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Fredet's Fascia – No Time to Die

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ABSTRACT

Introduction: Pierre Fredet (1870-1946) was a French surgeon after whom the pre-duodenopancreatic fascia was named. There is no use of the name Fredet's fascia in everyday surgical communication. Surgical treatment of right colon cancer is increasingly performed laparoscopically, and knowledge of anatomy is essential for quality surgical treatment. Discussion: One of the earliest and most famous descriptions of mesocolon was given by Treves in 1885. For decades, no research would accurately study the structure of mesocolon, until Culligan. He described the anatomy of the mesocolon and presented significant discoveries. Fredet's fascia is located in front of the duodenum, pancreas, and the place of separation of the upper mesenteric artery. The peritoneum is fused with the mentioned anatomical elements and extends in the cranial-caudal direction. Mobilization of the hepatic flexure and the right half of the transverse colon allows access to the Fredet fascia and exposure of the anterior surface of the pancreas and the second segment (D II) of the duodenum.Conclusion: Fredet's fascia is useful for achieving complete mesocolic excision and D3-lymphadenectomy in right colon cancer with a reduced risk of intraoperative complications. Future studies should provide an answer to the question of whether Fredet's fascia remains on the pancreas during dissection or on the mesocolon during complete mesocolin excision in right colon cancer.

INTRODUCTION

Pierre Fredet (picture 1) was a French surgeon after whom the preduodenopancreatic fascia was named. There is no use of the name Fredet's fascia in everyday surgical communication. The desire is to reaffirm the stated anatomical term, because this fascia is found every day in colon surgery (1).

Picture 1. Pierre Fredet (1870-1946)

source: Cerbonnet G. Pierre Fredet, 1870-1946. Last president of the National Society and first president of the Academy of Surgery. Chirurgie. 1986;112(1):13-26.

When Heald proposed total mesorectal excision (TME) for surgical treatment of rectal cancer, there was a standardization of surgical treatment of rectal cancer with improved results. The method is based on the theory that the mesorectum consists of a visceral and parietal surface covering the rectum (blood vessels and lymphatic nodes) (2). Similar to Heald's concept TME, Hohenberger presented the concept of Complete Mesocollic Excision (CME). According to Hohenberger, the mesocolon is covered by the visceral and parietal fascia, which, in the form of a sheath just like the mesorectum, envelop the vascular stalk and the associated lymphatic nodes (3).

Surgical treatment of right colon cancer is increasingly performed laparoscopically, and knowledge of anatomy is essential for quality surgical treatment.

DISCUSSION

Anatomical development of the mesocolon - historical moments

One of the earliest and most famous descriptions of the mesocolon was given by Treves in 1885. He studied the anatomy of the intestine, peritoneum, and mesentery on corpses and reported that the mesocolon was discontinuous and fragmentary (4). Before Treves, Carl Toldt in 1879 had results opposite to Treves. He studied the development of the mesentery and noticed the permanent existence of the mesocolon in humans, as well as a special fascial plane between the mesocolon and the retroperitoneum. Known as the Toldt fascia, it is formed by the fusion of the visceral peritoneum of the mesocolon with the parietal peritoneum of the retroperitoneum (5).

For decades, no research would accurately study the structure of the mesocolon, until Culligan. He described the anatomy of the mesocolon and presented significant discoveries: mesocolon is continuous from ileocecal to rectosigmoid level;

Toldt's fascia is identified at the place where the mesocolon is placed on the retroperitoneum (ascending, descending and sigmoid mesocolon), while it does not appear in the transverse and mobile part of the sigmoid; the proximal rectum starts from the mouth of the mesorectum and mesosigma (6).

Culligan was the first to describe the exact anatomy of the mesocolon, confirm its continuity, and provide convincing evidence to surgeons to perform CME from an anatomical aspect (5). Later, Gao performed a similar study with confirmation of the results, proving the continuity of the mesocolon and the existence of a visceral fascia. In his study, he also found that the fascia was able to block tumor migration (7).

Significance of Fredet's facies in right colon resection

As with rectal cancer, colon cancer, except in advanced cases, is primarily lymphogenic metastasis. The mesocolon is covered with a visceral fascia. The CME concept was inaugurated by Hohenberger, which implies the application of a sharp dissection of the visceral peritoneum

from the retroperitoneal space in order to avoid damage to the visceral facia. This procedure makes it possible to show the origin of the quantitative arteries and their central ligation and maximum removal of lymph nodes (3).

CME and D3-Lymphadenectomy are two basic elements of surgical treatment of right colon cancer, which include respect for embryonic spaces during surgical dissection, high ligation of blood vessels feeding the tumor, and dissection of lymphoadipid tissue, which lies at the medial border of the superior mesenteric vein (SMV) (3,8). Toldt's fascia, extends between the ascending colon and the retroperitoneum, is a good landmark used by colorectal surgeons (9). In contrast, Fredet's fascia still remains a neglected anatomical structure. Knowledge of Fredet's fascia, development, and location may be useful for performing minimally invasive D3-L, reducing the risk of intraoperative bleeding from SMV (9).

Fredet's fascia is located in front of the duodenum, pancreas, and the place of separation of the upper mesenteric artery. The peritoneum is fused with the mentioned anatomical elements and extends in the cranial-caudal direction. Mobilization of the hepatic flexure and the right half of the transverse colon allows access to the Fredet fascia and exposure of the anterior surface of the pancreas and the second segment (D II) of the duodenum.

