



# Meckel's diverticulum: Ten years' experience

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## ABSTRACT

**Objective:** To evaluate the demographics and characteristics of children with Meckel's diverticulum (MD).

**Material and Methods:** In this retrospective study, we analyzed the medical records of all children who were treated for MD in the department of pediatric surgery of Tepecik Training and Research Hospital over a period of 10 years (1995-2004). Age, gender, clinical manifestations, diagnostic approaches, and histopathological reports were documented.

**Results:** In total, 57 children were diagnosed with MD. Of these, 40 children were treated surgically. Furthermore, 26 had acute abdomen, 15 had intestinal obstruction, 10 had rectal bleeding, and 6 had some other diagnosis. The mean age of the boys (n=43) was 4.77±3.82 years, whereas that of the girls (n=14) was 3.85±3.67 years. Histopathological examination revealed ectopic mucosa in 9 patients, omphalomesenteric duct remnants in 4 patients, diverticulitis in 24 patients, and ulcerations in 14 patients.

**Conclusion:** The prevalence of MD was 1.6%. Boys were approximately 3 times more commonly affected than girls. In most cases, the initial diagnosis was acute abdomen and the presenting symptoms on admission were intestinal obstruction and rectal bleeding.

**Keywords:** Meckel's diverticulum, child, prevalence, symptom

## INTRODUCTION

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract with an estimated prevalence of 2% in the general population (1-4). Meckel's diverticulum is caused by failure of closure of the vitelline duct at the 5th week of fetal growth. It contains all layers of the normal bowel and has been shown to contain ectopic tissues such as gastric or pancreatic tissue in about 50% of cases. Meckel's diverticulum cases are generally asymptomatic, and complications and symptoms are more common in patients with ectopic tissue (1-3). The male to female ratio in Meckel's diverticulum is one, with a male dominance in symptomatic cases. Patients often present with complications such as bleeding, bowel obstruction, fistula and intussusception (2, 4-6). Lifelong complication rates are reported as 4-34% (1-4), and complications are more common in patients younger than 2 years of age (3, 7). Complication rate is reported to decrease with advancing age (8). In this study, we aimed to retrospectively evaluate the frequency of MD we encountered in our clinical practice, along with general patient characteristics, and our diagnostic and therapeutic interventions.

## MATERIAL AND METHODS

Archive records of our clinic for the past 10 years were analyzed retrospectively, and files of patients with MD were extracted. Cases detected incidentally during another surgical procedure were classified as asymptomatic diverticula. The symptomatic cases were evaluated in two groups according to the admission complaints as either monosymptomatic or polysymptomatic. The demographic characteristics of patients with MD who underwent resection were investigated. Accompanying surgical pathologies were evaluated.

The presence of ectopic mucosa and inflammation were investigated as part of histopathological evaluation of resected MD. Ectopic mucosa types detected within the diverticulum were also evaluated. The results of <sup>99m</sup>Tc scintigraphy that was used as a diagnostic method were evaluated according to histopathological results. The mortality and morbidity rates were calculated for cases with resection of MD.

## Statistical Analysis

This is a descriptive, retrospective study based on patient records. The mean, standard deviation and percentage values were analyzed. The mean diameters associated with diverticula were compared using Student t test. Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) 13.0 software package was used for statistical analysis.

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Received: 14.08.2014

Accepted: 20.09.2014

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## RESULTS

17.449 surgeries were performed in our pediatric surgery clinics over the past 10 years. Of these, 3.429 were abdominal surgeries. Meckel's diverticulum was identified in 1.6% of children who underwent abdominal surgery for any reason.

Meckel's diverticulum was detected in 57 cases, 43 female and 14 male, with a mean age of  $4.99 \pm 3.90$ . The preoperative diagnoses were acute abdomen in 26 cases, intestinal obstruction in 10, rectal bleeding in 10 patients and 6 patients were admitted with other diagnoses.

When the gender and age distribution of 40 cases with MD excision were examined, MD excision was most common in the 0-2 year's group with 17 cases (42.5%). Excision was performed in order of decreasing frequency in 12 patients (30%) in the 2-6 age group, 7 cases in the 6-10 age group (17.5%), and four cases above 10 years of age (10%). Meckel's diverticulum resection was performed in four asymptomatic cases, three of them in the 0-2 age group and the other in the 6-10 age groups. Asymptomatic MD excision was not performed in other age groups. Within 36 symptomatic patients who underwent MD excision, 14 were in the 0-2 age group, 11 in the 2-6 age group, seven in the 6-10 age group, and four in the group above 10 years of age.

Clinical presentations of symptomatic patients were separated as mono and poly-symptomatic. Of the 36 symptomatic patients with excision of MD 25 (70%) were mono-symptomatic and 11 (30%) were poly-symptomatic. Ten of 25 mono-symptomatic patients had rectal bleeding, eight had abdominal pain and four cases were admitted to the clinic with symptoms like abdominal distension, loss of bowel movements, umbilical discharge or bleeding, abdominal mass, and vomiting. Six of 11 poly-symptomatic patients had vomiting and abdominal pain, two vomiting and bleeding, two vomiting and abdominal distension. The mean age at onset of symptoms and signs were;  $6.66 \pm 3.91$  years for abdominal pain, was  $5.13 \pm 4.31$  years for vomiting, and  $2.89 \pm 3.54$  years for rectal bleeding. The mean age of incidentally diagnosed asymptomatic patients were  $1.64 \pm 1.97$  years.

