

# Mattox Maneuver as a Pedagogical Resource for Dissection of the Left Hemi-Abdomen

Isadora Medrado Goulart<sup>1</sup>, Miguel Pereira Goulart Neto<sup>1</sup>, Matheus Alves de Souza<sup>1</sup>, Natália Inácio Beltramini<sup>1</sup>, Miriam Pardini Gomes<sup>2</sup>, Nathalia Simões Carneiro<sup>1</sup>, Aline Ribeiro Cunha<sup>3</sup>, Luis Fernando Ricci Boer<sup>4</sup>, Fernando Batigalia<sup>5</sup>, Luciana Estevam Simonato<sup>6</sup> and Rogério Rodrigo Ramos<sup>7\*</sup>

<sup>1</sup>*Universidade Brasil, Fernandópolis, Brazil*

<sup>2</sup>*Universidade do Oeste Paulista, Presidente Prudente, Brazil*

<sup>3</sup>*Medicine of the Medical Residency Program in General Surgery at Universidade Brasil, Fernandópolis, Brazil*

<sup>4</sup>*Medicine of the Medical Residency Program in Orthopedics and Traumatology, Medical School of São José do Rio Preto (FAMERP), São José do Rio Preto, Brazil*

<sup>5</sup>*Department of Human Anatomy, Postgraduate Program in Health Sciences and Specialist in General Surgery and Gastroenterology, Medical School of São José do Rio Preto (FAMERP), São José do Rio Preto, Brazil*

<sup>6</sup>*Department of Clinical Propaedeutics and Human Pathology, Universidade Brasil, Fernandópolis, Brazil*

<sup>7</sup>*Department of Human Anatomy and the Residency Program in Anatomy Surgery for Residents, Universidade Brasil, Fernandópolis, Brazil*

**Abstract:** The unawareness of anatomy and surgical skills during the intervention can hinder the the surgical outcome, knowing that the anatomoclinical understanding and operation skills are prerequisites for surgery. Students need to improve their surgical and anatomy skills through the pedagogical method "Dissection by Mattox Maneuver" in formaldehyde-preserved bodies. Twenty bodies were used. The material was used in accordance with Law 8501 of November 30, 1992, which regulates the use of unclaimed cadavers for study or scientific research purposes. The inclusion criterion was the preserved abdomen, excluding bodies with dissected thorax and inguinal region. It was possible to visualize and identify abdominal anatomical elements in the left flank, as well as the application of the Mattox maneuver. The dissection of the anterolateral wall of the abdomen and soft tissues with exploration of the abdominal cavity through laparotomy, followed by the Mattox maneuver in a formaldehyde-preserved cadaver can be used as a teaching method for medical students, especially for General Surgery interns. The maneuver allows improving the clinical and surgical study of laparotomy, through cadaveric dissection.

**Keywords:** Surgery, Laparotomy, Mattox Maneuver, Anatomy, Teaching.

## 1. INTRODUCTION

Mattox maneuver is a surgical procedure that allows mobilizing the abdominal organs of the left and central flank, maintaining their integrity. Learning and using the avascular plan in an intraoperative surgical procedure is the secret to this maneuver [1].

An appropriate method to learn this maneuver is the use of dissection in cadavers. Dissection by Mattox maneuver begins by mobilization of the descending colon and sigmoid by incision of the white line of Toldt, which is the junction of the parietal peritoneum with the fascia of Denonvilliers [2]. This line is a lateral reflection of the visceral peritoneum that covers the colons and their

mesentery over the lateral wall of the abdomen to become the posterior parietal peritoneum. Thus, blunt dissection and mobilization of organs can be initiated in this plane, and mobilization of the left colon with its main vessels is done sequentially until the aorta is explored. It is important to highlight that dissection and mobilization in other planes is done with minimal sectioning and separation of soft tissues [3,4]. It is important to show that dissection not only allows studying the segments and regions of the body, and acquiring surgical skills, but also respecting the corpse, thus learning to practice Medicine with care.

It is noteworthy that the Mattox maneuver is indicated in a laparotomy procedure, especially in abdominal hemorrhagic conditions [5]. During the evaluation of patients with suspected abdominal trauma, the most frequent and worrisome clinical picture is the presence of hemorrhagic shock without

\*Address correspondence to this author at the Projected Road F1 s/n, Santa Rita Farm, Medical School, Brazil University, Box: 15613-899, Fernandópolis, Brazil; Tel: 055(17)3465-4200; E-mail: rogerio.enfer@gmail.com

apparent cause [6,7]. The approach for patients with hemodynamic instability and obvious signs of abdominal trauma is immediate surgical exploration [6]. However, patients with blunt abdominal trauma hemodynamically unstable referred to exploratory laparotomy are 2.4 times more likely to die than those without circulatory changes [8].

