

Introduction

In the recent years, the therapeutic and diagnostic indications of colonoscopy have grown dramatically whereas the incidence of colonic perforations during colonoscopy has been estimated to be 0.04 to 0.9 per cent for diagnostic colonoscopy, and 0.06 to 0.7 per cent with therapeutic procedures^{1, 2}. The published data has been attributed to adequate bowel preparation, early diagnosis and prompt surgical treatment⁴.

Controversy prevails regarding the ideal management of colonic perforation secondary to colonoscopy⁵. The choice between non operative and surgical treatment depends on the patient's general health, the adequacy of bowel preparation and the type of colonoscopic procedure performed⁶. The proponents of non surgical regime have advocated a mortality rate resulting from colonoscopic perforations is low: zero to 0.03 per cent³ which may more conservative approach to perforations resulting from therapeutic colonoscopy and an operative intervention to the diagnostic-related perforations^{7, 8}.

Present prospective analysis describes the outcome of conservative treatment of cases, not known to have co morbidities that sustained colonic perforations during colonoscopy. This is an attempt to set forth guidelines for the management of such colonic injuries which will help establish further evidence based conclusions.

Patients and Methods

This project examined the consecutive patients referred to the surgical unit directly from the endoscopy suite, emergency room or medical units of Jinnah Hospital. The inclusion criteria

included the patients with an acute (within 48 hours) colonoscopically induced colonic perforation. Patients with a history of perforation longer than 48 hours, chronic medical ailments and co morbidities, older than 60 years and associated cancerous growths were excluded from the series. After the double contrast CT scan confirmation of the colonic perforations, the patients were closely observed in the surgical unit and treatment was initiated with bowel rest, intravenous antibiotics (Cefuroxime and Metronidazole) and fluids, and analgesics. Patients' clinical status was closely monitored along with daily abdominal X rays and blood biochemistry including CBC, urea, creatinine and serum electrolytes. The patients not responding to the conservative treatment and/or deteriorating during a maximum of 72-hours observation were subjected to immediate surgical intervention.

The data was collected in a locally maintained database (Microsoft Access). All calculations were performed with Graphpad Instant Version 3.00 (Graphpad Software San Diego, CA, USA).

Results

38 cases were examined in this series; thirty five patients, based on exclusion criteria, underwent urgent surgical intervention (**Figure 1**). These included 18 diabetics, 7 COPD, 4 colorectal cancers, 3 cardiac and 3 immunocompromised cases. The remaining 3 patients, which met the inclusion criteria, are discussed in detail;

Case 1

A 49-old-male underwent an unremarkable colonoscopy for altered bowel habits and was discharged home

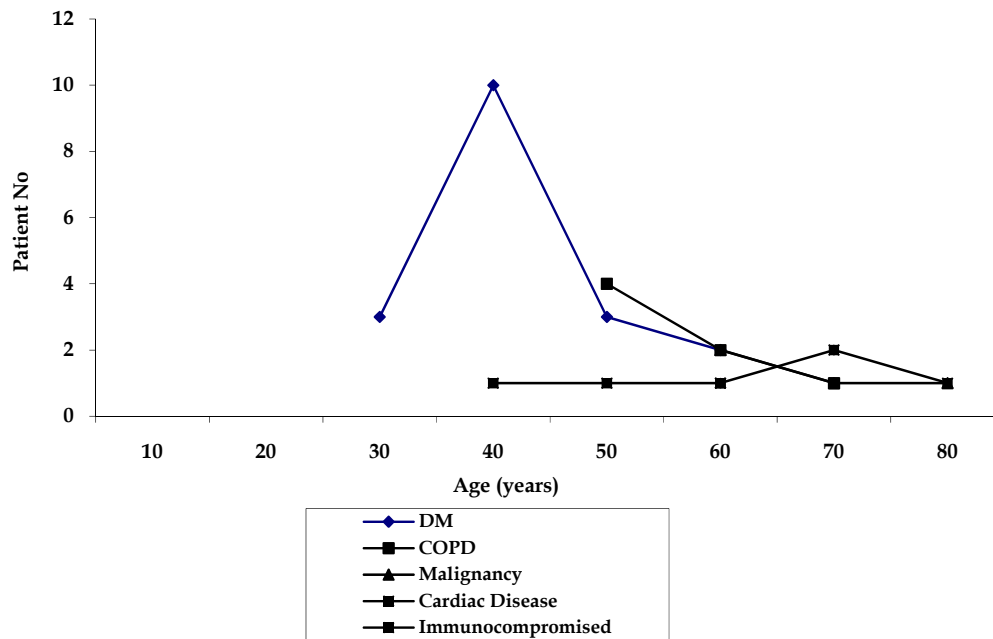


Figure 1: The analysis of patients who required surgical intervention for colonic perforations

after few hours of observation. He was readmitted the same night with complaints of severe abdominal pain, vomiting, and fever. Imaging including AXR, CXR (**Figure 2**), and abdominal CT scan confirmed a perforation at the lower descending colon. He was managed with bowel rest, IV antibiotics and fluids. The patient's condition improved with the non surgical management and responded to gradually introduced oral fluids and diet.

A repeat CT scan on 6th day revealed closed colonic perforation.

