

Incidence and management of colonoscopic perforations: 8 years' experience

Hagit Tulchinsky, Osnat Madhala-Givon, Nir Wasserberg, Shlomo Lelcuk, Yaron Niv

Hagit Tulchinsky, Osnat Madhala-Givon, Nir Wasserberg, Shlomo Lelcuk, Department of Surgery B, Rabin Medical Center, Beilinson Campus, Petah Tiqva, and Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

Yaron Niv, Department of Gastroenterology, Rabin Medical Center, Beilinson Campus, Petah Tiqva, and Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

Correspondence to: Hagit Tulchinsky, MD, Department of Surgery B, Sourasky Medical Center, 6 Veizman St., Tel Aviv 64239, Israel. hagitt@tasmc.health.gov.il

Telephone: +972-3-6973209 Fax: +972-3-6974635

Received: 2005-06-25 Accepted: 2005-07-15

Tulchinsky H, Madhala-Givon O, Wasserberg N, Lelcuk S, Niv Y. Incidence and management of colonoscopic perforations: 8 years' experience. *World J Gastroenterol* 2006; 12(26): 4211-4213

<http://www.wjgnet.com/1007-9327/12/4211.asp>

Abstract

AIM: To review the experience of a major medical teaching center with diagnostic and therapeutic colonoscopies and to assess the incidence and management of related colonic perforations.

METHODS: All colonoscopies performed between January 1994 and December 2001 were studied. Data on patients, colonoscopic reports and procedure-related complications were collected from the departmental computerized database. The medical records of the patients with post procedural colonic perforation were reviewed.

RESULTS: A total of 12 067 colonoscopies were performed during the 8 years of the study. Seven colonoscopic perforations (4 females, 3 males) were diagnosed (0.058%). Five occurred during diagnostic and two during therapeutic colonoscopy. Six were suspected during or immediately after colonoscopy. All except one had signs of diffuse tenderness and underwent immediate operation with primary repair done in 4 patients. No deaths were reported.

CONCLUSION: Perforation rate during colonoscopy is low. Nevertheless, it is a serious complication and its early recognition and treatment are essential to optimize outcome. In patients with diffuse peritonitis early operative intervention makes primary repair a safe option.

© 2006 The WJG Press. All rights reserved.

Key words: Colonoscopy; Complications; Perforation; Polypectomy; Management

INTRODUCTION

Since first introduction in 1969^[1] flexible colonoscopy has been accepted as the best method for the diagnosis, treatment and follow-up of colorectal pathologies. Nevertheless, being an invasive procedure it harbors major risks of bleeding, perforation and even death^[2-4]. The incidence of perforation is 0.2% to 0.4% for diagnostic colonoscopy and 0.3% to 1.0% with polypectomy^[2,5,6]. Recent large series have reported lower perforation rates of 0.002% to 0.19%^[7-10]. The aim of the present study was to review the experience of a major university affiliated medical center with colonoscopy and to assess the incidence of perforations and their management.

MATERIALS AND METHODS

A total of 12067 colonoscopies were performed between January 1994 and December 2001. Data on patients undergoing colonoscopy was entered into a computerized database and included demographic patient information and detailed colonoscopic reports. A retrospective review of the medical records of all patients diagnosed with colonic perforation after colonoscopy was performed. The following parameters were analyzed: patient age and sex, background disease, laboratory work-up, indication to endoscopy, interval from the procedure to the diagnosis of perforation, clinical presentation, location, management, and outcome of the perforation.

RESULTS

Of 12 067 colonoscopies performed, seven were associated with colonic perforation. There were 4 women and 3 men with a mean age of 70 years (range 31-80) (Table 1). The procedure was done on an outpatient basis in all cases. Five perforations occurred during diagnostic colonoscopy, one during polypectomy and one during electrocoagulation of an arteriovenous malformation. Six perforations were

identified during the procedure or immediately thereafter, and one patient who had a cecal polyp coagulated with hot biopsy forceps, was diagnosed about 24 h after the procedure. In 3 patients perforation was suspected when a hole in the intestinal wall was noted. All the patients had severe abdominal pain and distention. Plain abdominal roentgenograms performed in all 7 patients showed free intraperitoneal air in 4, retroperitoneum in 2 and no abnormalities in one patient.

Six patients had, on examination, diffuse abdominal tenderness and underwent immediate operation. All five perforations that occurred during diagnostic colonoscopy were found to be in the sigmoid colon, and repair was achieved mostly by debridement and primary suture of the perforated site. The postoperative period was uneventful. One patient was treated nonoperatively with intravenous fluids, antibiotics and intestinal rest and was placed under close clinical observation. He was afebrile and had localized abdominal tenderness with no peritoneal signs or leukocytosis. The patient who was diagnosed and operated on about 24 h post colonoscopy had a wound infection. Median hospital stay of the operated group was 8 d (range 4-15). The patient who was treated nonoperatively was hospitalized for 13 d. There were no deaths.

