

# Management of the open abdomen with dynamic closure of the abdominal wall. A case report

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## Case Report

General Surgery



**Background:** Management of the open abdomen, particularly in the context of abdominal sepsis, continues to pose a significant surgical challenge. While static closure techniques remain widely used, dynamic methods such as mesh-mediated fascial traction combined with negative pressure therapy (NPT) have demonstrated improved outcomes in selected cases.

**Objective:** To describe a dynamic closure technique using low-weight polypropylene mesh in conjunction with NPT, applied in a septic patient requiring open abdomen management.

**Case Report:** A 72-year-old woman with a history of hypertension was admitted for a complicated parastomal hernia with signs of sepsis. She underwent sigmoidectomy with colostomy, followed by emergency reoperation due to generalized peritonitis. An open abdomen strategy was initiated, with repeated NPT cycles every 72 hours. On the fifth dressing change, dynamic fascial traction was performed by securing polypropylene mesh to the aponeurotic edges and applying progressive medial traction, while maintaining negative pressure at -120 mmHg.

**Results:** Progressive reduction in the fascial gap was observed with each intervention, achieving closure without requiring permanent mesh implantation. No major complications occurred, and the patient remained free of wound dehiscence or incisional hernia at discharge.

**Conclusion:** The combination of mesh-mediated fascial traction and NPT is a viable option for abdominal wall closure in septic patients with open abdomen. This technique may promote early closure, limit morbidity, and reduce long-term sequelae when applied appropriately.

**Keywords:** Open abdomen, negative pressure therapy, dynamic closure, abdominal sepsis, mesh traction, abdominal wall reconstruction.

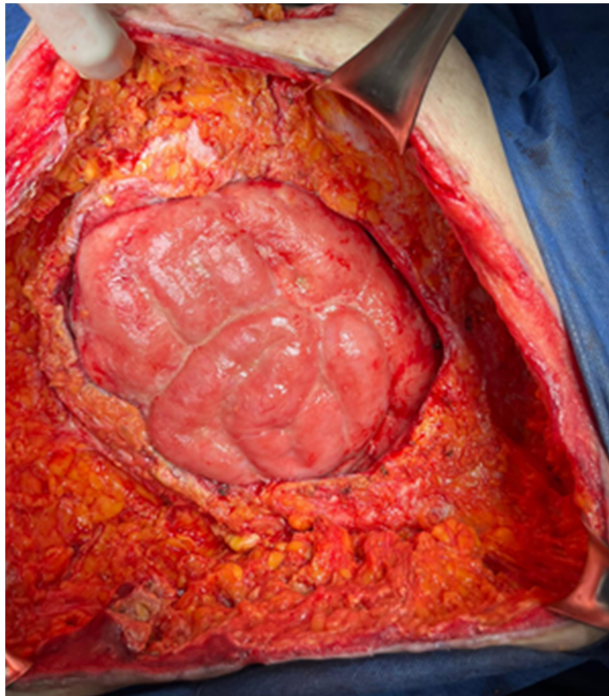
The open abdomen is a complex clinical scenario that often arises in critically ill surgical patients, particularly those with intra-abdominal sepsis. While life-saving in the acute setting, prolonged open abdomen carries significant risks, including fluid loss, infection, fistula formation, and development of large ventral hernias with loss of domain. Traditionally, static closure techniques—such as the Bogotá bag or negative pressure therapy (NPT) alone—have been used to manage these cases. However, these approaches are often associated with delayed closure and high rates of long-term complications. In recent years, dynamic closure strategies, such as mesh-mediated fascial traction combined with NPT, have been proposed to improve outcomes by promoting gradual, controlled approximation of the fascial edges. The European Hernia Society's 2018 guidelines now recommend dynamic closure techniques as part of the standard management of open abdomen. This case series

describes the application of a combined technique using low-weight polypropylene mesh and continuous NPT in the setting of abdominal sepsis, illustrating its feasibility and effectiveness in achieving early fascial closure.

