

The feasibility and risk of early colonoscopy in acute diverticulitis: a prospective controlled study

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Background and study aim: Following acute diverticulitis, colonoscopy is advised to rule out malignancy. Commonly, the colonoscopy is postponed to avoid the potential risk of perforation. In a previous pilot, noncontrolled study, we showed that early colonoscopy is feasible in patients with acute diverticulitis. This randomized controlled trial compared early and late colonoscopy in hospitalized patients with acute diverticulitis.

Patients and methods: 154 patients diagnosed with acute diverticulitis were hospitalized between January 2004 and June 2006. Of these, 35 patients were excluded because of either free perforation or pericolic air on computed tomography (CT), and another 18 because they had undergone colonoscopy in the previous year. The remaining 101 patients were offered the possibility of participating in the study, with random allocation

to either early in-hospital colonoscopy or late colonoscopy, 6 weeks later. Randomization was refused by 15 patients, and 86 were included in the study.

Results: 45 patients were randomly allocated for early colonoscopy and 41 for late colonoscopy. Three and 10 did not present for the examination, in the early and late group respectively. The cecum could not be reached in eight and three patients from the early and late groups, respectively. The colonoscopy revealed polyps in five patients, two in the early group and three in the late group. No malignancy was detected. There were no complications in either group.

Conclusions: Early colonoscopy in acute diverticulitis is feasible and safe in the absence of pericolic air on CT, and has greater compliance. However, no added value is apparent compared with the CT scan currently used.

Introduction

The diagnosis of acute colonic diverticulitis is based on the clinical presentation of left lower quadrant pain, fever and leukocytosis, and on characteristic findings on computed tomography (CT) scan [1–3]. Adenocarcinoma of the colon might mimic both the clinical presentation and the findings on CT scan. Therefore, colonoscopy is recommended following an attack of acute diverticulitis. It is a common practice to postpone the colonoscopy for 6 weeks, in order to avoid a potential risk of converting a sealed perforation into a free perforation [4–8]. This approach is, however, not evidence based. In a previous prospective nonrandomized pilot study we showed that early colonoscopy during hospitalization in patients with acute diverticulitis is feasible and safe, as long as there is no peridiverticular air on CT scan [9].

The present study is a prospective randomized trial, where patients with acute diverticulitis were randomly allocated to either an early colonoscopy during hospitalization or to a late colonoscopy 6 weeks later.

Our study had two end points: the primary end point was to assess in a double-blind controlled trial whether there is an increased risk in performing early colonoscopy during an attack of acute diverticulitis. To the best of our knowledge, there are no data in the literature regarding this issue.

The secondary end point was to assess whether a change in policy (performing early colonoscopy during an attack of acute diverticulitis) will improve compliance and increase endoscopic findings.

Patients and methods

Consecutive patients, hospitalized between January 2004 and June 2006 for acute lower abdominal pain, fever and leukocytosis, and with suspicion of acute diverticulitis, were prospectively evaluated.

All patients underwent abdominal CT, and only those with characteristic findings on CT compatible with the diagnosis of acute diverticulitis were included. CT criteria for acute diverticulitis included the presence of colonic diverticuli, with thickening of the colonic wall at the site of the diverticuli and pericolic fat infiltration.

Patients with CT findings of pericolic air or fluid adjacent to a diverticulum and, obviously, patients with free perforation, were excluded, as were those with a lesion seen on CT scan that was suspicious of colonic cancer. Patients who had undergone a colonoscopy within the year prior to the current episode of acute diverticulitis were also excluded since additional colonoscopy was considered superfluous.

After informed consent had been obtained, all patients included in the study were randomly allocated to either early in-hospital colonoscopy, or late ambulatory colonoscopy at 6 weeks later. Patients were treated conservatively with intravenous antibiotics. On the day of discharge, patients in the early colonoscopy group underwent colonoscopy, while patients assigned to late colonoscopy received an appointment for that examination 6 weeks later.

Bowel cleansing was achieved with an oral sodium phosphate preparation (Soffodex; Dexon, Israel) given orally 1 day prior to the procedure. Colonoscopies were performed by three endoscopists, with at least 10 years of experience, and conscious sedation was used, with intravenous midazolam 2.5–5 mg (Midolam; Rafa Laboratories, Israel) and meperidine 50 mg (Dolestine; Biogal, Hungary). Patients who underwent the procedure during hospitalization stayed in hospital for at least 6 hours after colonoscopy and were discharged thereafter if no symptoms suggestive of perforation had developed.

All patients were contacted on the telephone at 1 and 3 days following the procedure, and asked about symptoms suggestive of perforation (e.g. abdominal pain, fever). In addition, all patients received follow-up phone calls at 6 months and 1 year following their discharge.

