

<https://doi.org/10.47183/mes.2026-488>



COMBINED FRAGMENT WOUND OF THE CHEST AND ABDOMEN WITH TENSION PNEUMOTHORAX, RIGHT KIDNEY INJURY, AND INFERIOR VENA CAVA DAMAGE: A CLINICAL CASE

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Introduction. Combined fragment wounds of the chest and abdomen are among the most severe types of combat trauma. Injuries to the inferior vena cava (IVC) and renal vessels are associated with massive retroperitoneal hemorrhage and high mortality rates, reaching 50–70%. In a mobile medical group (MMG) (Level 2+ of medical care), located close to the combat zone, treatment success depends on rapid decision-making, a well-organized multidisciplinary approach, and the performance of complex vascular reconstructions.

Case description. A 32-year-old serviceman was delivered to the MMG 30 min after sustaining a fragment wound. The condition was extremely severe, characterized by profound hemorrhagic shock grade II and severe anemia. A penetrating abdominal wound with injury to the right kidney and retroperitoneal hemorrhage, as well as a right-sided pneumothorax, were diagnosed. The consultation team decided on emergency surgery. Pleural cavity drainage and a midline laparotomy were performed, revealing a massive retroperitoneal hematoma (2 L of blood evacuated). Exploration demonstrated an injury to the right renal hilum with avulsion of the renal artery and vein, alongside two defects of the IVC: avulsion of the right renal vein from its confluence and a through-and-through defect of the anterior wall. After intravenous heparin administration, the IVC was clamped, the vein defects were closed with a parietal suture, and the renal vein stump was oversewn. Due to fragmentation of the renal hilum, a right-sided nephrectomy was performed. The operation was completed with a laparostomy. Intraoperative hemotransfusion amounted to 2000 mL of blood components. The postoperative condition was stable, and the patient was evacuated to a rear hospital.

Conclusions. This case demonstrates the possibility of successfully providing specialized surgical care to wounded patients with critical major vessel injuries in a MMG (Level 2+ of medical care). The key success factors were rapid evacuation, coordinated work of a multidisciplinary team, correct choice of damage control tactics with temporary hemostasis and subsequent vascular defect closure under systemic heparinization.

Keywords: combat surgical trauma; fragment wound; combined trauma; inferior vena cava; renal vessels; retroperitoneal hematoma; vascular suture; nephrectomy; military field surgery; open abdomen

For citation: Kazantsev A.N., Bushlanov P.S., Shengelia N.G., Chaava A.I. Combined fragment wound of the chest and abdomen with tension pneumothorax, right kidney injury, and inferior vena cava damage: A clinical case. *Extreme Medicine*. 2026. <https://doi.org/10.47183/mes.2026-488>

Funding. The work was carried out without sponsorship.

Compliance with ethical principles. The patient was admitted to the hospital in an extremely severe condition (hemorrhagic shock, emergency surgery). At the time of care and during the early postoperative period, his condition did not permit obtaining informed consent for the publication of data. All information in the article is completely de-identified and contains no personal data or photographs that could identify the individual.

Potential conflict of interest. The authors declare no conflict of interest

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Received: 14 Mar. 2026 **Revised:** 13 Apr. 2026 **Accepted:** 20 Apr. 2026 **Online first:** 5 Aug. 2026

УДК 616-089

СОЧЕТАННОЕ ОСКОЛОЧНОЕ РАНЕНИЕ ГРУДИ И ЖИВОТА С РАЗВИТИЕМ НАПРЯЖЕННОГО ПНЕВМОТОРАКСА, ПОВРЕЖДЕНИЕМ ПРАВОЙ ПОЧКИ И НИЖНЕЙ ПОЛОЙ ВЕНЫ: КЛИНИЧЕСКИЙ СЛУЧАЙ

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Введение. Сочетанные осколочные ранения груди и живота относятся к наиболее тяжелым видам боевой травмы. Повреждения нижней полой вены (НПВ) и почечных сосудов сопровождаются массивным забрюшинным кровотечением и высокой летальностью, достигающей 50–70%. В условиях подвижной медицинской группы (ПМГ) (2+ уровень оказания медицинской помощи), приближенной к зоне боевых действий, успех лечения зависит от скорости принятия решений, четкой организации мультидисциплинарного подхода и выполнения сложных сосудистых реконструкций.

