

Abdominal Compartment Syndrome – A Major Complication of Large Incisional Hernia Surgery

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Rezumat

Sindromul de compartiment abdominal - complicație în chirurgia defectelor parieto-abdominale voluminoase

Incidența hipertensiunii intraabdominale (HTIA) și a sindromului de compartiment abdominal (SCA) este subapreciată în chirurgia defectelor parieto-abdominale de mari dimensiuni, cu diametrul transversal maxim de peste 10 cm, acesta fiind considerat principalul factor de risc pentru dezvoltarea hipertensiunii intraabdominale, alături de restricția ventilatorie sub 60% și obezitate. Hipertensiunea intraabdominală înregistrează o prevalență de cel puțin 50% în rândul bolnavilor critici și a fost identificată ca factor de risc independent, amenințator de viață. Încă, medicii nu evaluează corespunzător și nu sunt conștienți de consecințele potențial letale ale hipertensiunii intraabdominale netratate. Aceste consecințe pot fi sindromul de compartiment abdominal, urmat de insuficiență organică multiplă și chiar moartea pacientului. Lucrarea dorește să evidențieze imperiozitatea recunoașterii în timp util a acestei patologii, ca factor cheie în managementul corect al acestor complicații.

Cuvinte cheie: sindrom de compartiment abdominal, hipertensiune intraabdominală, hernie incizională.

Abstract

The incidence of Intraabdominal Hypertension (IAH) and Abdominal Compartment Syndrome (ACS) is underestimated within the surgery of large size parietal-abdominal defects, with the maximum transverse diameter above 10 cm, being considered the main risk factor for the development of intra-abdominal hypertension, together with ventilatory restraint under 60% and obesity. Intraabdominal hypertension has a prevalence of at least 50% among critical patients and was identified as an independent life-threatening risk factor. However, doctors do not evaluate it properly and do not realize the potential lethal consequences of untreated intra-abdominal hypertension. These consequences may be abdominal compartment syndrome, followed by multiple organ dysfunction and even patient death. The paper intends to highlight the importance of the early recognition of this pathology, as a key factor in the correct management of these complications.

Key words: abdominal compartment syndrome, intraabdominal hypertension, incisional hernia.

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Introduction

Abdominal wall compliance together with abdominal content determine intraabdominal pressure. Under normal conditions intraabdominal pressure is below 5 mmHg. Even if the concepts of intraabdominal hypertension and abdominal compartment syndrome have been known for more than a century, there are still difficulties in making a distinction between them (1,2). Intraabdominal hypertension, as a

general notion, represents an intraabdominal pressure above 12 mm Hg, not accompanied by the dysfunction of any organ or system while abdominal compartment syndrome is a consequence in time of the intraabdominal hypertension effect (final result of an extreme IAH). Initially, both terms were associated to traumatic pathology, but over time they have been used both in connection to surgical patients and patients suffering from medical disorders. The fact that intraabdominal hypertension occurs in 18-80% of critical patients explains the increase of medical interest in this problem (1,2,3).

Intraabdominal pressure is monitored by indirectly supervising it, based on the measurement of the pressure inside the urinary bladder. The critical level of intraabdominal pressure, above 15 mm Hg, is considered a warning for applying a technical solution to prevent the "suffocation" of the abdominal content by an excessively tight "corset" (4,5). Timely detection of this complication insures a favourable evolution of these patients, subject to the application of correct therapeutic measures.

In this paper, we present the case of an obese patient with median voluminous eventration, who developed an abdominal compartment syndrome, 3 days after surgery, which caused his death despite a new surgical operation which was probably late.

Case presentation

We present the case of an obese (BMI= 35) patient, aged 65, operated in a local health care unit, in February 2009, for bilateral inguinal hernia by median approach. The evolution at that point was followed by the development of a stercoral fistula, seven days after the surgery. A second surgery became necessary and a segmental colectomy "à la Hartmann" was performed.

In November 2009, the patient presented to our department with voluminous multi-sacculated pubian-supraumbilical median eventration, irreducible spontaneously and upon taxis manoeuvres as well as for the reconversion of bowel movement. Biological tests and preoperative paraclinical examinations (abdominal ultrasound scan, plain abdominal radiography) were within normal limits, except for FEV1 lowered by 35%. After the prior preoperative preparation the surgery is performed under general anaesthesia and the intestinal continuity is restored, after Hartmann procedure and the incisional hernia repair - retromuscular alloplasty procedure. The large size of the defect makes it difficult to completely close the anterior sheath of the rectus abdominis muscles, their suture being made partially with continuous approaching thread in order not to additionally increase the intraabdominal pressure (Fig. 1 and 2)

