

CHILDREN'S MECKEL DIVERTICULUM - HISTORY, DIAGNOSIS AND TREATMENT

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Abstract: Meckel diverticula remains a challenging disease diagnosis and the treatment that its frequency is about 2% in the general population. Most patients with Meckel diverticulum remain asymptomatic throughout vietii. Pentru general population, approximately 4-35% of the diverticula become symptomatic. Complications, when they occur, can be fatal if not surgically intrevine. Difficulty in making the diagnosis of Meckel diverticulum made an important chapter of digestive surgery and pediatric surgeon interested primarily because 60% of complications are encountered by the age of 2 years.

Cuvinte cheie: Diverticul Meckel, complicatii, diagnostic, tratament

Rezumat: Diverticulul Meckel rămâne o patologie provocatoare ca diagnostic cât și ca tratament frecvență acestuia fiind de aproximativ 2% în populația generală. Majoritatea pacienților cu diverticul Meckel raman asimptomatici pe tot parcursul vietii. Pentru populația generală, aproximativ 4-35% din diverticuli devin simptomatici. Complicațiile, atunci cand apar, pot fi fatale, daca nu se intrevine chirurgical. Dificultatea întâmpinată în punerea diagnosticului de diverticul Meckel realizează un capitol important al chirurgiei digestive si interesează în primul rând chirurgul pediatru deoarece 60% din complicații se întâlnesc până la vârsta de 2 ani.

SCIENTIFIC ARTICLE OF BIBLIOGRAPHIC SYNTHESIS

History

The first description of a Meckel diverticulum in the medical literature was made by Hildanus in a autopsy study in year 1598. Other descriptions of the Meckel Diverticulum were made by Lavater in 1672 and Ruysch in 1698. The first intestinal occlusion as a complication of the Meckel Diverticulum was described in the year 1744 by Aymand (1). Littre named in 1770 this particular type of hernia, with the presence of Meckel diverticulum in a hernial sac, as "Littre hernia". Although until today the hernia sac containing the Meckel Diverticulum kept the name of "Littre hernia" some contradictions still exists considering the description made by Littre on his 3 cases. A strangulated part of the bowel in a hernia sac is more probably an example of "Richter hernia" with the implication of a bowel part on his hole circumference as Richter described in 1777 (2). Morgagni in 1769 recognized the congenital character of the Meckel Diverticulum. In 1808-1809 Meckel described the Meckel Diverticulum (MD) as a yolk relic, inseparated by the rest of omphalomesenteric pathology (2,3).

Johann Friedrich Meckel, anatomy professor at the Halle University (Germany) said that the Meckel Diverticulum is a remnant of the duct between the intestinal tract and umbilical vesicle. He sustained this because of the fact that he didn't find in the same embryo more than one diverticulum with the same bowel structure and that this is always situated in the distal part of the bowel, outside of the bowel circumference and there are always associated lesions (2). Meckel was the one who demonstrated on bird embryo the connection of the primitive digestive yolk vesicle or the umbilical vesicle through the yolk channel or the omphalomesenteric channel and proved that the

diverticulum was an anomalous persistence of a part of this channel and its vessels (4). Johann Meckel continued his research on this issue and he observed that although the omphalomesenteric channel disappears during the 10th intrauterine week, it can be seen after this period also. In a case he described the persistence of the hole duct till the umbilicus. His description considering the origin of the diverticulum was so exact that his name was associated with the name of the diverticulum.

Embriology

The vitelline duct ensures the link between the primitive bowl and umbilical vesicle, beginning from the 3rd-4th week of the embryological development. At this level the primitive gut develops a partial mesenterium. Starting from the 5th week by the increase in the length of the bowel the umbilical loop is formed- with the tip located at the umbilical level, at the insertion point of the vitelline duct. The umbilical loop presents two branches almost parallel: superior and inferior branch between which is the insertion of the mesenterium which develops a rotating movement, schematic of "Fredet"(2,5). The superior branch has an accelerated increase rhythm developing the duodenum, jejunum and most of the ileum. It gives birth to a convolute that develops into the clomic diverticula of the umbilical cord occurring from the 6th to 10th week of the physiological herniation. This physiological herniation represents the adaptation mode to the available abdominal space, which is occupied almost entirely by the liver. The inferior brach evolution in its traject to the posterior wall that swoops caudally giving rise to splenic flection. The inferior branch has an upward movement is a result of "rotational" movement giving rise to future upward colon and cecum. During embryonic development of the channel will come off the yolk and umbilical loop disappears. The vitelline duct usually

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completely obliterates from the 5th to 9th week of the intrauterine week (1, 6). The role of the duct is for transportation of the nutrients from umbilical vesicle from the primitive gut in weeks 3-9 of embryonic life. The persistence of the vitelline duct after the 8th -9th week of the intrauterine life is determined by the visualization of different anomalies part of the omphaloenteric duct pathology (2,5,6).

