

## **MECKEL'S DIVERTICULUM**

### **(Report of 59 Patients)**

**Semih Baskan\*, Abdullah Sağlam\*\*, Erdoğan Sözüer\*\***

Fifty nine patients with Meckel's diverticulum have been examined. In 28 of them (%47), the symptoms were caused by the complications of diverticula. In the rest of the patients (31 patients), the diverticula has been found by chance during laparotomy . These patients were admitted to the hospital for various abdominal complaints. Ten of the symptomatic patients had acute inflammation of diverticula, 8 had a mechanical bowel obstruction, four had perforations of diverticula, and four were complaining from rectal bleeding. Within the symptomatic group the rate of mortality was found to be 7.4%, within the asymptomatic group however, no patient has been lost due to either Meckel's diverticula or the surgical interventions. Symptomatic Meckel's diverticulum mostly possess longer and narrower lumen than asymptomatic ones. The presence of ectopic tissue in the diverticulum increases the incidence of complication. Yet these criteria do not necessarily indicate which diverticula will lead to a complication, the excision of asymptomatic Meckel's diverticulum may be preferred.

**Key words: Meckel's diverticulum, complications.**

The Meckel's diverticula was first time described by Johann Friedrich Meckel. It is the most frequent intestine anomaly. The rate or incidence within the public is only 2%. The presence of ectopic tissue in the diverticula is not rare. Complications such as bleeding, obstruction, inflammation and even perforation may be caused.

## Materials and Methods

The record of 55,993 patient treated in the General Surgical Clinics of Medical Faculties at Ankara University and Erciyes University (Kayseri) have been screened and Meckel's diverticula has been found in 59 patients (1.05). In this study, the surgical findings, pathological reports and the result of treatments of these 59 patient has been investigated. The mortality and morbidity rates of these patients were also studied. For the statistical analysis, the Chi-square test was used. The arithmetic means have been given with ( $\pm$ ) standard errors.

## Results

Out of 59 patients, the youngest is only five months old and the eldest is 76 years old. 42 of the patients are male and the rest (17) is female. The ratio of male to female is 2.5/1. 28 patients is considered to be in the symptomatic group, whilst the remaining 31 being in the asymptomatic group. Those patient who have received surgical treatment for various other reasons but have seen to have Meckel's diverticula during the operation are regarded as asymptomatic. The distribution of the symptomatic and asymptomatic patients according to the age group is given in Figure 1. The average age of symptomatic patients is  $19.4 \pm 3.2$ , whereas the average age of asymptomatic patients has been found to be  $32.1 \pm 4.0$ .

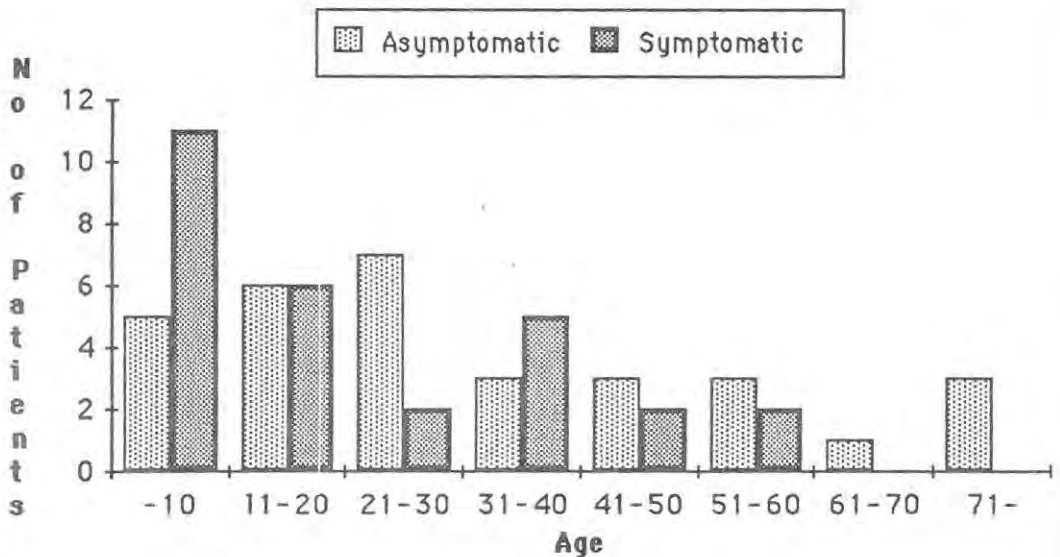


Figure 1. Age distribution in symptomatic and asymptomatic patients with Meckel's diverticulum.

Table I. Observed complications of MD in 59 patients.

Complication	Number of Patients
Intestinal Obstruction	
Bands	5
Intussusception	3
Volvulus	2
Inflammation	8
Perforation	6
Haemorrhage	4
Total	28

The complications of Meckel's diverticula found in the symptomatic group are seen in Table 1. Out of these group, four have received operation due to findings of lower gastrointestinal tract bleeding, 10 have received operation due to findings similar to acute appendicitis, and the remaining 4 patients have been operated due to viscus perforation considerations. In none of these patients, neither Meckel's diverticula nor related complications have been suspected prior to the operation.

