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Introductory Chapter: Abdominal Trauma – An Update

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1. Introduction

“The first doctor invited to the victim should remember that he has three tasks: (1) take measures against shock; (2) recognize damage to the internal dense organ—the cause of internal bleeding; and (3) recognize damage to the hollow organ—the cause of hyperacute peritonitis. He should also know that all injuries, without any exception, are subject to the competence of the surgeon and require extreme urgency. Whether it is a perforation of the intestine and infection of the peritoneum, or a rupture of a dense internal organ and bleeding—it doesn’t matter, in either case, the victim is in mortal danger and the minutes are counted” [1].

Closed injuries and abdominal wounds have always been a difficult surgical problem. The presence of many vital organs in the abdominal cavity, the specifics of their anatomical structure, vascular architectonics and innervation, the immediate proximity of intestinal contents rich in pathogenic flora, the presence of organs producing extremely active enzymes—all this leads to massive internal bleeding, rapid development of peritonitis, and the occurrence of irreversible changes in organs and tissues.

As with no other injury, abdominal trauma requires accurate and rapid diagnosis, thoughtful and adequate surgical tactics, and the ability to predict the dynamics of the development of pathological changes occurring in parenchymal organs and the gastrointestinal tract [2].

As a rule, abdominal trauma differ in the severity of the general condition, internal bleeding, the development of shock, the distinct dependence of treatment outcomes on the timing of surgery, the complexity, complexity of the operation, and the need for particularly careful management of the patient in the postoperative period. Even in peacetime, they are accompanied by a significant frequency of complications and adverse outcomes.

Abdominal trauma account for up to 1/3 of peacetime injuries, and their frequency and severity, despite the downward trend, remain high. The main part of the victims is men of working age, which makes the problem particularly relevant [3].

Over the past 20 years, serious changes have taken place in the structure of abdominal trauma due to the steady increase in the number of road accidents, falls from heights, man-made disasters, natural disasters, and local military conflicts. The characteristic features of modern abdominal trauma are the multiplicity and severity of injuries accompanied by gross violations of homeostasis and disorders of vital functions of the body, which causes a high, nondecreasing mortality rate—6.1–26% and a high frequency of postoperative complications—10–27% [4].

Meanwhile, most of the victims with abdominal trauma are hospitalized in general surgical departments, whose doctors do not always have sufficient experience in providing care to such patients. The outcomes are negatively affected by errors in diagnosis and treatment, most of which are allowed due to the lack of uniform tactical settings on the nodal issues of the problem.

Despite the availability of a wide range of classical and modern diagnostic, resuscitation and anesthesiological aids, many issues of surgical tactics in abdominal trauma still remain unresolved to the end. The unfavorable factors should also include unjustified highly traumatic surgical interventions carried out due to diagnostic errors made in determining the leading damage in victims with combined trauma [5].

The proportion of unjustified laparotomies in a wide range of surgical approaches for abdominal trauma remains unreasonably high today. Until recently, with an abdominal wounds, as well as when it was impossible to exclude damage to the abdominal organs with a closed abdominal injury, a wide laparotomy was an unshakable axiom. However, in the last decade there have been many reports about the use of minimally invasive technologies in the diagnosis and treatment of abdominal trauma [6].

Thus, the arguments given indicate that the problem of modern diagnostic and therapeutic approaches to abdominal trauma is very relevant and requires detailed coverage.

2. Diagnostic algorithm for abdominal trauma

Blunt abdominal trauma requires a thoughtful diagnostic approach and interpretation of the results taking into account the overall condition of the patient. Laboratory tests, such as blood gas analysis, determination of pH, base excess/deficit, hemoglobin and hematocrit levels, and INR, are mandatory for diagnosis as allow to quickly assess the physiological condition of the patient. All patients with blunt abdominal trauma should undergo an urgent focused assessment with sonography for trauma (FAST), since this method is simple and commonly, and since 1999 has been used for evaluating not only the abdomen but also the cardiac and thoracic regions. It should be borne in mind that FAST has limitations in the detection of bowel and mesenteric injuries [7].

The gold standard for the diagnosis of blunt abdominal trauma is multi-slice computed tomography (MSCT). Hemodynamically stable patients with abdominal pain and direct or indirect signs of abdominal trauma with MSCT should undergo diagnostic laparoscopy. All patients with blunt abdominal trauma, including those with negative MSCT data, should be admitted for dynamic observation and, if necessary, re-examination for at least 24 hours, since negative MSCT data cannot reliably rule out intra-abdominal injuries. In case of persistent pain or clinical signs of peritonitis, unclear or abnormal findings in FAST and/or MSCT, the next step is diagnostic laparoscopy, which should be performed within the first 24–36 h after trauma [8].

3. General principles of management of abdominal trauma

The main task that a physician solves when helping a patient with abdominal trauma is to determine the indications for surgery, the timing of its implementation,

and the possibilities of conservative therapy. There is a difference in determining indications for surgical treatment in patients with open (wounds) and blunt abdominal trauma.

Most patients with abdominal wounds, both penetrating and non-penetrating, are subject to surgical treatment. Surgical treatment should be understood as the debridement, and in the case of the penetrating wound—the performance of median diagnostic laparotomy. If there are obvious signs of penetrating abdominal wounds, the operation immediately begins with a median laparotomy. Signs of intra-abdominal bleeding or peritonitis in patients with an abdominal wall wounds are also an indication for urgent laparotomy. In all other cases, the debridement is performed, the task of which is not only the removal of nonviable tissues, hemostasis and suturing, but also the final determination of the nature of the wound: whether it is penetrating or not. The presence of a peritoneal defect is an indication for median laparotomy. It should also be remembered that with abdominal wounds, any doubt is resolved in favor of surgery.

It should be noted that in recent years, there have been reports of nonsurgical treatment of patients with penetrating abdominal wounds.

With a blunt abdominal trauma, tactics are more differentiated. The presence of obvious signs of intra-abdominal bleeding, as well as peritonitis, serves as an absolute indication for immediate surgery, regardless of the severity of the condition and hemodynamic parameters. Conservative treatment is subject to patients with abdominal wall bruises, with intra-organ hematomas of parenchymal organs that do not tend to increase, with small and stable subcapsular hematomas. The complex of conservative measures for blunt abdominal trauma includes the creation of rest, the appointment of respiratory analeptics, and therapy aimed at the prevention and treatment of organ failure. Of great importance is the replenishment of blood loss, anti-shock measures, the introduction of hemostatic agents, and cardiotropic drugs.

4. Conclusions

For a physician who is faced with a patient with an abdominal trauma, the hemodynamic status and the mechanism of injury are keys to choosing appropriate diagnostic approach and management. Most hemodynamically, unstable patients require immediate laparotomy, but in hemodynamically stable patients, two important issues need to be clarified: (1) Is there an intra-abdominal injury? and (2) If there is an intra-abdominal injury, which organ is involved and how serious is its damage? The answers to them can help make the right decision [9].

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