

Endoscopic assisted second-look in the management of mesenteric vascular occlusion

Mohamed Lotfy, Ramadan M. Ali, Ahmed R. Abd-Elfattah

ABSTRACT

Aims: To evaluate the role of the endoscopic assisted second-look in patients with mesenteric vascular occlusion (MVO). **Methods:** Between February 2016 and February 2017, 25 patients were operated for the treatment of MVO. For all patients resection of variable lengths of bowels was performed. In spite of the clinical course of the patients, the endoscopic assisted second-look examination was performed 72 hours postoperatively at the bed side in the ICU or in the operating room via a large nelaton rectal tube catheter which was put in the patients' abdominal cavity to assist the drainage and to give an access to the peritoneal cavity postoperatively. **Results:** The mean time of admission after the onset of symptoms was three days (range, 1–5 days). In all patients, laparotomy was performed and variable lengths of dead small bowel mean 2.25 meters (range 1–3 meters) were resected and anastomosis was done. In 18 patients, the endoscopic assisted second-look examination revealed normal bowel viability and apparently good anastomosis, In five patients, intestinal necrosis was detected and in two patients anastomotic leakage was detected. For those seven patients, a second operation was necessary for further resection of the necrotic part of bowel and to correct the anastomotic

leakage respectively. **Conclusion:** The endoscopic assisted second-look is a minimally invasive, simple approach that can be performed at the bed-side for diagnosing the progress of MVO. It also helps to decrease the need for unnecessary second laparotomy, however, Close clinical and laboratory observation of all patients, even those with negative second-look procedures cannot be omitted.

Keywords: Endoscopy, Mesenteric vascular occlusion, Second-look

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INTRODUCTION

Mesenteric vascular occlusion severe enough to cause bowel necrosis is usually accompanied with enormously bad prognosis and mortality rate ranging from 40–100% [1–3].

The mesenteric vascular occlusion may be caused by mesenteric embolism, underlying atherosclerosis, non-occlusive ischemia secondary to generalized visceral vasospasm or mesenteric vein thrombosis [4].

Mesenteric vascular occlusion is considered as a consequence of the elderly people and often causes an emergent acute abdominal pain that mandates

exploration and bowel resection-anastomosis [5, 6]. In 1965, Shaw added the second-look laparotomy to defeat the complexity in judging the sufficiency of the extent of bowel resection during surgery [7].

As bowel resection is the most frequent management for the mesenteric vascular occlusion disease, assessing bowel viability throughout the operation is fundamental. Signs of bowel viability comprise good peristalsis, good mesenteric pulsations and good intestinal color. But tests such as fluorescein uptake test and mesenteric color duplex ultrasonography are useful as well. However, none of these methods has a sure judgment on intestinal viability, as a thrombus in the mesenteric vessels can continue to progress even after the resection. To evaluate the final bowel viability precisely, a second-look laparotomy is the gold standard [8, 9].

Second-look means early abdominal re-exploration to ensure the viability of intestinal loops and is the cornerstone of MVO surgical treatment [8, 9]. When a second-look surgery is indicated, the endoscopic assisted second-look may be a helpful substitute to conventional surgery, because it prevents seriously ill patients from the trauma of the hazardous re-exploration and can be done as a bed-side procedure in the ICU [4]. We aimed, in this study, to study the applicability of the endoscopic assisted second-look in patients with MVO.

MATERIALS AND METHODS

Between February 2016 and February 2017, 25 patients were operated for MVO at emergency department, Zagazig University Hospital. History, clinical examination, laboratory investigations and computed tomography (CT) scanning or computed tomography angiography was used to confirm the diagnosis. Patients were explored and diagnosis of MVO was confirmed and variable lengths of small bowel were resected (mean = 2.25 meters) and primary anastomoses were done. Our aim was to preserve as much bowel as possible, only frankly necrotic bowel was resected initially and then all patients underwent an endoscopic assisted second-look examination 72 hours later.