DISCUSSION

Colonic perforation occurs rarely during colonoscopy but it is still considered a major complication^[2-4]. During the 8-year period reviewed, there was a combined diagnostic and therapeutic colonoscopic perforation rate of 0.058%. This rate is lower than that in most of the published series^[7-10]. The management of colonoscopic perforations may be conservative or surgical, and should be selective. The choice of treatment depends on the mechanism and size of the perforation, adequacy of bowel preparation, timing of diagnosis, the patient's clinical condition and the primary colonic pathology^[9-16]. Table 1 summarizes some reports evaluating the incidence and management of colonoscopic perforations. The low morbidity rate in our series is probably attributed to the combination of supportive treatment and early surgical intervention, which resulted in no intraperitoneal contamination in 4 out of 5 patients, and therefore primary repair could be completed safely. Early surgical exploration in all patients with peritoneal irritation or free air on abdominal X-ray is recommended by other authors as well^[10,17,18]. Farley *et al*^[10] reported on 43 perforations among 57 028 colonoscopies (0.075%). Forty-two were treated by emergency laparotomy. Most patients underwent primary repair or limited resection with anastomosis. The authors concluded that in order to minimize morbidity and mortality prompt operative intervention is the best strategy in most patients. Dafnis *et al*^[18] reported on 8 perforations in 6066 colonoscopies (0.13%). All patients underwent surgery. Most perforations were repaired by primary closure, and the postoperative course was uneventful in all patients.

Perforations occurring during diagnostic colonoscopy are due to direct mechanical penetration with the instrument tip, sharp flexion of the colonoscope, high pressure applied when a loop is formed or barotrauma

Table 1 Reported colonoscopic perforation rates and management

Author	Time interval (yr)	No. of colono-scopies	Perforation	Mortality n (%)	
				Operative	Non op.
Anderson <i>et al</i> ^[7]	10	10 486	20 (0.19)	19 (1)	1 (1)
Araghizadeh <i>et al</i> ^[9]	30	34 620	31 (0.09)	20 (0)	11 (1) ¹
Farley <i>et al</i> ^[10]	16	57 028	43 + 2 ² (0.075)	42 (0)	3 (0)
Christie <i>et al</i> ^[12]	10	4784	7 (0.15)	2 (0)	5 (0)
Hall <i>et al</i> ^[14]	6	17 500	15 (0.09)	14 (0)	1 (0)
	(4-15)				
Jentschura <i>et al</i> ^[16]	9	29 695	31 (0.1)	24 (2)	7 (0)
Lo <i>et al</i> ^[17]	6	26 708	12 (0.04)	6 (1)	6 (0)
Dafnis <i>et al</i> ^[18]	17	6066	8 (0.1)	8 (0)	0
Carpio <i>et al</i> ^[25]	10	5424	14 (0.26)	8 (2)	6 (1)
Present study	8	12 067	7 (0.058)	6 (0)	1 (0)

¹Three of 11 patients failed medical treatment and required surgery; ²Two patients were treated after colonoscopy performed elsewhere; ³Includes only colonoscopic polypectomies.

as a result of aggressive gas insufflation^[19,20]. The most common underlying cause in the present study was direct mechanical injury of the colonic wall by the colonoscope. It occurred in patients with diverticular disease or a strictured, severely diseased colonic segment. These risk factors are in accordance with those noted in the literature^[21,22]. Perforations during therapeutic colonoscopy occur as a result of similar mechanisms, as well as from thermal or electrical injury, as in two cases in the present study^[11,12]. The most frequent site of perforation was the sigmoid colon, as in other studies^[10,13,18,23,24]. This may be explained by its anatomical characteristics of frequent redundancy or narrowing from diverticular disease or adhesions after previous pelvic operations^[25].

In conclusion, although the rate of perforation during colonoscopy is low, it is a serious complication and its early recognition and treatment are essential to optimize outcome. Surgery is mandatory in all patients with generalized peritoneal irritation. Early operative intervention makes primary repair a good and safe option, with low morbidity and mortality, unless there is a colonic pathology that necessitates resection. Selected patients with localized peritoneal irritation can be managed nonoperatively.