This context denotes that hemodynamically unstable patients with abdominal injury or suspected abdominal injury who required laparotomy have a mortality rate over 56%, especially those with systolic blood pressure below 60mmHg [9]. These patients, therefore, require rapid and efficient management in the pre-hospital and initial care, as well as greater postoperative attention, since aggressive surgical management in patients with signs of shock should be maintained [8]. Therefore, the importance of using the Mattox maneuver in a laparotomy procedure when the patient has hemorrhage, knowing that bleeding is the main cause of intraoperative death or death in the immediate postoperative period as a result of the Surgery [5].

It is important to note that unawareness of anatomy, surgical skills during the intervention and especially hemodynamic instability of the patient can hinder the surgical outcome, knowing that the anatomical-clinical understanding and operation skills are prerequisites for surgery. Thus, medical students conducted this study

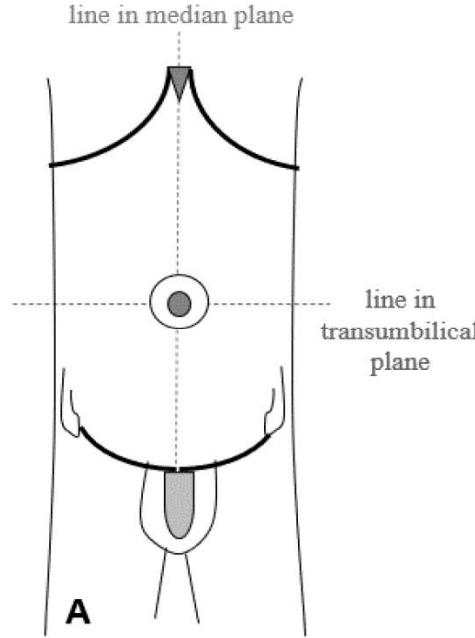
aiming to improve their surgical and anatomical skills through the pedagogical method “dissection by Mattox Maneuver”.

## 2. MATERIALS AND METHODS

The sample consisted of 20 cadavers from the Laboratory of Human Anatomy of Universidade Brasil, Fernandópolis Campus, SP. These were formaldehyde-preserved male corpses. The material was used in accordance with Law 8501 of November 30, 1992, which regulates the use of unclaimed cadavers for study or scientific research purposes. Inclusion criteria encompassed the intact abdomen.

The surgical instruments used were surgical kit (fabric to cover upper and lower segments, leaving only the abdomen free for dissection); 4 Gosset and Langembeck retractors; 4 straight and curved intestinal clamps; 4 Moynihan tweezers; 4 Mixter and Backaus tweezers; 4 malleable blades; 4 anatomical tweezers with and without rat tooth; 2 surgical scissors; 4 Hemostatic Kelly tweezers. The dissection of the abdominal cavity was performed, followed by the analysis of clinical aspects of abdominal structures and viscera.

Two lines were drawn with sterile surgical pen for skin marking, one in the median plane (from the xiphoid to the pubic symphysis process) and the other in the transumbilical plane (which crosses the navel from



**Figure 1:** First incisions demarcated by lines in the anterolateral wall of the abdomen, line in the median plane and in the transumbilical plane (A); two upper edges (UE) and two lower edges (LE) (B).

lateral to lateral) (Figure 1A). The lines are the sites of incisions of the anterolateral wall of the abdomen, skirting the umbilical scar. Thus, the incision was from the xiphoid process to the umbilical scar, from the umbilical scar to the pubic symphysis joint and finally, from the umbilical scar to the sides, making a Cross-shaped incision, which separates the incised tissues into four edges, two upper (costal) and two lower (inguinal) edges (Figure 1B), allowing the visualization of the Abdominal Cavity.

Next, the small intestine of the left half-side was folded medially to mobilize the left colon with its main vessels (Mattox maneuver), until the aorta and inferior mesenteric artery are visualized for cordone wire isolation.