Описание случая. Военнослужащий 32 лет доставлен в ПМГ через 30 мин после осколочного ранения. Состояние крайне тяжелое (геморрагический шок II степени, анемия тяжелой степени). Диагностированы проникающее ранение живота с повреждением правой почки и забрюшинным кровотечением, а также правосторонний пневмоторакс. Консилиумом принято решение об экстренной операции. Выполнены дренирование плевральной полости, срединная лапаротомия. Обнаружена массивная забрюшинная гематома (эвакуировано 2 л крови), ранение ворот правой почки с отрывом почечной артерии и вены, а также два дефекта НПВ: отрыв правой почечной вены от устья и сквозной дефект передней стенки. После внутривенного введения гепарина выполнены

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пережатие НПВ, ушивание дефектов вены пристеночным швом, прошивание культи почечной вены. Из-за разможнения ворот почки выполнена правосторонняя нефрэктомия. Операция завершена лапаростомией. Интраоперационная гемотрансфузия составила 2000 мл компонентов крови. Послеоперационное состояние стабильное, пациент эвакуирован в тыловой госпиталь.

Выводы. Данный случай демонстрирует возможность успешного оказания специализированной хирургической помощи раненым с критическими повреждениями магистральных сосудов в условиях ПМГ (2+ уровень оказания медицинской помощи). Ключевыми факторами успеха явились быстрая эвакуация, слаженная работа мультидисциплинарной бригады, правильный выбор тактики контроля повреждений с временным гемостазом и последующим ушиванием сосудистых дефектов на фоне системной гепаринизации.

Ключевые слова: боевая хирургическая травма; осколочное ранение; сочетанная травма; нижняя полая вена; почечные сосуды; забрюшинная гематома; сосудистый шов; нефрэктомия; военно-полевая хирургия; открытый живот

Для цитирования: Казанцев А.Н., Бушланов П.С., Шенгелия Н.Г., Чаава А.И. Сочетанное осколочное ранение груди и живота с развитием напряженного пневмоторакса, повреждением правой почки и нижней полой вены: клинический случай. *Экстремальная биомедицина*. 2026. <https://doi.org/10.47183/mes.2026-488>

Финансирование. Работа выполнена без спонсорской поддержки.

Соответствие принципам этики. Пациент был доставлен в госпиталь в крайне тяжелом состоянии (геморрагический шок, экстренная операция). В момент оказания помощи и в раннем послеоперационном периоде его состояние не позволяло получить информированное согласие на публикацию данных. Вся информация в статье полностью обезличена, не содержит персональных данных и фотографий, позволяющих идентифицировать личность.

Потенциальный конфликт интересов. Авторы заявляют об отсутствии конфликта интересов.

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Статья поступила: 14.03.2026 **После доработки:** 13.04.2026 **Принята к публикации:** 20.04.2026 **Online first:** 05.08.2026

INTRODUCTION

Modern armed conflicts are characterized by high-intensity combat operations and the use of precision weapons, resulting in a rising proportion of severe combined and multiple injuries [1–3]. According to medical service data, chest and abdominal injuries constitute a significant part of combat surgical trauma, being distinguished by their particular severity, the development of life-threatening complications, and high mortality [4, 5]. The combined nature of these injuries, in which a single injurious factor (fragments) affects several anatomical regions, significantly worsens the condition of the wounded, requiring prompt and coordinated actions from surgeons [6, 7].

One of the most critical variants of combat abdominal trauma involves damage to retroperitoneal structures and major vessels, in particular, the inferior vena cava (IVC) and the renal vessels. Injuries to the IVC, despite their relative rarity (about 0.5–5% of all penetrating abdominal wounds), remain among the most lethal. Mortality for injuries to this vessel, according to various authors, ranges 20–70%, reaching its highest values in combined injuries and unstable hemodynamics [8, 9]. As noted by Kurguzov et al., the difficulty of surgical treatment is due not only to massive, often fatal bleeding, but also to the technical difficulties of accessing the injury zone, especially with retroperitoneal hematomas, as well as the high risk of air embolism and thromboembolic complications in the postoperative period [10].

