

An Update in the Management of “Frozen Abdomen”

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ABSTRACT

With a 0.5–3% incidence following initial closure of a laparotomy incision, wound dehiscence is a significant postoperative complication that signifies an abrupt mechanical failure of wound healing. Both clinical entities have common pathophysiological and clinical processes, as recently as the idea of "intentional open abdomen" was defined ("postoperative open abdominal wall"). While early restoration is the goal, a considerable number of patients may experience adhesions between the anterolateral abdominal wall and abdominal viscera; this condition is commonly referred to as "frozen abdomen," and the only practical option seems to be to postpone wound closure. We provide the "Coliseum technique" as the last surgical approach to treat it. This new method offers a creative substitute for abdominal exploration in situations with frozen abdomen that is considered "malignant" because of peritoneal carcinomatosis. Lifting the surgical wound's edges upward and suspending them from a retractor above the abdomen with threads makes it easier to approach the peritoneal cavity, maximizes the exposure of internal organs, and reduces the risk of operating-related damage to the blood supply and innervation of the abdominal wall muscles, which is an essential step for hernia repair later on.

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INTRODUCTION

After the first closure of a laparotomy incision, acute abdominal wound failure—also referred to as burst abdomen, evisceration, wound dehiscence, wound disruption, and fascial dehiscence—is a dangerous postoperative complication. With a frequency of 0.5% to 3% of all laparotomies, it is the inadvertent formation of an open abdomen. There are two types of wound breakdown: total, which affects the skin and all other layers of the abdominal wall, and incomplete, which affects just the skin (1,2).

In patients with certain intra-abdominal diseases, the idea of purposefully creating a postoperative open abdomen as a consequence of a planned therapeutic surgery has recently changed the meaning and treatment of "postoperative open abdominal wall" (POAW) dramatically (3).

While early reconstruction is the goal, many POAW patients experience adhesions between the abdominal viscera and the anterior abdominal wall's underside; this condition is commonly referred to as "frozen abdomen," and delayed wound closure seems to be the only practical solution (4).

For the treatment of "frozen abdomen," a number of surgical procedures have been suggested, highlighting its remarkable qualities and challenging nature. The "Coliseum" technique, first reported by Sugarbaker, is a novel approach of exploring the abdominal cavity, primarily in instances of peritoneal carcinomatosis (5).

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Figure 1. View of frozen abdomen

DISCUSSION

Surgical wound dehiscence is a major postoperative complication that carries a considerable risk of morbidity and death, and it has been well documented for many years. Acute mechanical failure of wound healing has recently been labeled as "unintentional acute postoperative open abdominal wall." (6).

According to van Ramshorst et al., among a number of risk variables, wound contamination is the most significant for abdominal wound disruption, with a risk score of 1.9 (7).

As soon as the therapeutic goal is met, regardless of the factors that led to its formation, the goal is to close the abdominal wall as soon as feasible. High rates of morbidity (34–44%), together with longer hospital stays and higher expenses, highlight the need for the right care. Since randomized controlled trials have not produced any results, the best course of action is still up for discussion. The existence of wound contamination, the attachment of abdominal viscera to the anterolateral abdominal wall, and the existence of an enteroatmospheric fistula are significant factors in determining the course of treatment. Accordingly, POAW can be divided into four categories: (1) POAW without fixation (1A: clean, 1B: contaminated, and 1C: with bowel leak); (2) POAW with developing fixation (2A: clean, 2B: contaminated, and 2C: with bowel leak); (3) POAW with developed fixation (frozen abdomen) (3A: clean frozen abdomen, 3B: contaminated frozen abdomen); and (4) POAW with established frozen abdomen and enteroatmospheric fistula (8).

When local wound conditions improve, an attempt can be made to permanently close the musculofascial layers, but this must be done within a very short period of time—two to three weeks, ideally while the patient is still in the hospital. When expectant care is extended (beyond three weeks) owing to insufficient progress, a "frozen abdomen" develops, and the only practical course of therapy is a planned incisional hernia repair (9).

The decision to use VAC closure improves the patient's overall health and the local wound conditions, but it also results in class 3A POAW, which has increased bowel fixation and loss of domain from further fascial lateralization, making tension-free repair more challenging. This prolongs the waiting period to 12 weeks from the time of POAW identification (10).

In situations of "frozen abdomen," "obliterative peritonitis" requires a minimum of four months to resolve, allowing for a safe laparotomy and adhesiolysis (11).

The primary objective of surgical care for "frozen abdomen" is to enter the peritoneal cavity by laterally positioned incisions, away from the granulating tissue, to avoid intestinal damage and surgical field contamination, which might compromise the use of mesh. Furthermore, to minimize the risk of short bowel syndrome, the degree of intestinal resection in more complex instances of enteroatmospheric fistulae, where it is essentially inevitable, should be minimized (12).

According to Demetriades, the abdominal cavity was reached by means of lengthy vertical incisions spaced 8–10 cm laterally from the open abdominal wound. The adherent bowel loops were then mobilized under direct view, moving from the lateral to the midline. A crystalline polypropylene and high-density polyethylene Marlex mesh was used to cover the defect, and the skin and subcutaneous tissue were sealed over the mesh (13).

According to Sriussadaporn et al., an incision is made around the granulating tissue of the scar to access the abdomen. Following the removal of the affected enteric loop and enteroenteric anastomosis, an absorbable sterile mesh made of undyed filaments made from a homopolymer of glycolic acid was used to seal the abdominal defect. Bilateral bipediced anterior abdominal skin flaps were then used to cover the inert, noncollagenous, and nonantigenic material (12).

Marinis et al. described their experience with many cases of enterocutaneous fistulae-related "frozen abdomen" and suggested a comparatively early surgery based on a lateral surgical approach along the POAW's circumference (14).

An inventive substitute for abdominal exploration in situations with "malignant" frozen abdomen resulting from peritoneal carcinomatosis is the "coliseum" approach. A large space in continuity with the abdominal cavity is created (peritoneal expansion) by lifting the edges of the surgical wound upward and suspending them under traction by threads from a frame positioned horizontally above the abdomen. This maximizes the exposure of intra-abdominal organs for the administration of hyperthermic intraperitoneal chemotherapy (15).

Suspension threads allow for extensive peritoneal cavity exposure while separating the abdominal wall and contents (bowel loops) that contribute to the "frozen abdomen." Additionally, this form of extensive abdominal wall components dissection aided mesh installation following bowel resection and anastomosis (16).

CONCLUSION

We discuss how to treat a "nonmalignant" frozen abdomen that resulted from a surgical abdominal wound disruption caused by contamination and infection by using the Coliseum procedure. By employing this "seriously applied suspending

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Coliseum technique," the adhering "frozen abdomen" is isolated, a large operating field is created for the surgeon's convenience, and all dissected abdominal wall layers are constantly pulled taut. We think that this "oncosurgical" surgical method may be used to treat "benign" frozen abdomens as well, expanding the range of interventional technological options in a safe and effective manner.

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