Case 2

A 40-year-old male, with a history of rectal bleeding since four years, underwent colonoscopy which revealed a large polyp in sigmoid colon which was snared as a single mass. The patient was discharged home the same day but developed abdominal pain and

Table 1: Summary of the cases incorporated in the series

No	Age (years)	Gender	Indication for colonoscopy	Procedure	Underlying pathology	Time after colonoscopy (hours)	Outcome
1	49	Male	Altered bowel habits	Diagnostic	Nil	12	Uneventful
2	40	Male	Rectal bleeding	Therapeutic	Sigmoid lipoma	20	Uneventful
3	57	Female	Rectal bleeding	Diagnostic	Diverticular disease	14	Uneventful



Figure 2: Erect chest X ray showed free air under both hemi diaphragms.

distension which necessitated hospital admission on the next morning. He was found to have tachycardia, temperature 38°C with generalized abdominal tenderness and absent bowel sounds, WBC count was 18000/mm³. A gastrograffin enema outlined an area of contrast leakage from the sigmoid colon and a double contrast CT scan of the abdomen and pelvis confirmed extravasations of the contrast from sigmoid colon with a small collection measuring 10 X 10 mm around that site. The patient was started on intravenous fluids, intravenous Cefuroxime 750mg and Metronidazole 500 mg 8 hourly, bowel rest under strict bed side observation for the vital and abdominal signs, and daily WBC count. He made uneventful recovery and within 48 hours abdominal pain, distension, and fever settled. The patient was given intravenous Cefuroxime for five days and tolerated oral feeds very well. He was discharged home in a stable condition. The histologic report of the subjected specimen showed a 4 X 2.7 X

2.4 cm submucosal lipoma made up of lobules of mature adipocytes.

Case 3

A 57-year-old female, referred from the Endocrine Unit, for persistent lower GI bleeding had colonoscopic examination which showed remarkable diverticular disease in the sigmoid colon. The patient was sent home in the afternoon, only to come back with excruciating abdominal pain and bleeding per rectum the same night. She had 38.8°C fever, markedly tender and distended abdomen with absent bowel sounds. CT scan with triple contrast demonstrated contrast leak from the sigmoid colon. A conservative regime was started with bowel rest, IV Cefuroxime and Metronidazole, IV fluids, analgesia, and close monitoring in the surgical unit. The patient showed clinical improvement and opened her bowels on 3rd day. Her follow up CT scan after 6 days showed no contrast extravasations.

Discussion

The frequency of colonoscopic complications, especially perforations, decline with experience but are not always avoidable⁹. Ker et al¹⁰ concluded in their study that diagnostic colonoscopy required surgical intervention more frequently than therapeutic colonoscopy¹⁰. This observation stemmed from the fact that perforations resulting from therapeutic and diagnostic colonoscopies originate by different mechanisms. Perforations during diagnostic colonoscopy result from mechanical forces during insertion or from barotrauma, forcible blindinstrumentation, endoscopic torquing with alpha maneuver and the "slide-by" technique in which the colonoscope is advanced along the

mucosal surface without direct visualization¹¹. These manipulations cause undue stretching on the bowel with resultant linear tears of the mucosa on the antimesenteric side of the colon which cause transmural rupture¹². Diverticulosis enhances the risk of direct injury by the colonoscope tip because of the danger in mistaking the mouth of a diverticulum for the bowel lumen. The most frequent site of mechanically induced perforation is the intraperitoneal sigmoid colon because of its frequent redundancy, narrowing from diverticular disease and adhesions from previous pelvic operations. Probably a combination of the aforementioned mechanisms led to colonic perforation in case 3.

Colonic perforations after therapeutic procedures are more common. The mechanisms include the direct injury caused by biopsy forceps, brushes, dilators and more frequently, the thermal or electrical injury when using laser or electrocautery¹³. Colonic injury follows the forceful pulling or uncontrolled depth of penetration by electrocautery or laser. Such perforations from colonoscopy may be identified by the endoscopist during the procedure or may have delayed presentations. Immediate perforation may be noticed visually by the appearance of mesenteric vessels, fat vessels, fat, or other bowel loops through the colonoscope⁵. Unfortunately, none of the perforations reported in this study could be identified during the procedure. Delayed presentations of colonic perforation have been documented to occur up to 72 hours postprocedure¹⁴. Persistent abdominal pain, distension and tenderness with fever, tachycardia, absent bowel sounds and subcutaneous emphysema indicate colonic perforation. Plain X- ray of the

chest and abdomen often reveal pneumoperitoneum but lack of this finding does not exclude peritonitis¹⁵. Other radiological findings suggestive of colonoscopic colon perforation include gross pneumomediastinum, pneumopericardium, pneumothorax and pneumatosis intestinalis^{16, 17, 18}. More precise definition of the size and extent of the colonic damage are established by water soluble contrast CT enema.

A number of published reports have documented a successful treatment of colonoscopic injuries without surgery^{19, 20}. Non operative treatment involves hospitalization, intestinal rest and intravenous fluids and antibiotics to contain peritonitis and allow the perforation to seal²¹. Close observation is mandatory and surgical intervention should be contemplated if patient's condition deteriorates or there is no improvement in 72 hours. In the present study, all patients showed clear cut improvement by clinical and radiological parameters. Operative treatment without delay is indicated for patients with diffuse peritonitis, failure of medical treatment, large colonic injuries, ongoing sepsis and those with underlying pathology (i.e. cancer, unremitting colitis and distal obstruction)⁶.

The surgical procedures range from primary repair, resection and anastomosis or defunctioning colostomy. A stoma may be more appropriate with significant peritoneal soilage, hemodynamic instability and comorbidities²². The absence of a co morbid illness plays an integral role towards the uninterrupted progress of the patient's condition under conservative regime. Non surgical observation should be deferred in the presence of co morbidity owing to the

theoretical risk of non healing colonic perforations.

Although major conclusions can not be drawn on the basis of small number of patients in this study, the author infers that non surgical management of colonoscopic perforations can lead to favorable outcome but a successful outcome must be achieved rapidly. This approach in the surgical setting is feasible, effective and safe but warrants close observation. Further evidence based clinical studies are required to elucidate its safety profile.

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