In our emergency department, our strategy is to do a second-look for all patients explored for MVO especially if bowel resection and anastomosis was performed. We did an endoscopic assisted second-look examination under sedation within 72 hours after the 1st operation at the bed side in the ICU or in the operating room under complete aseptic conditions. At the end of the 1st operation, in addition to the usually used drains a 24-fr nelaton rectal tube was inserted and fixed into the left lower quadrant of the abdomen prior to closing the abdominal wall. The rectal tube was cut near the blunt end to make it like a soft port through which we accessed the peritoneal cavity using our USB endoscope (Figure 1) (Dower me, AD-14-5M) (5.5 mm diameter, 5 meters length, 60° 2 mega pixels camera with six adjustable small led spots,



Figure 1: The used endoscope connected to an android cell phone.

resterilizable in CIDEX® 2.4% for twenty minutes and can be connected to android smart phones by micro-USB using a special software [camerafi, vault micro, inc.]). The procedure was accompanied by application of an upward traction on the anterior abdominal wall using two towel forceps applied on both sides of the umbilicus, right hypochondrium, left hypochondrium and suprapubic regions (in this order) to create a working space for the endoscope. The fixing stitch of the tube was removed to allow to and fro movements of the tube with the endoscope inside the peritoneal cavity and loops were examined as we withdrew the tube containing the endoscope. The Second look endoscopy was done in Trendelenburg and reverse Trendelenburg positions. Resection of a long part of the bowel facilitated the work of the endoscope. The first site to be examined was the anastomotic site then the remaining parts of the intestines were examined in the central part of the abdomen, the right hypochondrium, the left hypochondrium and the pelvic regions (in that order). Patients who developed abdominal compartmental syndrome after the first operation were excluded from this study.

All patients were given Subcutaneous Clexane®, in a dose of one mg/kg per day treatment once MVO was diagnosed and continued until the patient received an oral anticoagulant (Warfarin-Na). Once the patient became stable, an echocardiography was performed before hospital discharge.

RESULTS

Our patients were sixteen men and nine women with a mean age of 65.43 years (range, 55–70 years). The mean hospital stay was 15.3 days (range 10–25 days). Acute abdominal pain was present in all of the patients. Nausea and vomiting were present in 17 (68%) patients and bloody diarrhea in 5 (20%) patients. The mean time of admission after the onset of symptoms was three days (range 1–5 days). The endoscope was successful in all of the twenty-five patients. the mean time of the endoscopic assisted second-look examination was 25.24 minutes and

ranging (22–35 minutes). In eighteen patients, a second-look mobile endoscopic examination showed normal viable intestinal loops and apparently good anastomosis (Figure 2). In five patients, intestinal gangrene was found (Figure 3) and a second laparotomy was done for them and another one meter of small intestine was resected in average without anastomosis. In the other two patients

there was a leaking anastomosis (Figure 4) which was suspected prior to endoscopy by fever, tachycardia and leukocytosis and the patients were explored. In all seven patients the abdominal wall was closed, drained and both ends of the intestines were exteriorized as stomas. In this study, the mortality rate was 28% (7 patients). Multiorgan failure was the main cause of death (4 patients) and 2 patients died of acute myocardial infarction and one patient died of sepsis (Table 1).

DISCUSSION

The death rate related to MVO was 80–90% in 1970s and decreased to sixty to seventy percent in 1980s and 1990s [2, 3]. The improved mortality has been related to earlier diagnosis secondary to increased knowledge, innovative angiography, resection of all necrotic intestine, second-look laparotomy or second-look laparoscopy and advances in intensive care measures [8, 10].

The second-look laparotomy is considered as the cornerstone for assessing of further intestinal viability and an operation is the only way to get rid of necrotic bowel. During the first operation, assessment of bowel viability by physical examination (inspection of bowel and palpation of vessels) is useful but far away from sensitivity and specificity and cannot give us enough courage to omit the need for the second-look procedure [9, 11–13].

The second-look laparoscopy has been addressed as a technique of obtaining needed information with a lesser amount of risk. Choosing laparoscopy as an alternative to laparotomy for the second-look procedure may permit the surgeon to avoid additional surgical trauma to the seriously ill patients who do not require further resection [14–16].