### 3. RESULTS AND DISCUSSION

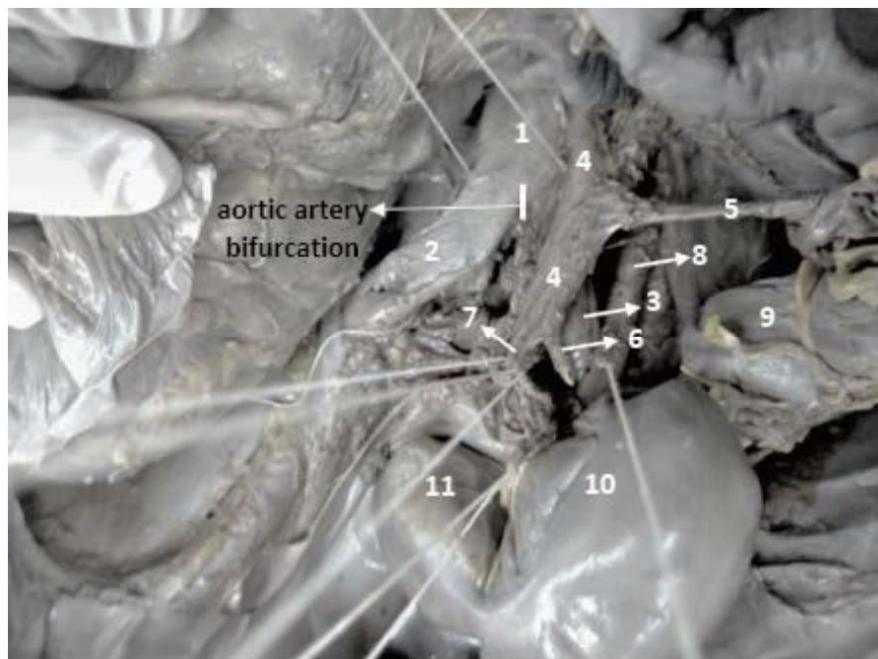
During the dissection of male human specimens stored in the Department of Anatomy of the Universidade Brasil, it was possible to visualize and identify abdominal anatomical elements in the left flank (Figure 2), as well as application of the Mattox maneuver.

After performing the dissection of the abdominal cavity and the Mattox maneuver in a male cadaver, it can be said that this pedagogical method is essential for medical students and interns to expand the

anatomical and clinical knowledge and acquire experience in surgical techniques. During the investigation in the abdominal cavity, there was no report of altered abdominal viscera and vascular variation.

It is noteworthy that the left colic artery (Figure 1) is classically described as the first branch of the inferior mesenteric artery. Nevertheless, the studies by Covantev *et al.* [10] observed an anatomical variation in the branches of the lower mesenteric artery during dissection of a female cadaver. In the article, a rare variation was presented, in which the large intestine was vascularized by the inferior mesenteric artery. In this case, the ascending, transverse, descending and sigmoid colons and the rectum were vascularized by the inferior mesenteric artery, thus, the right and middle colic artery are branches of the lower mesenteric artery, making this type of variation even rarer. It is important to emphasize that the surgeon should be aware of possible arterial variations during surgical intervention, thus with the need for anatomical knowledge and its anatomical variations to avoid any complications during surgery and in the postoperative period.

As for the Mattox maneuver, the students were able to apply the maneuver correctly, thus achieving the objective of the study. This fact is described in the studies by Navalón *et al.* [5]. The authors report that



**Figure 2:** Structures on the left flank after dissection and application of the Mattox maneuver. Aorta (1); right common iliac artery (2); left external iliac artery (3); inferior mesenteric artery (4); left colic artery (5); sigmoid artery (6); superior rectal artery (7); ureter (8); descending colon (9), sigmoid colon (10) and rectum (11).

massive bleeding is the main cause of intraoperative death or surgery-related death in the immediate postoperative period. The article describes the basic principles for the control of surgical bleeding, reporting several maneuvers, including the Mattox maneuver. Nonetheless, if maneuver fails, more complex procedures are required.

Another important factor observed regarding the maneuver was the study by Accola *et al.* [11]. In the study, 22 patients with penetrating lesions were treated. During the operative process, there was need to use the Mattox maneuver in 10 patients, but five survived. The authors report that the deaths were related to hemorrhagic shock and problems with vascular repair in patients with multiple lesions.

Based on the context, the Mattox maneuver in abdominal exploration surgeries is indispensable, especially when there is need to approach the retroperitoneum, as well as resection of the contralateral left colon, leaving visible organs and anatomical structures in the left hemi-abdomen. It is important to emphasize that this maneuver can be learned during academic teaching by the dissection method, thus, surgical training can be performed in formaldehyde-preserved cadavers.

#### 4. CONCLUSION

The dissection of the anterolateral wall of the abdomen and soft tissues with exploration of the abdominal cavity through laparotomy, followed by the Mattox maneuver in formaldehyde-preserved bodies can be used as a teaching method for medical students, especially for General Surgery interns. The Mattox maneuver allows improving the anatomical-clinical and surgical study of the abdomen through cadaveric dissection.

#### STATEMENT OF POTENTIAL CONFLICT OF INTERESTS

The authors state that there is no conflict of interests.

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