

## TREATMENT OF MID-LINE ABDOMINAL WALL HERNIAS WITH THE USE OF ENDO-STAPLER FOR MID-LINE CLOSURE

*Tratamento de hérnias da linha média do abdome com uso de grampeador endoscópico para fechamento da linha média*

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**ABSTRACT - Introduction:** Minimally invasive videosurgery has modified anatomy dissection of diseases that are treated operatively. However, the benefit of this method has been delayed due to the lack of development of technologies and articulated movements for the abdominal wall, demanding the need for investments and time for solidification. This approach to repair the abdominal wall is based on the Rives-Stoppa principles. **Technique:** With the patient in supine position, a small supra pubic incision is done and the pre-peritoneal space is achieved and inflated. After the trocars are placed, the peritoneal sac is dissected and the abdominal cavity is entered, above the arcuate line. The posterior rectus sheath is liberated and a linear stapler is placed in both sides and fired, creating a midline and a retromuscular space, where the mesh is placed and fixed. **Conclusion:** The method is feasible, easy to perform, reproducible, saves time and with a good functional result.

**HEADINGS** - Ventral hernia. Midline. Laparoscopy. Surgical stapling

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**DESCRIPTORES** - Hérnia ventral. Linha média. Laparoscopia. Grampeamento cirúrgico.

**RESUMO - Introdução:** A cirurgia minimamente invasiva modificou a maneira de analisar e dissecar os tecidos nos procedimentos cirúrgicos. No entanto, a vantagem deste método é limitada na parede abdominal, devido à falta de desenvolvimento de tecnologias e movimentos articulados para seu emprego nesta região, exigindo a necessidade de investimentos e de tempo para a solidificação. Esta abordagem para reparo operatório da parede abdominal é baseada nos princípios Rives-Stoppa. **Técnica:** Com o paciente em decúbito dorsal, uma pequena incisão supra-púbica é feita e o espaço pré-peritoneal é alcançado e insuflado. Após os trocárteres serem colocados, o saco peritoneal é dissecado e a cavidade abdominal é atingida acima da linha arqueada. As bainhas posteriores do músculo reto do abdome são liberadas e um grampeador linear é colocado em ambos os lados e acionado, restituindo a linha média e criando um espaço retromuscular, onde a tela é colocada e fixada. **Conclusão:** O método é viável, fácil de realizar e reproduzível, economizando tempo e com resultado funcional satisfatório.

## INTRODUCTION

Minimally invasive video surgery has modified anatomy dissection of diseases that are treated operatively. However, the benefit of this method has been delayed due to the lack of development of technologies and articulated movements for the abdominal wall; demanding the need for investments and time for solidification.

The use of synthetic prostheses associated with videosurgery has revolutionized a previously undefined treatment that was dependent on the experience and expertise of each surgeon<sup>5,6</sup>. The laparoscopic treatment of abdominal wall weakness, with ventral and incisional hernias, has been greatly used nowadays, but without a standard procedure. Until recently the use the intra-peritoneal prostheses was not applied due to its characteristics and limitations; however, new engineering concepts applied to them changed this scenario.

As it is true to the procedure, there is no standard for the disease. This depends on multiple predisposing and precipitating factors, with subjective and variable characteristics. Videosurgery was initially published in 1991

and posteriorly was presented in various individual case descriptions. Since 2000, there have been more comparative and randomized papers either published or discussed in dedicated meetings. There is no established indication for this method. Laparoscopic surgery can be the preferably choice for recurrent hernias, obese patients and postoperative open bariatric surgery.<sup>2,3,4</sup>

Hernias with less than 3 cm ring defect can be corrected conventionally by single suture<sup>2</sup>. The videosurgery must consider adhesions between bowels and the formation of intra-peritoneal scars, since these cannot permit the access and/or the production of one unique cavity and an adequate work space against the anterior abdominal wall<sup>3</sup>.