Our used endoscope is a simple endoscope manufactured mainly for industrial usage but it is waterproof and can be sterilized in CIDEX® and costs around ten US dollars including the shipping fees.

Although laparoscopic second-look procedure avoids additional risk to seriously ill patients as compared to second-look laparotomy but it still has some risk related to insufflation and it also needs many equipment, (laparoscopic tray) making it difficult to be carried out as bed-side procedure. However, our used simple endoscope lacks the need for insufflation (replaced by vertical traction on the anterior abdominal wall in four areas) and can easily be done as a bed-side procedure [17, 18].

Yanar et al., in their study of the laparoscopic second-look left a laparoscopic port sheath during the first operation to give them access to the abdomen later during the second-look, however this port is hard and may be injurious to the edematous bowel loops. We avoid this risk and used firm nelaton rectal tube catheter 24 Fr which carries less risk than the hard port sheath [14]. Laparoscopy has an upper hand over this endoscope by being both diagnostic and therapeutic.



Figure 2: Normal viable intestine captured by the mobile endoscope during the second look.



Figure 3: Gangrenous loop of intestine captured by the mobile endoscope during the second look.



Figure 4: Leaking anastomosis as seen by the endoscope.

Table 1: Clinical characteristics and outcome of our patients

Patients' number	Comorbidities	Duration of symptoms onset before admission to hospital (days)	Length of resected intestine in the 1st operation (meters)	Results of second look	Duration of hospital stay (days)	Results of the management
1.	IHD, HTN	1	3	Normal	14	
2.	AF	2	3	Gangrenous bowel loops	22	Died of MOF
3.	DM	2	3	Normal	10	
4.	IHD, HTN	4	2	Anastomotic leaks	25	Died of MOF
5.	IHD, HTN	3	2.5	Normal	10	
6.	DM, AF	3	1	Gangrenous bowel loops	24	
7.	IHD, HTN	3	1.5	Normal	12	
8.	IHD	4	2	Normal	11	Died of MI
9.	IHD, HTN	1	2	Normal	10	
10.	HTN	2	2.5	Normal	12	
11.	IHD,HTN	5	1.5	Normal	14	Died of acute MI
12.	DM	5	1.5	Gangrenous bowel loops	24	Died of MOF
13.	DM	4	2.5	Normal	10	
14.	DM	1	2	Normal	10	
15.	HTN	5	3	Normal	14	
16.	DM	2	2	Normal	11	
17.	DM	4	2.5	Normal	15	
18.	AF	3	2.75	Anastomotic leaks	21	Died of sepsis
19.	HTN	1	2	Normal	10	
20.	AF	3	2	Normal	22	
21.	AF	2	3	Normal	11	
22.	IHD	5	3	Normal	13	
23.	AF	3	2	Gangrenous bowel loops	23	
24.	HTN	4	1.5	Normal	10	
25.	IHD	3	2.5	Gangrenous bowel loops	25	Died of MOF

IHD: Ischemic Heart Disease, HTN: Hypertension, DM: Diabetes Mellitus, AF: Atrial Fibrillation, MOF: Multiorgan Failure, MI: Myocardial Infarction

Our used endoscope was successful to achieve the procedure and was a reliable method to examine the intestines and denote whether they are viable or gangrenous with nearly the same reliability of laparoscopic second-look [14].

No complications were encountered and no delayed laparotomies. this of course aided by close clinical and laboratory observation of the patients even those with negative second-look procedure.

Endoscopic assisted second-look has the same advantage as laparoscopic second-look in minimizing the risk of infection, wound dehiscence, and hernia formation which may develop after conventional second look laparotomy [19].

CONCLUSION

The endoscopic assisted second-look is a minimally invasive simple cheap procedure. It is a fairly reliable method for diagnosing the progress of mesenteric vascular occlusion and judging the bowel viability. It is safer as compared to the conventional and laparoscopic second-look. It also helps to decrease the need for unnecessary second laparotomy. It also can be done as a bedside procedure, however, Close clinical and laboratory observation of all patients, even those with negative second-look procedures cannot be omitted.

Author Contributions

Mohamed Lotfy – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Ramadan M. Ali – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Ahmed R. Abd-Elfattah – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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