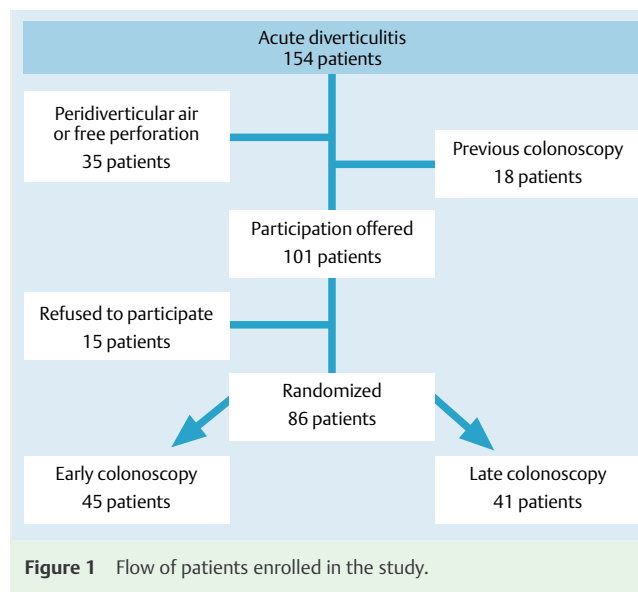
The demographic characteristics of all patients and their radiographic and endoscopic findings were recorded. The study was approved by the local ethics committee.

Statistical analysis

Patients' demographic and other characteristics were analyzed, using the Student *t* test for continuous variables, and the χ^2 test (with Yates' correction) or Fisher's exact test for categorical variables. Statistical analyses were conducted by using Statsoft software (Tulsa, Oklahoma, USA).

Results

Between January 2004 and June 2006, 154 patients were hospitalized with a diagnosis of acute diverticulitis. A total of 35 patients were excluded because of either free perforation or pericolic air on CT and another 18 patients because of a colonoscopy within the previous year. The remaining 101 patients were offered participation in the study. Of these, 15 patients refused to



participate, and therefore 86 patients were included in the study and were randomly allocated to either early in-hospital colonoscopy or to late outpatient colonoscopy, 6 weeks later (► **Figure 1**).

The two groups were similar with regard to age and gender, length of hospital stay, and blood test results (► **Table 1**).

Patients in the early colonoscopy group underwent colonoscopy between 3 and 11 days (median 5.2 days) following their admission. Patients in the late colonoscopy group underwent their colonoscopy between 6 and 19 weeks (median 7.8 weeks) following admission. Colonoscopy results for the two study groups are shown in ► **Table 2**.

As shown in ► **Table 2**, early colonoscopy was associated with a lower number of patients not presenting for the examination, but with a higher rate of incomplete examination. Reasons for failed cecal intubation in the early colonoscopy group were excessive pain during the examination (six patients), poor colonic preparation (one patient), and dolichocolon (one patient). One of the patients who suffered from pain agreed to a repeat colonoscopy after discharge. His second colonoscopy was successful all the way to the cecum. The other patients in the early colonoscopy group in whom cecal intubation failed in the first colonoscopy refused to have a second examination. In the late colonoscopy group, only three patients did not complete the examination due to a sharp angle which did not allow passage of the endoscope. These patients refused another colonoscopy or further attempts to evaluate the colon.

Findings on colonoscopy included the presence of eight polyps in five patients. The early colonoscopy and the late colonoscopy groups each had one patient with a 1-cm polyp in the sigmoid colon. Another three patients (two in the late and one in the early colonoscopy group) had two small polyps each; the size of these polyps ranged between 2 and 7 mm, and they were located in different parts of the colon. The larger polyps were villous adenomata; in one (in the early colonoscopy group) there was also moderate dysplasia. The smaller polyps comprised tubular adenomata (three in the cecum and two in the sigmoid colon) and one tubulovillous adenoma in the cecum. All the polyps were resected uneventfully, and all patients underwent colonoscopy with no complications.

Table 1 Patient characteristics. Values are given as mean \pm SD

	Early colonoscopy (n = 45)	Late colonoscopy (n = 41)	P value
Male/female	14/31	14/27	n. s.
Age, years	60.5 \pm 11.4	60.3 \pm 14.7	n. s.
Hospitalization, days	4.2 \pm 1.9	5.2 \pm 1.8	n. s.
Hemoglobin, g/dl	13.2 \pm 1.1	13.1 \pm 1.2	n. s.
White blood cells, 10 ³ cells/mm ³	11.3 \pm 2.9	11.4 \pm 2.3	n. s.

Table 2 Colonoscopy results in the two study groups

	Early colonoscopy (n = 45)	Late colonoscopy (n = 41)
No show, n (%)	3 (7)*	10 (24)
Incomplete examination, n (%)	8 (18) †	3 (7)
Polyyps, n	3	5
Complications, n	0	0

* $P = 0.033$

† Not significant.

Discussion

In this randomized prospective study we demonstrated the feasibility and safety of early colonoscopy during hospitalization in patients with acute diverticulitis and no pericolic air. It was as safe as late colonoscopy, which is the current practice, and showed better compliance.

