

# Endoscopic balloon dilatation for Crohn's strictures of the gastrointestinal tract is feasible

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## ABSTRACT

**INTRODUCTION:** Despite optimized medical treatment, Crohn's disease can cause gastrointestinal (GI) strictures, which requires surgical intervention. Lately, endoscopic balloon dilatation has been established as an alternative to surgery. In the following, we report our experiences with endoscopic dilatation of strictures in the gastrointestinal tract caused by Crohn's disease.

**MATERIAL AND METHODS:** From January 2005 to February 2011, 23 patients with Crohn's disease were referred for endoscopic dilatation. Based on data derived from this cohort, a retrospective analysis was made. Patients with Crohn's disease, obstructive GI symptoms and known bowel strictures were included. Their mean age was 39 years (20-59 years) and 65% were female. Prior to the procedure, all patients had been evaluated by barium small-bowel follow through, abdominal magnetic resonance imaging and/or endoscopy.

**RESULTS:** Dilatation was performed in 19/23 (83%) patients. During a mean follow-up period of 21 months (range 1-47 months), relapse was observed in 14/19 patients (74%). Five patients (26%) were referred to surgery due to complications ( $n = 1$ ) or multiple relapses ( $n = 4$ ). A total of 54 endoscopic dilatations were performed during the study period. Only one complication (perforation) was experienced, which resulted in a complication rate of 1.9%.

**CONCLUSION:** Endoscopic dilatation in patients with Crohn's disease with obstructive GI symptoms seems safe. In three out of four patients, surgery was avoided during a mean follow-up of two years. Further optimisation of the procedure is needed to lower the rate of recurrence.

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Crohn's disease is well characterized and treatment is based on well-established international guidelines [1]. However, the disease often follows an individual course in terms of symptomatology and response to medical treatment. Despite optimized medical treatment, the disease can cause strictures throughout the gastrointestinal (GI) tract. Intestinal strictures not associated with penetrating complications have been estimated to develop in 12% and 18% during the first five and 20 years of disease, respectively [2].

Strictures often require surgical intervention either



Endoscopic balloon dilatation of Crohn's-related bowel stricture. Source: Jakob Hendel.

by resection of the diseased bowel segment or by stricture plasty. The postoperative morbidity after resection is associated with complications in 13-22.9% of cases; the primary complications are bowel obstruction, anastomotic leakage, wound infections and postoperative bleeding [3, 4]. Furthermore, after three years, stricture recurrence is found in 84% and approximately one third of the patients will need another resection [5, 6]. Recurrent surgery may lead to short-bowel syndrome in a small percentage of patients [6]; a risk which may be reduced by stricture plasty. Still, during the first ten postoperative years, approximately 50% of patients will require repeated surgery due to recurrence of intestinal obstruction [7].

Facing the problems related to repeated surgery and knowing how resistant the strictures are in terms of medical treatment, efforts have been made to develop an endoscopic solution using balloon dilatation. In some institutions, this method has been used for a decade, and a recent meta-analysis shows that the procedure is technically successful in 86% and associated with complications in ~2% of patients [8-10]. Recently, also long-term results from endoscopic dilatation of Crohn's strictures have been published [11-13]. Double-balloon enteroscopy (DBE) and spiral enteroscopy (SE) enable visualisation of the small bowel and complete the endoscopic access to the entire GI tract. Two recent studies have demonstrated that balloon dilatation of small bowel strictures is also feasible using DBE [14, 15].

## ORIGINAL ARTICLE

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In our department, we introduced endoscopic balloon dilatation of Crohn's-related strictures in 2005. As a result, all patients with Crohn's-related gastrointestinal strictures are now being treated endoscopically with balloon dilatation if possible. In the following, we report our experiences with endoscopic dilatation of strictures caused by Crohn's disease.

