Management of the Open Abdomen

Demetrios Demetriades, MD, PhD[a,*], Ali Salim, MD[b]

KEYWORDS

• Damage control • Intra-abdominal hypertension • Peritoneal sepsis
• Open abdomen • Temporary abdominal closure • Enteroatmospheric fistula

KEY POINTS

- Routine monitoring of bladder pressures in high-risk patients should be a standard intensive care unit (ICU) protocol.
- Intra-abdominal hypertension (IAH) produces toxic lymph, which causes organ dysfunction. Early release of the IAH and effective removal of the toxic lymph improve outcomes.
- Damage control should be considered early, before the patient reaches the extremis stage.
- Although the open abdomen is a strong weapon in the surgeon's armamentarium, it is also associated with serious complications, such as severe fluid and protein loss, nutritional problems, enteroatmospheric fistulas, and development of massive incisional hernias. The most effective way to prevent or reduce these complications is to close the abdominal wall as soon as possible.
- In severe abdominal sepsis, the open abdomen, using traditional abdominal packing, is of no benefit and might be associated with increased mortality and a higher incidence of enteroatmospheric fistulas. However, there is evidence that negative pressure therapy in these cases improves outcomes.
- Numerous techniques may be used for temporary abdominal closure. They include the Bogota bag, the Wittmann patch, absorbable synthetic meshes, and various negative pressure therapy techniques. Each technique has its own advantages and disadvantages.
- The development of an enteroatmospheric fistula increases the ICU stay by 3-fold, the hospital stay by 4-fold, and the hospital charges by 4.5-fold. The most effective way to prevent this complication is early closure of the abdominal wall. The management strategy should include temporary local control to prevent spillage of enteric contents on the surrounding tissues, while planning the definitive closure of the fistula.

[a] Division of Acute Care Surgery, Department of Surgery, University of Southern California, Los Angeles, CA, USA; [b] Division of Trauma, Burns, and Surgical Critical Care, Brigham and Women's Hospital, Boston, MA, USA
* Corresponding author.
E-mail address: demetria@usc.edu

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INTRODUCTION

The management of complex abdominal problems with the open-abdomen and temporary abdominal closure techniques has become a common and valuable tool in surgery. Damage control for life-threatening intra-abdominal bleeding, early recognition and treatment of intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS), and new strategies in the management of severe intra-abdominal sepsis have resulted in a major increase in the number of cases treated with an open abdomen. Although the open abdomen is usually effective in addressing the primary disorder, it is also associated with serious complications, such as severe fluid and protein loss, nutritional problems, enteroatmospheric fistulas, fascial retraction with loss of abdominal domain, and development of massive incisional hernias (**Box 1**). The initial management of the open abdomen may determine the frequency, severity, and duration of these complications and have a significant effect on survival.

Indications for the Open Abdomen

There are 3 major indications for the use of the open-abdomen technique: (1) prevention or treatment of the ACS, (2) damage control for life-threatening intra-abdominal bleeding, and (3) management of severe intra-abdominal sepsis.

IAH and ACS

IAH and ACS are commonly encountered among both surgical and nonsurgical critically ill patients. Although IAH is defined as a sustained pathologic increase in intra-abdominal pressure (IAP) greater than or equal to 12 mm Hg, ACS is defined as a sustained increase in IAP greater than 20 mm Hg that is associated with new organ dysfunction/failure. Analogous to cerebral perfusion pressure, abdominal perfusion pressure (APP; mean arterial pressure [MAP] – IAP) is a measure of the net pressure available for perfusion of intra-abdominal organs. A target APP associated with appropriate perfusion is 60 mm Hg.

Classification

IAP is defined as the steady-state pressure concealed within the abdominal wall. For most critically ill patients, an IAP of 5 to 7 mm Hg is considered normal. Although the exact pressure that defines IAH is debated, most studies show a decrease in visceral organ perfusion at an IAP of 10 to 15 mm Hg. Thus, if left untreated, prolonged increases in IAP could result in multisystem organ failure.

In defining the severity of IAP, the World Congress on Abdominal Compartment Syndrome introduced a useful grading system for IAH: grade I (IAP 12–15 mm Hg), grade II (IAP 16–20 mm Hg), grade III (IAP 21–25 mm Hg), and grade IV (IAP>25 mm

Box 1
Problems associated with the open abdomen

- Fluid and protein loss
- Malnutrition
- Enteroatmospheric fistulas
- Loss of abdominal wall domain
- Prolonged intensive care unit and hospital stay
- Increased hospital costs