Case Report

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Coronary Sinus Injury in a Multisystem Thoracoabdominal Cut/Stab Wound

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ABSTRACT We report a case of successful treatment of a patient with multiple stab and cut wounds of chest and abdomen which resulted in the injuries of venous coronary sinus and abdominal organs. Surgical wound revision in the antishock unit, priorities of surgical accesses (thoracotomy and laparotomy) allowed timely cure the injury. A key feature of our case report is a coronary sinus trauma.

Coronary sinus suturing in a closed heart surgery is technically difficult. It has the potential hazard due to the proximity of coronary arteries, stricture and thrombosis of the coronary sinus after suturing. Extracorporeal circulation and cardioplegia ensure reliable hemostasis and intact patency of the coronary sinus.

Clinical case of suturing coronary sinus injury in a closed heart surgery proves the reasonable use of autopericardial strengthening strips and local hemostatic made of regenerated cellulose.

Keywords: multitrauma, thoracoabdominal wound, venous coronary sinus injury, liver damage, abdominal injury, diaphragm injury

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INTRODUCTION

The treatment of penetrating wounds of the chest and abdomen with damage to the heart and abdominal organs is an urgent problem in emergency surgery. The main causes of death are massive blood loss, cardiac tamponade, or a combination of both. A reasonable sequence of stages of surgical intervention largely determines the result of treatment.

Clinical observation

A 56-year-old patient was delivered via ambulance to the Irkutsk Regional Clinical Hospital on April 10, 2020 an hour after receiving stab wounds to the chest and abdomen. Due to hypotension at the stage of transportation, an infusion of 1,200 ml of crystalloid solutions was carried out.

Upon admission, there were no signs of external blood loss on outer clothing. Upon examination, three stab wounds were found: IV intercostal space on the left along the anterior axillary line — a wound 4.0 × 0.5 cm, 2 cm below the costal arch on the right along the mid-clavicular line — 2.0 × 0.5 cm; in the midline of the abdomen just above the navel — 1.0 × 0.5 cm.

Considering the wound in the area of I.I. Grekov, hemorrhagic shock (blood pressure 100/60 mm Hg, pulse 100 beats/min, Allgower and Burri shock index — 1.0), pulse pressure 40 mm Hg, the patient was immediately admitted to the operating room combined with an anti-shock ward. Weight 90 kg, height 168 cm, BMI 32 kg/m^2 . The

consciousness was clear. Alcohol intoxication, agitation. Acrocyanosis, pale skin; SaO_2 when breathing atmospheric air 95%. During auscultation, breathing was heard in all parts of the lungs, muffled heart sounds were noted. Significant enlargement, tension of the jugular veins. A heart injury was suspected.

Fifteen minutes after admission to the hospital under intubation anesthesia in the position of the patient lying on his back with a roller under the left shoulder blade, primary surgical treatment was performed and the penetrating nature of the wounds was confirmed.

Twenty minutes after hospitalization, an anterolateral thoracotomy was performed on the left in the IV intercostal space. The pleural cavity contained 100 ml of liquid blood. The pericardium was bluish in color, tense, widespread imbibition of mediastinal fatty tissue by blood was revealed. There were no ongoing bleeding. Longitudinal pericardiotomy anterior to the phrenic nerve was performed and 100 ml of liquid blood and clots were removed from the pericardial cavity. Ongoing active venous bleeding. After fixing the pericardium with sutures, the heart was dislocated into the wound. The source of bleeding was found, a tangential wound of the proximal third of the coronary sinus, about 1 cm long. Temporary hemostasis with digital compression. When trying to close the wound with an atraumatic needle and tighten the sutures with a 5-0 thread, eruption of the wall of the coronary sinus was noted. Given its diameter (up to 0.8 cm), two autopericardial patches 10 × 4 mm in size were used to prevent narrowing of the lumen deformity. Two U-shaped stiches were formed with tightening threads to the approximation of the walls and the cessation of active bleeding. The coronary sinus was passable, there were no signs of venous plethora of the heart. There was mild bleeding from the punctures. The application of a local hemostatic agent with dimensions of 5.1×10.2 cm (*Surgicel Snow*).

Given the absence of ongoing bleeding and the discrepancy between the detected volume of blood loss and the severity of the condition, the chest was not sutured. An upper midline laparotomy was performed. In the abdominal cavity, mainly in the right subphrenic space, up to 500 ml of liquid blood and massive clots were revealed. The wound of IV segment of the liver 3 cm long with a fixed clot. The liver wound was sutured with two U-shaped sutures (ethicon 3.0). The wound of the anterior wall of the fundus of the stomach, up to 0.5 cm long, penetrating into the lumen of the stomach, was sutured with separate serous-muscular sutures (vicryl 4/0). A penetrating wound of the anterior dome of the left half of the tendon center of the diaphragm was found, penetrating into the pericardial cavity, up to 2 cm long, which was sutured with separate sutures (vicryl 1/0). The omental sac was opened and the posterior wall of the stomach and pancreas were examined. There were no other damages. Drainage and layer-by-layer suturing of the abdominal wall were performed.

Repeated transpleural, pericardial revision of the coronary sinus — valid hemostasis. The pericardium is sutured with separate sparse sutures, a fenestration is formed below the phrenic nerve. After sanitation and drainage of the pleural cavity, layer-by-layer suturing of the chest wound was performed.

Operation time 145 minutes. The patient was delivered to the intensive care unit with stable hemodynamics without inotropic support. The data of electrocardiogram, echocardiography and dynamics of markers of myocardial damage ruled out a violation of the venous outflow of the heart. There were no indications for blood transfusion (Hb 91 g/l). The patient was extubated, transferred to spontaneous breathing 9 hours after the operation. On the 3rd day he was transferred to the ward block. The first paroxysm of atrial fibrillation on the 7th day was stopped by medication. The patient was discharged 12 days after the operation in a satisfactory condition.

Questionnaire 16 months after surgery. No complaints.

DISCUSSION

The sequence of operations for wounds of the chest and abdomen is based on the choice of injury priority. Surgical intervention in a patient with a wound in the area of I.I. Grekov and the clinic of hemorrhagic shock were performed immediately without instrumental studies. After suturing the coronary sinus of the heart, the chest wound was not sutured. We performed laparotomy with the elimination of damage to the abdominal organs.

According to the analysis of the literature, damage to the coronary sinus is rare, mainly during open heart surgery [1–4]. Suturing a defect in the wall of the coronary sinus in case of wounds should provide not only reliable hemostasis, but also a normal outflow of venous blood. The deformation of the lumen can lead to its thrombosis, hemorrhagic myocardial infarction [5, 6], and pulmonary embolism [7].

In the above observation, the prevention of outflow disorders and reliable hemostasis were ensured by the use of autopericardial patches with additional application of a local hemostatic agent without circulatory support.

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