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## LAPAROSCOPIC RESECTION OF COMPLICATED MECKEL'S DIVERTICULUM: REPORT OF TWO CASES

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### ABSTRACT

**Background:** Meckel's diverticulum is a true congenital diverticulum of a small intestine. It is remnant of the omphaloenteric duct and positioned at about 50-100 cm proximal to ileocecal valve on an antimesenteric border of ileum. Meckel's diverticulum can be found in approximately 2% of population and it is asymptomatic in most people. Most common complication is intestinal obstruction (intussusception) (36.5%), inflammation of diverticulum with or without perforation (12.7% and 7.3%) and hemorrhage from ulceration due to an ectopic gastric mucosa (11.8%).

**Case study:** We report two cases of complicated Meckel's diverticulum (inflammation and hemorrhages) which were treated laparoscopically.

**Conclusion:** We find that laparoscopic resection of Meckel's diverticulum with endostapler is as safe method as open resection with all already known benefits of laparoscopic surgery.

### Keywords:

Meckel's diverticulum, laparoscopy

### INTRODUCTION

Meckel's diverticulum is a true congenital diverticulum of a small intestine. It is remnant of the omphaloenteric duct and positioned at about 50-100 cm proximal to ileocecal valve on an antimesenteric border of ileum. It was named by Johann F. Meckel who had first described it in 1809 [1]. Meckel's diverticulum can be found in approximately 2% of population and it is asymptomatic in most people [2-4]. About 4% of patients with Meckel's diverticulum will develop complications. Most common complication is intestinal obstruction (intussusception) (36.5%), inflammation of diverticulum with or without perforation (12.7% and 7.3%) and hemorrhage from ulceration due to an ectopic gastric mucosa (11.8%). In rare cases neoplasm (3.2%) or fistula (1.7%) can occur in Meckel's diverticulum [5].

Very few patients with asymptomatic Meckel's diverticulum are aware of having it. In these patients it is most often incidentally found during laparotomy for some other reason. Patients who develop complications

like ileus, perforation or inflammation have clear clinical picture of acute abdomen and therefore diagnosis is made through emergency operation. Patients with occult bleeding from Meckel's diverticulum are hard to diagnose. These patients most often present with chronic anemia of unknown cause. In some cases upper GI barium series can reveal ileal diverticulum [6]. Despite that, nuclear imaging with Technetium-99m is probably the best tool for diagnosis ectopic gastric mucosa that can cause peptic ulcer of a small intestine with consequently bleeding [7]. Technetium behaves in a manner that is analogous to halide anions (eg, chloride, iodide). The mucoid surface cells of gastric mucosa, whether located normally or ectopically, actively accumulate and secrete pertechnetate into the intestine. In rare cases of heavier bleeding with hematochezia selective mesenteric arteriography is indicated. It has high accuracy with bleeding at rate 2-3ml/min and in these cases superselective embolization should be considered, if available, so that surgery can be performed under stable conditions [8].

With increasing surgeons' experience more and more complicated Meckel's diverticula are being treated laparoscopically.

### CASE STUDY

Case of a first patient was 37 years old male, who was admitted to our emergency department due to epigastric pain which migrated several hours later to right lower quadrant of abdomen. Laboratory tests demonstrated leukocytosis ( $11.8 \times 1000/\text{mm}^3$ ) and an elevated C-reactive protein (47 mg/L). All other laboratory tests were within normal limits. Native abdominal X-ray was nonspecific. Due to a suspected acute appendicitis no further preoperative imaging diagnostic tests were made and emergency laparoscopic exploration was performed.

Patient was positioned on a table in standard laparoscopy position. Surgeon and assistant were standing on the patient's left side. Pneumoperitoneum was established using Veress needle to the pressure of 15 mm Hg. Trocars were placed in our standard fashion for laparoscopic appendectomy with optical trocar at umbilicus and two

working trocars, 10 mm trocar in left lower quadrant and 5 mm trocar suprapubically. (Figure 1)

During operation normal appendix was found. Further exploration revealed at about 70 cm from ileocecal valve phlegmonous Meckel's diverticulum (Figure 2). Diverticulum was excised with linear endostapler (Endo GIA™ 60 mm) at its base and was brought out in an endobag (Figures 3, 4 and 5). Surgery and postoperative course went with no complications. Patient was discharged from the hospital on the 3rd postoperative day in good general condition.

