

Medial visceral rotations: the Cattell-Braasch vs. the Mattox maneuvers

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In a Zone I retroperitoneal hematoma, surgical exploration is warranted. The medial visceral rotations are maneuvers used to expose retroperitoneal structures; the great vessels and their branches. The right and left medial visceral rotations are also known as the Cattell-Braasch and the Mattox maneuvers, respectively. They should be performed according to the exact anatomic location of a suspected injury. Herein, we describe and review the methodology of the maneuvers via cases of Zone I retroperitoneal hematoma.

Key Words: Retroperitoneal space, Abdominal injuries, Hematoma, Viscera, Rotation

Introduction

When describing traumatic injuries, the retroperitoneal space is divided into three zones; Zones I, II and III (1). The Zone I is located in the midline of the retroperitoneum, and can be divided into supramesocolic and inframesocolic regions, based on the position of the proximal superior mesenteric artery. An anatomic location of injury should be stated in reference to one of these regions. There are two major surgical methods utilized in order to access the retroperitoneal region, with each approaching from the opposite direction. A right medial visceral rotation, the Cattell-Braasch maneuver, is used to expose the entire inframesocolic retroperitoneal organs, including the inferior vena cava (IVC), the right renal pedicle, the right iliac vessels, the duodenum, and the head of the pancreas. A left medial visceral rotation, the Mattox maneuver, is performed for exposure of the entire aorta from the dia-

phragmatic hiatus caudally to the iliac vessels. The only indication for use of this maneuver is a central supramesocolic retroperitoneal hematoma (1). These two maneuvers are powerful tools that allow trauma surgeons to perform damage control surgery. However, there has been confusion and misunderstanding in regard to their indications and the techniques themselves. We present video clips regarding these maneuvers and review their precise techniques via cases of a Zone I retroperitoneal hematoma.

Case presentation

Case of an inframesocolic retroperitoneal hematoma

In the case of a grade IV renal laceration, previously reported by Kim (2), the IVC and the right renal pedicle were exposed using the Cattell-Braasch maneuver to check for potential injuries of the great vessels (Video 1).



Fig. 1. The abdominal computed tomography scan demonstrates irregularity of the abdominal aortic wall with paraaortic hematoma and extravasation (arrow) at three critical points. (A) The level of the celiac axis (arrow head), (B) The proximal superior mesenteric artery (arrow head), and (C) Hilum of the left kidney (posterior aspect of the left renal vein).

Case of a central supramesocolic retroperitoneal hematoma

A 71-year-old man who was gored by a bull sustained multiple traumatic injuries, with an injury severity score of 25; a grade IV spleen laceration, a grade III laceration on the body and tail of the pancreas, and a grade IV laceration of the left kidney with accessory renal vessel injuries. His hemodynamics were unstable, with a pulse rate of 84 beats/min and a blood pressure of 86/45 mmHg. The abdominal computed tomography scan demonstrated irregularity of the aortic wall with extravasation from the left lateral margin of the aorta at the levels of the celiac axis, the superior mesenteric artery and the left renal pedicle (Fig. 1). Emergency laparotomy with distal pancreatectomy and ligation of innominate vessels in the level of supramesocolic and renal pedicle was performed, and the paraaortic hematomas were approached with the Mattox maneuver (Video 2). The second-look operation was performed 33 hours after the damage control surgery. The patient recovered without re-bleeding and was discharged on hospital day 51.

Discussion

A right medial visceral rotation (the Cattell-Braasch maneuver)

The Cattell-Braasch maneuver was first introduced to expose the third and fourth portions of the duodenum (3). The maneuver begins with dissection of the hepatic flexure and then dividing along the white line of Toldt. Once the avascular fusion between the small bowel mesentery and the posterior peritoneum is incised, extensive medial

mobilization of the right colon and the entire small bowel is achieved. As seen in Video 1, the Kocher maneuver was performed in the last step. This tip is based on the author's personal experience that performing the Kocher maneuver before colonic mobilization may jeopardize the mesenteric root during traction. The anatomical complexity around the superior mesenteric artery and vein are resolved by this maneuver, thus exposing the subhepatic IVC and nearby structures is much simplified (4). The only two inaccessible areas of the retroperitoneum with this maneuver are the retrohepatic IVC and the suprarenal aorta. The latter is accessible with the following Mattox maneuver (1).

A left medial visceral rotation (the Mattox maneuver)

The Mattox maneuver, allowing for a complete exposure of the anterior and lateral aspect of the aorta, was developed in the 1970's (5); it has facilitated the exploration of a supramesocolic hematoma in Zone I ever since. The maneuver divides the splenorenal ligament following incision of the left peritoneal reflection. Once the dissection plane in the retroperitoneal space has been opened, the descending colonic mesentery with its major vessels, the left kidney and its pedicle, the spleen, the stomach and the pancreatic tail are mobilized medially, until the entire length of aorta is visualized (1). Alternatively, in the modified Mattox maneuver, the left kidney is maintained in the Gerota's fascia, in order to be protected from the traction injury, and the left renal vein hinders access to the anterior aorta.

The medial visceral rotations allow trauma surgeons unlimited exposure to the injured key retroperitoneal

structures. A decision to perform either maneuver should be made based on the anatomic location of the hematoma. Gentle manipulation in retraction is required in order to prevent common iatrogenic damages such as spleen laceration and pancreatitis in the Mattox maneuver and avulsion of the superior mesenteric vein in the Cattell-Braasch maneuver (1,6).

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Supplementary material

Supplementary data including two video can be found with this article online at www.traumaimpro.org.

Video 1. A video recording showing a series of processes for the Cattell-Braasch maneuver to approach the left retroperitoneal hematoma extended to the midline.

Video 2. A video recording showing the damage control surgery; distal pancreatectomy and bleeding control of paraaortic hemorrhage with the Mattox maneuver. The second-look operation definitively controlled hemorrhage.

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