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Original Research Article

Incidence, complications and management of Meckel's diverticulum

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ABSTRACT

Background: The incidence of complications of Meckel's diverticulum is decreasing over years. Whether symptomatic or asymptomatic, it is often diagnosed intraoperatively. Controversy exists as regards the method of its operative removal and more so the safety and efficacy of its removal if found incidentally.
Methods: A three years prospective and three years retrospective study was undertaken in 125 diverticula found by 3726 laparotomies. Intraoperative findings, type of operation, postoperative management, histopathology and complications in both complicated and asymptomatic diverticula were analyzed.
Results: Male to female ratio was 3:2. Found in 3.4% of surgical population, 23 (18.4%) were defined to have complications and 102 were incidental. Complications decreased as the age advanced falling to zero after age 60. Meckel's diverticulitis, peptic ulcer and umbilical sinus were common in childhood and intestinal obstruction was common in adults. Patients with ectopic mucosa mostly gastric had more complications. 42.2% of incidental cases underwent surgery due to early age, narrow and long diverticula. In both the groups, segmental resection was preferred to simple diverticulectomy. Ectopic tissue could not be substantiated by feeling the induration or thickening of wall. Mortality and morbidity in symptomatic group was 8.7% each and in incidental group 0% and 4.6% respectively.
Conclusions: Intestinal obstruction and inflammatory pathology are common complications, gastric mucosa being common association. Narrow and long diverticula in young should be excised prophylactically with zero mortality and acceptable morbidity to prevent further complications.

Keywords: Asymptomatic, Complications, Incidental, Incidence, Meckel's diverticulum, Management

INTRODUCTION

After repeated research, the incidence of the complications due to Meckel's diverticulum (MD) is found to be in downward trend, most cases presenting in childhood. Complications of MD include ulceration, hemorrhage, intussusception, bowel obstruction, inflammation, perforation and rarely fistulae, tumors, torsion, Littre's hernia.[1] All these complications can be challenging to diagnose because patients may present with non-specific symptoms which produce a clinical picture that mimics other more common gastrointestinal disorders. Most of these cases are diagnosed intraoperatively where Tc99m pertechnate scan, laparoscopy and enteroscopy facilities are either not available or not widely used. Symptomatic MD was defined as one that the surgeon believed was the main contributing factor to the preoperative diagnosis without any other significant pathology contributing to the clinical features.[2] The diverticula in symptomatic patients tend to be longer and narrower than those in asymptomatic patients.[3] Controversy exists whether one should remove an incidentally detected MD or not.

We present our experience in a three years prospective and three years retrospective study on MD with special

focus on its incidence, complications and safety and efficacy of its management.

METHODS

All cases of MD found during laparotomy in the surgery operation theater of VSS Medical College Hospital, Burla, Odisha, India, were selected for study three years prospectively from January 2012 to December 2014 and three years retrospectively from December 2011 to January 2009. We included 125 cases of MD from both elective and emergency surgeries.

Scheme of work recorded was age; sex; clinical methods and investigations; intraoperative macroscopic findings and operation performed; postoperative management, complications and histopathological diagnosis along with presence of ectopic mucosa.

RESULTS

Total number of MD identified intraoperatively during the 6 years was 125 out of 3726 abdominal cases operated (3.4%), 23 symptomatic (18.4%) and 102 asymptomatic. Male to female ratio of all cases operated was 2.2:1 and that of MD was 3:2 whether symptomatic or asymptomatic.

Incidence of symptomatic MD was more in children and decreased as the age advanced. No single case was seen above age 60 in present study. Asymptomatic MD is less common in extremes of age (Table 1).

Table 1: Symptomatic and asymptomatic patients in different age groups.

Age group in years	Symptomatic patients	Percentage of symptomatic patients	Asymptomatic patients	Percentage of asymptomatic patients
0-10	7	30.5	11	10.8
11-20	5	21.7	26	25.5
21-30	3	13.0	23	22.5
31-40	4	17.4	18	17.6
41-50	3	13.0	16	15.7
51-60	1	4.4	6	5.9
>60	0	0	2	2.0
Total	23	100	102	100

Out of 23 symptomatic cases maximum patients presented with bowel obstruction (39%) in the form of band, intussusception or Littre's hernia which was followed by bleeding (35%).

Complications like Meckel's diverticulitis, peptic ulcer and umbilical sinus were more common in early age whereas intestinal obstruction was more common in adult age (Table 2).

Table 2: Spectrum of complications in different age groups.

	0-10 years	11-20 years	21-30 years	31-40 years	41-50 years	51-60 years	> 60 years
Meckel's diverticulitis	1	2	0	0	0	0	0
Umbilical sinus	1	0	0	0	0	0	0
Peptic ulcer syndrome	4	3	1	0	0	0	0
Diverticular or ileal perforation	0	0	0	2	0	0	0
MD with fibrous band	0	0	0	2	2	0	0
MD with intussusception	1	0	2	0	0	0	0
MD lipoma with intussusception	0	0	0	0	0	1	0
Littre's hernia	0	0	0	0	1	0	0

All the surgeries were done by open method. In the symptomatic group maximum (18) cases underwent resection and end to end anastomosis (78.3%) including the case of Littre's hernia. Simple diverticulectomy in 2 cases, ileostomy in 2 cases and omphalectomy with

resection anastomosis in the umbilical sinus case were the other operations contemplated.

In asymptomatic group maximum (59) cases were not operated (57.8%) due to wide based (>2cm diameter) or short MD (<2cm height). Prophylactic removal of MD was done if it was narrow necked or elongated to avoid future complications; 27 cases (26.5%) underwent resection and anastomosis and 16 cases (15.7%) underwent simple diverticulectomy. We could not perceive the induration or thickening of wall to be correlated with histological findings of ectopic mucosa.

Histologically ileal mucosa was present in most cases along with other ectopic mucosa. In symptomatic group, the gastric mucosa was more common ectopic tissue (43.5%) followed by pancreatic mucosa (8.7%). In asymptomatic group, some MD also contained ectopic mucosa but most cases had ileal mucosa (Table 3).

Table 3: Heterotropic tissue in symptomatic and asymptomic MD.

	Gastric	Duodenal	Pancreatic	Colonic	Jejunal	Hepatobiliary	Endometrial	Lipomatous	Indigenous (Ileal)
Symptomatic MD (n=23)	10 (43.5%)	0	2 (8.7%)	1	0	0	0	1	19 (82.6%)
Asymptomatic MD (n=43)	3 (7%)	1	1	1	2	0	0	0	42 (97.7%)

Among the 23 symptomatic cases after surgery one patient (4.3%), in which gangrenous small gut was detected intra-operatively and ileostomy was done, died on 4th post-operative day. Two patients (8.7%) developed fecal peritonitis and anastomotic leak, one presented with peritonitis and another with fistula on 5th and 7th post-operative day respectively. First one died after relaparotomy in the same hospitalized period compounding to mortality of 8.7% and the other was controlled with conservative management. Another case (4.3%) developed sub-acute intestinal obstruction due to narrowing of ileum at the diverticular site compounding to the morbidity rate of 8.7%.

Among the asymptomatic cases operated one out of 16 simple diverticulectomy developed sub-acute intestinal obstruction after 6 months and one out of 27 resection anastomosis developed anastomotic leak on 7th day compounding to two out of 43 (4.6%) complications but without any mortality. One out of 59 (1.7%) cases left as such without intervention presented with Meckel's diverticulitis after one year.

DISCUSSION

MD, the most common congenital anomaly of small intestine, represents the patent intestinal end of the vitello intestinal duct. It occurs in 2% of population and usually lies 60cm proximal to the ileocecal junction.[4] It is a true diverticulum located mostly in the anti-mesenteric border of ileum having a separate blood supply from the adjacent small bowel mesentery, the omphalomesenteric artery or vitelline artery. In about 60% cases the mucosa contains heterotopic epithelium namely gastric (over 60%), pancreatic, duodenal and sometimes colonic, hepatobiliary and endometrial.[5] A male to female prevalence ratio of 3:2 has been reported.[5] According to some authors MD occurs with equal frequency in both sexes, symptoms predominantly occur in males.[6-7]

Incidence of MD in present study was found to be 3.4% of all laparotomy cases with a male preponderance. Most studies suggest an incidence between 0.6 to 4%.[7] Symptomatic MD is more common in children and its incidence decreases as the age advances.

Michas and his colleagues reported an incidence of complications varying from 25% to 33% but in the recent literature it ranges from 4%-16%.[6,7] In this study 23 out of 125 cases (18.4%) were having complications like study by Mackey et al.[8] Meckel reported an incidence of about 25%.[9] Presentation as small bowel obstruction is commonest followed by bleeding.

Complications like Meckel's diverticulitis, peptic ulcer and umbilical sinus are more common in children less than 10 years of age whereas intestinal obstruction is more common in adults in our series comparable to some studies but in contrast to Mayo experience where it is reverse.[2,10] In a review article obstruction as a complication in adults varies from 14-53%.[7] Wide mouthed and short MD is considered as innocuous and can be left as such if accidentally found during laparotomy. Only 1.7% of such cases in this study presented with diverticulitis after one year. In Mayo

clinic experience the incidental MD can be selectively removed that has any of the four features namely age <50 years, male sex, length >2cm and histologically abnormal tissue.[2] In a similar earlier study younger than 40 years instead of 50 years was at risk.[8] According to Bani-Hani young age but not the male sex, long and narrow (< or = 2cm diameter) diverticulum and heterogenous tissue are significantly associated with complications.[3]

In asymptomatic patients, most preferred segmental resection rather than diverticulectomy alone in our series. As per Mayo group if ectopic tissue is not palpable simple diverticulectomy will be sufficient.[2] In symptomatic patients it is better to go for segmental resection of the part of ileum that contains it, because ectopic gastric mucosa is common and may lie at its base near its origin that may cause peptic ulcer later.

In symptomatic cases, gastric ectopic mucosa is more commonly associated and in asymptomatic cases ileal mucosa in this study. Due to pluripotent cell linings of vitelline duct various ectopic mucosae can be seen in all parts of MD including its junction with ileum and complications are more with their presence. So, simple transverse resection is not recommended in short MD.[11]

Among the symptomatic group mortality was 8.7% and morbidity was 8.7%. Mackay found 10.3% mortality and 17.6% morbidity in his study.[8] In the operated group of asymptomatic cases there was 4.6% complications but with no mortality. Cullen observed mortality, morbidity and long-term complication rate of 2%, 12% and 7% respectively in symptomatic cases and 1%, 2% and 2% respectively in asymptomatic cases.[12] One out of 59 cases (1.7%) not operated on MD presented with symptom after 1 year.

According to Stone et al incidental removal of asymptomatic diverticula in adults, particularly in women, is not recommended because complications directly attributable to diverticulum removal are although uncommon those that do occur are often life threatening.[13]

In mayo clinic experience surprisingly mortality and morbidity were more in asymptomatic group, but they could not correlate that to diverticulectomy alone and thus recommended diverticulectomy in that group.[2] Some studies abandoned incidental diverticulectomy in adults due to comparatively higher mortality and morbidity[10,14] whereas Cullen and Matsagas recommended removal of incidental MD safely regardless of age.[12,15]

CONCLUSION

Although its incidence is low MD must be searched for in all abdominal emergency cases. Males suffer more than females from MD pathology. MD causing disease is least in old age. When it presents clinically is always associated with complications.

Most common presentation is intestinal obstruction in adults and peptic ulcer or diverticulitis in children. Normal ileal mucosa is most common, but in symptomatic cases gastric mucosa is the commonest heterotropism. Segmental resection and end to end anastomosis of ileum is the best mode of management of symptomatic MD if the general condition permits. Incidentally detected MD in early age with narrow base and long length needs to be removed.

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