Various presentations of Meckel's Diverticulum

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Background – Meckel's diverticulum is very difficult to diagnose. The aim of this study was to study the various presentations of Meckel's diverticulum in TUTH in one year.
Methods – Retrospective study of nine patients admitted from emergency in one year data was done.
Result - In acute abdomen we have to think about Meckel's diverticulum and its complications. The diagnosis of symptomatic Meckel's diverticulum is difficult to make, especially in adults. The diagnosis must be considered in anyone with unexplained abdominal complaints, nausea and vomiting, or intestinal bleeding.

Introduction

Although Meckel's diverticulum is the most prevalent congenital abnormality of the gastrointestinal tract, it is often difficult to diagnose. It may remain completely asymptomatic, or it may mimic such disorders as Crohn's disease, appendicitis and peptic ulcer disease. Ectopic tissue, found in approximately 50 percent of cases, consists of gastric tissue in 60 to 85 percent of cases and pancreatic tissue in 5 to 16 percent. The diagnosis of Meckel's diverticulum should be considered in patients with unexplained abdominal pain, nausea and vomiting, or intestinal bleeding. Major complications include bleeding, obstruction, intussusception, diverticulitis and perforation. The most useful method of diagnosis is with a technetium-99m pertechnetate scan, which is dependent on uptake of the isotope in heterotopic tissue. Management is by surgical resection.

Patients and methods

This is retrospective study of nine patients. Data were collected from surgeons and pathologists report. Demographic data, clinical presentation, preoperative diagnosis, intraoperative findings, surgical procedure performed, histopathological report and postoperative follow up of patients were recorded from hospital record book. All patients were admitted from emergency. Most of the patients presented with symptoms of pain abdomen, vomiting and gradual distention of abdomen. After clinical examination and investigations, provisional diagnosis of acute appendicitis was made in two of patients, peritonitis due to perforated appendix in two patients, ileal perforation in three patients, and duodenal ulcer perforation in two patients. All patients were prepared for operation. Preoperative resuscitation was done. Prophylactic antibiotics (metronidazole and ciprofloxacin) were given in all cases. Midline laparotomy was performed under general anaesthesia. Postoperative follow up was done up to six weeks. Histopathological report was collected in six patients where as in two cases it was missing.

Result

However peroperative findings was Meckel's diverticulitis in two patients , perforation at the base of Meckel's diverticulum in four patients, internal herniation in one patient and small bowel volvulus around fibrous band joining the Meckel's diverticulum to anterior abdominal wall in two patients. In last three cases ileum was gangrenous. Diverticulectomy with wedge resection was done in six patients and segmental resection of gangrenous ileum followed by anastomosis was done in last three cases. Distance of Meckel's diverticulum from ileocaecal junction was ranging from 40 - 80 cm. postoperative follow up was done for 6 weeks. Postoperative period was uneventful except in last case. In last case there was wound infection, which was treated by daily dressing and antibiotics. Hospital stay was ranging from 3 – 10 days. Histopathological report was suggestive of gastric mucosa in five cases, pancreatic tissue in 1 case and data was missing in three patients.

Discussion

Meckel's diverticulum is a true intestinal diverticulum that results from the failure of the vitello-intestinal duct to obliterate during the fifth week of fetal development. It contains all normal layers of the intestinal wall and, in approximately 50 percent of cases, contains tissue from other sites (ectopic tissue)[1]. This ectopic, or heterotopic, tissue can often be the cause of complications occurring in Meckel's diverticulum. Meckel's diverticulum occurs in about 2 percent of the population, making it the most prevalent congenital abnormality of the gastrointestinal tract. Even so, it can be difficult to diagnose. It can be asymptomatic or mimic common abdominal disorders such as Crohn's disease, appendicitis and peptic ulcer disease. Many primary care physicians have never seen a patient with this abnormality, and the management involves a sometimes-controversial decision about whether to surgically remove an incidentally discovered Meckel's diverticulum.

Diagnosis

The diagnosis of symptomatic Meckel's diverticulum is difficult to make, especially in adults. The diagnosis must be considered in anyone with unexplained abdominal complaints, nausea and vomiting, or intestinal bleeding. Meckel's diverticulum can mimic a variety of more common ailments, such as peptic ulcer disease, gastroenteritis, biliary colic, colonic diverticulitis and milk allergy. Appendicitis is the most common preoperative diagnosis in cases of complicated Meckel's diverticulum[2].

