Limited ileo-caecal resection for localised Crohn’s disease in childhood: Clinical outcome and predictors of further surgery

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Abstract

Objectives: To investigate the outcome of limited ileo-caecal resection in children with localised Crohn’s disease (CD) and determine predictors of further surgery.

Methods: Review of children diagnosed with CD and operated on for ileo-caecal disease from 1995 to 2005. Age at diagnosis, endoscopic disease distribution, indication for surgery, site of recurrence and date of last follow-up were recorded. Surgery required removal of only the ileo-caecal junction and caecal pole with removal of the minimum terminal ileal length.

Results: Thirty seven children underwent intestinal resection. Time between primary operation and most recent follow-up was 3.8 years (range 1 month–8.8 years). Indications for surgery were obstruction/stricture (20), treatment-resistant disease (13) and abscess/perforation peritonitis (4). Follow-up was available in 32. Nine (28%) required re-laparotomy. Median time to second laparotomy was 12 months (range 4–58 months). Eighteen children required no endoscopies after surgery (median follow-up 3.4 years).

Conclusion: Most conservative surgery occurs about 2 years after diagnosis. About 1 in 4 children have a further laparotomy within 12 months. Over half of these require division of adhesions. Limited ileo-caecal resection for localized Crohn’s disease is not associated with early peri-anastomotic recurrence. Developments in laparoscopic surgery are likely to further reduce complications from adhesions.

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KEYWORDS
Crohn’s disease; Child; Ileo-caecal; Resection; Adhesion

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Clinical outcome and predictors of further surgery for localised Crohn’s disease in childhood

1. Introduction

Crohn’s disease is a chronic relapsing disease of the gastrointestinal tract, most commonly occurring at the ileo-caecal region. Crohn’s disease in children and adolescents may lead to impaired education, socialisation and disordered growth.\(^1,2\) The precise aetiology of growth failure in these patients is not known but a combination of disease activity, poor nutrition and prolonged corticosteroid exposure are all important factors.\(^3\) Medical management is the mainstay of current treatment. Surgery for Crohn’s disease is indicated when medical management has failed to induce remission, or complications of the disease such as stricture or abscess formation. Well timed surgery in children and adolescents can result in prolonged disease remission and excellent catch-up growth.\(^4,5\)

Recurrence of disease following a primary resection for Crohn’s disease is a common phenomenon, with between 33–88% of patients requiring a second laparotomy at some point.\(^6,7\) Early recurrence of symptoms due to inadequate excision of disease is particularly undesirable in adolescents as prolonged disease activity in this patient group can lead to significant morbidity and permanent stunting. Some retrospective data in adults suggests that laparoscopic techniques may reduce the need for further surgery to <10% in patients having a laparoscopic ileo-caecal resection.\(^8\) There are still only very limited reports of laparoscopic resections in children with Crohn’s disease,\(^9\) with less than twenty children currently reported in the world literature.

It has been our policy since 1995 to confine first resection for ileo-caecal disease to the minimum necessary to remove macroscopic disease. The purpose of this retrospective review is to determine clinical outcomes after a conservative open surgical approach and set a baseline standard against which future laparoscopic surgical outcomes can be measured. We also wished to determine whether there were any predictors of which children go on to require further surgery.

2. Patients and methods

The Centre for Paediatric Gastroenterology at the Royal Free Hospital, London is one of the largest centres in the UK for management of Paediatric Inflammatory Bowel Disease. As a retrospective audit and hence without the need for formal ethical approval, the records of all children and adolescents diagnosed with Crohn’s disease and operated on for ileocaecal disease between 1995 and 2005 were reviewed by LC and EA and consolidated onto an anonymised SPSS v.11 database by EA. Initial diagnosis was made in all cases by established criteria of clinical, endoscopic, histological and/or radiological assessment. In addition to detailed demographic data, other data collected included: Age at diagnosis, initial endoscopic disease distribution and age at operation, indication for operation, indication and type of further laparotomies, site of recurrence and date of last follow-up. No appropriate control group could be identified as more extensive resections were very rare, and frequently involved a sub-total colectomy.

Furthermore, therapies at final follow-up, height and weight at final follow-up, repeat endoscopies and final medication use were also recorded. Since 1995 it has been the policy of the Centre for Paediatric Gastroenterology at the Royal Free Hospital to collaborate with an experienced adult colorectal surgeon (AL) in the management of all adolescents requiring surgical intervention. Surgical policy has always been to confine a first resection for localised ileocaecal disease to the minimum necessary to relieve acute symptoms and hence preferably discontinue medical therapy. This generally requires the removal of only the ileocaecal junction and caecal pole. The extent of the terminal ileal resection is dependent on the severity and extent of macroscopically involved bowel at the time of surgery. No attempt is made to achieve microscopic or histological clearance. This conservative approach allows a small incision, almost always below the umbilicus and a minimal loss of bowel. Rapid recovery with early return to school and enhanced growth is usual.