### MATERIAL AND METHODS

Between January 2005 and February 2011, endoscopic dilatation was attempted in 23 patients. Based on data derived from this cohort, a retrospective analysis was made. The patients included were known with Crohn's disease and bowel strictures and had obstructive symptoms with abdominal cramps, nausea and vomiting. Patients with ileus or intraabdominal abscess were excluded. Before the procedure, all patients had been evaluated by barium small-bowel follow-through, by abdominal magnetic resonance imaging and/or endoscopy. Written informed consent was obtained from all patients.

The mean age of the 23 patients (15 woman and eight men) was 39 years (20-59 years). The duration of disease before the first procedure was 13 years (1-34 years). Prior to the procedure, 18 (78%) patients had undergone surgery, mainly ileocaecal resections. The location of the strictures was at the anastomosis after ileocaecal resection (10), in the small bowel (9), in the colon (2), in an ileoanal pouch (1), in the duodenum (1) or at the pyloric junction of the stomach (1). The patients' demographic data are summarized in **Table 1**.

The choice of endoscopic procedure was made based on localisation of the lesion. Lesions in the stomach or duodenum were accessed by gastroscopy. Lesions located distally to the ligament of Treitz, but within the proximal two thirds of the small bowel were accessed by peroral DBE or SE. Lesions within the distal small-bowel segment were accessed by anal approach DBE. Colonoscopy was used for strictures at the anastomosis after ileocaecal resection and in the colon. When using DBE or SE for the procedure, the patients were under general anaesthesia, while most of the other patients were under conscious sedation with midazolam/fentanyl or propofol. Two patients received no sedation. Each stricture was dilated after fluoroscopic or visual delineation of the lesion. The lengths of the strictures were five centimetres or less, the majority were only 1-2 cm long. A balloon was inserted over a guidewire. Dilatation was performed until a balloon diameter of 15 mm had been reached. The inflation time at the maximal diameter was one minute.

*Trial registration:* not relevant.

### RESULTS

Dilatation was performed in 19/23 (83%) patients. In the remaining four cases, one stricture was passable for the endoscope, so dilatation was found to be unnecessary, and three strictures were not amenable to dilatation (due to the length and severity of the stricture in two patients and adhesions in one patient). The latter three patients were referred to surgery.

The number of strictures dilated per session varied from one to five. With the exception of two patients, all described good clinical effect with remission of their obstructive symptoms (89%). One patient described only a brief effect. After five months, this patient underwent another dilatation without clinical resolution of the obstructive symptoms. The patient was then referred to surgery at which multiple adhesions were found. The other patient with a poor outcome had a stricture dilated at the ileocolonic anastomosis without any effect. A subsequent gastroscopy revealed an additional stricture in the duodenal bulb, which was dilated with good clinical effect.

After endoscopic treatment, the patients were observed for a mean of 21 months (range 1-47 months). Relapse was defined as recurrent symptomology. Because of relapse, a second treatment was necessary in 14/19 patients (74%). The mean observation period before the second dilatation was eight months (1-27 months). Seven of the patients who were re-dilated experienced at least one more relapse. During a mean follow-up period of 32 months (23-39 months), five patients (26%) were referred to surgery.

 TABLE 1

Patient demographics.

Patients	23
Dilatations	54
Females, %	65
Age, years, mean (range)	39 (20-59)
Disease duration, years, mean (range)	13 (1-34)
Follow-up, months, median (range)	21 (1-47)
Patients with previous surgery, n (%)	18 (78)
<i>Type of previous surgery (some were multi-operated), n</i>	
Small bowel resections	7
Ileocaecal resections	12
Colonic surgery	8
Anastomotic strictures, %	42
<i>Medical therapy at first dilatation (some in multi-therapy)</i>	
No therapy	65
Azathioprin/6-MP/MTX	26
Infliximab	4
Prednisolon	17

6-MP/MTX = 6-mercaptopurine/methotrexate

A total of 54 endoscopic dilatations were made during the study period. Only one (1.9%) major complication was experienced. This was a perforation of the bowel during balloon dilatation in a 62-year-old female. The patient had undergone multiple surgical procedures due to Crohn's disease and diverticulitis. Prior to the procedure, she underwent three successful dilatations of her neoterminal ileum without complications and with good clinical effect. Her postoperative course was uneventful and she was discharged within a few days.