Second patient was 19 years old female, who had been conservatively treated for sideropenic anemia during three years before radionuclide scintigraphy was made and set suspicion on bleeding Meckel's diverticulum. Preoperative erythrocytes level was 3,45 (normal values 4,0 – 5,0 x 10<sup>6</sup> /mL) and hemoglobin level was 102 g/L (normal values 121 – 151 g/L). Laparoscopic exploration was scheduled.

Position of patient on the table and trocar placement was according to our standard laparoscopic appendectomy procedure, same as with first patient.

During operation long Meckel's diverticulum was found with diameter of approximately 2 cm (Figure 6). It was resected with linear endostapler (Endo GIA™ 60 mm) (Figure 7). Surgery and postoperative course went with no complications. Patient was discharged from the hospital on the 4th postoperative day in good general condition. Pathohistological diagnosis confirmed ectopic gastric mucosa in the Meckel's diverticulum with peptic ulcer and blood clot at the base of the excised diverticulum. Postoperatively normalization of hemoglobin and iron levels was found.

## DISCUSSION:

In only less than 10 % of patients with complicated Meckel's diverticulum the preoperative diagnosis is correct [9-11]. The condition is often hard to distinguish from other causes of acute abdomen as for example appendicitis, colonic diverticulitis, Crohn's disease or obstructive ileus caused by other condition than Meckel's diverticulum [12]. In most cases the definitive diagnosis is made intraoperatively.

On the other hand, in a study of 776 patients by Kusumoto *et al.*, 88% of patients presenting as bleeding had a correct preoperative diagnosis versus 11% with symptoms other than bleeding [13]. Bleeding Meckel's diverticulum does not present with clinical picture of acute abdomen and in most cases the bleeding is not so severe to obstruct adequate diagnosis process that in most cases will require scintigraphy.

Surgical resection is a standard of treatment of a complicated Meckel's diverticulum. The resection can be achieved by the simple diverticulectomy or by the resection of a segment of a bowel containing the diverticulum. In cases where intestinal ischemia,

perforation or severe inflammation is present segmental bowel resection is recommended. Similar, when ectopic tissue at the diverticular-intestinal junction or palpable mass is found segmental resection should be done. In other cases simple diverticulectomy is considered as a safe procedure.

Whether a asymptomatic, incidentally found Meckel's diverticulum should be resected or not is still a matter of a debate. Intraoperatively it is usually impossible to determine whether the diverticulum is at increased risk of developing complications. Even though most surgeons do not recommend prophylactic diverticulectomy some authors found that male patients older than 40 and with diverticulum longer than 2 cm are at higher risk of developing complications and therefore in such cases they recommend diverticulectomy of an incidentally found Meckel's diverticulum [14,15].

## CONCLUSIONS

We find that laparoscopic resection of Meckel's diverticulum with endostapler is as safe method as open resection with all already known benefits of laparoscopic surgery. We also think that laparoscopic surgery has special advantage when dealing with Meckel's diverticulum because very often one encounters diagnostic dilemma which then can be solved with much less invasive technique of laparoscopy. In our opinion during any laparotomy done for acute abdomen, if Meckel's diverticulum is found, diverticulectomy or intestinal with anastomosis should be performed to avoid secondary complications arising from it.

## CONFLICT OF INTEREST:

**The authors declare that there is no conflict of interest.**

**The patient gave her informed consent prior to her inclusion in case report.**

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**FIGURES:**

Figure 1:

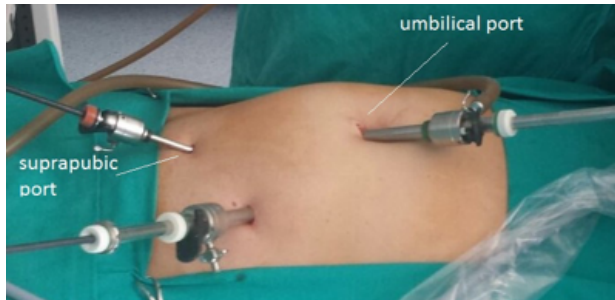


Figure 2:

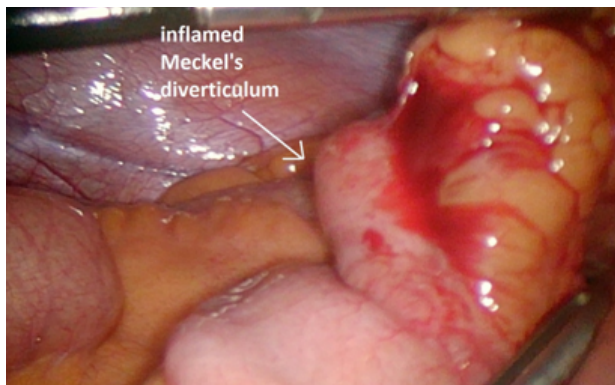


Figure 3:

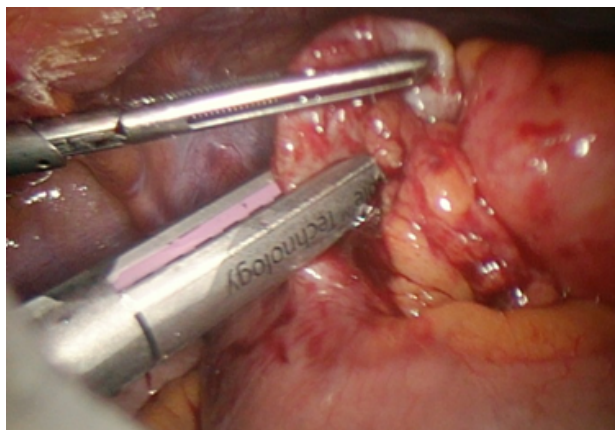


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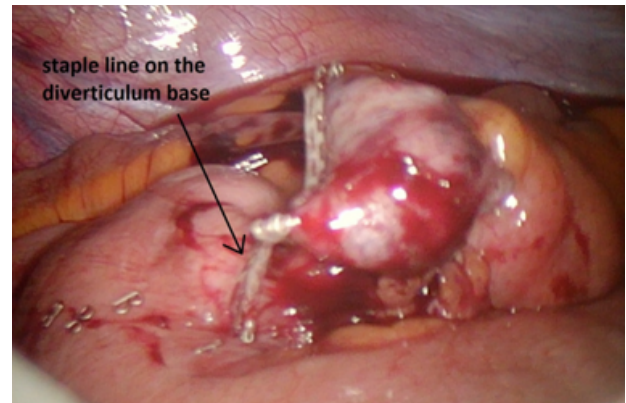


Figure 5:

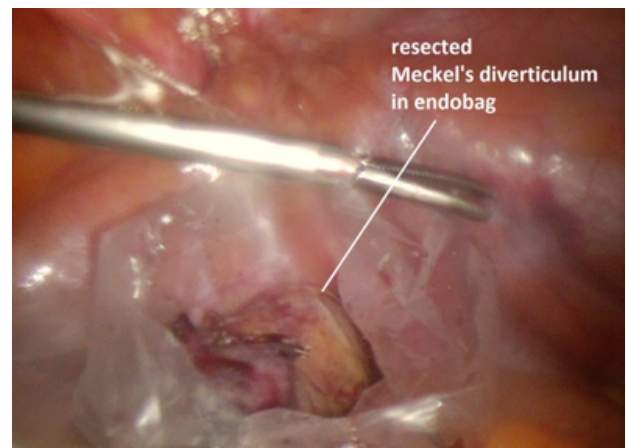


Figure 6:

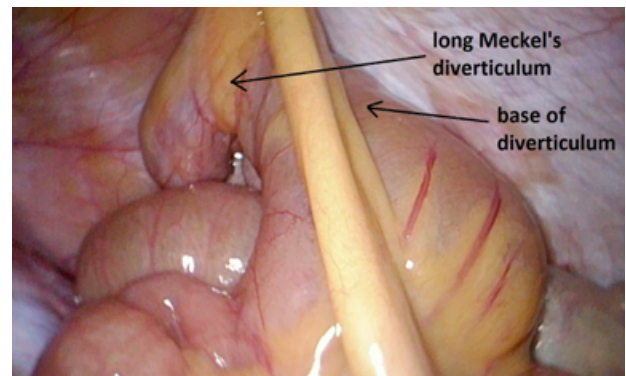


Figure 7:

