PATHOLOGY OF MECKEL'S DIVERTICULUM IN THE ACTIVITY OF AN EMERGENCY SURGERY CLINIC

D. Ancuța¹, O. Crețu¹, L. Sima¹, F. Huț¹, I. Avram¹

SUMMARY. Meckel's Diverticulum (MD), is the most frequent congenital malformation of the gastro-intestinal tract, and it is determined by the obliteration of omphalo-mesenteric duct. This study aims at showing MD incidence in our clinic as well as the therapeutic attitude that was taken up intra-operatively in case of an asymptomatic MD with no pathological changes. The study is based on a 10 year-retrospective analysis (1996-2005) that included patients suffering from Meckel's Diverticulum, who were admitted to the Clinic of Emergency General Surgery of C.E.H.T. 17 patients have been assessed and diagnosed intra-operatively with MD, 14 men (82.3%) and 3 (17.6%) women. Group 1, included 10 patients (8 men) suffering from MD that was discovered incidentally, when a laparotomy was efectuated for a different disease, group 2 included 7 patients (6 men) that developed symptomatic MD. There have been analyzed patients’ characteristics, repartition by gender and age groups, the method of diagnosing Meckel’s Diverticulum, the surgical behaviour towards complicated and asymptomatic Meckel’s diverticulum. There have been reported significant differences between the 2 groups in terms of repartition by gender (p=0.002), and patients’ age, namely the age of the patients belonging to group 2 with symptomatic MD was significantly younger (p=0.001). Patients belonging to symptomatic group had a longer diverticulum (p=0.003), with a large site of implantation (p=0.004), being associated with a significant increase of complications rate (p=0.001). There has been also reported a significant increase of morbidity in the symptomatic group 2 (p=0.003), but mortality was null in both groups. Therapeutic behaviour was different depending on the clinical picture at admittance and morpho-pathological aspect of lesion. Complicated or non-complicated Meckel’s diverticula are difficult to diagnose clinically and preoperatively. A pathologic MD will be surgically approached by resection, and a non-pathologic MD that was found intra-operatively, should be removed by resection or by clogging technique, depending on its dimensions and morpho-pathological aspect.

Key Words: Meckel's Diverticulum

PATOLOGIA DIVERTICULULUI MECKEL INTR-O CLINICA DE CHIRURGIE DE URGENTA

REZUMAT: Diverticulul Meckel (MD) este cea mai frecventă malformăție a tractului gastro-duodenal și este determinată de obliterarea canalului omfalo-enteric. Acest studiu prezintă incidența DM în clinica noastră și atitudinea terapeutică intraoperatorie la cazurile asimptomatice fără modificări patologice. Studiul se bazează pe o analiză retrospectivă pe 10 ani (1996-2005) ce include pacienții cu DM internați în Clinica de Chirurgie de Urgență a Spitalului Municipal de Urgența Timișoara. 17 pacienți au fost diagnosticați intraoperator cu DM, 14 bărbați (82.3%) și 3 femei (17.6%). Grupul 1, include 10 pacienți (8 bărbați) cu DM descoperit incidental cu ocazia laparatomiei efectuate pentru o altă boală. Grupul 2 include 7 pacienți (6 bărbați) cu DM simptomatic. Au fost analizate caracăteristicile pacienților, repartiția lor pe sexe și grupe de vârstă, metoda de diagnostic a DM, atitudinea chirurgicală în cazul DM complicat sau asimptomat. S-au observat diferențe semnificative între cele 2 grupei legate de repartiția pe sexe (p=0.002) și vârstă. Pacienții din grupul 2 cu DM simptomatic au fost mulți mai tineri (p=0.001). Pacienții din grupul simptomatic au avut un diverticul mai lung (p=0.003) cu zona de implantare mai largă (p=0.004) având o rată mai mare a complicațiilor (p=0.001). Deasemenea s-a observat o morbiditate crescută în grupul 2 (p=0.003) dar mortalitatea a fost 0 în ambele grupuri. Atitudinea terapeutică a fost diferită în funcție de tabloul clinic la internare și aspectele morfopatologice. DM complicat sau necomplicat este dificil de diagnosticat clinic preoperator. Un DM patologic trebuie rezecat iar unul ne-patologic poate fi rezecat sau poate fi invăzat în lumen depinzând de dimensiunile și aspectul său morfopatologic.

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Introduction

Meckel's Diver ticulum (MD), is the most frequent congenital malformation of the gastro-intestinal tract, and it is determined by the obliteration of omphalo-mesenteric duct. It was defined as a morpho-clinic entity in 1809, by the German anatomist J.F. Meckel. The incidence of MD ranges from 2% to 4% in general population.

Symptomatic Meckel's Diverticulum occurs in 60% of the cases in patients under the age of 2 years old, MD being pathology characteristic for pediatric surgery and it also occurs in 40% of the cases in adolescents and adults. MD is clinically evident in 4% - 30% of the cases. According to Cullen et al. MD is rarely present in clinic activity because its complications occur rarely in 4 - 6.4% of the patients that are malformation-holders (1).