The diagnosis cannot be made with plain radiographs, and arteriography is not always diagnostic because arterial supply is not always abnormal. Contrast studies such as upper gastrointestinal series with small bowel follow-through are of limited value because the layers of barium-filled intestine will obstruct the view of the diverticulum[2].Computed tomographic scans are often nonspecific but occasionally helpful. The most useful method of detection of a Meckel's diverticulum is technetium-99m pertechnetate scanning. However, the technetium scan depends on uptake by heterotopic gastric mucosa. Not all diverticula contain ectopic tissue; because complications such as bleeding are often caused by ectopic gastric tissue, diagnosis may be assisted in symptomatic cases. In technetium-99m pertechnetate scanning, technetium-99m pertechnetate is injected intravenously; over time, it accumulates in the gastric mucosa.

In children, the scan has a sensitivity of 85 percent and a specificity of 95 percent, but in adults, the sensitivity falls to 62.5 percent and specificity to only 9 percent[3]. Many conditions can cause a false-positive diagnosis in adults: mucosal hyperemia of any cause, angiomas, urinary tract obstruction, an ectopic kidney or uterine pooling of blood. False-negative results are less common but causative conditions include impaired vascular supply, recent barium gastrointestinal study, premedication with atropine, a small diverticulum or hemorrhage washes out the isotope. The accuracy of the scan can be improved with the use of pentagastrin, which increases technetium uptake in gastric mucosa; however, it may also increase the washing away of the isotope by stimulating peristalsis. Cimetidine (Tagamet) improves diagnostic accuracy by inhibiting the intraluminal release of technetium, and glucagon does so as an antiperistaltic. A combination of pentagastrin and glucagon can be used to increase the uptake of the isotope and cease peristalsis simultaneously. When the Meckel's scan is nondiagnostic or in patients with non-bleeding presentations, ultrasonography is perhaps the most useful noninvasive method of achieving diagnosis.

Management

The approach to treatment of a Meckel's diverticulum depends on whether it was discovered incidentally or as a result of symptoms. Ileal resection has traditionally been the treatment of choice for asymptomatic diverticulum, because the extent of heterotopic tissue and disease cannot be determined by palpation, and ulcerations can recur if the ectopic tissue persists. Ileal resection permits the removal of any damaged tissue, inflammation and ectopic tissue.

Perhaps the most controversial area of management with regard to Meckel's diverticulum has been the asymptomatic patient with an incidentally discovered diverticulum. Strategies that have taken into account factors such as the age and sex of the patient, the length of the diverticulum and the diameter of the mouth or base of the diverticulum have proved to be ineffective in assisting the decision to prophylactically remove this congenital developmental variant[4].

A physician can choose to leave the incidentally discovered diverticulum or perform a simple diverticulectomy or an ileal resection. Some physicians have voiced concern that ectopic tissue may be left behind if ileal resection is not performed; however, because the ectopic tissue is generally found at the distal end of the diverticulum, it will usually be included in the excised diverticulum. If the diverticulum is left intact, any fibrous bands attached to the diverticulum must be excised to prevent any future torsion or obstruction.

Researchers involved in the previously mentioned 15-year retrospective chart review concluded that prophylactic diverticulectomy is unwarranted because the likelihood that an asymptomatic diverticulum will become symptomatic is low (about 4.2 percent), and that rate decreases with age. However, several factors now lend support to the concept of prophylactic diverticulectomy[5].

Another previously mentioned study did not support the theory that the incidence of complications from Meckel's diverticulum decreases with age. Once a Meckel's diverticulum develops complications and is surgically removed, the operative mortality, morbidity and cumulative long-term risk of postoperative complications are 2 percent, 12 percent and 7 percent, respectively. For Meckel's diverticula that are incidentally discovered and removed, the corresponding rates are 1 percent, 2 percent and 2 percent, respectively.

Laparoscopy can be useful in the diagnosis and treatment of Meckel's diverticulum. In addition, the laparoscope can be used to remove an incidentally discovered diverticulum. The literature has also reported the successful use of laparoscopic diverticulectomy in infants with bleeding Meckel's diverticulum. Also, the now-proven safety and ease of the gastrointestinal stapling device have made this an acceptable tool in simple, uncomplicated diverticulectomy, provided the diverticulum fits easily in the device. In this technique, the mouth of the diverticulum is stapled before the diverticulum is removed; this allows the diverticulectomy to be performed without opening the bowel's lumen, which lowers the chances of contamination. Opponents of prophylactic diverticulectomy have addressed the morbidity and mortality that occur in incidental resection.