Injuries to the renal vessels are usually combined with injury to the kidney itself and surrounding structures.

Massive blood loss, measured in liters, rapidly leads to the development of irreversible hemorrhagic shock [11, 12]. In their work on the diagnosis and treatment of retroperitoneal organ injuries, Smolyar et al. emphasize that the detection of a tense or rapidly expanding retroperitoneal hematoma during laparotomy is an absolute indication for its revision to rule out injury to major vessels and parenchymal organs [13]. Delay in this situation is unacceptable. This conclusion is consistent with current military field surgery guidelines¹.

Modern military field surgery is based on the principles of staged treatment with evacuation by designation; however, the key factor for the survival of wounded patients with ongoing internal bleeding is the maximum possible proximity of specialized surgical care to the combat zone [7, 14]. As shown by the analysis of operations in the North Caucasus and the current Special Military Operation, the deployment of first-echelon multidisciplinary hospitals, reinforced by teams of specialists (vascular, thoracic surgeons, traumatologists), allows for the provision of high-tech care in the shortest possible time after injury [15–18]. It is precisely this approach, implemented in a MMG — mobile medical group (Level 2+ of medical care), that makes it possible to perform complex reconstructive vascular interventions, which until recently were considered the prerogative of rear specialized centers [18, 19].

In the medical care delivery system of the Russian Federation, the MMG at the level 2+ represents a specialized stage at which specialist physicians of narrow profiles are involved in treatment and diagnosis using special research methods. While casualty care at the first level is primarily delivered by general practitioners

¹ Samokhvalov IM, ed. *Military Field Surgery. National Guideline*. Moscow: GEOTAR-Media; 2024. EDN: [AYGYWM](https://doi.org/10.47183/mes.2026-488)

or paramedics, the second level integrates both comprehensive surgical capabilities—including vascular, neuro-, and general surgeons—and specialized medical specialties, such as neurologists, cardiologists, ophthalmologists and endocrinologists. The key tasks of this level are as follows:

- conducting in-depth diagnostics using special research methods;
- treating diseases that require follow-up by specialist physicians on an outpatient basis or in a day hospital setting;
- providing consultative assistance by specialist physicians upon referral from general practitioners².

The management of such wounded patients is inextricably linked to the concept of damage control surgery (DCS), which involves performing a shortened intervention to stop bleeding and control the source of contamination, followed by correction of vital functions and definitive reconstruction [6, 18]. However, in some cases, with stable hemodynamics or the possibility of rapid definitive bleeding control, performing a single-stage radical intervention is possible. The choice of strategy is a complex decision made after an on-site consultation [11].

The issue of reconstruction of venous trunks deserves special attention. Historically, ligation of injured veins was preferred; however, modern studies, including the work of Nikolaev et al., demonstrate a high risk of developing venous thromboembolic complications and chronic venous insufficiency following the ligation of major veins such as the IVC or iliac veins [20]. Therefore, restoring the integrity of the IVC, especially in cases of complete transection or extensive defects, is the operation of choice.

Thus, the presented clinical case is highly relevant, as it demonstrates the successful application of the entire arsenal of modern military field surgery: from rapid evacuation and coordinated work of a multidisciplinary team to the performance of a complex vascular intervention on the IVC and renal vessels in a MMG (Level 2+ of medical care).

CASE DESCRIPTION

The patient, a 32-year-old male serviceman, sustained a blind fragment wound as a result of an unmanned aerial vehicle strike. The time interval from the moment of injury to admission to the MMG (Level 2+ of medical care) was approximately 30 min. Evacuation was carried out by ambulance (armored medical vehicle) accompanied by a paramedic, who applied aseptic dressings to the wounds at the prehospital stage.

Complaints upon admission

The patient complained of intense pain at the wound sites in the left suprascapular region and the right lumbar

region, severe general weakness, dizziness, a feeling of shortness of breath, and difficulty breathing.