For the postoperative obese patient, which has undergone an open method and developed an incisional hernia, videosurgery must be considered a good option because of systemic diseases associated with obesity.

This operative approach to repair the abdominal wall is based on the Rives-Stoppa principles. The procedure was designed to reconstruct the mid-line from the peritoneal cavity, approximating the rectus abdominal muscles at the same time that creates a posterior sheath suture line with a retromuscular space, where the mesh will be allocated, using videosurgery and linear stapling to avoid greater tissue detachments and suture efforts by the surgeon.

The goal of this proposal is to reconstruct the midline approximating the rectus muscles of the abdomen and placing a mesh in retromuscular space by laparoscopy, avoiding large displacements in obese patients.

## TECHNIC

The technique of linear cutting and stapling was tested in an animated laboratory before its consideration in a surgical field. As the recognition of the stability and safety of the suture was identified was proposed the laparoscopic technique for the midline ventral hernia treatment for a patient after consenting agreement was signed.

### Operative technique

Patient is positioned on the operating table in the supine position with arms along the body. The use of long-term bladder catheter was done preoperatively. Supra pubic incision was made in the midline, 2 cm above the pubis, for the insertion of a 12 mm trocar. Pre-peritoneal space was created with a dilating balloon coupled to 0° direct optical view. Inflation of pre-peritoneal space with the velocity of one liter per minute, until reaching up to one liter of carbon dioxide in the cavity, was done. Then, a review of the puncture site and the cavity and change of the

optical vision from 0° to 30° which can be 5 mm or 10 mm in diameter - preferably using the former one -, was made. Two other 5 mm or 3 mm trocars were placed under direct vision on the left and right lower quadrants. Dissection of the peritoneal sac, along the anterior wall until the arcuate left and right lines and opening into peritoneal cavity, at this point with access to the defect, was the following step.

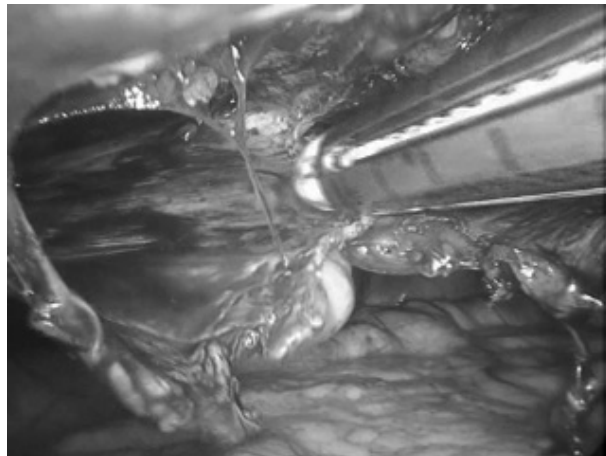


FIGURE 1 - Approximation of the posterior aponeurosis and closing the midline with white stapler

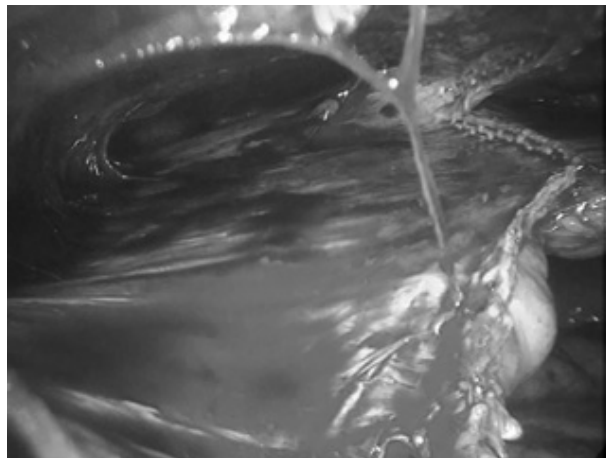
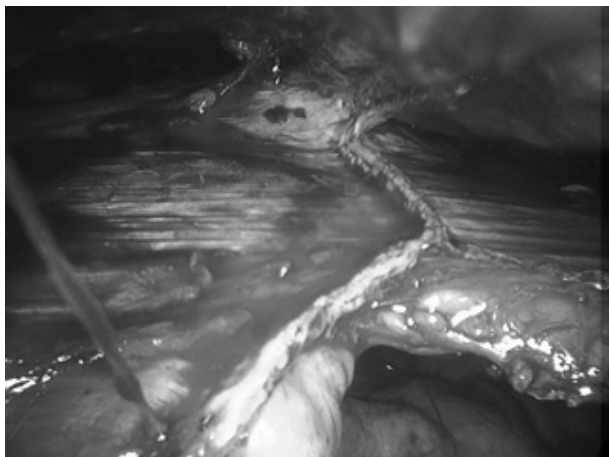