Early colonoscopy was not associated with an increase in the risk of perforation when performed in patients without pericolic air on CT. The reason for excluding patients in whom pericolic air was seen at CT was that, in our previous pilot study in patients with acute diverticulitis, the only perforation during early colonoscopy occurred in a patient in whom air had been seen, on the initial CT, adjacent to the wall of a diverticulum [9]. This complication led us to the conclusion that pericolic air at CT might be a risk factor for perforation, and that early colonoscopies in these patients should be avoided.

A complete colonoscopy (to the cecum) was possible in only 37 of 45 patients (82%) in the early colonoscopy group compared with 38 of 41 patients (92.6%) in the late colonoscopy group. Both groups however had a lower rate of complete colonoscopy than would be expected with experienced endoscopists (95%) [10,11]. Our results showed a lower rate of cecal intubation in patients during or after an attack of acute diverticulitis, with a tendency to a higher failure rate during the acute inflammation (not statistically significant). In the early colonoscopy group most of the failures resulted from excessive pain during the examination. It is reasonable to assume that the inflammatory process caused stricture and hypersensitivity at the site of the inflammation, thus air insufflation during the examination caused pain and early termination of the procedure. The operator was probably more careful during these colonoscopies and tended towards early termination in order to avoid complications. In the late colonoscopy group, the reason for not reaching the cecum was a sharp angle which prevented the endoscope from advancing inside the colon. In these cases the reason is probably

the narrowing and stiffening of the bowel lumen caused by the diverticular disease.

Our study showed that there was a statistically significant difference in compliance for undergoing colonoscopy: 93.3% of the hospitalized patients underwent colonoscopy, compared with only 75.6% of the ambulatory group. This difference may be explained by the availability of hospitalized patients and their tendency to agree to the examination a short time after the attack, and by the fact that an individual who had been relieved of pain would be less likely to show up for an examination.

Another interesting point was patients' reluctance to repeat the colonoscopy after the first examination had not reached the cecum. Out of 11 patients with an incomplete examination, only one agreed to have another colonoscopy. The other 10 patients refused because of the pain during the first colonoscopy.

Polyyps were identified and resected in five of the 86 patients (6%). Two polyyps were larger than 1 cm and had the histology of villous adenoma, one of them with moderate dysplasia. The polyyps did not appear to relate to the clinical symptoms of acute diverticulitis. No malignancy or other cause for inflammation was identified.

The polyyp prevalence was lower than expected for average-risk individuals aged 50 years or more. The expected prevalence for this age group is 24%–47% [12–17], while we detected polyyps in only 7.5% of these patients. The reason for that observation is unknown.

Altogether, none of the patients clearly benefited from undergoing an early colonoscopy. None of the colonoscopy findings changed either the diagnosis or the treatment of any of the patients.

An interesting point is the lack of any other finding that could have mimicked acute diverticulitis. In a previous study in acute diverticulitis, containing data collected between 2000 and 2002, we found an obstructing tumor of the sigmoid colon in one colonoscopy and a chicken bone trapped in a diverticulum in another [9]. These two patients suffered from a protracted clinical course prior to the colonoscopy. We believe that the difference is the result of improvement in CT resolution during recent years. It is very likely that colonoscopy is no longer necessary following an uncomplicated acute diverticulitis, if the CT findings are characteristic of acute diverticulitis only and the clinical course is not protracted. However, colon cancer within the setting of acute diverticulitis with a typical CT is rare, so that the pre-test likelihood is quite low and our number of cases might not be sufficient to detect such instances.

The expected perforation rate in colonoscopies overall is 0.2%–0.4% for diagnostic colonoscopy and 0.3%–1% after polypectomy [18,19]. However, the expected complication rate in colonoscopies performed during and after acute diverticulitis has not yet been studied. Therefore, a statistical power calculation was not feasible. As a consequence, the small number of patients included in the study might cause a beta error in the conclusion that early colonoscopy is as safe as late colonoscopy, since a huge number of patients is needed to detect a difference. Yet, we managed to prove that the complication rate is very low in early colonoscopy, even if it might not be as safe as late colonoscopy.

In conclusion, early colonoscopy during an attack of acute diverticulitis in patients without pericolic air on CT is feasible and safe. However, it has no added value. The rate of cecal intubation in these patients is lower than generally accepted. The only advantage of early colonoscopy is the greater compliance. The indi-

cation for a complete colonoscopy following an attack of acute diverticulitis should be further studied. In the light of the great improvement in the resolution of CT scans, at the present time we do not recommend a routine colonoscopy following an uncomplicated attack of acute diverticulitis in the presence of typical CT findings. However, in cases where the clinical course has been protracted, or in cases with suspicious radiological findings, colonoscopy is indicated. In these cases colonoscopy should be performed even during the acute phase of diverticulitis, because there is better patient compliance and no increase in complication rate.

Competing interests: None

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