All operation notes were checked (LC) to ensure that the procedure carried out was a limited ileo-caecal resection as previously defined. All information was substantiated by personal records maintained by the main surgeon at each follow-up clinic during this time period. All but two operations were carried out by the same colorectal surgeon (AL). Restoration of continuity after bowel resection was by side-to-side stapled anastomosis in all cases. The primary end point was re-laparotomy during the period of follow-up.

All children were routinely continued on aminosalicylate therapy after surgery, with some continuing immunosuppressant therapy if pre-operative assessment had suggested any colonic/upper GI disease activity. All group data are given as medians unless otherwise stated and non-parametric statistics were used where necessary.

3. Results

Thirty eight children and adolescents underwent intestinal resection for localised ileo-caecal disease between May 1995 and November 2005. Of these, 32 had complete follow-up data available after their first laparotomy and therefore only these were used in the analysis of follow-up data. Age at diagnosis was 12.5 (range 8–16 years) and at time of surgery was 15.0 years (range 9–18). Time between primary operation and most recent follow-up was 3.8 years with a range from 1 month to 8.8 years. Time between diagnosis and the first laparotomy in all 38 children was 26 months (range 2–96 months). At diagnosis 35/37 children had disease activity identified in the terminal ileum, two had normal ileal histology but had recto-sigmoid and peri-anal disease.

The indications for surgery are shown in Fig. 1. Of these, three were emergency procedures. All but four children had

![Figure 1](https://academic.oup.com/ecco-jcc/article-abstract/1/2/82/517933/128257f733)
a limited ileo-colic resection with a primary anastomosis. Out of the remaining four, two also had a sigmoid colectomy for localised disease, and two underwent a limited ileo-colic resection with formation of temporary stoma.

Of the thirty two children with complete follow-up, nine (28%) required re-laparotomy during follow-up (Fig. 2). Median time to second laparotomy was 12 months (4–58 months). Of those who went on to have a second laparotomy, 3 had a further laparotomy within another 26 months.

The indications for a second laparotomy can be grouped as follows:

3.1. Obstruction unrelated to Crohn’s disease (5)

Two patients developed adhesional/fibrotic strictures at the level of the ileo-colic anastomosis. This resulted in obstructive symptoms which required one stricturoplasty and one resection of the anastomosis. In both cases, histology of the resected specimens showed no evidence of active Crohn’s disease. Three required division of adhesions at sites unrelated to previous surgery. None of these were therefore not considered post-operative recurrences.

3.2. Recurrence requiring colonic resection (4)

Four patients developed severe colitis following the ileocaecal resection despite having a macroscopically normal colon at the primary operation and pre-operative colonscopy. They required surgery at 4, 5, 16 and 58 months after their initial surgery. The first patient required a more extensive ileo-colic resection with a further primary anastomosis, thus representing early disease recurrence at the site of resection. The second relapse required a more extensive colonic resection following the formation of an inflammatory mass after a sigmoid colectomy. One required a subtotal colectomy (with preservation of rectal stump) and formation of an end-ileostomy after 16 months, and one patient had more extensive colonic disease after almost 5 years needing a further ileo-colic resection (Fig. 2).

3.3. Resection specimen histology

Of 38 children, 3 ileal histology results were not available. Sixteen of 35 (46%) had histologically normal ileal resection margins, 19 had chronic or active inflammation. The colonic margin was histologically normal in 20/36 (55%), all others had mild to moderate disease activity. The ileal resection specimen samples were histologically normal in 19/35, the colonic specimen were normal in 16/35 samples. The presence or absence of disease in either the resection margin/tissue was not predictive of later disease recurrence. Only 2 of the 12 children with active disease in both ileal and colonic resection margins went on to need a further laparotomy.

3.4. Growth data

Median Z scores for height at diagnosis, surgery and final follow-up did not differ significantly. There were no significant differences between Z scores of weight at diagnosis and at time of surgery (p=NS), as well as between weight at final follow-up compared to weight at time of surgery (p=NS). The patient numbers were too small to perform relevant analysis on pre- and post-pubertal growth data.

4. Follow-up clinical data

Eighteen children required no endoscopies after surgery (median follow-up 3.8 years) and 56% (18/32) were only on aminosalicylate therapy at final follow-up. The remainder (14/32) required a further endoscopy at a median of 1.2 years (range 1 month to 5.2 years), with 9/14 children having some ileal/anastomotic ulceration, and 5 having colonic disease alone. All but one child received further treatment for these findings and 6/14 went on to have a further laparotomy.