#### Dimensions of the diverticula and the distance from ileocecal valve

Out of 59 patient with Meckel's diverticula, the diameter of the 22 cases and the length of 25 case are recorded in their surgical reports. The summary of these dimensions are given in Table II. As seen this table, The MD's narrower than 1.5 cm appear to give more symptoms than the broader ones. This difference found to be significance at the  $p < 0.05$  level. No statistical significance has been found between the length of the Meckel's diverticulum and whether or not they give symptoms ( $p > 0.05$ ).

The distance between the diverticulum and the ileocecal valve varies between 20 cm and 100 cm; with an average of  $63.1 \pm 3.7$  cm.

Table II. Length and diameter of MD in symptomatic and asymptomatic cases.

	Symptomatic	Asymptomatic
Length		
≤ 4 cm	5	6
>4 cm	10	4
Not Stated	13	21
Diameter		
≤ 1.5 cm	9	3
> 1.5 cm	3	7
Not stated	16	21

#### Existence of Ectopic Tissue

The heterotopic mucosa has been found in the diverticula of 14 patients (22.0%). In symptomatic group, gastric mucosa in 7 cases and duodenal mucosa in one case have been found, whereas in the asymptomatic group, gastric mucosa in 2 cases and colonic mucosa in 3 cases have been found. The existence of heterotopic mucosa has an incidence rate of 28.6% in symptomatic group, and 16.1% in asymptomatic group. This difference has not been found to be significant ( $p>0.05$ ).

#### Treatment and Complications after Operation

Table III shows the surgical treatment given to the patients. In general, the ileum resection has been preferred in the symptomatic cases. A patient with findings of mechanic intestinal obstruction has been taken to operation yet only the excision of mesodiverticular band could have been done due to the patient's poor general condition. A second patient in the asymptomatic group has also been found to have omfalodiverticular band, however, only the omfalodiverticular band was excised but the diverticula has not been removed due to the fact that this was a criminal case.

Table III. Operative procedures in symptomatic and asymptomatic group of patients.

	Diverticulectomy	Ileal Resection	Band Excision	Total
Symptomatic	19	8	1	28
Incidentally Found	26	4	1	31
Total	45	12	2	59

After treatment, 1 patient has developed complications. Two patients in symptomatic group has been lost due to the leakage of anastomosis. The reasons for the loss off these two patients is the necrosis of the Meckel's diverticula and its perforation. Another patient in the asymptomatic group had bilateral hemopneumotoraks and flail chest due to a road accident has been admitted to the operation for intraabdominal bleeding and lost in five hours after the operation (Tablo IV)

Table IV. Morbidity and mortality in 59 symptomatic and asymptomatic groups of patients.

	Symptomatic		Asymptomatic	
	Complication	Exitus	Complication	Exitus
Pulmonary	6		3	
Wound infection	8		1	
Wound dehiscense	1			
Abscess-Sepsis	2			
Anastomotic Leak	3	2		
Respiratory Failure		1	1	
Cardiac Failure	1			
Total	21	2	5	1
No. of patients with complication	11		3	
Complication rate	39.2%		9.7%	
Mortality rate		7.4%		3.1%

## Discussion

During the first stages of foetal life, omfalomesantric canal connects the yolk sac and midgut. This canal, in general, naturally disappears within 5-9<sup>th</sup> weeks of pregnancy. The lack of such involution lead to the malformations such as umbilical sinus, umbilicoenteric fistula, the fibrous band that joins the umbilicus with ileum and Meckel's diverticula. The most frequent of these malformations is the Meckel's diverticula, a fibrous band that stretches to the front of the abdomen or the ileum mesentery may accompany MD (4,10).

The literature reports an incidence rate of 1-4% with an average of 2% for Meckel's diverticula (6,7,13). It is seen more in males than females, and cause more frequent complication in male patients (5,6). We also had more male patients than female ones. The

average age in symptomatic group ( $19.4 \pm 3.2$ ) is smaller than that of the asymptomatic age groups ( $32.1 \pm 4.0$ ), i.e., the patients in symptomatic group is in young age groups (See Figure 1). Meckel's diverticula is known to cause more complications at younger ages (3,5,6).

The development of a complication in Meckel's diverticula mostly arisen from the bands related to the diverticula or ectopic tissue in the diverticula, yet complications may also develop without these (4,10). The most frequently observed complication varies with the type and the age group (pediatric or adult) of the patient. The most frequent complication seen in the pediatric patients group is the bleeding (2,9,14). In general groups, however, it is the mechanical obstruction of the intestine and inflammation (1,6,7,8,11,12). With our patient group, the most frequent was inflammation (Table 1). A fibrous band that stretches from the tip of Meckel's diverticula to the front wall of the abdomen or ileum mesoa could be the cause of an acute mechanical obstruction of the intestine. On the other hand, as seen in two of our patients, the fibrous band that stretches to the front wall of the abdomen can cause volvulus (Table 1). As observed in 3 of our patients, intussuseption related to the Meckel's diverticula is the other cause of the obstruction. Other complications of diverticula, inflammation, perforation due to necrosis that is caused by the inflammation, and the presence of the heterotopic gastric mucosa in the diverticula, and the bleeding caused by the ulceration in ileum due to acidic secretions of the gastric mucosa. Ectopic gastric mucosa in diverticula was found in all of the patients received surgical intervention due to bleeding.

It is found that the diameter of the diverticula is related to the complications caused by the diverticula. Those diverticulum that's lumen narrower than 1,5 cm create more complications (Table II). Although the Table 2 indicates that the longer diverticulum create more complications this is not verified by the statistical analysis. Mackey et al, and Leijonmar et al report that longer and narrower diverticulum create more complication (5,6).

The incidence of the ectopic tissue existence is higher in symptomatic group (28.6%) than asymptomatic group (16.1%). Though statistical analysis of our group did not indicate any significance for this difference, it is in agreement with the literature (3,5). In the cases that the ectopic tissue exist in the diverticula, the complications of diverticula are more frequently observed. It has to be mentioned here that similar to the other investigations (9,14), in our investigation, in all of the patients that had been operated due to the bleeding of diverticula ectopic gastric mucosa has been found in the diverticulum. Gastric mucosal aberration almost always seen in the bleeding Meckel's diverticula.

In the majority of the 59 patients of our study group, diverticulectomy is favoured operation (Table III). Apart from the cases of extreme necessity, the diverticulectomy should be preferred to the ileum resection (4,13). When the neighboring ileum had ulceration and bleeding when there is a tumor in the diverticula, the ileum resection should be preferred (4,6,7,13).

Our study has shown that there is a considerable difference in the mortality and morbidity rates between symptomatic asymptomatic patients (Table IV). Similar to our result, in various other investigations the rate of complications related to the operations are reported to be 2-14% in asymptomatic cases whilst they are 10-33% in symptomatic diverticulum (1,6,7,11).



Two of our symptomatic patients has been lost due to diverticulectomy and related anastomotic leakage (mortality 7.49). In the asymptomatic group there is no loss of patient due to diverticulectomy. The only patient lost in this group died early after the operation because of a pulmonary problem. In the literature, the mortality rate after the diverticulectomy of symptomatic cases is reported to be 7.5-10.3% (6,9). Morbidity and mortality has been found to be high in those patients who have been operated due to Meckel's diverticula and related complications.

There seems to be no agreement between the researcher on whether to do diverticulectomy routinely (2,3,7,8), to do it selectively (6,12,13) or not to do it (6,11) in the cases where Meckel's diverticulum was incidentally found. According to Soltero and Bill, the most strong supporter of not to do any diverticulectomy in such cases, if the bands related to diverticula is seen, they should be excised, but no diverticulectomy should be carried out (11). These researcher who has done research in a closed society with statistical means have found the risk of development of any symptom in diverticula to be only 4.2%. They are of the opinion that such a low risk of complication, the resection of asymptomatic diverticulum is not necessary.

Those researcher that support selective diverticulectomy (6,12,13) suggest that the diverticulectomy should be carried out in the cases where diverticulum have thin and long lumens where there is a high likelihood of the presence heterotopic tissue in the diverticulum, and where the diverticula has been found in a patient younger than 40 years old; for the rest of the cases they suggest that the diverticula should be left in its place.

We are of the opinion that the diverticulectomy should be routinely carried out in suitable cases, even though the risk of symptom development is low. A diverticulectomy especially carried out during the elective abdominal operations has no significant contribution to mortality or morbidity (7,8,13). In our asymptomatic study group, the mortality and morbidity is not high (Table IV). Especially within this group, there is no mortality that could possibly related to diverticulectomy.

The only way of protection the patient from the complications of Meckel's diverticula is the removal of diverticula even though it is incidentally found. Selective diverticulectomy as suggested by Mackey et al. has some advantages too. The sizes of the diverticula, the presence of ectopic tissue and the age of the patient are indeed the factors defining the prognosis of the diverticula. However, the value of these factors are limited. The complications can also develop in diverticulum with large lumens (Table II). Complications, bleeding excluded, may be seen in the diverticulum that has no aberran tissue; in addition to this whether or not the aberran tissue exist can only be determined after a histological investigation. Therefore, we feel that the selective diverticulectomy should only be considered in the risky patients. The removal of of incidentally found diverticula will prevent the patient from high mortality and morbidity diverticula complications. The diverticulectomy should especially be preferred in young patients because thy can easily tolerate the operation and they are highly susceptible to the development of complication in diverticula.

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