

Resection and Primary Anastomosis without Colonic Lavage in Non-Malignant Left Colon Emergency Conditions, Is it a Safe Practice?

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ABSTRACT

Background: Intra-operative colonic lavage is a widespread procedure introduced to decompress and clean the colon of its faecal load during emergency surgery of the left colon in order to perform a safe anastomosis. **Objective:** We planned our study not to perform colonic lavage in the included cases in order to figure out its feasibility and safety on single stage resection and anastomosis of the left colon in non-malignant emergency surgeries in a series of patients according to certain inclusion criteria. **Patients and methods:** this is a prospective study that included 38(thirty eight) patients with acute, non-malignant, obstruction or perforation of the left colon admitted to the emergency department, Kasr Alaini University hospital, faculty of medicine, Cairo University between October 2014 and October 2016. They underwent a one stage resection and anastomosis without colonic lavage. The exclusion criteria for anastomosis were: haemodynamic instability and American Society of Anaesthesiologists (ASA) grade >3. Anastomotic leak and surgical site infection were the main outcome measures. **Results:** all the 38 patients were subjected to a single stage left colon resection and anastomosis being performed without colonic lavage (21 with obstruction and 17 with perforation). The leak rate was 7.8 % (3 cases) out of the 38 patients that were evidenced by bowel contents in the drainage fluid. A 21 % morbidity rate was recorded due to 8 surgical site infections. **Conclusion:** The procedure is safe. The low morbidity and mortality of one stage resection and anastomosis without colonic lavage of the left colon can justify future prospective studies including a larger number of patients to compare its results with those obtained by one stage resection with colonic lavage.

Keywords: Colon resection, obstruction, perforation, anastomosis, intra-operative colonic lavage

INTRODUCTION

Anastomotic leakage is the main complication after resection of the left colon in an emergency setting. It has been established in previous studies that anastomotic dehiscence is caused by peritoneal infection and faecal load. Intra-operative colonic lavage is often performed in order to decompress the colon and reduce its bacterial load. Alternatively, near total colectomy with ileorectal anastomosis is suggested. ⁽¹⁾

However, several reports stressed that colonic lavage is useless for ensuring the integrity of the anastomosis and associate with such a procedure a prolonged operating time, a higher risk of infection in the operating field, electrolyte imbalance and intra-operative hypothermia ^(2,3)

Moreover, a retrospective analysis of the literature shows that the healing of anastomoses is conditioned by many local, systemic and technical factors rather than the faecal load ⁽²⁾. A prospective study enrolling a large number of patients to evaluate the safety of left colon

anastomosis in emergency setting without colonic lavage is still lacking and the published prospective studies did not include analysed variables: ASA status, peritonitis grade and comorbidity factors, that are important to evaluate the limits of and the indications for one stage resection without intra-operative colonic lavage ⁽¹⁾

PATIENTS AND METHODS

A prospective study was carried out in our emergency unit, general surgery department, faculty of medicine, Cairo University over a period of 24 months over patients with left colon non-malignant obstruction and perforation. Between October 2014 and October 2016, 38 patients underwent single stage procedure of left colon resection and anastomosis without colonic intra-operative lavage in patients with perforation and obstruction (non-malignant) in emergency conditions.

All the patients were given an explanation about the operative procedures with their pros,

cons and possible results and complications. If he/she agreed then the case had been selected for this study. The study did not involve any extra medical work up or significant risk. It did not cause economic burden to the patients.

All the patients studied underwent surgery within 24 hours after hospital admission. Patients with poor general conditions (American Society of Anaesthesiologists (ASA) grade >3, which is the most commonly used grading system that predicts morbidity and mortality), and haemodynamic instability were considered ineligible for bowel anastomosis, and a Hartmann procedure or a diverting colostomy was performed on them due to their poor prognosis and the probability of anastomotic leakage if anastomosis is done same stage. Pediatric age group was excluded from our study population.

