abstract

The omphalomesenteric duct (OMD), a temporary structure essential to fetal development, normally involutes completely by week 8 or 9 of gestation. On occasion, the OMD persists, the clinical presentations of which vary widely. We describe a case of a 6-week-old male with a patent OMD remnant that was initially treated as an umbilical granuloma, which then potentially allowed for prolapse of the small bowel through the umbilical ring. The patient required resection of the incarcerated bowel but had an otherwise uneventful and complete recovery. Pediatrics 2012;130:e1708–e1710

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KEY WORD
umbilical evisceration

ABBREVIATION
OMD—omphalomesenteric duct

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The omphalomesenteric duct (OMD), also known as the vitelline duct, is a structure present in normal fetal development. Early in gestation, it connects the yolk sac to the primitive gastrointestinal tract in the developing embryo. The OMD is expected to completely involute by week 8 or 9 of gestation, after which no remnant should persist.\textsuperscript{1,2} OMD remnants occur in \textasciitilde2\% of the population, a number that is likely a conservative estimate because many cases are asymptomatic.\textsuperscript{3,4} There is no known genetic or environmental cause or gender predilection,\textsuperscript{2} although in many reports there is a male predominance of symptomatic cases.\textsuperscript{3–5}

We report a case of an infant with small bowel evisceration through a patent OMD remnant in whom a suspected umbilical granuloma was first cauterized twice with silver nitrate. There are many previous reports in the literature of bowel evisceration through a patent OMD,\textsuperscript{6–8} however, to the best of our knowledge, this is the first case report of small bowel prolapse after treatment of a benign-appearing external umbilical mass.

CASE REPORT

A 43-day-old term male infant was transferred to our emergency department with apparent eviscerated small bowel protruding through the umbilicus. A prominent umbilical stump with an underlying red hue was noted at birth and had been slowly increasing in size during the following weeks. His primary pediatrician applied silver nitrate twice to the umbilicus at the 2 previous office visits for treatment of a suspected umbilical granuloma.

On the evening of presentation, our patient had taken a normal feeding and had begun to cry \textasciitilde1 hour later. His parents opened his diaper and found moist, tubular structures emerging from his umbilicus. There was no history of difficulty feeding, vomiting, abnormal stools, drainage from the umbilicus, or fever. The infant was born via cesarean delivery to a paraplegic mother; his prenatal and birth history was otherwise unremarkable.

On arrival to our emergency department, the patient was afebrile, with a heart rate of 150 beats per minute, a respiratory rate of 42 breaths per minute, and an oxygen saturation of 100%. His weight was 3.8 kg (sixth percentile for age). On examination, he was alert, had a vigorous cry, and was well appearing. His abdomen was soft and nondistended, without a scaphoid appearance. Two dark-red, dusky, moist, elongated masses with blind ends emerged from the umbilicus (Fig 1). His capillary refill was \textasciitilde2 seconds, and he had moist mucous membranes. Results of the cardiopulmonary examination were normal. An abdominal radiograph demonstrated a normal bowel gas pattern.

The presumptive diagnosis of an OMD remnant with evisceration of small bowel was made. Our patient was taken emergently to the operating room for an exploratory laparotomy where it was confirmed that the ileum had intussuscepted through a Meckel’s diverticulum. The Meckel’s diverticulum communicated to the umbilicus through an OMD remnant, which was patent to the outside, thus allowing the bowel to eviscerate. The segment of small bowel that prolapsed through the umbilical ring was incarcerated and required resection. A total of 25 centimeters of small bowel was resected, which included the Meckel’s diverticulum. The patient had an uncomplicated postoperative course and was discharged from the hospital after 6 days.

DISCUSSION

OMD remnants are uncommon and the result of a partial or complete failure of the OMD to involute. The clinical presentation of symptomatic OMD remnants is dependent on the location and degree of duct patency. Persistent tissue exclusively at the ileal end with no connection to the umbilicus results in a Meckel’s diverticulum, an entity well described in the medical literature. Meckel’s diverticulum most often present as painless rectal bleeding due to ectopic gastric mucosa. A patent duct in the middle section with closure at both the umbilical and ileal ends results in an OMD cyst. Complete patency of a duct remnant results in a fistula from the umbilicus to the terminal ileum and commonly presents as drainage, often fecal, from the umbilicus.\textsuperscript{9,10} Fibrous bands that attach to the anterior abdominal wall occur when an OMD is present but not patent, and can cause small bowel obstruction.\textsuperscript{11} An OMD remnant may also be present as an umbilical polyp, which appears as red mucosa in the umbilical dimple. Although these are usually independent anomalies, umbilical polyps may connect to deeper structures.\textsuperscript{5} Of these possible anomalies, Meckel’s diverticula are by far the most common type of OMD remnant. Our patient’s presentation (ie, a patent OMD) occurs infrequently, accounting for only \textasciitilde5\% of all OMD anomalies.\textsuperscript{2}

The case studies in the literature illustrate this wide spectrum of presentation. In 1 series of 217 cases of OMD remnants, 40% of the lesions were symptomatic; the remaining 60% were found incidentally during laparotomy.\textsuperscript{5}
Of the symptomatic lesions, the most common presenting symptoms were painless rectal bleeding, obstruction, abdominal pain, and umbilical drainage. In a more recent study looking at only symptomatic lesions, the most common presenting symptoms were obstruction, abdominal pain, and umbilical anomalies. Symptomatic lesions tend to present earlier in life but are reported well into adolescence and adulthood. Small bowel obstruction can occur due to a wide range of OMD pathologic conditions. This is most often due to a Meckel’s diverticulum as the lead point of intussusception or fibrous bands that result in volvulus, direct bowel compression, or internal hernias. In our case, this particular presentation with evisceration of small bowel through the umbilical ring has been reported to occur but is extremely uncommon.

Our patient’s umbilical mass was initially but incorrectly thought to be an umbilical granuloma and was treated as such with 2 separate applications of silver nitrate by the primary pediatrician. Umbilical granulomas are the most common cause of umbilical masses. They form during the first weeks of life at the base of the umbilicus after cord separation, appear moist and pink, and range in size from 1 to 10 millimeters. In contrast, umbilical polyps are described as bright red, are often larger, contain gastric or intestinal tissue, and do not resolve with the application of silver nitrate. In 1 report, there was a 30% to 60% chance that another part of the OMD was present when a true umbilical polyp was seen. It is unclear whether our patient had external evidence of an OMD remnant before the prolapso of bowel; however, the diameter of the patent duct was possibly increased by the silver nitrate applications. This increase in diameter of the persistent OMD may have allowed the intestine to intussuscept, first through the Meckel’s diverticulum and then through the patent duct that connected the Meckel’s diverticulum to the umbilicus.

Symptomatic OMD remnants require surgical excision. The diagnosis is often not confirmed until surgery is performed and the exact anatomy of the umbilicus and its relation to the gastrointestinal tract is established; ultrasound and/or injection of contrast into a suspected sinus or fistula may be able to delineate the anatomy before surgery, however. A fistulogram can also discern between an intra-peritoneal communication with the bowel or an extraperitoneal connection to the urinary tract. This contrast study would help differentiate between an OMD remnant and a patent urachus, another embryologic remnant that connects the bladder to the allantois early in gestation. Urachal abnormalities will present as umbilical drainage, mass, or pain; they also have the potential for serious complications but are less likely than OMD remnants to be a surgical emergency.

CONCLUSIONS

Because of their wide breadth of presentation and low incidence, OMD remnants should be included in any differential diagnosis of umbilical anomalies. This recommendation may be particularly salient for the general pediatrician who frequently encounters neonates and infants with benign-appearing umbilical masses. We would encourage the consideration of an OMD remnant for any patient who has an umbilical mass that does not respond to silver nitrate cauterezation or appears more erythematous than the typical umbilical granuloma, or with umbilical drainage of any kind. If available, an urgent surgical evaluation and abdominal ultrasound is recommended.

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