Objective status upon admission

General condition. Extremely severe. Consciousness clear, the patient is coherent, oriented, but lethargic. Skin and visible mucous membranes are pale, acrocyanosis is present. Breathing is somewhat rapid and shallow. The patient is in a forced supine position.

Circulatory system. Pulse of weak volume and tension; tachycardia — heart rate 100 bpm. Blood pressure (BP) was 90/60 mmHg. Auscultation reveals muffled but rhythmic heart sounds. Peripheral veins are collapsed.

Respiratory system. Respiratory rate (RR) 21/min. Auscultation of the lungs reveals markedly diminished breath sounds on the right, and vesicular breath sounds on the left. Percussion reveals a tympanic sound on the right. Hemopneumothorax on the right.

Status localis:

- Wound No. 1. In the left suprascapular region, about 0.5 cm in diameter, edges even, no signs of active external bleeding, discharge scanty serosanguineous. No foreign body (fragment) is visualized in the wound.
- Wound No. 2. In the right lumbar region, 5 cm lateral to the spinous process of L1, up to 1 cm in diameter, edges even, no active external bleeding, discharge hemorrhagic. No fragment is visualized (Fig. 1).

Abdomen. Not distended, but tense in the lower parts and the right half. Palpation reveals sharp tenderness in the right parts. Peritoneal irritation signs are doubtful. No dullness of percussion sound in the flanks. Peristalsis is audible but diminished.

Urination. Spontaneous, urine of the color of “meat washings” (macroscopic hematuria).

Injury severity assessment

Revised Trauma Score (RTS). Upon admission: SBP = 90 — 3 points, RR = 21 — 3 points, GCS = 15 — 4 points. RTS = 3.4491. This value corresponds to a severe condition, indicates a high probability of fatal outcome, and confirms the need for immediate surgical intervention.

Laboratory and instrumental diagnostics. In the admission and triage department of the MMG, the minimal investigations necessary for making the decision to operate were performed.

A stat complete blood count (CBC) demonstrated a sharp decrease in hemoglobin to 86 g/L, a red blood cell count of $2.8 \times 10^{12}/L$, and a hematocrit of 25%, which was consistent with moderate post-hemorrhagic anemia.

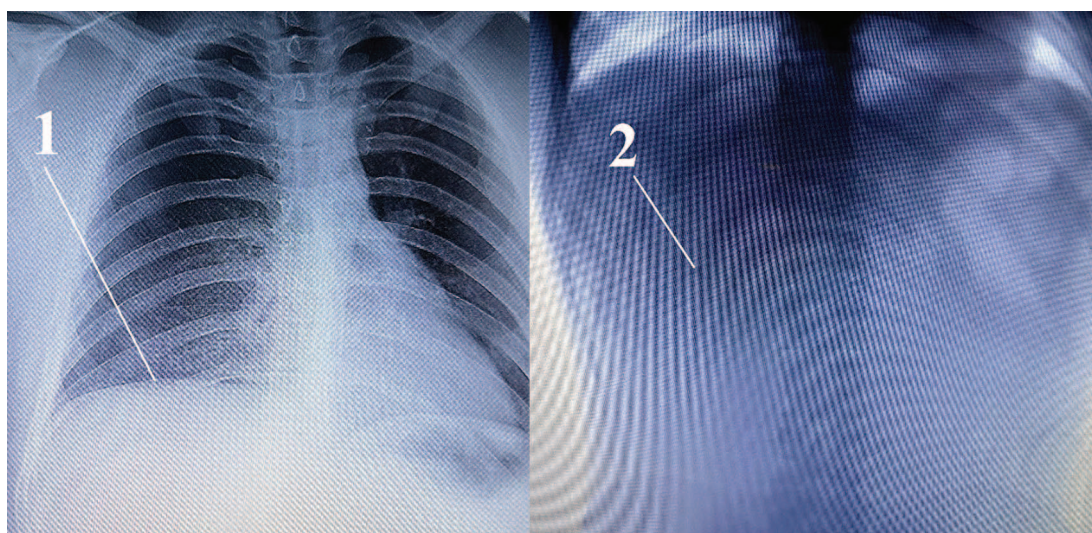
Chest and abdominal X-ray (plain) revealed the presence of free gas in the right pleural cavity (Fig. 2).