Definition

The Meckel diverticulum represents a form of omphalo mesenterium persistence (7) or a part of the omphalo mesenteric duct (5). The Meckel diverticulum existence is because of the uncompleted regression of the omphalo mesenteric duct during the embryological period with the maintenance of a diverticulum on the antimesenteric part of the terminal ileum, near the ileocecal valve (8). The Meckel diverticulum represents a pathological structure appeared because of the persistence of the vitelline duct during the embryonic period (9). The Meckel diverticulum was defined as a portion of the most proximal remnant vitelline duct which in a physiological manner involutes in the 9th intrauterine week (10). The Meckel diverticulum is situated at the level of terminal ileum, at a variable distance from the ileocecal valve. Some authors say that it is situated at 40-100cm from the ileocecal valve or 60 cm from the ileocecal valve (11) or 10-90 cm from the ileocecal valve (12) being described a position at 150 cm also (13). In children it is situated approximately 40 cm from the ileocecal valve and in adults about 50 cm from it (2). The Meckel diverticulum is situated on the antimesenteric margin of the ileum (2,4,11) in contrast with the pseudo duplication and diverticulum's of other etiologies (14).

The incidence of the Meckel Diverticulum in general population

Most of the authors consider that the Meckel diverticulum is about 2% in general population (7) In a study of 1954 children that had appendectomy with the exploration of minimum of 100 cm of the ileum a frequency of the diverticulum of 3.2% was detected. In the medical literature a frequency of 0.13-4.5% was observed (15-17).

Clinical manifestation and evolution

It is said that in general population about 4-35% of the diverticulae are symptomatic (18,19). Dineen and Mackey reported a percent of symptomatically patients of 16.9 (20). According to age 85% of the new birth are symptomatic. Between 1 month and 2 year old children 77% are symptomatic and after 4 year old only 15 % are symptomatic (21,22). The symptomatology usually consists of: bleeding, inflammation, perforation, intestinal occlusion, invagination, volvulus, Litter hernia, giant Meckel diverticulum.

Most of the patients remain asymptomatic during the whole period of their life and the risk of complications is about 4-40% (23-25). Way and Doherty said that the complications frequency is about 4% in patients with Meckel diverticulum and 40% of the complications appears till the age of 10 year old (14). The complications when it appears can be fatal without surgical treatment.

The diagnosis difficulties for the Meckel diverticulum represent an important chapter of the digestive surgery and interest the pediatric surgeon because 60% of this complication appears till the age of 2 year old (4). When the MD is surgically removed a post operative complication risk is about 0-8% (26,27). The most frequent long term complications were the occlusions because of the post operative adhesions (28).

The paraclinical diagnosis

Technetium Scintigraphy. After the years 1980-1990 the scintigraphy using Technetium 99 was used in children with rectal bleeding, for the detection of the gastric ectopically

mucosa from the MD, the investigation being named " Meckel Scan" (29). The studies based on this investigation reported a great number of false positive and false negative results.

The echocardiographic examination

The abdominal echocardiography became a current practice in the pediatric and surgical services. Rarely the echocardiographic examination may reveal suggestive images for MD and using this examination could be observed the images of eventual MD's complications associated with signs and symptoms that can offer an exact image of the intraperitoneal pathological modifications that are preoperatively useful.

Computed Tomography and Magnetic resonance Imaging exam

The Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) exam may offer clear and specifically images of the MD by the accuracy of the details offered by the obtained images. In the current practice these exams are not used for the diagnosis of MD, mostly because of a lack of symptomatology in uncomplicated diverticulum. In the case of complicated MD as surgical emergencies the echocardiography and laparoscopy are the preferred exams.

Laparoscopy – the diagnosis and treatment of MD

The laparoscopy was first described at the end of 80's being largely used today and also being a standard in some surgical interventions. It is preferred by the surgeons because of the operative images that are sometimes superior to that from the laparotomy. It is preferred by the surgeons and patients in the same time because of shorter hospitalization times and the short time of postoperative recovery of patients and with very low morbidity rates.

The laparoscopy is used as a diagnosis tool being less traumatic for the patient compared to laparotomy, sometimes being used as a diagnosis and therapeutic tool in the same procedure.

Some pediatric surgeons use the laparoscope especially as a diagnosis tool and the MD removal being made using laparotomy, the procedure name being laparoscopically assisted surgery (30,31). Other surgeons use to remove the diverticulum by laparoscopy or change the technique depending of the children or diverticulum size: externalization in the wound in small children or in the cases with complicated Meckel and resection using the stapler in bigger children or asymptomatic diverticulae.

There is a discussion if a single trocar technique is a good one in MD, this being a complicated technique when a complicated MD needs to be dissected. For externalizing a Meckel diverticulum, a single trocar is enough.

Therefore MD remains a challenging pathology considering the diagnosis and treatment.

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