Treitz redux: the ligament of Treitz revisited

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Abstract
In the medical literature, the ligament of Treitz is frequently used as a term to designate the duodenojejunal flexure, but the attributes of the structure itself are not generally known. Indeed, anatomists describe it as the suspensory muscle of the duodenum, arising from the connective tissue around the stems of the celiac and superior mesenteric arteries and inserting as nonstriated muscle commonly into the third and fourth portions of the duodenum and frequently into the duodenojejunal flexure as well. Misconceptions regarding its configuration and anatomic relationships continue to be widely illustrated. The fibromuscular structure plays an important role in the embryologic rotation of the bowel and in facilitating normal progression of contents from the extraperitoneal duodenum to the mesenteric small bowel and contributes to the effects of the superior mesenteric artery syndrome. Whereas virtually all other ligaments and mesenteries in the abdomen have been imaged, features of the ligament of Treitz render its visualization by CT or MRI challenging.

Key words: Ligament of Treitz—Suspensory muscle of the duodenum.

The ligament of Treitz [1], like the polar ice cap, is a structure that many refer to but few have seen. Although often cited by medical practitioners—including surgeons, gastroenterologists, and radiologists—its true location, anatomy, nature, and significance remain clinically nebulous. An informal poll of medical students, clinicians, and radiologists who know of its existence and indeed use the term in reference to the region of the duodenojejunal junction testifies to widespread ignorance of its attributes. Despite the radiographic visualization of virtually all other ligaments and mesenteries in the abdomen [2], its identification by modern cross-sectional imaging techniques has yet to be fulfilled.

This article briefly reviews the characteristics of the ligament of Treitz, emphasizing that its usage as a term for the duodenojejunal junction is not only inaccurate but misleading and that these features may in time lead to its recognition by imaging techniques.

The duodenum, so named because its length is 12 finger breadths, is comprised of four portions. At the duodenojejunal flexure, generally about 2.5 cm left of the midline at the level of the inferior border of the first lumbar vertebra, the extraperitoneal duodenal loop penetrates the posterior parietal peritoneum to reenter the peritoneal cavity and the bowel continues as the mesenteric small intestinal loops. The duodenojejunal flexure serves as a useful landmark to delineate between the body and the tail of the pancreas [2]; also, immediately cephalad to it courses the root of the transverse mesocolon, extending from the infraampullary segment of the descending duodenum to the peritoneal reflections at the splenic hilus [2]. Lateral to the fourth portion of the duodenum and the duodenojejunal flexure courses the ascending colic branches of the inferior mesenteric vessels and its associated plica duodenojejunalis; this peritoneal fold, which contributes to the fossa within which left paraduodenal hernias may invaginate [2], has in the past been surgically confused for the suspensory muscle of the duodenum [3].

Wenzel Treitz, an Austrian physician and professor of anatomy and pathology in Krakow and Prague, described in 1853 a thin triangular muscle springing with a broad base from the upper edge of the duodenojejunal flexure. Ascending dorsal to the pancreas toward the aortic hiatus, it was described as then changing into a tendon that blended with the dense connective tissue around the stems of the superior mesenteric artery and celiac axis. Considered a “fixation apparatus,” it was named the “musculus suspensorius duodeni” [1].

The suspensory muscle or ligament of Treitz is generally conceived of as a thin fibromuscular band exclusively limited to the duodenojejunal junction [4] and is
occasionally depicted or described in this manner in anatomical atlases [5–7]. However, exclusive attachment to the flexure, if it occurs at all, is rare [8–10]. Rather, the muscle is usually attached to the third and fourth portions of the duodenum and frequently to the duodenojejunal flexure as well (Fig. 1). At its base, the smooth muscle fibers of the suspensory muscle are continuous with the longitudinal and circular muscle fibers of the duodenum [1, 9–14].

Superiorly, the muscle is gradually replaced by collagenous and elastic fibers [10, 14] and is then attached by its apex in a strong binding between the connective tissue of the duodenal part of the suspensory ligament and the perivascular connective tissue in the region of the stems of the superior mesenteric and celiac arteries [8–10, 14, 15].

Some confusion was originally sown in Treitz’s description of a striated muscle bundle from the diaphragm (Hilfsmuskel) from the right edge of the esophageal hiatus descending to become continuous tendinously in the connective tissue with the suspensory muscle of the duodenum [1, 3, 4]. This misconception continues to be illustrated by Netter [16] and is so described in some textbooks of anatomy [17]; however, the possibility of a digastric-type muscle has been discounted, and the two muscles have been clearly shown to be separate entities developmentally, structurally, and microscopically [8, 10].