² Samokhvalov IM, ed. *Military Field Surgery. National Guideline*. Moscow: GEOTAR-Media; 2024. EDN: [AYGYWM](#)



Photos taken by the authors

Fig. 1. Blind penetrating fragment wounds to the chest (1) and abdomen (2)



Photos taken by the authors

Fig. 2. Chest and abdominal X-ray. 1 — right-sided pneumothorax; 2 — foreign body in the right half of the abdomen

On the plain abdominal X-ray. A metallic fragment measuring up to 1.0×2.0 cm is projected onto the area of the right kidney at the level of L1–L2. The contours of the right kidney and the lumbar muscle are not differentiated. Conclusion: penetrating shrapnel wound of the right half of the abdomen with damage to the right kidney.

Focused Assessment with Sonography for Trauma (FAST). The examination revealed the presence of free fluid in the right pleural cavity (hemothorax). While no fluid was visualized within the abdominal cavity, a massive heterogeneous area (hematoma) was detected in the right retroperitoneal space, extending from the subhepatic space to the pelvic cavity.

Preoperative diagnosis. Combined injury to the chest and abdomen. This included a penetrating fragment wound to the chest in the left suprascapular region, resulting in a right-sided hemopneumothorax, alongside a penetrating fragment wound to the abdomen in the right lumbar region, resulting in a retroperitoneal hematoma. Severe post-hemorrhagic anemia. Traumatic shock grade II.

Surgical procedure

This intervention was performed by the Level 2+ MMG staffed with a specialized team, including a trained vascular surgeon. The operation was performed

under endotracheal anesthesia with muscle relaxants. Intraoperative infusion-transfusion therapy was administered.

First stage. Drainage of the pleural cavity. To eliminate the pneumothorax and expand the lung, drainage of the left pleural cavity was performed as the first stage, using the standard technique in the second intercostal space along the midclavicular line. A Bulau (underwater seal) drain was placed.

Second stage. Laparotomy and exploration. A midline laparotomy from the xiphoid process to the pubis was performed. No pathology was found during exploration of the abdominal organs. A bulging of the posterior parietal peritoneum on the right side was noted, caused by a massive, tense retroperitoneal hematoma extending to the ascending colon, the duodenum, and into the pelvis. The hematoma was bluish-purple in color, tense, and pulsatile. A decision was made to open it (Fig. 3A).

Third stage. Bleeding control from major vessels. After mobilizing the right colon and incising the parietal peritoneum over the hematoma, a massive gush of fresh blood with clots occurred, from which approximately 2 L of blood were evacuated. The right renal hilum zone was visualized in the wound, from which intense pulsatile bleeding continued. An injury to the right renal hilum with transection of the renal artery and renal vein was found. Both the artery and vein were bleeding. Vascular clamps were immediately placed on the proximal vessel segments, and the bleeding was stopped. According to the AAST (American Association for the Surgery of Trauma) kidney injury scale, the findings corresponded to grade V injury: a shattered kidney in the hilar region

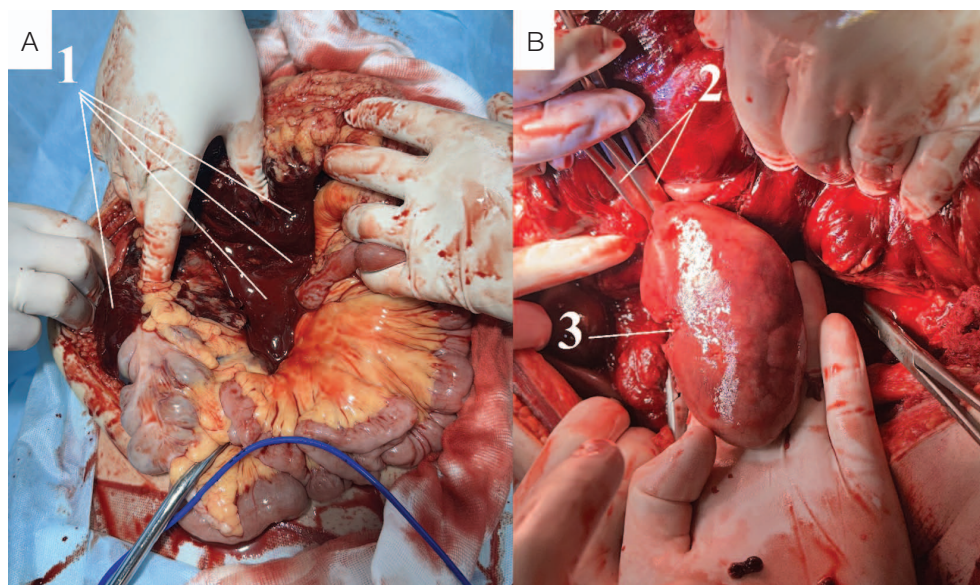
combined with traumatic amputation (avulsion) of the renal artery and vein from the main vessels. This type of injury carries an extremely high risk of uncontrolled hemorrhage and, as a rule, requires nephrectomy (Fig. 3B).