Clinic/ para-clinic diagnosis as well as the most suitable surgical attitude to be adopted when MD is found intra-operatively and it is not morphologically modified represent the most important problems to be solved by the surgeon.

The surgeon in emergency surgery faces 2 situations: 1) the clinical picture of acute peritonitis, intestinal occlusion or digestive hemorrhage when the laparotomy shows a complicated MD. 2) When a laparotomy was effectuated for a different disease, a Meckel's Diverticulum with no pathological changes is diagnosed.

This study aims at showing DM incidence in our clinic as well as the therapeutic attitude that was taken up intra-operatively in case of an asymptomatic MD with no pathological changes.

Material and method

The study is based on a 10-years retrospective analysis (1996-2005), and included patients suffering from Meckel's Diverticulum, who were admitted to the Clinic of Emergency General Surgery of S.C.M.U.T.

17 patients have been assessed and diagnosed intra-operatively with MD, 14 men (82.3%), and 3 (17.6%) women. The first group included 10 patients (8 men) suffering from MD that was discovered incidentally, when a laparotomy was effectuated for a different disease, the second group included 7 patients (6 men) that developed symptomatic MD. The patients included

### Table 1. Characteristics of the patients belonging to the two groups

<table>
<thead>
<tr>
<th>Patients' Characteristics</th>
<th>Group 1 (n=10)</th>
<th>Group 2 (n=7)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men/ women</td>
<td>8/2</td>
<td>6/1</td>
<td>0.002</td>
</tr>
<tr>
<td>Age± DS</td>
<td>44.9 ± 12.1</td>
<td>41.1 ± 12.1</td>
<td>0.001</td>
</tr>
<tr>
<td>Length (cm) of MD± DS</td>
<td>4.06 ± 0.96 (2.5-5.5)</td>
<td>4.34 ± 1.40 (2.5 – 6.4)</td>
<td>0.003</td>
</tr>
<tr>
<td>Diameter of base (cm) MD± DS</td>
<td>1.36 ±0.25 (1.1 –1.9)</td>
<td>1.57 ± 0.34 (1.5 – 2.4)</td>
<td>0.004</td>
</tr>
<tr>
<td>Histological exam (no. of patients)</td>
<td>0</td>
<td>7</td>
<td>0.001</td>
</tr>
<tr>
<td>Complications (no. of patients)</td>
<td>0</td>
<td>3</td>
<td>0.001</td>
</tr>
</tbody>
</table>

There have been analyzed patients' characteristics, repartition by gender and age groups, the method of diagnosing Meckel's Diverticulum, the surgical behaviour towards complicated and asymptomatic Meckel's diverticulum.

Considering that the lots of patients were not selected by a randomized process, it was necessary to check homogeneity of lots. We had to deal with nominal variables, so we used x² statistic test (Cotlon reference).

In most cases the value of "p" was obtained by directly applying the x²test, but when one of the values from contingency table was < 5%, Yates correction was applied. The calculations have been made with the help of EpiInfo 2000 soft, the version for Windows, by using Statcalc module. There have been reported significant statistic differences for p < 0.05.

Characteristics of the patients belonging to the two groups are summed up in table 1.
Results

There have been reported significant differences between the 2 groups in terms of repartition by gender (p=0.002), and by patients' age namely, the age of the patients belonging to group 2 with symptomatic MD was significantly younger (p=0.001). Patients belonging to symptomatic group had a longer diverticulum (p=0.003), with a larger implantation base (p=0.004), being associated with a significant increase of complications rate (p=0.001). 3 patients (42.8%) presented post-operative complications consisting in suppuration processes of laparotomy wounds. There has been also reported a significant increase of morbidity in the symptomatic group 2 (p=0.003), but mortality was null in both groups. Therapeutic behaviour was different depending on the clinical picture at admittance and morpho-pathological aspect of lesion.

Thus, in 2 cases belonging to the first group, the resection of MD was performed and it was followed by monoplane extramucous enterorrhaphy with separate stitches, and in the other 8 cases, after performing the ligature of vascular diverticular pedicle, the diverticulum was clogged and then the seromuscular suturing with separate stitches was performed at the bottom of diverticulum. In all the symptomatic patients belonging to the second group, the resection of diverticulum is performed and it is followed by monoplane submucous enterorrhaphy with separate stitches.

Discussions

Meckel's Diverticulum (MD) occurs in the ileum, about 35 cm from its termination, and represents the best-known congenital abnormality of the ileum and it is determined by the incomplete obliteration of omphalo-mesenteric or vitelin duct. The abnormality is found more frequently in men, there is reported a men/women ratio of 4:1 (3, 8) in medical literature.

There have been reported significant differences between the 2 groups in terms of disease repartition by gender (p=0.002), 82.3% of the patients are men and 17.6% women. Based on many necrotic studies there has been reported a MD incidence of 2% (4, 5) in general population, the most symptomatic forms being diagnosed during childhood (6, 7). Our study reported a significant difference between different age groups, namely the symptomatic form has a higher incidence in groups of younger age (41.1. ± 13.1 vs. 44.9 ± 12.1, p=0.001). Meckel's Diverticulum (MD) represents a pathology that is seldom found in emergency surgical activity. The most frequent MD is found as the main cause of acute abdomen during a laparotomy or it is incidentally diagnosed when a laparotomy was effectuated for a different disease. Most symptomatic Meckel's Diverticula present a complex symptomatology that resulted from hemorrhage or inflammation that are difficult to differentiate from appendicitis or perforation (12).