Complication

As stated earlier, a person with Meckel's diverticulum has a 4 to 6 percent lifetime risk of developing a complication. The major complications are hemorrhage, obstruction, intussusception, diverticulitis and perforation. Bleeding is

the most common complication occurring in children, and it typically presents as hematochezia. The hemorrhage is a result of heterotopic gastric mucosa leading to ulceration. Most adults present with obstruction, diverticulitis or both. Obstruction is often caused by fibrous bands attached to the diverticulum, as seen in the illustrative case.

This illustrative case demonstrates a rare phenomenon of axial torsion of the diverticulum, resulting in a compromised blood supply and gangrene. This condition could be considered a severe form of diverticulitis. Less frequently, fistulas can form in the presence of perforation, especially in association with Crohn's disease. However, there is not an increased incidence of Meckel's diverticulum in patients with Crohn's disease. A Meckel's diverticulum can also be part of the contents of a Littre's or diverticular hernia.

Conclusion

Meckel's diverticulum is most common congenital abnormality of gastrointestinal tract. In children most common presentation is bleeding per rectum whereas in adults it presents as intestinal obstruction, peritonitis due to perforated Meckel's diverticulum or as acute appendicitis. In children we can diagnose Meckel's diverticulum but it is difficult to diagnose in adults. So in all acute abdomen, we have to think about Meckel's diverticulum and its complications.

Table 1: Demographic data and clinical presentation of patient

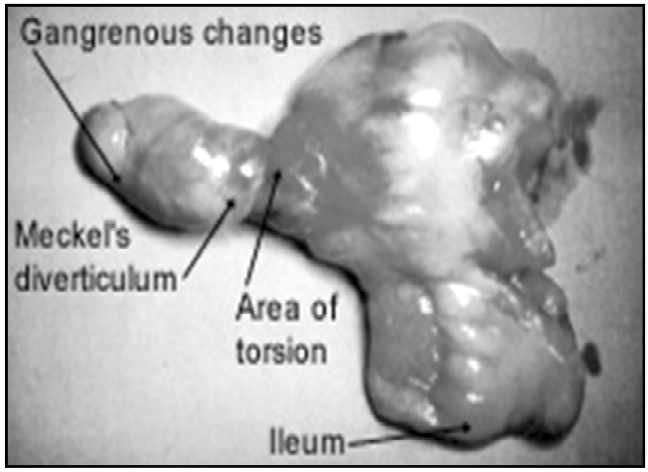
Demographic data of patients	
Total number of patients	9
Male / female ratio	4 / 5
Age (years)	16 – 35
Clinical presentation	
Pain abdomen	8
Vomiting	7
Distention of abdomen	5

Table 2: Preoperative diagnosis and preoperative findings of patients

Preoperative diagnosis	
Acute appendicitis	2
Perforated appendix	2
Ileal perforation	3
Duodenal ulcer perforation	2
Peroperative findings	
Meckel's diverticulitis	2
Perforation	4
Small bowel volvulus	2
Internal herniation	1

Table 3: Surgical procedure performed and histopathological report of patients

Surgical procedure performed	
Meckel's diverticulectomy with wedge resection	6
Resection and anastomosis of small bowel	3
Histopathological report	
Gastric tissue	5
Pancreatic tissue	1
Data missing	3



Gross specimen of Meckel's diverticulum removed from patient in illustrative case.

References

1. Yahchouchy EK, Marano AF, Etienne JC. Meckel's diverticulum. *J Am coll surg* **192**:658-662, 2003.
2. Rossi p, Gourtsoyiannis N, Bezzi M. Meckel's diverticulum:imaging diagnosis . *Ajr Am j Roentgenol* **166**:567-573, 1996.
3. Sanders LE. Laparoscopic treatment of Meckel's diverticulum: Obstruction and bleeding management with minimal morbidity.Surg Endosc **9**:724-727, 1995.
4. Groebli Y, Bertin D, Morel P. Meckel's diverticulum in adults: retrospective analysis of 119 cases and historical review. *Eur j Surg* **167**:518-524, 2001.
5. Cullen jj, Kelly KA, Moir CR. Surgical management of Meckel's diverticulum: An epidemiologic, Population based study. *Ann Surg* **220**:564-569, 1994.
6. Soltero Mj, Bill AH. The natural history of Meckel's diverticulum and it's relation to incidental removal: A study of 202 cases of diseased Meckel's diverticulum found in King county . *Am j Surg* **132**: 168-173, 1976.