## Case report

A 72-year-old female patient with a medical history of hypertension was admitted with a complicated parastomal hernia and clinical signs of abdominal sepsis. She initially underwent sigmoidectomy with distal closure and creation of an ascending colostomy. Her postoperative course was complicated by generalized peritonitis, which required urgent reoperation and an open abdomen approach. Initial management consisted of abdominal lavage and application of NPT using a polyurethane sponge system, with dressing changes performed every 72 hours. On the fifth change, dynamic fascial traction

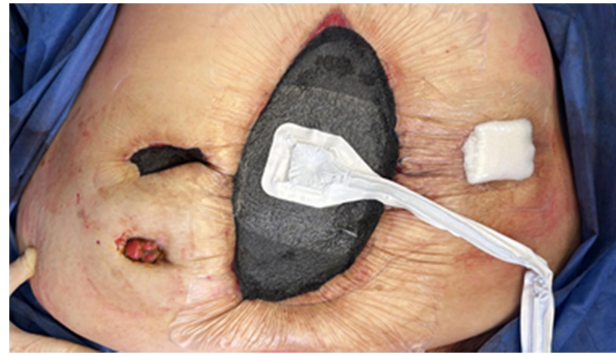
From the From the Department of General Surgery at Hospital General de México "Dr. Eduardo Liceaga. Mexico City, Mexico. Received on July 16, 2025. Accepted on July 21, 2025. Published on July 24, 2025.



**Figure A.** Open abdomen during dynamic fascial closure with negative pressure therapy in a septic patient. Fascial edges are retracted laterally, with exposed subcutaneous tissue and centrally protected viscera. The image was taken during a dressing change before reapplying fascial traction.

was initiated. Two low-weight polypropylene meshes were sutured to the medial edge of each rectus abdominis muscle using a continuous non-absorbable suture (polypropylene 2-0). The meshes were then joined medially with a running suture to apply gradual tension, drawing the fascial edges toward the midline. The sponge was placed above the mesh, in the subcutaneous plane, and sealed with adhesive film. Continuous negative pressure of -120 mmHg was applied using a vacuum-assisted closure device. At each subsequent dressing change, the medial suture was released, excess mesh was trimmed, and a new suture was placed to maintain progressive tension. This process was repeated until the fascial margins were sufficiently approximated to allow definitive closure without permanent mesh implantation.

Following the initiation of dynamic fascial traction, the abdominal wall defect showed progressive reduction in diameter, with a 2 to 4 cm decrease observed at each dressing change. The gradual approximation allowed for preservation of tissue viability and tension control. Complete fascial closure was achieved after several dressing changes, without requiring permanent mesh implantation. The patient tolerated the procedure well and did not experience any signs of abdominal compartment syndrome, wound infection, or dehiscence. At the time of hospital



**Figure B.** Application of negative pressure therapy (NPT) over an open abdomen in a septic patient. The polyurethane sponge is sealed with adhesive drape and connected to a vacuum-assisted system. The stoma is visible on the left flank.

discharge, the abdominal wall was fully closed, and no clinical or imaging evidence of incisional hernia was noted. The recovery was uneventful, and no additional surgical intervention was required.

## Discussion

Managing the open abdomen in the context of sepsis remains a critical and challenging aspect of surgical care. While traditional static methods are still widely practiced, they frequently fall short in achieving early primary fascial closure and are associated with a high incidence of late complications, including large incisional hernias and prolonged hospitalization. In contrast, dynamic closure techniques provide an active solution to the problem of fascial retraction. By combining negative pressure therapy with mesh-mediated traction, the technique facilitates gradual, controlled approximation of the fascial edges while maintaining abdominal domain and minimizing tension on tissues. Our experience aligns with previously published multicenter data showing fascial closure rates of up to 89% with this approach. Moreover, this method appears particularly advantageous in septic patients, where early closure can reduce contamination risks and improve overall prognosis. Although our case illustrates the technique's feasibility and success in a single patient, further studies are needed in our setting to evaluate outcomes in larger cohorts and to standardize protocols for its use. Cost-effectiveness, resource availability, and surgical team training are additional factors that should be addressed in future research.

## Conclusion

The use of dynamic fascial closure with low-weight polypropylene mesh and negative pressure

therapy represents a safe and effective option for abdominal wall reconstruction in patients with open abdomen due to sepsis. The technique enables early closure, minimizes complications, and may reduce the need for delayed reconstruction or permanent mesh implantation. Its timely application in selected patients can significantly improve surgical outcomes, shorten hospital stays, and reduce the incidence of ventral hernias. Continued implementation and study of this technique are warranted in our institution and in similar clinical settings.

### Conflicts of interests

The authors have no financial or personal relationships that could inappropriately influence or bias the content of this article.

### Acknowledgements

The authors would like to acknowledge the surgical nursing team and intensive care unit staff at the Hospital General de México “Dr. Eduardo Liceaga” for their invaluable support during the care of this patient. We also extend our gratitude to the hospital’s Department of Surgical Education for fostering an environment that encourages innovation and collaboration.

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