## DISCUSSION

During the past five years, we have implemented endoscopic dilatation of strictures as a routine option in the treatment of Crohn's disease. During this period, 54 dilatations have been made in 19 patients. When introducing a new method, one of the most important parameters is safety. Only one complication (perforation) was experienced. This yields a complication rate of 1.9%, which is comparable to results reported from other centres [8, 11, 13]. In a meta-analysis, the complication rate was estimated to ~2% [9]. Comparing these estimates from endoscopic treatment with surgical results, we find it reasonable to conclude that endoscopic balloon dilatation is a safe treatment option for Crohn's strictures in the GI tract.

Inflation of the balloon is made after fluoroscopic or visual delineation of the lesion, and the balloon is inflated to a diameter of 15 mm. In other studies, 18 mm has proven safe and this diameter is used routinely in other centres [12]. In two studies, the balloon was inflated to a diameter of 25 mm which resulted in a lower relapse rate. However, a significantly higher number of complications was also observed [16, 17]. It may be speculated that the relapse rate is proportional to the size of the balloon during dilatation. However, further studies are needed to confirm this assumption. When we introduced endoscopic dilatation of Crohn's-related strictures, our first priority was safety. In view of our results and the literature, we consider increasing balloon diameter to 18 mm to address the high number of relapses.

Many studies technical have evaluated success by passing the lesion with the endoscope after dilatation of the stricture [13]. Coucknuyt et al found a positive correlation between passing the site of the lesion and the number of relapses [16]. On the other hand, complications have been reported as a result of advancing the scope past the site of the dilatation [8]. In our experience, we do not routinely pass the stenosis after dilatation if it can be fully inspected in its entire length thereby excluding significant bleeding or perforation. Our measure for success is based on disappearance of symptoms which in our experience does not necessarily re-

quire passage of the stenosis with the endoscope unless passage is of diagnostic or therapeutic importance.

The procedure was performed in three out of four patients assigned for treatment. The rate of technical success is comparable to that of other centres [8, 10]. Endoscopy provided useful information, even when dilatation was impossible, in the sense that it helped determine the precise location and characteristics of the stricture. In some cases, we found that symptoms were due to adhesions rather than to strictures. Recognition of fistulas discovered during endoscopy could also be of much clinical relevance to the surgeon.

Relapse is a problem in the treatment of Crohn's-related strictures. We found that 74% of our patients experienced renewed symptoms during a mean follow-up period of 21 months. One out of four is referred to surgery. In other series, the rate of relapse was lower, but the percentage of patients referred to surgery was similar, meaning that the majority of the patients experiencing recurrence could be managed by re-dilatations [8, 10, 11]. Using re-dilatations, surgery can in some cases be avoided; in others, it may be postponed. Considering the low rate of complications, we do not believe that it is necessary to set a limit on the number of re-dilatations that may be performed. The patient is referred to surgery after a joint consensus between surgeons, the endoscopist and last – but not least – the patient.

Relapse seems to be the primary problem in endoscopic treatment of strictures. Efforts have been made to reduce the rate of recurrence. A recent placebo-controlled study with series of postoperative steroid injections failed to show any benefit concerning the rate of recurrence after endoscopic balloon dilatation of Crohn's-related strictures [18]. Injections with infliximab after endoscopic dilatations of Crohn's strictures in the colon have proven to be safe, but their clinical effect has yet to be shown [19]. Rejchrt et al. have shown that it is feasible to insert biodegradable stents into a stricturing ileocolonic anastomosis after balloon dilatation, but studies presenting clinical effect are not yet available [20].

In summary, we find that endoscopic treatment of Crohn's strictures using balloon dilatation is a safe alternative to surgery. We find the method safe, and surgery was avoided during a mean follow-up period of two years in three out of four patients. We suggest that Crohn's patients with stenotic symptoms should primarily be evaluated for possible endoscopic resolution of strictures. Further optimisation of the procedure is needed to reduce the rate of recurrence.

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