partial relief from pain). So in our view appendectomy is justifiable even if appendix is looking normal on laparoscopy and there is mesenteric lymphadenopathy.

Limitations of study were that, the total number of cases is less, follow up has been short, the post-operative assessment has been done by the same team. Hence a bias factor cannot be completely excluded in evaluation of symptoms post operatively. Age limit has been 4-12years. No adolescences are included in the study. Chronic abdominal pain is a very interesting topic in adolescent girls and it would have been very interesting to include them in the study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Singh S, Rawat JD. Is elective appendectomy is a valuable option in children, with chronic undiagnosed right lower abdominal pain? A prospective study. *Int Surg J* 2017;4:385-9.