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A CLINICAL CASE OF SUCCESSFUL APPLICATION OF VACUUM THERAPY IN THE TREATMENT OF POSTOPERATIVE STERNOMEDIASTINITIS

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The article presents observation of a clinical case of postoperative sternomediastinitis. The technique of using vacuum therapy in the treatment of purulent wounds is highlighted. The authors described the possibility of using vacuum therapy without performing the final reconstructive operation in a patient with severe concomitant pathology.

Keywords: sternomediastinitis, vacuum therapy, thoracic surgery, cardiac surgery.

Due to the rapid development of cardiac surgery in the late 20th century, the number of studies devoted to postoperative sternomediastinitis significantly increased [1]. At present, cardiosurgical patients are people of senile age with a significant comorbid background determining a great number of risk factors for complicated tissue healing in the surgical access area [9]. Poststernotomy mediastinitis aggravates the patient's clinical condition and increases the duration of treatment [8], while the long-term expensive treatment of postoperative complications of cardiac surgery raises the question of the cost component [10]. The cost of treatment of a deep postoperative sternal infection is excessively high doubling the cost of the overall treatment of cardiac patients [10] and reaching \$500,000 in specialized centers of the United States [11], which even with an infection rate of less than 1% presents quite an impressive cost for any country.

At present, the most prevalent management of sternomediastinitis is a two-stage treatment [3, 5], including early initial surgical debridement of the wound [15], the process of preparing the wound for reconstruction, which is most often carried out using vacuum therapy [7] and performing reconstructive surgeries preserving the sternum tissue [14] or its complete removal [12]. The stage-by-stage approach to the treatment is deter-

mined by the severe condition of the patient, presence of concomitant pathology [2] and, clearly, by the bacterial contamination of the wound. At this, the final reconstructive surgery most frequently consisting of the extirpation of the sternum and plasty of the anterior thoracic wall defect is rather traumatic and long [5].

Widespread application of the vacuum therapy in the interstage period leads to the decrease in the percentage of cases requiring final reconstructive surgery from 42.8% to 25% as well as to reduce the rate of postoperative complications following the final chest wall reconstruction from 28.6% to 7.1% [13].

According to some observations, vacuum therapy has been sufficient for the treatment of the postoperative sternal infection with no need for further reconstructive surgery, whereas the duration of the treatment increased [6].

Vacuum therapy is an innovative method of treating wounds of various etiology accelerating the course of the wound process. For the application of a vacuum dressing, a hydrophilic polyurethane sponge, a sealing film coating, a drainage tube and a vacuum source with a container to collect the liquid are most often used. Devices for vacuum therapy are capable of creating and maintaining negative pressure in the wound for a long time in a constant or intermittent mode with a pressure in the range from 50 to 200 mm Hg. Art., with the optimal level of negative pressure in the wound being considered 125 mm Hg. [4].

A clinical case of a comorbid female patient with a severe concomitant pathology who was given vacuum therapy without reconstructive surgery can be considered as an example.

Female patient named K. aged 68 was admitted to the department of the thoracic surgery of the Regional Clinical Hospital №1 of the Ministry of Health of the Khabarovsk Region on October 11,

2010. According to her past medical history, on August 12, 2021, she underwent a simultaneous surgical intervention using a transsternal approach and laparotomy access involving tricuspid valve plasty and inferior vena cava thrombectomy. The patient had right-sided nephrectomy for the right kidney cancer, tumor thrombus of the right renal vein and inferior vena cava, recurrent renal bleeding, and acquired tricuspid valve disease. In addition, the patient had ischemic heart disease involving stable exertional angina FC II. Postinfarction cardiosclerosis was noted (lower wall myocardial infarction occurred in June, 2021). Obliterating atherosclerosis of coronary arteries was characterized by diffuse lesion of the 50% stenosed anterior descending and circumflex artery, and occlusion of the small right coronary artery (CAG, August 05, 2021). Indicators such as paroxysmal atrial fibrillation in the absence of a paroxysmal event, the risk of thromboembolic complications according to the CHA2DS-VASc score of 6, risk of bleeding according to HAS-BLED score of 2 points. EIT No. 1 360 J. was performed on August 20, 2021. The patient had Stage III hypertension, 1-st degree arterial hypertension, risk IV, CHF 2A FC II according to NYHA. Other diagnoses included CKD 3B, Type 2 Diabetes mellitus, Diabetic macro-microangiopathy, Anemia of mixed origin. Intraoperatively, during cardiac surgery, the patient had blood loss of up to 4000 ml, which required cardiopulmonary bypass and blood transfusion. In the early postoperative period, respiratory and cerebral insufficiency, acute kidney injury, metabolic disorders, hyperglycemia were present. The heart rhythm was impaired. The patient received prolonged artificial lung ventilation, sessions of renal replacement therapy and transfusion of blood components on August 20, 2021. The cardiac rhythm was restored by electropulse therapy. The patient was

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discharged on August 31, 2021. 20 days after discharge, a swelling appeared in the lower corner of the postoperative scar, later the swelling opened up on its own with the appearance of a discharge. The patient was referred to the emergency room of the Regional Clinical Hospital №1 by a general surgeon, being examined by a thoracic surgeon on October 8, 2021. Hospitalization was recommended. The patient was admitted to the emergency room on October 11, 2021. Spiral Computer Tomography (SCT) of the chest was performed. According to the SCT (performed on October 11, 2021), subcutaneous air accumulation sized 36x20 mm in the sternum manubrium area, and subcutaneous emphysema of the soft tissues of the right chest were revealed. There was a sternal bone rarefaction, diastasis of the sternum up to 15 mm along its entire length, right-sided hydrothorax (Fig. 1, 2).

