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### Laparoscopy in Crohn's disease



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In Crohn's disease (CD) surgical management, laparoscopic approach offers several theoretical advantages over the open approach. However, the importance of inflammatory lesions associated with CD, and the frequent presence of adhesions from previous surgery have initially questioned its feasibility and safety. In the present review article we will discuss the role of laparoscopic approach for Crohn's disease surgical management, along with its potential benefits as compared to the open approach.

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#### Introduction

Crohn's disease (CD) is an inflammatory bowel disease (IBD), characterized by a relapsing transmural bowel inflammation, which can affect any segment of the gastrointestinal tract, from the mouth to the anus. This chronic inflammation can give rise to complications, such as stricture, abscess, fistula, haemorrhage, or malignant transformation, which are the main indications for surgery: despite optimal medical treatment, over 60–70% of all CD patients will require surgical treatment within ten years of diagnosis [1]. Furthermore, CD is a recurring disease and its etiologic treatment is still not known, leading to a high risk of postoperative recurrence, as up to 60% of CD patients will develop clinical symptoms of recurrence after their index procedure and up to 30% will require further operation [1–5], leading to the development of intra-abdominal adhesions. These high rates of complications, along with the frequent occurrence of intra-abdominal adhesion and the thick and friable inflammatory mesentery often observed in CD give rise to a technically demanding surgery.

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On the other hand, Crohn's disease patients are, theoretically, ideal candidates for minimally invasive surgery: they are often young and active patients, for whom the benefits of laparoscopic approach in terms of cosmesis and postoperative recovery are essentials, and they usually have little abdominal fat, making them suitable for advanced laparoscopic techniques. Furthermore, the reduced intra-abdominal adhesions and abdominal wall trauma following laparoscopy, as compared to open approach, might improve long terms results and facilitate the unfortunately frequently required reoperation in CD patients.

In this article, we will review the results of laparoscopic approach and laparoscopic-assisted hybrid procedures for CD surgical management.

## **Small bowel Crohn's disease**

### *Technical feasibility of laparoscopic approach*

The importance of inflammatory lesions observed in small bowel CD has initially questioned the technical feasibility of the laparoscopic approach in this indication. The rate of conversion to laparotomy may be regarded as a good reflection of these potential technical difficulties. The first studies assessing laparoscopy for small bowel CD, published as early as 1993 [6–9], were impaired by an important conversion rate of up to 19%. However, numerous studies were performed since and most of them were included in five meta-analyses [10–14]. These latter reported pooled conversion rates ranging from 7% [11,13] to 11% [12], which compares favourably to those observed in other pathologies such as colon cancer (ranging from 11 to 29% in a meta-analysis [15]) or sigmoid diverticulitis (19.2% in a recent RCT [16]), although most of included studies were not randomized control trials and could therefore be biased by a selection process, leading to a potential underestimate of the conversion rate. These results also highlighted the importance of the learning curve and expertise in this technically demanding indication.

In an attempt to identify potential risk factors for conversion, Schmidt et al reported that intra-abdominal fistula, smoking habit, steroid medication, extracecal colonic disease, and preoperative malnutrition were associated with a higher risk of conversion [17]. In a second study, we prospectively analysed the operative results of 69 consecutive patients who underwent a laparoscopic ileocecectomy for CD [18]. Although male gender, three or more acute flares of CD prior to surgical procedure, pre-operative immunosuppressive medication (azathioprine or mercaptopurine), resection of an additional intestinal segment, and complication related to a penetrating behaviour (intra-abdominal abscess or fistula) were significantly associated with a higher rate of conversion to laparotomy in univariate analysis, only resection of an additional intestinal segment and intra-abdominal abscess or fistula were assessed as independent risk factors for conversion after multivariate logistic regression.

### *Ileocolic resection for stricturing Crohn's disease*

The terminal ileum is the most common CD location as it affects up to 50% of the patients [19]. Consequently, ileocolic resection is the most frequently performed procedure for CD [20]. This procedure, when performed for non-penetrating primary CD limited to the terminal ileum, can be regarded as an ideal indication for laparoscopic approach, as it is not associated with potential technical difficulties related to fistula, abscess, inflammatory mass, extensive disease, or adhesions rising from previous procedure.

### *Short-term results*

To date, the largest single center experience with laparoscopy for small bowel CD was reported in 2009 by the Mount Sinai Medical Center [21]. A total of 335 laparoscopic procedures for CD were included and among them, 49% were ileocolic resections performed for non-penetrating primary CD. Technical feasibility was highly satisfactory with conversion rates of 2% for the overall population (only 0.5% considering only primary ileocolic resections). Overall, postoperative mortality was nil and postoperative complications occurred after 13% of the procedures, including 4% that required emergent reoperation. The most commonly observed complications were bowel obstruction (5%) and anastomotic leak (2%).

Numerous studies have been reported comparing short-term outcomes associated with laparoscopic and open approaches for ileocolic resections in patients with non-penetrating primary CD [22–

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