REFERENCES

- 1 Wolff WI, Shinya H. Colonofiberoscopy. *JAMA* 1971; **217**: 1509-1512
- 2 Rogers BH, Silvis SE, Nebel OT, Sugawa C, Mandelstam P. Complications of flexible fiberoptic colonoscopy and polypectomy. *Gastrointest Endosc* 1975; **22**: 73-77
- 3 Smith LE. Fiberoptic colonoscopy: complications of colonoscopy and polypectomy. *Dis Colon Rectum* 1976; **19**: 407-412
- 4 Kavic SM, Basson MD. Complications of endoscopy. *Am J Surg* 2001; **181**: 319-332
- 5 Shahmir M, Schuman BM. Complications of fiberoptic endoscopy. *Gastrointest Endosc* 1980; **26**: 86-91
- 6 Mühldorfer SM, Kekos G, Hahn EG, Ell C. Complications of therapeutic gastrointestinal endoscopy. *Endoscopy* 1992; **24**: 276-283

- 7 **Anderson ML**, Pasha TM, Leighton JA. Endoscopic perforation of the colon: lessons from a 10-year study. *Am J Gastroenterol* 2000; **95**: 3418-3422
- 8 **Gedebou TM**, Wong RA, Rappaport WD, Jaffe P, Kahsai D, Hunter GC. Clinical presentation and management of iatrogenic colon perforations. *Am J Surg* 1996; **172**: 454-457; discussion 457-458
- 9 **Araghizadeh FY**, Timmcke AE, Opelka FG, Hicks TC, Beck DE. Colonoscopic perforations. *Dis Colon Rectum* 2001; **44**: 713-716
- 10 **Farley DR**, Bannon MP, Zietlow SP, Pemberton JH, Ilstrup DM, Larson DR. Management of colonoscopic perforations. *Mayo Clin Proc* 1997; **72**: 729-733
- 11 **Christie JP**, Marrazzo J 3rd. "Mini-perforation" of the colon--not all postpolypectomy perforations require laparotomy. *Dis Colon Rectum* 1991; **34**: 132-135
- 12 **Wadas DD**, Sanowski RA. Complications of the hot biopsy forceps technique. *Gastrointest Endosc* 1988; **34**: 32-37
- 13 **Hall C**, Dorricott NJ, Donovan IA, Neoptolemos JP. Colon perforation during colonoscopy: surgical versus conservative management. *Br J Surg* 1991; **78**: 542-544
- 14 **Nelson RL**, Abcarian H, Prasad ML. Iatrogenic perforation of the colon and rectum. *Dis Colon Rectum* 1982; **25**: 305-308
- 15 **Jentschura D**, Raute M, Winter J, Henkel T, Kraus M, Manegold BC. Complications in endoscopy of the lower gastrointestinal tract. Therapy and prognosis. *Surg Endosc* 1994; **8**: 672-676
- 16 **Lo AY**, Beaton HL. Selective management of colonoscopic perforations. *J Am Coll Surg* 1994; **179**: 333-337
- 17 **Clements RH**, Jordan LM, Webb WA. Critical decisions in the management of endoscopic perforations of the colon. *Am Surg* 2000; **66**: 91-93
- 18 **Dafnis G**, Ekbohm A, Pahlman L, Blomqvist P. Complications of diagnostic and therapeutic colonoscopy within a defined population in Sweden. *Gastrointest Endosc* 2001; **54**: 302-309
- 19 **Young HS**, Keeffe EB. Complications of gastrointestinal endoscopy. In: Sleisenger & Fordtran's gastrointestinal and liver diseases. 6th ed. Philadelphia: WB Saunders, 1998: 301-309
- 20 **Orsoni P**, Berdah S, Verrier C, Caamano A, Sastre B, Boutboul R, Grimaud JC, Picaud R. Colonic perforation due to colonoscopy: a retrospective study of 48 cases. *Endoscopy* 1997; **29**: 160-164
- 21 **Hunt RH**. Towards safer colonoscopy. *Gut* 1983; **24**: 371-375
- 22 **Macrae FA**, Tan KG, Williams CB. Towards safer colonoscopy: a report on the complications of 5000 diagnostic or therapeutic colonoscopies. *Gut* 1983; **24**: 376-383
- 23 **Carpio G**, Albu E, Gumbs MA, Gerst PH. Management of colonic perforation after colonoscopy. Report of three cases. *Dis Colon Rectum* 1989; **32**: 624-626
- 24 **Garbay JR**, Suc B, Rotman N, Fourtanier G, Escat J. Multicentre study of surgical complications of colonoscopy. *Br J Surg* 1996; **83**: 42-44
- 25 **Damore LJ 2nd**, Rantis PC, Vernava AM 3rd, Longo WE. Colonoscopic perforations. Etiology, diagnosis, and management. *Dis Colon Rectum* 1996; **39**: 1308-1314

S- Editor Pan BR L- Editor Zhu LH E- Editor Bai SH