Complications related to Meckel's diverticulum (MD): perforation due to enteroscopy and bleeding

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Complications of Meckel's diverticulum (MD) are rare and occur in about 4-6% of cases, more frequently in younger men. Most common complication is bleeding; less frequent are intussusception, perforation and intestinal obstruction. Detection of MD and its complications can be challenging, but the combination of video capsule endoscopy (VCE) and double-ballon endoscopy (DBE) allow more precise diagnosis and present a challenge for clinicians.

We described two patients with complicated MD: one with perforated diverticulum after enteroscopy, and one with bleeding. Both patients were previously examined for obscure bleeding. Due to the limitation of conventional endoscopy, highly suspected MD is diagnosed with new and innovative methods, VCE and DBE. In the first case the diverticulum was with ectopic gastric tissue, in second case diverticulum was bleeding without ectopic mucosa. Surgical approach required resection method. We need to think about MD if we wish to diagnose and treat its complications.

Key words: Meckel's diverticulum, video capsule endoscopy, double-balloon endoscopy

INTRODUCTION

Long time ago, in 1598, diverticulum was described for the first time and later named by German specialist for anatomy, Johann Friedrich Meckel Jr. who described its anatomy and embryological origin.¹ Meckel's diverticulum represents incomplete obliteration of embryonic vitelline duct that is localized an antimesenteric side of small intestine. Meckel's diverticulum is the real diverticulum.

MD represents one of the most common anomalies of gastrointestinal tract with incidence of 1-4%.²,³ It is usually located ileum, within 100cm of the ileocecal valve and contains various ectopic tissues: gastric mucosa (in around 50%), pancreatic tissue (around 5%), colon mucosa, endometrium, hepatobiliary tissue or their combination.² Most common complication (4-6%) is bleeding from larger blood vessel, invaded by erosion or ulcer as a result of secretion from ectopic mucosa.²,⁴ Less frequently, intussusception, perforation or intestinal obstruction occur. Helicobacter pylori can colonize ectopic gastric mucosa of MD but has no significance in bleeding.² Extremely rare, malignant transformations in MD can occur (carcinoid, adenocarcinoma, leiomyosarcoma). Perforation during DBE is very rare.

Since conventional endoscopy has limited value in MD, introduction of innovative methods, video capsule endoscopy (VCE) and double-ballon endoscopy (DBE) has significantly improved diagnosis. Definite diagnosis of MD still remains a diagnostic challenge and there are still "false results" in a certain number of cases.

Compared to traditional push enteroscopy, VCE has proved superior in identifying location of bleeding in small intestine, 68% vs. 32% respectively and also when complete diagnostic contribution is analyzed (38/50 vs 19/50, p<0.05).⁵ Compared to push and retrograde terminal ileoscopy, DBE reaches longer average length (240-360 cm orally 1 102-140 cm anal).⁶

Advantage of DBE compared to VCE is the possibility of pathohistological diagnosis (biopsy) and endoscopic therapy.

First MD diagnosed using DBE was described in 2001. by Yamamoto.⁷

He Q. and other authors have shown diagnostic value of DBE in MD prior to surgery (86.5%) and correct diagnosis was made mostly using retrograde DBE approach, in several cases antegrade approach was used.⁸

New surgical approach includes stapler diverticulotomy, clindoid resection and small intestine resection, there are also laparoscopic techniques, laparoscopic diverticulotomy.⁹
This article describes two patients with complicated Meckel's diverticulum. First patient had both common complication- bleeding and a rarely described complication of MD in literature- perforation of diverticulum during enteroscopy. Second patient had bleeding from MD.

CASE REPORTS

CASE 1: Perforation of MD due to enteroscopy

17 year old patient (born in 1987.), case history number 20188 was admitted to hospital because of painless dark red bloody stools and subsequent severe anemia (RBC 2,04, Hb 50, Le 17,0) in 2004. Gastroscopy and colonoscopy were performed and results were negative. Patient received 4 units of RBC concentrate. He was symptom free until 2007, when he was admitted to hospital because of bloody stools. Laboratory results showed RBC at 2,9, Hgb was 86.8. He received 3 unites of RBC concentrate. Colonoscopy was performed and pathohistological finding showed that some elements can indicate at Crohn's colitis but needed to be correlated with endoscopic finding. Small intestine passage was done and results were normal. Because of abundant bleeding not explained by morphology of colon, Meckel's diverticulum was suspected. Pathohistological analysis after repeated colonoscopy with terminal ileoscopy showed no elements for IBD.

Investigation on bloody stools and possible Meckel's diverticulum was done again in 2010. MSCT enterography was performed, no Meckel's diverticulum was seen and mesenteric artery and its branches were without defect in contrast filling. Scintigraphy with 370 MBq Tc-99m Sn colloid showed accumulation of activity in right lower quadrant above bladder. This could indicate Meckel's diverticulum, differential diagnosis included transient stasis in distal part of right ureter. In terminal ileum through bloody content, endoscopy capsule (duration of examination was 5hrs and 30minutes) detected double lumen and diaphragm sign that is highly indicative of Meckel's diverticulum. Double balloon enteroscopy, lower/retrograde approach (duration of examination around 90minutes); around 1 meter of ileum was explored and in that area a longitudinal opening could be seen, dark content was secreted, possible spastic opening of Meckel's diverticulum. Patient was discharged but a day later he came again complaining of diffuse abdominal pain. Plain abdominal X-ray showed no aero-liquid levels or free gas collection. Few hours later pain worsened, abdominal guarding was present on physical examination and repeated plain abdominal X-ray showed pneumoperitoneum.