At final follow-up three children were on steroids (two prednisolone, one budesonide), twelve on immunosuppressants (11 Azathioprine/6-mercaptopurine, 1 Methotrexate), two patients were on maintenance anti-TNF therapies. Only two children were on no treatment at all.

5. Discussion

Currently, 20–30% of patients with Crohn’s disease present before 20 years of age10 and the numbers appear to be increasing.11,12 Nearly half of these patients will require surgery within 5 years of diagnosis,13 with the most common indications being obstruction and treatment resistance.14,15 Early post-operative recurrence in children threatens education, socialisation and particularly growth. If conservative surgery were shown to increase the risk of an early recurrence in these patients, there might be a case for adopting a more radical approach, at least at the initial operation.

The longstanding trend towards conservatism in the surgical management of Crohn’s disease is well illustrated in the preference for limited resection and stricturoplasty whenever possible.16 Although stricturoplasty is of clear benefit in conserving bowel length and does not appear to increase the rate of disease recurrence,17 this technique is not appropriate in treating inflamed and frequently distorted ileo-caecal segments of bowel. Furthermore, surgery in a child in early to mid-puberty is also seeking to minimise the potential for relapse during the remaining pubertal growth spurt. Stricturoplasty alone would leave an adolescent with residual disease with possible ongoing negative effect on growth. However, there is ample evidence to show that attempts to achieve complete surgical clearance of disease are ineffective at reducing the risk of further surgery, while increasing the likelihood of short bowel syndrome.18,19 Further, the extent of the resection margin makes little difference to the rate of recurrence, even if the margin shows active disease.20,21 This is confirmed by our findings.
The conservative approach has led to fewer patients with Crohn’s disease developing short bowel syndrome and other biochemical problems which were a common cause of death in the past.\textsuperscript{22} There is no evidence that this policy should be reconsidered in adult patients.

This cohort review shows the outcome of a limited ileocolonic resection in children with localised Crohn’s disease. We documented that surgery occurs about 2 years after diagnosis and that about 1 in 4 (28\%) require a repeat laparotomy in about 12 months. However over half of these were not for bowel resection or recurrent disease, but for fibrotic adhesions. Although there are no reports of increased adhesions following laparotomy in Crohn’s patients \textit{per se},\textsuperscript{23} this result suggests that strategies to reduce the risks of adhesions are clearly warranted in this group of patients.

The increasing use of laparoscopic surgery as opposed to open surgery may well reduce this risk\textsuperscript{24,25} and has importantly not been shown to be associated with increased risk of disease recurrence\textsuperscript{6} or an increase in adverse effects.\textsuperscript{26} However although hospital stay, cosmesis and less wound infections are documented after laparoscopic ileo-caecal resection, the post-operative analgesia requirement and overall quality of life have not been significantly better in large prospective studies in adults.\textsuperscript{27} Laparoscopic techniques also have the additional benefit of a faster recovery and smaller wounds in a population likely to require re-operation in the future.\textsuperscript{28} The sub-umbilical incision reported in this series is however only slightly longer, particularly in the younger child, than the 3 cm incision required for the resection specimen.\textsuperscript{9}

The remainder of the children who underwent re-laparotomy required more extensive surgery for treatment-resistant colonic disease. However, only 6% (2/33) children went on to require formation of a permanent ileostomy in the 3.8 years median follow-up period.

This review does not support the case for more extensive surgery. It suggests that disease recurrence requiring surgery is usually not at the anastomotic site, but colonic in origin. In only one patient with recurrence would recurrent disease have been removed by an initial standard right hemicolectomy that included the hepatic flexure. This patient developed recurrent disease of the terminal ileum extending into approximately 9 cm of colon (with no skip lesions) and this region could have been resected en bloc at the initial operation. We also showed that surgery provides a prolonged remission for about 50% of children, the majority of whom are only on topical anti-inflammatory drugs 3 years after their resection. For those children who relapse, they tend to do so within about a year and the vast majority of them will require immunosuppressants. About half of these will go on to require further surgery in the next 3 years.

For the majority of children (32/33), limited ileo-caecal resection for localised disease is not associated with early peri-anastomotic recurrence. Therefore, despite the concerns of early post-operative recurrence in children and adolescents with Crohn’s disease, there seems no reason to abandon the policy of minimal primary resection in favour of more radical surgery. It may be that a better understanding of post-operative prophylaxis and laparoscopic surgical techniques are the key to further improving the post-operative course in this group of children.

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