Our study included 5 cases of symptomatic patients (71.4%) that preoperatively showed acute appendicitis, one symptomatic patient (14.3%) who showed generalized acute peritonitis that was secondary to a suspicion of perforated ulcer. It also included a patient (14.3%) that presented acute perforated gangrenous diverticulitis in the sac of mezogastric eventration, the necrosis of bowel being initially suspected in the eventration sac.
In all these cases resection of the diverticulum was undertaken followed by monoplane submucous enterorrhaphy with separate stitches. There was no need to perform any segmentary enterectomy, the implantation site of diverticulum being smaller than 2.5 cm in diameter, and adjacent intestinal wall not being significantly inflamed.

Early postoperative complications occurred as wound suppurations, two of them occurred after McBurney laparotomy, and the third one occurred in the patient with perforated gangrenous diverticulitis in the sac of eventration. Suppuration processes required local treatment, but they had a difficult healing only in the patient with perforated gangrenous diverticulitis in the sac of eventration, because the wound presented a blocked evisceration and it postoperatively healed per secundam, after 35 days. There were no other early or late postoperative complications in this lot of patients and mortality was null.

Patients from group 1 represent the particular situation in which a Meckel's Diverticulum with a normal morpho-pathologic aspect is incidentally diagnosed when a laparotomy was effectuated for a diagnosed disease and the abdomen was explored.

In 6 cases uncomplicated MD was found intra-operatively by accident during the appendicectomy with forms of acute congestive phlegmonous appendicitis and in other 4 cases for gynecological diseases (broken right ovarian cysts, acute salpingitis). In all these cases a McBurney type laparotomy was performed, MD was discovered and diagnosed due to a systematic exploration of a 1 meter-long-segment of the terminal ileum. This should be the usual approach no matter if the intra-operatively found lesion (acute appendicitis, broken ovarian cysts, acute salpingitis) has indication for surgery or not. All 10 cases of uncomplicated MD have been incidentally discovered by systematic exploration of terminal ileum. In all 10 cases we removed the diverticulum. In 2 cases the resection of MD was performed and it was followed by monoplane submucous enterorrhaphy with separate stitches, and in the other 8 cases, after performing the ligation of vascular diverticular pedicle, the diverticulum was clogged in the ileal lumen up to the edge of its base and then the seromuscular suturing with separate stitches was performed at the base of diverticulum. There were no early or late postoperative complications in these 10 cases. The Clogging of diverticulum in the ileal lumen could be done when the implantation base is smaller than 1.5 cm and the diverticulum has a normal morphological aspect at palpation and at the macroscopic exam and length of MD is < 5 cm. In our view this method of clogging MD is the most appropriate one because this way we avoid contamination of peritoneal cavity by not opening the intestinal lumen. In our clinic, when a Meckel's Diverticulum with no pathological changes is incidentally diagnosed during a laparotomy that was effectuated for an abdominal disease, we remove MD by resection or by clogging. But when a MD is incidentally diagnosed and has morpho-pathological changes at palpation and at the macroscopic exam, when its length is over 5 cm and the implantation base is larger than 1.5 cm, we always remove MD by resection. In medical literature, there is an important debate for and against removing MD that was incidentally discovered during a laparotomy, most authors recommending its ablation (9, 10, and 11) (table 2).

Conclusions
- Asymptomatic and symptomatic Meckel's Diverticula (MD) could not be clinically and preoperatively diagnosed.
- The complicated forms of MD mimic appendicitis, peritonitis, occlusion or hemorrhage.

Table 2. Data from literature review regarding the approach of Meckel's Diverticulum.

<table>
<thead>
<tr>
<th>Author</th>
<th>Total cases</th>
<th>No. of symptomatic cases</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cullen</td>
<td>145</td>
<td>57</td>
<td>Removal recommended</td>
</tr>
<tr>
<td>Demartines</td>
<td>91</td>
<td>36</td>
<td>Removal recommended</td>
</tr>
<tr>
<td>Kapral</td>
<td>115</td>
<td>26</td>
<td>Removal recommended</td>
</tr>
<tr>
<td>Groebli</td>
<td>119</td>
<td>52</td>
<td>Selective removal</td>
</tr>
<tr>
<td>Bemelman</td>
<td>136</td>
<td>51</td>
<td>Selective removal</td>
</tr>
<tr>
<td>Our group</td>
<td>17</td>
<td>7</td>
<td>Removal recommended</td>
</tr>
</tbody>
</table>
Meckel's Diverticulum should be systematically searched for whenever there is performed surgery, appendicectomy included.

Pathological Meckel's Diverticulum will be always surgically approached by resection.

Non-pathological MD that was intra-operatively found should be removed by resection or by clogging technique, depending on its dimensions and morphi-pathological aspect.

References: