

## CASE REPORT

# Obliterated, fibrous omphalo-mesenteric duct in an adult without Meckel's diverticulum or vitelline cyst

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### Abstract

Vitello-intestinal [omphalo-mesenteric duct (OMD)] connects the developing mid-gut to the primitive yolk sac, provides nutrition to the embryo and remains patent and connected to the intestines until the fifth to ninth week of gestational period. Varied remnants of the vitello-intestinal duct have been reported. The present case-report describes a completely obliterated fibrous remnant of the duct. The remnant presented as a thick cord extending from the umbilicus towards the terminal part of the ileum and beyond. The terminal part of the cord showed a few ramifications that ended in the mesentery. This embryological entity was not found to be associated with any other anomaly usually related to non-regression of the vitello-intestinal duct. Though very rare, the occurrence of such innocuous band of fibrous cord across the abdominal cavity may cause entanglement of intestinal loops around it. Possibility of such a situation should be suspected in an acute abdominal condition. The structure reported in this study might not be detected by investigations used to uncover common anomalies of patent vitello-intestinal ducts.

**Keywords:** vitello-intestinal duct, acute abdomen, Meckel's diverticulum, umbilical sinus, omphalo-umbilical cyst.

### □ Introduction

Persistent vitello-intestinal duct [omphalo-mesenteric duct] is a rare anomaly of the primitive yolk sac [1, 2]. The vitello-intestinal duct provides nutrition to the early developing embryo. The duct provides a communication between the primitive yolk sac on the ventral side of the embryo and the midgut loop through the umbilical coelome [2]. The duct lies in the axis of the herniating loop of the midgut and resembles an extension of the superior mesenteric artery towards and beyond the umbilicus. The vitello-intestinal duct gradually attenuates and involutes from the terminal part of the ileum by the 5<sup>th</sup> to 9<sup>th</sup> week of gestational period [1]. Remnants of the duct present as varied anatomical entities. The most common of presentation of a persistent duct (67%) is the Meckel's diverticulum found in approximately 2% of the population [1, 3]. The frequency of occurrence estimated at 2% of population is perhaps an overstatement [3]. Males present with a persistent duct thrice more commonly than the females. Though the Meckel's diverticulum is a part of the small intestine, 17% of them might present patches of gastric mucosa and rarely pancreatic islet tissues [4]. About 10% of the diverticula may be attached to the umbilicus with a fibrous cord [5]. In several cases, however, the fibrous cord is seen to regress leaving no trace of connection between the Meckel's diverticulum and the umbilicus [6]. A persistent OMD may also remain patent extending from the terminal ileum to the umbilicus and discharge fecal material at the umbilicus, forming a fecal fistula [7].

Several complications are encountered with the persisting duct in general or stereotypic problems related to

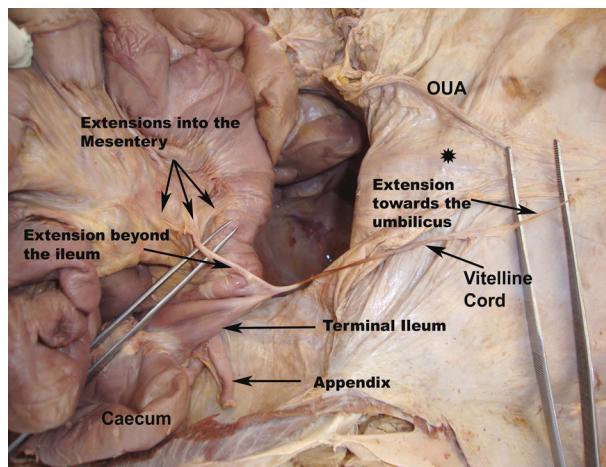
a particular variant of the remnant. Complications associated with a persistent omphalo-mesenteric duct are intestinal atresias, umbilical hernia, volvulus of the gut, cardiac malformation, cleft lip and palate, and exomphalos. Trisomy 13 and Down's syndrome have also been reported as possible etiological factors in the development of OMD remnants [8, 9].

