

# Meckel's diverticulum

## What is Meckel's diverticulum?

This is the vestigial remnant of the vitellointestinal duct. It is the most frequent malformation of the gastrointestinal tract. If present, it is located in the distal ileum, usually within 100 cm of the ileocaecal valve

For medical students, Meckel's diverticula are said to 'obey the rule of 2s' - ie it is present in 2% of the population; it is symptomatic in 2% of those with it; children are usually less than 2 years old; males are twice as common as females; it is found approximately 2 feet proximal to the ileocaecal valve; it is 2 inches long or less and it has 2 types of mucosal lining.<sup>[1]</sup>

## How common is Meckel's diverticulum?<sup>[2]</sup>

Autopsy records show an incidence of about 0.3-2.9% in the general population. For symptomatic diverticula, studies show a 1-4:1 male-to-female ratio and a predisposition to younger ages.

The lifetime risk of complications is around 4%, maximal at 2 years of age, around 1% aged 40 years and decreasing towards zero by age 70.<sup>[3]</sup>

## Meckel's diverticulum symptoms (presentation)<sup>[1]</sup> <sup>[2]</sup>

### Asymptomatic

Meckel's diverticulum is a common incidental finding at laparotomy. The vast majority of those with Meckel's diverticulum are asymptomatic. Complications are most likely to occur when the diverticulum contains heterotypic tissue. This is most often gastric, but may also be pancreatic, jejunal or colonic mucosa. The lifetime risk of developing a complication that requires surgery is thought to be 4-6%.

### Haemorrhage

This accounts for 25–50% of all complications. It is more common in children younger than 2 years (in which age group it is the most common complication) and in males. The patient usually reports bright red blood in the stools. The amount may vary from minimal recurrent episodes to a large shock-producing haemorrhage. Meckel's diverticulum should always be excluded in a child presenting with massive painless rectal bleeding.

The blood may be bright red if the bleeding is brisk, or darker if it is milder and transit time is slow. Melaena-like tarry stool may also be seen if gastric tissue present in the diverticulum ulcerates, or if it produces acid which causes damage to the adjacent ileal mucosa.

### **Intestinal obstruction**

This presents in 10–43% of symptomatic patients. The frequency of complications of Meckel's diverticulum varies widely in the literature. Studies varyingly report intestinal obstruction or haemorrhage as the most common complication in adults.

The presenting symptoms are usually abdominal pain, vomiting and constipation. Various mechanisms produce the obstruction, including a fibrotic band attaching the diverticula to the abdominal wall causing a volvulus of the small bowel and intussusception in which the diverticulum is the lead point. An intussusception may present with redcurrant jelly stools or a palpable lump in the lower abdomen.

### **Diverticulitis**

Symptoms include diarrhoea, abdominal cramps and periumbilical tenderness. The pain may be anywhere in the abdomen but, when located in the right iliac fossa can mimic appendicitis ('Meckel's diverticulitis'). This can go on to cause adhesions, leading to obstruction.

### **Perforation**

This can occur spontaneously or due to a foreign body such as a fish bone.

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### **Umbilical anomalies**

Anomalies may include fistulas, cysts, sinuses and fibrous bands between the diverticulum and the umbilicus. There may be a history of recurrent infection, chronic sinus formation, abdominal wall abscess formation and infection or excoriation of the periumbilical skin.

## Neoplasm

This is extremely rare and has been reported in approximately 0.5–5% of complicated diverticula. Various types of tumour can occur, including sarcoma, leiomyoma, leiomyosarcoma, carcinoid and fibroma.

## Miscellaneous

Other complications that have been reported include the formation of stones and phytobezoar, vesicodiverticular fistulas and 'daughter diverticula' (formation of a diverticulum within a Meckel's diverticulum).

## Investigations<sup>[4]</sup>

The diagnosis of Meckel's diverticulum is often very challenging but should always be considered in the differential diagnosis of patients presenting with GI bleeding or intestinal obstruction.

Investigations are dictated by the type of complication. For paediatric patients presenting with haemorrhage and a suspected Meckel's diverticulum, technetium-<sup>99m</sup> pertechnetate scintigraphy is the modality of choice, but this is less sensitive in adults.<sup>[5]</sup>

In cases of Meckel's diverticulum causing intestinal obstruction, the diagnosis is rarely made pre-operatively. If an enterolith is present in the diverticulum it can sometimes be detected on plain abdominal X-ray. Meckel's diverticulum is difficult to see on CT scan but routine scanning during investigation of the obstruction may reveal a [volvulus](#), [intussusception](#) or a true knot.

Neoplasms are rare and the chances of detecting them on imaging are small. A large tumour will sometimes be seen on scintigraphy, CT scanning or in barium studies.

Investigations are tailored to the requirements of the individual patient and barium studies and ultrasonography are sometimes employed in all these situations to clarify equivocal findings or as less invasive investigations in paediatric patients.

One study reported the use of wireless capsule endoscopy to detect Meckel's diverticulum in children.

# Meckel's diverticulum treatment and management<sup>[6] [7] [8]</sup>

Complications such as haemorrhage, diverticulitis, intestinal obstruction and umbilico-ileal fistulas are absolute indications for resection.

Management of coincidentally discovered Meckel's diverticulum remains controversial.

In asymptomatic individuals, current recommendation is to resect a diverticulum discovered incidentally if there is a higher risk of complication, such as:<sup>[6]</sup>

- Patients aged younger than 50.
- Diverticula longer than 2 cm.
- Diverticula with narrow necks.
- Diverticula with fibrous bands.
- Suspected ectopic gastric tissue.
- Inflamed, thickened diverticula.

For a symptomatic Meckel's diverticulum, laparoscopic (or laparoscopically-assisted) resection has been shown to be safe, less invasive and more cost-effective than laparotomy.<sup>[9]</sup> It may be necessary to convert to laparotomy.

## Postoperative complications

These are not uncommon. Complications of surgery were reported in 5.5% of symptomatic patients in one 2020 review.<sup>[10]</sup> Possible complications include bleeding, ileus, suture line or intestinal anastomotic leak, intra-abdominal abscess or [pulmonary embolism](#).

Late postoperative complications include intestinal adhesions leading to small bowel obstruction.

# History<sup>[1]</sup>

In 1809, Johann Friedrich Meckel published a paper concerning a diverticular remnant of the omphalomesenteric duct sited at the ileum. The document was quite detailed and included a description of the anatomy and embryonic origin. It thus came to be known by his name, although it was first described as an unusual diverticulum of the small intestine by Fabricius Hildanus in 1598.

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