There were 15 patients with MD out of 110 patients with intestinal obstruction (13.6%); MD excision was performed on 13 of them. The underlying pathology of intestinal obstruction (intussusception, volvulus, MD and internal hernia) were analyzed separately. 82 cases were operated for intussusceptions during 10 years. Meckel's diverticulum was detected in nine of these patients seven of which underwent MD resection, and two of which were manually reduced. There were 10 patients with volvulus, and 15 cases with internal hernia that underwent surgery. Two of the 10 patients who were operated on due to volvulus and one of the 15 patients who were operated on due to internal hernia had MD which were all resected. In addition, MD resection was performed in three cases with giant MDs.

$^{99m}\text{Tc}$  scintigraphy was performed in eight patients with rectal bleeding. In the histopathologic evaluation of six patients with a positive Meckel scintigraphy, gastric mucosa was detected in four patients, without any ectopic mucosa in the remaining two. In the histopathological evaluation of the two patients

with negative scintigraphy, pancreatic tissue was observed in one while the other did not have ectopic mucosa.

The histopathological examination of 40 patients with MD resection revealed diverticulitis in 24, ulceration in 14, ectopic mucosa in nine, and an omphalo-mesenteric duct in four patients. As a result, 11 patients had more than one histopathologic finding. Gastric mucosa was identified in eight of the nine patients with ectopic mucosa and one patient had pancreatic tissue.

During the postoperative follow-up of 40 cases with MD resection, one early and two delayed intestinal obstructions have developed. Two patients were managed nonoperatively, and one was operated due to prolonged ileus and underwent ileotransversostomy. One patient who underwent gastrostomy and cervical esophagostomy for esophageal atresia and trachea-esophageal fistula developed intestinal perforation due to an obstruction created by MD, and died due to cardiac abnormalities and sepsis. Another patient who presented with rectal bleeding while being monitored for prematurity underwent emergent surgery with diverticulectomy and ileostomy, and died due to sepsis and renal pathologies. According to 10-year data on our cases with resection for MD the total mortality rate was identified as 5%.

## DISCUSSION

Meckel's diverticulum was identified in 1.6% of all abdominal surgeries in our study group. In a study conducted on adults in Turkey, it has been reported that MD was detected in 1.3% of patients who underwent laparotomy (9), and this result is consistent with the results of our study.

In 11 patients who had been operated on with a presumptive diagnosis of acute appendicitis, MD was excised since the appendix was normal and one patient underwent additional appendectomy. Meckel's diverticulum resection is recommended in asymptomatic patients, in the absence of an absolute contraindication (7, 10). In our clinic, there were 19 asymptomatic patients with incidentally detected diverticulum during another surgical procedure; four patients underwent (21%) MD excision and surgical treatment was not applied to the MD in 15 (79%) patients.

In three of the patients who were enrolled in the study (7.5%) a giant MD was detected. Clinical presentations of these patients were restlessness, lack of bowel movement, abdominal distension and rectal bleeding. Evaluation of the three patients in our study showed that giant MD may present with different clinical signs and symptoms, and may display different histopathological findings.

Direct abdominal X-ray was used in 39 patients (97.5%), ultrasonography in 21 cases (52.5%), scintigraphy in eight patients (20%), and computed tomography in three patients (7.5%).  $^{99m}\text{Tc}$  scintigraphy is useful in the investigation of heterotopic gastric mucosa. Meckel's scintigraphy was carried out in eight patients with rectal bleeding.

In our study, nine patients (22.5%) were identified to have ectopic mucosa. Compared with the literature, the rate of ectopic mucosa according to histopathological evaluation is simi-

lar to our study (2). There was gastric mucosa in eight patients (89%), and pancreatic tissue in one patient (11%). Histopathological examination of the patients revealed ectopic mucosa in nine patients (22.5%), persistent omphalo-mesenteric duct in four patients (10%), diverticulitis in 24 patients (60%), and ulceration in 14 patients (35%).

Postoperatively, three patients (7.5%) developed intestinal obstruction: one in the early postoperative period and two in the delayed period. Two patients were treated non-operatively. One patient had been operated on due to prolonged ileus and received an ileotransversostomy. While the morbidity rate was reported as 3.67% and mortality rate as 0.18% in asymptomatic cases, these rates were identified as 9.56% and 1.99% with resection in symptomatic cases (10). In our study, the mortality rate has been identified as 5%. However, this mortality rate was attributed to the presence of additional abnormalities rather than being directly related to MD.

### CONCLUSION

Meckel's diverticulum was detected in 1.6% of abdominal surgeries that were performed in our clinic. The most frequent clinical presentations of MD in children, intestinal obstruction and rectal bleeding, were consistent with large series.

In our study group, the presumptive diagnosis was acute abdomen in 26 cases (45%). Patients who undergo surgery for acute abdomen should be evaluated in terms of MD, and MD should be particularly sought in patients with a normal appendix. In this study, MD-induced morbidity rate was found to be 7.5% and the mortality rate was 5%.

**Ethics Committee Approval:** Ethics committee approval was not required as the study was retrospective.

**Informed Consent:** Patient's approval was not needed for this retrospective study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - S.S., A.S.; Design - S.S., A.A.; Funding - S.S.; Materials - S.S.; Data Collection and/or Processing - A.S., A.A.; Analysis and/or Interpretation - S.S., H.D.; Literature Review - A.C., H.D.; Writer - S.S., H.D.; Critical Review - S.S., A.C.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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