The postoperative evolution was burdened by intense abdominal meteorism, 72 hours after the surgery the general condition of the patient becoming worse, requiring transfer in the intensive care department. The patient complained of diffuse abdominal pain, meteorism, dyspnoea, polypnea, bilateral pulmonary rales, precordial pain and vomiting. The

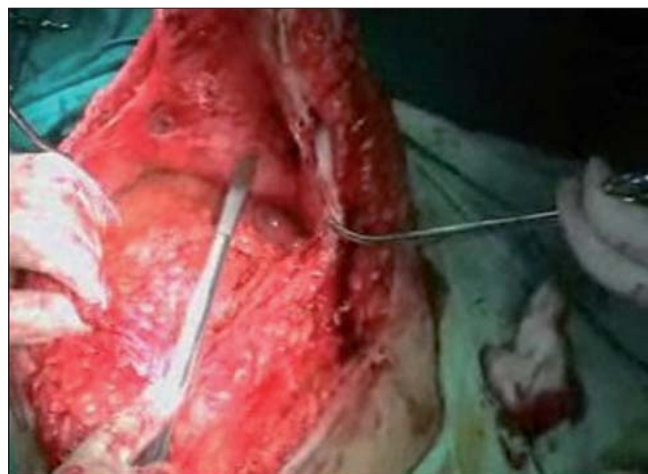


Figure 1. Intraoperative aspect of giant incisional hernia with transversal diameter over 10 cm

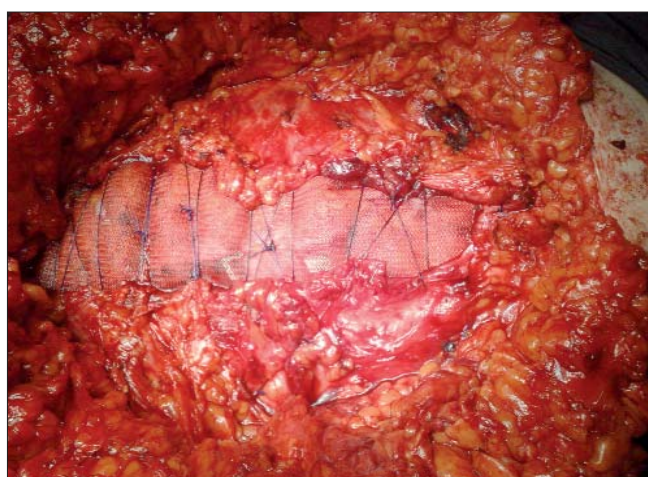


Figure 2. Partial closure with continuous suture of anterior layer of rectus abdominis sheath with polipropilene. The size of the defect make not possible the total closure of the aponeuroses

abdominal ultrasonography indicates intense abdominal meteorism, with distended intestinal loops and mixed content in the right and left flank. Ventricular allure - 98 beats/ minute, BP = 150/75 mm Hg, CVP = 0 cm H₂O, lactic acid 18 mg/dl, oligoanuria (300 ml/24h), O₂ sat. = 53.6%, corrected by administration of O₂ through the face mask, important gastric stasis. After being stabilized the patient undergoes another surgery and the continuous super-prosthetic and aponeurotic thread is removed. The evolution is favourable, with respiratory and hemodynamic compensation, reason for which the patient is transferred in the department. The patient has extended ileus and no intestinal movement for faeces and gases. 48 hours after the second surgery the patient complains of abdominal pain, respiratory, cardiac and renal functions being impaired, the parameters at that moment being: ventricular allure = 145 beats/minute, BP = 75/45 mmHg, Hb = 7g/dl, leukocytes = 16000/ μ L, lactic acid = 24 mg/dl, urea = 143 mg/dl, creatinine = 3.8 mg/dl.

The patient is subjected to decompressive laparotomy. During the surgery an ischemic appearance of the small intestinal loops was noticed, greatly dilated, requiring the resection of a necrosed segment, of approximately 30 cm, performing an entero-enteral and termino-terminal anastomosis; at the end of the surgery the decision to leave the abdomen half-opened (Bogota system) was taken because of the possibility of accentuation of hemodynamic or respiratory deterioration after closure and of massive intestinal oedema. Two days after the surgery, despite the treatment within the intensive care department, the patient experienced a respiratory and cardiac arrest, irreversible to resuscitation operations, which resulted in his death.

This case is a typical example of serious complications, occurred after a surgery that was apparently simple but which requires the careful postoperative monitoring of all parameters which might indicate IAH, the loss of this moment leading to the development of ACS.

