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*Case Study*

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# Patent Omphalomesenteric Duct: Case Presentation And Literature Review

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The most frequent malformations of the umbilical region include urachal abnormalities and persistent omphalomesenteric duct anomalies. These are caused by the failure of the vitelline duct and midgut junction to obliterate following the 5th to 9th weeks of gestation.

1. This failure can lead to various congenital anomalies of the yolk sac, with Meckel's diverticulum being the most common anomaly, presenting an incidence of 2%–4% in the general population.
2. The case of a newborn male patient with persistence of the omphalomesenteric duct is described below.

**Clinical Case**

The patient was a 12 hour old newborn, born at term at 40 + 5 weeks of gestation. He was the product of a first pregnancy from an 18 year old mother. The final prenatal ultrasound reported: gestational age of 34 + 3 weeks, single fetus, cephalic presentation, weight 2285 g, anterior placenta, and normal amniotic fluid index (AFI). No prenatal abnormalities were noted during the prenatal care. Delivery was vaginal with clear amniotic fluid, APGAR score of 9/10, birth weight of 3115 g, and early spontaneous meconium.

The pediatric surgery service was consulted due to the apparent discharge of intestinal material through the omphalus.

Upon evaluation, the physical examination revealed a patient in very good general condition, without supplementary oxygen, presenting intestinal material discharge through an open intestinal mucosa at the omphalus (Image 1).

The patient was scheduled for surgery. A transverse laparotomy was performed, revealing a congenital anatomical malformation located on the antimesenteric border of the distal ileum, approximately 30 cm from the ileocecal valve. This corresponded to a persistent omphalomesenteric duct extending toward the remnant of the umbilical cord. A 2 cm intestinal segment was resected, followed by an end-to-end ileal anastomosis.

The patient showed satisfactory progress, with resolution of postoperative ileus, and was discharged without complications.

The hospital echocardiography showed: patent ductus arteriosus (PDA) with a left-to-right shunt, measuring 1.5 mm in diameter, right ventricular dilation and hypertrophy, and a patent foramen ovale.

The histopathological analysis of the resected specimen reported: A tubular structure lined with intestinal type epithelium and surrounded by the muscularis propia and serosa layers of the small intestine.

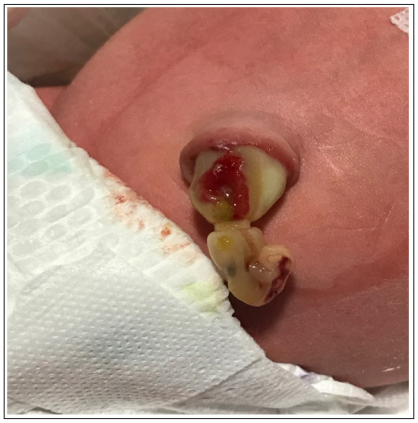

**Figure 1:** Intestinal loop through the omphalus with discharge of intestinal material.

**Discussion**

The persistence of the omphalomesenteric duct also defined as the vitelline duct or fistulous tract is the result of a congenital anomaly caused by the failure of the duct connecting the yolk sac to the embryonic midgut to obliterate [1-3].

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**Embryology**

The embryonic communication known as the omphalomesenteric duct contains vessels that supply the embryo until the placenta is formed [4]. At the sixth week of embryonic life, the intestine protrudes through the umbilical cord, rotating 90° counterclockwise. At this point, the omphalomesenteric duct should involute, transforming into a fibrous band that is subsequently reabsorbed. By the tenth week, the intestine returns to the abdominal cavity [3,5].

The omphalomesenteric duct is an embryological communication between the extraembryonic yolk sac and the primitive midgut, which normally involutes between the eighth and ninth weeks of fetal life (figure 1). When this failure occurs, it gives rise to a variety of malformations that typically present as anomalies of the omphalus, primarily in neonates. These can generate gastrointestinal tract complications such as obstruction, volvulus, hemorrhage, fecal/intestinal discharge, or secretion through it [2,6,7].

The congenital anomalies of the vitelline duct are described below:

- **Meckel's Diverticulum:** this is the most common anomaly, accounting for up to 67% of all congenital anomalies related to incomplete involution of the omphalomesenteric duct. It is typically located between 60 and 90 centimeters proximal to the ileocecal valve on the antimesenteric border [8,9]. It is a true diverticulum since it contains all layers of the intestinal wall. Additionally, it receives direct blood supply from the superior mesenteric artery. The differential diagnosis for this entity includes intestinal duplication or intestinal dysplasia, and the most common complication in the pediatric population is gastrointestinal tract hemorrhage. The preferred diagnostic method is Technetium 99 scintigraphy (Meckel's scan) [8,10,11]. The second most common complication is intestinal obstruction, which can be caused by intussusception, chronic diverticulitis, or enterolith impactation; the usual diagnostic method in children is an abdominal X-ray [2,4].
- **Enteroumbilical Fistula:** this represents complete patency of the omphalomesenteric duct (figure 2), which generally presents with the discharge of intestinal material and gas through the loop contained within the omphalus [7,9]. The diagnosis is clinical, although ultrasound and contrast fistulography can be used to identify the communication with the intestine [4,5]. Expectant behavior in these cases can trigger intestinal obstruction, volvulus, or ischemic complications when the ileum prolapses externally. Therefore, it always requires surgical resection with an end to end intestinal anastomosis, as performed in the case of the patient described [10,11].
- **Fibrous Band:** This occurs due to the obliteration of the omphalomesenteric duct without its complete reabsorption [10].
- **Vitelline Cyst:** also known as a central enterocystoma, it occurs when both ends of the omphalomesenteric duct close. It is more frequent in male children and is normally asymptomatic, but it can present as a firm, erythematous nodule at the umbilicus. It may occur in association with other remnants, such as omphalomesenteric duct bands, and cause intestinal obstruction secondary to volvulus [3,12].
- **Umbilical Polyp:** this occurs when the mucosa of the intestinal tract remains exposed at the umbilical level. It is one of the least common anomalies and consists of a remnant of ectopic intestinal epithelium at the umbilicus. They require surgical resection, a procedure during which potential fibrous bands or other remnants connecting to the ileum must be identified [6,12,13].
- **Sinus Tract:** This takes place when the proximal end attached to the ileum undergoes involution, but the distal end opening to the omphalus remains patent, which can generate mucoid secretions from the intestinal mucosa [2].

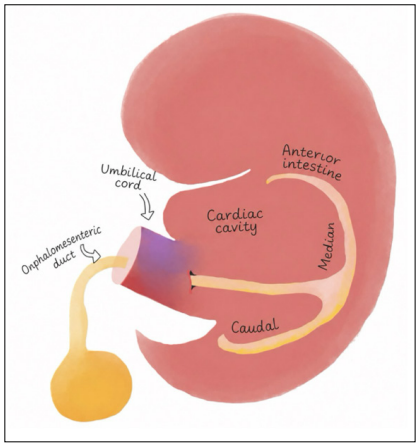


**Figure 2:** Embryological representation of the omphalomesenteric duct and its anatomical relationships (Illustration by Sofia Echavarría, UPB medical student).

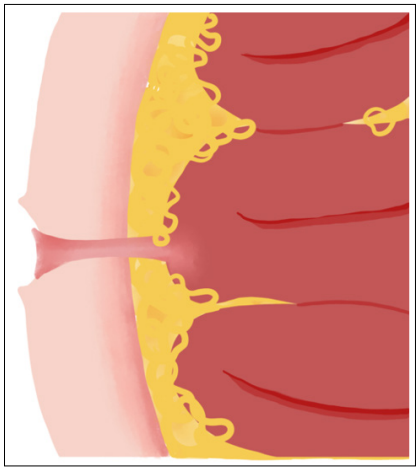

**Figure 2:** Patent omphalomesenteric duct (Illustration by Sofia Echavarría, UPB medical student).

**Conclusions**

The spectrum of congenital anomalies arising from the inadequate involution of the omphalomesenteric duct can lead to a wide variety of gastrointestinal tract complications. These range from localized abnormalities at the umbilical level during neonatal life to hemorrhage, obstruction, or even intestinal atresia in older children.

A patent omphalomesenteric duct is an uncommon anomaly with few cases reported in the literature.

Clinical suspicion is the primary key to diagnosing these pathologies.

Diagnostic imaging modalities such as ultrasound and contrast fistulograms are highly helpful. However, in the case discussed, they were unnecessary due to the direct visualization of intestinal material discharging through the omphalus, which provided a high index of clinical suspicion.

Surgical intervention will always remain the cornerstone of treatment. In older children, when performed in a timely manner, it prevents severe complications such as obstruction and even intestinal atresia.

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