FIGURE 2 - Results of the first line clipping

Adhesionolysis from the hernia sac leaving its contents freely inside the cavity, complete exposure of the medial defect borders and recognition of the position of the rectus abdominal muscles, opening of the posterior rectus sheaths from and along the margins of the arcuate lines, were done carefully. With the optics on the pubic trocar it was possible continuing to cranial direction inside the retromuscular space, each side, until the complete liberation of the posterior sheath and muscular fibers. This posterior detachment and exposure of the muscle fibers was under the avascular space until the epigastric area and the costal margins visualization.



**FIGURE 3** - Result of clipping the midline, creating retro muscle space for placement of the screen with the reconstituted midline

Approximation of the dissected posterior sheaths of each side using a grasper observing a retromuscular space formation, was the next step. The optic was moved to the lower quadrant trocar and linear endostapler was placed, followed by insertion from the suprapubic trocar through the dissected space, with one of the arms on the left and the other on the right on retromuscular spaces. The jaws were closed with approximation of each side by the posterior sheaths. Were avoided the muscular fibers in between them, what could be the cause of the staple-line dehiscence. With this procedure there was a formation of one retromuscular space permitting an anterior reconstruction of the midline at the same time the closure of the peritoneal cavity by posterior sheaths stapling. At this moment a lightweight monofilament macro porous mesh was allocated in this space, closing it using a fibrin sealant or stapled from inside.

The arcuade line opening was completely closed by suturing, stapling or using fibrin sealant.

## DISCUSSION

Videosurgical approach has an important appeal for causing less tissue damage and providing better recovery. There is no need for a large incision and the area to be reconstructed can be well visualized by the intracavity optical. The prosthesis is clearly placed in the right position and its fixation is done under practical steps of stapling, gluing or suturing, as preferred by the surgeon. Another important fact is the smaller amount of wound complications, such as infection or dehiscence compared to an open access<sup>7,8</sup>.

The procedure was able to achieve better results of the rectus muscle function with approximation comparing to the laparoscopic bridging maneuver<sup>4,9</sup>. The use of liner stapling is more appealing than

endoscopic suture, due to a safer approach for the patient and better management of time for the surgeon.

This procedure was developed previously by this group through the robotic reconstruction of the midline using single sutures<sup>1</sup>.

Afterwards, the linear endo-stapling suture was tested in the laboratory, in which benefits of this procedure was realized, therefore becoming a new option of treatment for a patient. The anterior suturing of the midline through the robotic arms from inside was able to give back to the patient the sensation of a good abdominal wall function and movement.

After the linear stapling the patient complained about a bulge considered as a retraction of hernia sac. It is different from classical laparoscopic approach, where the bulge is loose and limited by the mesh. Was realized that this procedure should be another option for patients with multiple or smaller defects of the midline, cranial to the arcuade lines, with some diastases of the rectus muscles, who could be treated without the midline xifoumbilical incision.

## CONCLUSION

The method is feasible, easier to perform, reproducible and saves time. It should be considered another option for the anterior abdominal wall reconstruction without opening it. Further studies are on the track to develop this technique.

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