Intestinal obstruction is reported to be the most serious complication of persistent OMD [10]. Amongst all neonatal cases of persistent OMDs, about 6% of the babies present as completely patent ducts with complications in the first twenty-eight days of life characteristically with intussusceptions of the small bowel through the patent vitelline duct in 20% of them [8, 11]. Distal part of the vitello-intestinal duct sometimes remains patent to form an umbilical sinus. The mucous membrane of the sinus may evert out to form the 'raspberry tumor' [12]. Remnants of the duct may sometimes show a mucous filled cyst at its centre [1]. The case reported here presents a rare anomaly of the OMD that is not associated with other variations expected to feature along with this variation.

### □ Material, Methods and Results

The case with a fibrous remnant of the vitello-intestinal duct reported here was detected in an adult male cadaver (about 60 years) during routine dissection for undergraduate students in the Department of Anatomy at Sri Aurobindo Institute of Medical Sciences (SAIMS), Indore, India. This anatomical entity exhibited a length of about fourteen centimeters and had a diameter of one millimeter at its middle thirds that was

the most fibrous and tough part of the cord-like structure. This structure (the vitelline cord) was found to be attached (a) at one end to the anti-mesenteric border of the terminal part of the ileum approximately at a distance of five centimeters proximal to the ileo-caecal junction, and (b) at the other end to a point fifteen centimeters below the umbilicus and about six centimeters to the right of the midline (Figure 1). The later attachment on the anterior abdominal part exhibited an extra-peritoneal extension towards the umbilicus. This extension was explored by dissection to establish the continuity of the structure towards the umbilicus. Dissection at the proximal attachment revealed the band passing beyond the loop of the distal ileum towards the mesentery. No circular bands were detected around the segment of ileum near the attachment of the cord. The remnant ended in the mesentery after ramifying into a few band-like structures. Careful examination of the gut could not reveal a Meckel's diverticulum, any sign of intestinal atresia, umbilical sinus or cyst along the fibrous remnant. The folds of peritoneum forming the medial umbilical ligament (containing the obliterated umbilical arteries) and the urachus were found to be more elevated and conspicuous than encountered normally. The umbilicus was absolutely normal when observed from the exterior.



**Figure 1 – Remnant of the vitello-intestinal duct (vitelline cord).** The medial inguinal ligaments containing the obliterated umbilical arteries (OUA) show prominent and elevated folds. Note the extensions of the cord at its two ends. Urachus is shown by asterisk.

## Discussion

Omphalo-mesenteric duct remnants present with symptoms that include abdominal pain, rectal bleeding, intestinal obstruction, umbilical drainage and umbilical hernia [13, 14]. Most of the symptoms seem to be age-dependent and appear before the age of 4 years. About 40% of the children with this anomaly present with symptomatic lesions, whereas this anomaly is usually asymptomatic in adult [2]. Though surgical intervention is necessary for a symptom producing OMD remnant, it is not required for asymptomatic subjects [14]. Persistent vitello-intestinal duct remnants

may commonly give rise to acute mechanical small bowel obstruction. It is a surgical emergency and an immediate and correct diagnosis of this condition is essential for intervention [15, 16]. Establishment of its etiology and an appropriate treatment should be initiated immediately [17]. Small intestine obstruction due to persistent vitello-intestinal duct, particularly in adult patients, is extremely rare with very few cases reported in the literature [18–21]. Such situation necessitates immediate abdomen surgery with resection of the duct [22]. Presence of a cyst associated with a fibrous remnant of the duct may also cause an acute intestinal obstruction [23].

As described before, the present case reports a well-preserved remnant of the vitello-intestinal duct without association of any other anomaly of the OMD. The case is extremely rare not only because it was found in an asymptomatic elderly individual, but also because the intestines did not show any other developmental anomaly. This band-like fibrous structure can be a potential cause of an intestinal obstruction, and result in an acute abdomen. Structures, as reported in this study, may be difficult to detect with routine investigations used as work-ups to detect usual and more common presentations of OMD anomalies. Prior knowledge of a possible existence of such an anomalous anatomical structure can be useful in diagnosing the cause of an abdominal emergency and planning appropriate surgical intervention where such a variant of persistent OMD is least expected.

## Conclusions

OMD remnants may occur as isolated cord like structures across the peritoneal cavity. It is rare to find an asymptomatic vitelline cord unrelated to a Meckel's diverticulum or a cystic dilation of the structure, in an adult.

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