Discussions

The abdominal compartment syndrome is a clinical entity described 100 years ago which acquired greater importance following the development of alloplasty techniques used for incisional hernias with high maximum transverse diameter, old, neglected hernias associated to the presence of an insufficient intraabdominal space, unable to adapt to the “new content”, without a significant increase in pressure (6,7). The syndrome is defined by an increase of the intraabdominal pressure over 25 mm Hg (or even over 30 mm Hg), accompanied by the impairment of different organs and systems functions (1,2,3,8). Once the intraabdominal pressure increases in association to the dysfunctions mentioned above, the surgical decompression has maximum emergency indication. The surgery in early stages enables a more rapid recovery, preventing the development of irreversible lesions. The abdominal compartment syndrome, late manifestation of uncontrolled intraabdominal hypertension leads to the so-called correspondence - pressure - organ dysfunction (Fig. 3).

In the presented case, we consider that the increased intraabdominal pressure led to the compression of the inferior vena cava and to the decrease of the venous return (preload) and implicitly of the cardiac output and the patient experienced hypovolemic shock. This evolution was complicated by the presence of intestinal ischemia, followed by oedema and the passage of fluids in space III - catch-22, the premise for the development of the SIRS (Systemic Inflammatory Response Syndrome), the patient's life being thus threatened by the loss of the optimum operative moment. The development of IAH and ACS shall be considered in all cases of primary or incisional hernia with the loss of domain (9,10,11,12,13). Intraabdominal pressure shall be monitored whenever there is a suspicion of development of these complications. The risk of non-monitoring leads to limited therapeutic options which result in an unfavourable evolution. The dosing of lactic acid may be brought into discussion, as an indicator of intestinal

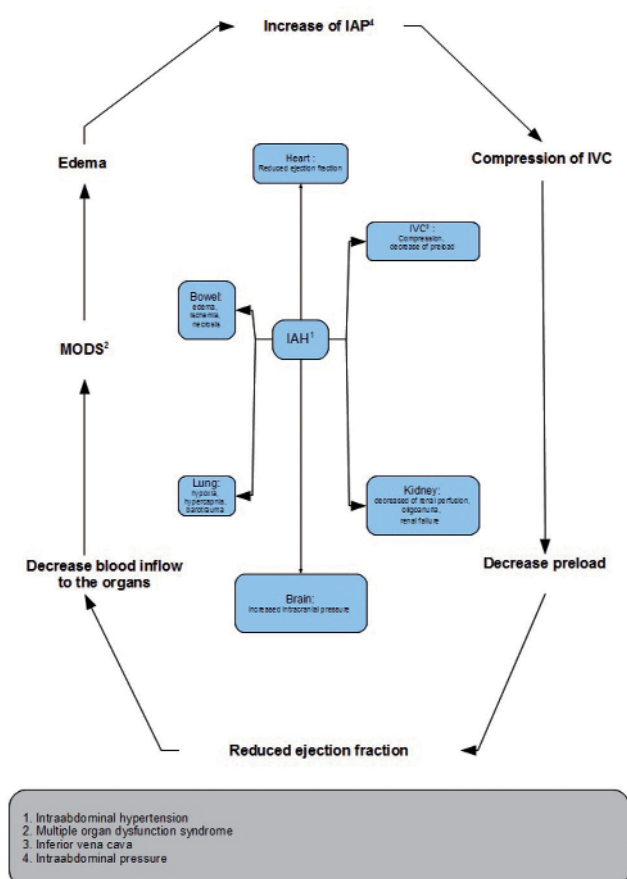


Figure 3. Abdominal compartment syndrome pathogenesis (7,8,9)

ischemia development, but it reaches very high values after several hours from development of necrosis (15,16,17,18,19).

In the case presented, there was no time for such monitoring, because of the rapid deterioration of the clinical condition. In this patient with abdominal compartment syndrome, even if recognized within the first 72 hours, moment in which the symptoms overlapped to postoperative ileus, performing as a first measure the removal of the aponeurotic continuous suture in view of decompressing the abdominal cavity, the moment when the surgery was performed was late, which lead to the tragic end of this case. This situation was possible because of the loss of the optimum operative moment mainly due to the nonspecific manifestations of IAH, being difficult to be differentiated in the immediate postoperative period from the ileus normally present after any major surgery.

Conclusions

IAH and ACS are not synonyms but they represent distinct stages within the evolution of the same process.

The risk of developing an abdominal compartment syndrome includes any situation associated to abdominal cavity volume restriction. The early recognition of abdominal compartment syndrome is the key in preventing the deterioration of the functions of different organs and systems and

decreasing mortality connected to this pathology which is frequently under-diagnosed. IAH and CAS represent extremely serious pathologic entities, associated to an increased mortality, aspects which justify the attention paid by specialists all over the world.

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