Embryological fascia is defined as follows (6,9,11):

- Toldt's facies: plane of adhesion between the ascending peritoneum of the ascending mesocolon and retroperitoneum (Fig. 1)

- Fredet's fascia: adhesive plane between the visceral peritoneum of the hepatic flexure and anterior pancreas and duodenum (Figure 2)

- Treitz fascia: plane of adhesion between visceral peritoneum of duodenum and pancreas and retroperitoneum (Figure 2)

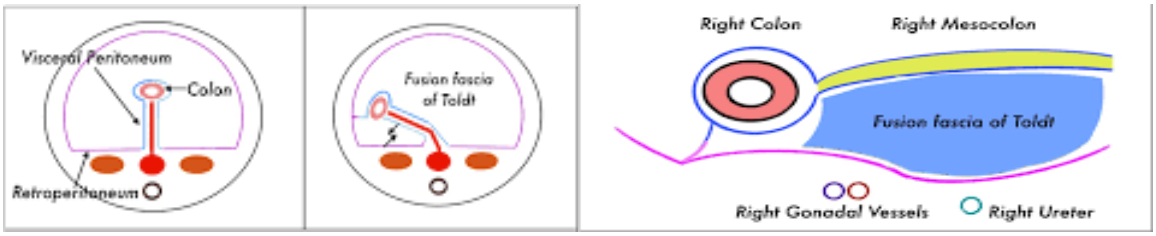

Figure 1. Toldt's fascia

Source: Garcia-Granero A et al. Surgical Endoscopy (2019) 33:3842-3850.

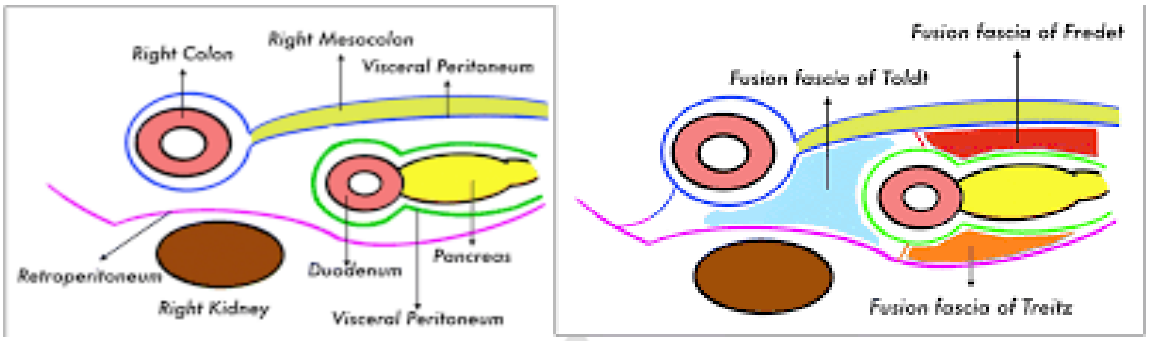

Figure 2. Fredet's fascia and Treitz's fascia

Source: Garcia-Granero A et al. Surgical Endoscopy (2019) 33:3842-3850.

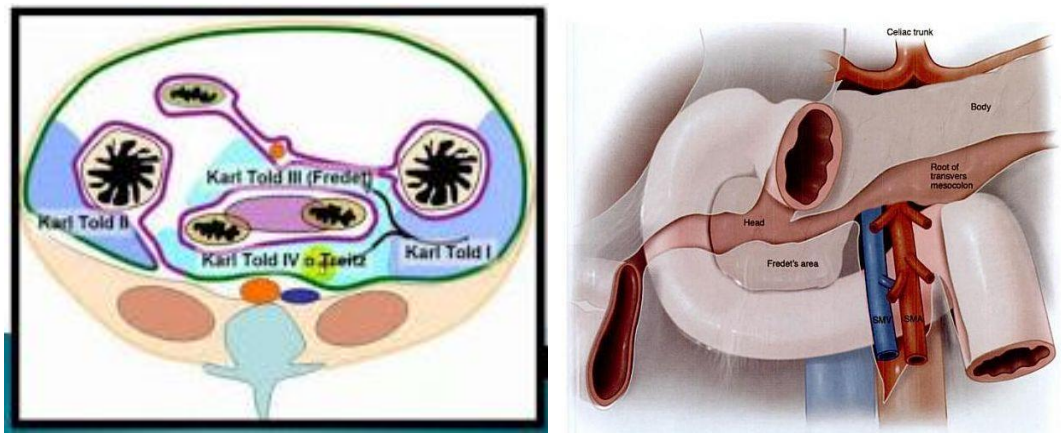

Figure 3. Fredet's fascia

The Fredet fascia is formed between the visceral preuodenal-pancreatic fascia and the visceral fascia of the right mesocolon (11) (Fig. 3). And if Fredet's fascia was described by Rouviere in 1924, it was later poorly described and is called the anterior fascia of the pancreas (9,11). Treitz

was used as a surgical reference in patients with pancreatic cancer (12). Fredet is not widely known among colorectal surgeons. Dissection and identification of the Fredet fascia allows entry into a safe area, thus reducing the risk of injury and bleeding from SMV (13).

CONCLUSION

Fredet's fascia is useful for achieving CME and lymphadenectomy D3 in right colon cancer with a reduced risk of intraoperative complications. This structure is especially suitable for minimally invasive surgery. Therefore, colorectal surgeons should have information and knowledge of the anatomy of Fredet's fascia. Future studies should provide an answer to the question that Fredet's fascia during dissection remains on the pancreas or on the mesocolon during CME in right colon cancer.

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