Laboratory results showed microcytic anemia (Er 4.39, HGB 95.9, MCV 69.1), Leukocytes were 10.0, CRP was 26.0. Emergency surgery was started and perforation of diverticulum was apparent (picture 1). Resection of ileum with diverticulum was performed, 10cm in length, ileo-ileal T-T anastomosis with lavage and drainage.

PICTURE 1.

PICTURE 2.

EC Topic GASTRIC MUCOSA IN MD

Pathohistological diagnosis was perforated Meckel's diverticulitis; diverticulum was with ectopic gastric tissue (picture 2). The patient recovered without incident and was discharged from hospital 12 days later with normal digestive function.

CASE 2: Bleeding

Second patient that we will present was the same age (17 years), when in 2012. bloody stools started. Gastroscopy and colonoscopy with terminal ileoscopy were performed and results were normal. Because of obscure bleeding video capsule endoscopy was done (duration of examination 4hrs and 38 minutes) and a segment of abnormal mucosa was detected (irregularity of mucosa and alteration of villous patterns) was visible in proximal part going to middle jejunum) so enteroscopy with biopsies and CT enterography were suggested. During capsule enteroscopy (Gemelli hospital, Italy) a double lumen
out of whom 287 had symptomatic MD showed intestinal obstruction in 36.5% of cases, intussusception in 13.7%, inflammation or diverticulitis and perforation in 12.7% and 7.3%, hemorrhage in 11.8%, neoplasm in 3.2% and fistula in 1.7% of cases. 10,12

Although clinical, pathohistological and radiological characteristics of MD complications are well known, their diagnosis before the surgery can be complicated.

In our first case, both performed diagnostic methods, VCE and DBE, showed results highly suggestive of MD prior to surgery, with dark hemolysis content indicative of bleeding, however, surgery proved perforation of MD. Perforation is most commonly result of diverticulitis. 5 Perforation during enteroscopy is very rare, in this particular case inflammatory process contributed to iatrogenic lesion. Diverticulitis is usually resulting of fecal or foreign body that leads to creation of ulceration and then perforation. 10

One of the biggest studies by Park and coauthors with symptomatic diverticulums, diverticulitis was found in 50 patients (28%), including 18 patients that presented with perforating diverticulitis. 1 Pathohistology in our first case showed the presence of ectopic gastric tissue in diverticulum, that is the most common case in literature and also in bleeding diverticulum. It has been demonstrated that 90% of bleeding Meckel's diverticulum has ectopic tissue, most commonly gastric mucosa. 17 Capsule endoscopy has been accepted recently as third in the line test for evaluating patients with gastrointestinal tract bleeding, after upper endoscopy and colonoscopy that have negative result. 13 It is also used when MD is suspected. 16 We followed guideline for evaluation patients with obscure gastrointestinal bleeding during evaluation of our second case, where double lumen image was seen with VCE, highly suggestive of diverticulum but without bleeding at that time. Reason for that can be found in study results that state that findings are significantly better when the period from start of bleeding to performing capsule endoscopy is shorter. It is reported that benefit from VCE is 73.3% when average time from hospitalization to VCE is 4,114 and 80% when that period is 3,6 days 14. After VCE that is used during initial diagnosis, DBE can be used for treatment or histopathological diagnosis after detection of location of bleeding in small intestine. Benefit of DBE in identifying the origin of bleeding in small intestine is around 78.9% according to Suzuki et al. 18

In both our cases surgical approach meant resection of ileum with diverticulum.

CONCLUSION

Meckel's diverticulum is the most common congenital malformation of gastrointestinal tract, it's symptoms usually develop in cases of complications that are rare in adult population and more frequent in young males. With introduction of new diagnostic methods, capsule endoscopy and double balloon enteroscopy diagnosing Meckel's diverticulum has improved, however, definite diagnosis and therapy remain a challenge with some pa-
tients, both for gastroenterologists and surgeons. Our first case demonstrates that there is no 100% safe method in diagnostics, including enteroscopy.

**SUMMARY**

**KOMPLIKACIJE MECKELOVOG DIVERTIKULA (MD): PERFORACIJA PROLIKOM ENTEROSKOPIJE I KRVAJENJE**

Komplikacije Meckelovog divertikuluma (MD) su rijetke i javljaju se u oko 4-6% slučajeva, češće kod mladih muškaraca. Najčešće se javlja krvarenje, a redje intususcepcija, perforacija, opstrukcija. Detekcija MD i njegovih komplikacija može biti zahtjevna, ali kombinacija video kapsula endoskopije (VCE) i double-ballon endoskopije (DBE), omogućuje precizniju dijagnostiku i pravi je izazov za kliničare.

Prikazana su dva pacijenata sa komplikacijom MD i to perforacijom divertikuma prilikom enteroskopije i pacijent sa krvarenjem iz MD. Oba pacijenta se predhodno ispitivana zbog opskrnog krvarenja. S obzirom na limiteranost konvencionalne endoskopije, visoka sumnja za postojanje MD postavljena je novim inovativnim metodama, VCE i DBE. U prvom slučaju divertikulum je bio sa ektopičnim želudacnim tkivom, a u drugom divertikulum je bio bez ektopične mukoze. Hirurški pristup je podraziljevao resekcionu metodu. O MD trebamo razmišljati da bi dijagnostikovali i liječili njegove komplikacije.

**REFERENCE:**