Primary Outcomes were anastomotic leak, surgical site infection and hospital stay. The data collection sheets were filled in by the investigators themselves. The biodata of the patients in the form of name, age, sex and address were noted. History of special habits of medical importance (smoking, hashish and tramadol) and history of comorbidities in the form of diabetes mellitus, hypertension, cardiac condition, hepatic affection, renal impairment, asthma and body mass index (BMI) for morbid obesity were noted too. Furthermore the date of admission, date of operation and date of discharge/morbidity were recorded. Patients were diagnosed on the basis of clinical symptoms, physical examination, haematological investigations and radiological investigations according to the need for each case.

Postoperative complications like acute systemic constitutional manifestations, surgical site infection, anastomotic leakage, need for re-exploration and mortality were noted together with postoperative hospital stay.

The one-stage procedure was carried out with left colon and splenic flexure mobilization, inferior mesenteric artery and vein ligation, and placement of a bowel clamp 10 cm proximal and 10 cm distal to the segment to be resected. Once the colonic segment was resected, the solid and liquid stools were cleaned from the 10-cm free open segments between the colotomies and the bowel clamp, and the mucosa was cleaned with povidone iodinated solution.

If the bowel was distended the proximal clamp was opened to evacuate gaseous content, avoiding

any spillage of faeces into the abdominal cavity as possible. Care was given to control active bleeding at the line of resection before the anastomosis. The anastomosis was always hand sawn using vicryl 3/0 interrupted sutures. Only two types of anastomosis were performed: side-to-end anastomosis and end-to-end anastomosis.

Intra-operative colonic lavage and diverting stomas were never performed. Antibiotic therapy was administered pre- and postoperatively (ceftriaxone 2 g daily and metronidazole 1.5 g daily), stopped on postoperative day five.

A clinical leak was defined as an anastomotic dehiscence verified by re-operation, the development of an enterocutaneous fistula or evidence of bowel contents in the drainage fluid. Surgical site infections were also recorded. Wound infection was defined as a purulent secretion from the laparotomy incision. All data were collected, in order to establish a baseline complications rate of one stage resection without colonic lavage.

RESULTS

Table (1): Demographic features of the studied patients.

	<i>Number</i>
Age (yrs.)	
Mini.-maxi.	24-67
Mean \pm SD	53.45 \pm 12.15
Sex	
Female	11 (28.9%)
Male	27 (71.1%)
Smoking (yes)	19 (50%)
Hashish (yes)	7 (18.4%)
Tramadol (yes)	5 (13.1%)
Pathology	
Diverticulitis	7 (18.4%)
Sig.volvulus	21 (55.2%)
Trauma	10 (36.3%)
Co-morbidity	
No	27 (71%)
asthma-HCV	1 (2.6%)
DM	4 (10.5%)
DM & HTN	1 (2.6%)
HTN	2 (5.2%)
HTN - RHD - HCV	1 (2.6%)
L.Cirrhosis	1 (2.6%)
Morbid obesity	1 (2.6%)
BMI	33.07 \pm 3.33
TLC	13.07 \pm 6.23
Hemoglobin	12.65 \pm 2.86
Albumin	3.82 \pm 0.94

This descriptive, prospective study was conducted to find out the efficacy of left colon single stage resection and anastomosis without lavage and its repercussion on the incidence of anastomotic leakage rate as the main dependent factor in our study. This would go together with reporting of other postoperative complications.

Demographic distribution of the patients

The age scope of the studied cases was ranging from 24 up to 67 year old (53.45 ± 12.15). The body mass index (BMI) mean value was 33.07 ± 3.33 . Male gender represented in 27 cases giving 71.1 % of the studied cases, while females represented 11 cases with 28.9 % of the cases. Special habits recorded were smoking, hashish and tramadol addiction. Out of 38 patients, only 11 patients had co-morbidities including hypertension, diabetes mellitus, cardiovascular disease, liver disease, asthma and morbid obesity (**Table 1**).

Presentation of the patients was classified into pathological (acute diverticulitis, sigmoid volvulus) and traumatic. Different extensions of left colon resection were included in the study, sigmoid colectomy was the most encountered procedure with incidence of 68.4% (26 patients) (**Table 2**).

As shown in table (2), anastomotic leakage occurred in 3 cases (7.8%) out of the 38 patients. Meanwhile, surgical site infection occurred in 21% of cases and the mortality was reported in only one case due to comorbidity (**Table 2**).

Table (2): clinical features and outcomes of the studied patients

	<i>Number</i>
Procedure	
Ext. Lt. hemicolectomy	1 (2.6%)
Left hemicolectomy	11 (28.9%)
Sigmoid colectomy	26 (68.4%)
Surgical site infection (yes)	8 (21%)
Anastomotic leak (yes)	3 (7.8%)
Hospital stay (days)	7.12 ± 4.55
Mortality (yes)	1 (2.6%)

Data are expressed as mean \pm SD or number (%).

DISCUSSION

Single stage resection and anastomosis for obstructions and perforations of the left colon is preferred over staged operations, which require a

higher number of operations to restore bowel continuity and do not immediately remove the site of pathology. Reduction of septic complications postoperatively was reported with this approach⁽³⁾

On the other hand, the benefits of simultaneously performing a resection and anastomosis or of performing a Hartmann procedure and restoring bowel continuity later, are still a matter of debate. It is generally agreed that haemodynamically stable patients with left-sided colonic obstruction may safely be treated by primary resection and anastomosis with a satisfactory outcome⁽³⁾

The appropriate surgical management of colonic perforation is still a controversial issue because of the number of variables that must be taken in account when making the surgical decision: comorbidities, general condition, peritonitis, cause of perforation. The presence of faecal peritonitis, adverse general conditions and haemodynamic instability are considered contraindications for single stage resection and anastomosis of the left colon, in order to avoid the high incidence of anastomotic leak, even though there are reports of routine use of one-stage resection in patients with perforated acute diverticulitis⁽⁴⁾

To perform a safe anastomosis and reduce the postoperative leakage rate, intra-operative colonic lavage was introduced in order to reduce the amount of faeces brought into contact with the anastomosis and to decompress the colon⁽³⁾

In fact, faecal load and the presence of peritonitis were always considered the reasons for anastomotic leak in emergency colonic surgery and in elective surgery with inadequate pre-operative preparation⁽⁵⁾. Although this method is widespread, several studies have shown that colonic preparation is unnecessary for preventing anastomotic leaks and wound infections in both elective and emergency colorectal surgery⁽⁴⁾.

Moreover, it has been pointed out that intra-operative colonic lavage has the disadvantage of prolonging surgical time, necessitating the use of large volumes of fluids to irrigate the colon and leading to the possibility of electrolyte and fluid imbalance, dangerous hypothermia and the spillage of fluid faecal content in the peritoneal cavity⁽⁶⁾

The incidence of anastomotic leak and mortality does not vary substantially between series in which resection and anastomosis was

carried out without on table lavage and series in which intra-operative colonic washout was performed. The reported incidence of anastomotic leaks in patients treated with intra-operative colonic lavage and one-stage resection ranges between 0 and 13% ⁽⁶⁾

On the other hand, in studies reporting resections of the left colon without intra-operative colonic lavage the leak rate ranges between 0 and 10% and mortality between 0 and 9.6%. ⁽⁷⁾

Although the group of patients in our series is small it encompasses a group of 21 patients with colonic obstruction, demonstrating the safety of the one stage resection without colonic lavage in a wide range of patients with acute disease of the left colon. In fact adopting as exclusion criteria only haemodynamic instability and ASA grade > 3, patients underwent one stage procedure irrespective of the presence of perforation, grade of distension and oedema of the bowel wall, and presence of obstruction. In accordance with Gooszen, the incidence of anastomotic leakage after one stage resection without on-table lavage was not correlated to the degree of peritonitis or to the degree of diverticulitis. Instead anastomotic complications were more frequent in patients with colon obstruction. ⁽⁸⁾

Patients with an anastomotic leak in our study were ASA grade 2, so it seems likely that ASA status is not a risk factor for the postoperative dehiscence. The efficacy of on-table lavage is also evaluated by studies on emergency patients with colonic injuries, which demonstrated that lavage had no influence on morbidity and mortality and by experimental studies demonstrating that the normal healing of a colonic anastomosis is possible in conditions of faecal loading and peritonitis ⁽⁹⁾.

Experimental studies emphasize the importance of blood supply, indicating that healing of the anastomosis, as well its breaking energy and breaking strength and are closely related to peri-anastomotic oxygen tension and colonic blood flow ^(10,11).

Therefore, it is highly suggestive that the positive results associated with one stage resection, both in those with or without intra-operative lavage series, may be attributable to a good microvascular blood flow and the consequent oxygen delivery at the site of the anastomosis rather than to colonic lavage ⁽¹⁰⁾.

CONCLUSION

The one stage resection and anastomosis not preceded by colonic lavage seems to be a safe procedure in patients suitable for that procedure, with anastomotic leak incidences comparable to those of series in which intraoperative colonic lavage was performed. Based on several data, it appears that one of the key factors in the successful use of colon anastomosis is its vascularization and not the bacterial load (12). Nevertheless, further randomized clinical studies involving a large series will be required. Our results seems to justify the conduction of a randomized controlled prospective trial to evaluate one stage resection without colonic lavage in a larger series.

REFERENCES

1. Slim K, Vicaut E, Panis Y, Chipponi J. Meta-analysis of randomized clinical trials of colorectal surgery with or without mechanical bowel preparation. *Br J Surg.* 2004;91(9):1125–30.
2. Naraynsingh V, Rampaul R, Maharaj D, Kuruvilla T, Ramcharan K, Pouchet B. Prospective study of primary anastomosis without colonic lavage for patients with an obstructed left colon. *Br J Surg.* 1999;86(10):1341–3.
3. Hsu TC. Comparison of one-stage resection and anastomosis of acute complete obstruction of left and right colon. *Am J Surg.* 2005;189(4):384–7.
4. Salem L and Flum DR (nd). Primary Anastomosis or Hartmann's Procedure for Patients with Diverticular Peritonitis? A Systematic Review. *Diseases of the Colon and Rectum* November 2004; 44(11): 1953-1964,.
5. Nyam DCNK, Seow-Choen F, Leong AFPK, Ho YH. Colonic decompression without on-table irrigation for obstructing left-sided colorectal tumours. *Br J Surg [Internet].* 1996 Jun 1;83(6):786–7. Available from: <http://dx.doi.org/10.1002/bjs.1800830618>
6. Conrad JK, Ferry KM, Foreman ML, Gogel BM, Fisher TL, Livingston S a. Changing management trends in penetrating colon trauma. *Dis Colon Rectum [Internet].* 2000;43(4):466–71. Available from:

- <http://www.ncbi.nlm.nih.gov/pubmed/10789740>
7. Catena F, La Donna M, Gagliardi S, Avanzolini A, Taffurelli M. Stapled Versus Hand-Sewn Anastomoses in Emergency Intestinal Surgery: Results of a Prospective Randomized Study. *Surg Today*. 2004;34(2):123–6.
 8. Gooszen AW, Tollenaar RAEM, Geelkerken RH, Smeets HJ, Bemelman WA, Van Schaardenburgh P, et al. Prospective study of primary anastomosis following sigmoid resection for suspected acute complicated diverticular disease. *Br J Surg*. 2001;88(5):693–7.
 9. Turan M, Ok E, Şen M, Koyuncu A, Aydin C, Erdem M, et al. A Simplified Operative Technique for Single-Stage Resection of Left-Sided Colon Obstructions: Report of a 9-Year Experience. *Surg Today* [Internet]. 2002;32(11):959–64. Available from: <http://dx.doi.org/10.1007/s005950200192>
 10. Deen KI, Madoff RD, Goldberg SM, Rothenberger DA. Surgical management of left colon obstruction: The University of Minnesota experience. *J Am Coll Surg*. 1998;187(6):573–6.
 11. Biondo S, Parés D, Martí Ragué J, De Oca J, Toral D, Borobia FG, et al. Emergency operations for nondiverticular perforation of the left colon. *Am J Surg*. 2002;183(3):256–60.
 12. Schilling MK, Maurer CA, Kollmar O, Büchler MW. Primary vs. secondary anastomosis after sigmoid colon resection for perforated diverticulitis (Hinchey Stage III and IV). *Dis Colon & Rectum* [Internet]. 2001;44(5):699–703. Available from: <http://dx.doi.org/10.1007/BF02234569>.
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