After preliminary preparation, on October 21, 2021 an operation was performed - surgical treatment of the wound of the sternum (Fig. 3, 4). Opening of the wound, debridement, necrectomy. According to intraoperative picture, the sternal wound dehiscence is observed along the entire length of the sternum, the right half is practically absent, diastasis is up to 1.5 cm, along the median line an abundant amount of fibrin and purulent discharge are present, cultural flora revealed *St. Epidermidis* β -hemolytic strain in the amount of CFU 10^4 .

Further on, within a week, the wound of the sternum was kept open during treatment, dressings were performed (Fig. 5.), all over the wound there was an abundant exudation.

From October 28, 2021 the patient received sternomediastinitis therapy using vacuum aspiration (Fig. 6). Vacuum dressing was changed in the operation room every three days with the removal of necrotized tissues, defibrinization and control of the wound for bacteria. Culture of the wound discharge taken on November 5, 2021 showed the decrease in the microbial wound load (*St. Epidermidis* β -hemolytic strain in the amount of CFU 10^2).

Considering the patient's comorbid background and contraindications for reconstructive surgery, a decision was made to continue conservative treatment of the patient using vacuum therapy without extirpation of the sternum and thoracoplasty. A standard mode vacuum therapy was continued. For the application of a vacuum dressing, a hydrophilic polyurethane sponge, a sealing film adhesive coating, a drainage tube and a vacuum



Fig. 1. Sagittal plane of the thoracic cage. Accumulation of gas is determined in the prethoracic area

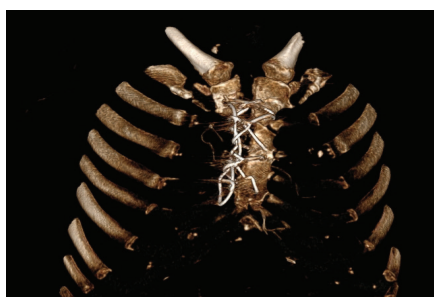


Fig. 2. 3D reconstruction of the chest, diastasis of the sternum is determined, the right part of the sternum is practically absent



Fig. 3. Postoperative wound before surgical interference

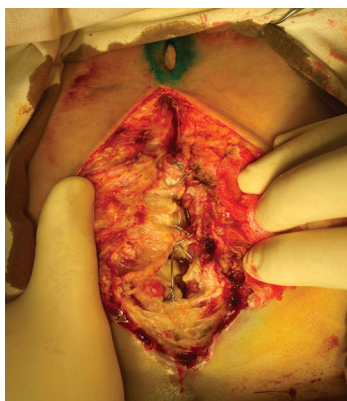


Fig. 4. The wound after opening (the sternal tissues are edematous, bone lesion is determined)



Fig. 5. Wound appearance before using vacuum aspiration.



Fig. 6. The appearance of the patient with a vacuum aspiration system applied to the chest (October 28, 2021r.)



Fig. 7. Wound appearance (November 5, 2021): exudation stage cessation



Fig. 8. Wound appearance (November 28, 2021): healing phase



Fig. 9. Wound appearance (December 16, 2021).



Fig. 10. Wound appearance on completion of the treatment (February 28, 2021): complete scarring of the thoracic wall wound.

source with a container for collecting fluid are most often used. Devices for vacuum therapy are capable of creating a negative pressure in the wound of 100 mm hg. crt. in continuous mode. Against the background of the therapy, the patient showed positive dynamics, she became more active, the thoracic wall wound cleared of fibrin having significantly decreased in size. On November 28, 2021 vacuum aspiration system was replaced (Fig.8). On November 29, 2021 the patient was discharged from the hospital with recommendations to continue vacuum therapy at the outpatient department.

The system of vacuum aspiration continued to be used in conditions of an

outpatient department till the slit-shaped superficial wound of the thoracic wall was formed which is essentially only a skin defect (Fig. 9).

Afterwards, the wound was managed openly with ointment-based dressings until the wound defect was fully epithelialized. The appearance of the wound at the end of treatment is shown in Fig. 10.

Conclusion: Based on the clinical observation presented, we can conclude that in cases where the highly traumatic reconstructive stage of surgical treatment is contraindicated due to concomitant pathology, it is appropriate to use the possibility of vacuum therapy to achieve the healing and complete scarring of the chest wall wound.

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