Fourth stage. IVC reconstruction. Upon careful exploration of the IVC, two defects were identified. Defect No. 1: Avulsion of the right renal vein from the lateral wall of the IVC. The size of the defect in the IVC wall was approximately 1 cm in diameter. Defect No. 2: A through-and-through (penetrating) defect of the anterior wall of the IVC, approximately 1 cm in diameter, located 1.5 cm above the first defect. To prevent thrombosis during vessel clamping, 5000 IU of unfractionated heparin was administered intravenously. The IVC was dissected and clamped both above and below the defects (Fig. 4).

Both defects were repaired via a continuous parietal suture using a 6/0 polypropylene suture on an atraumatic needle. The avulsed stump of the right renal vein was then oversewn with a 6/0 polypropylene suture (Fig. 5).

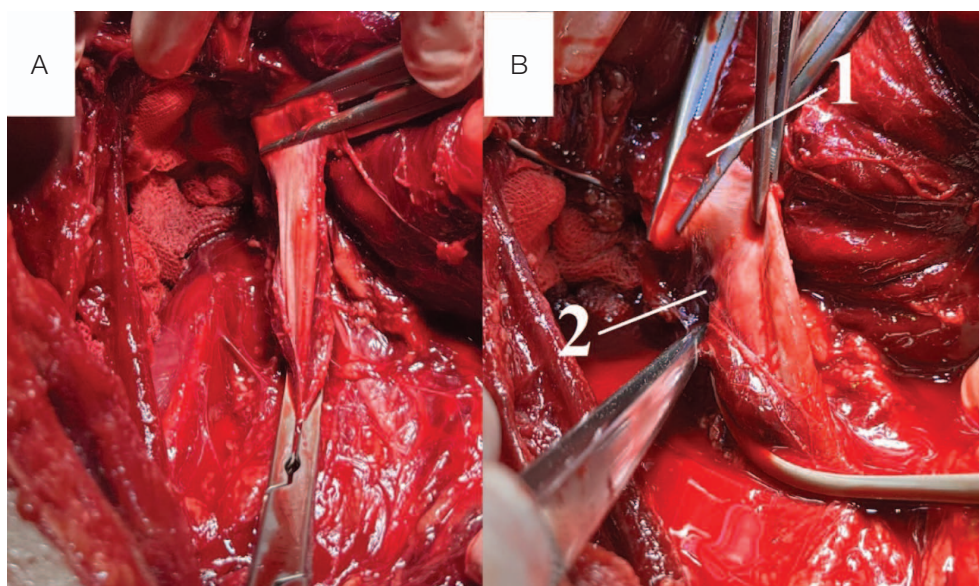
After this, blood flow through the IVC was restored — there was no bleeding, and the major blood flow was satisfactory.

Fifth stage. Nephrectomy. Exploration of the retroperitoneal space was performed, the left kidney was examined, and no evidence of injury was found. Upon re-examination of the right kidney, it was found to be shattered in the hilar region, the renal pelvis was ruptured, and the parenchyma had multiple lacerations. Renal reconstruction was deemed impossible due to the extensive nature of the injuries. A right-sided nephrectomy was performed (Fig. 6).



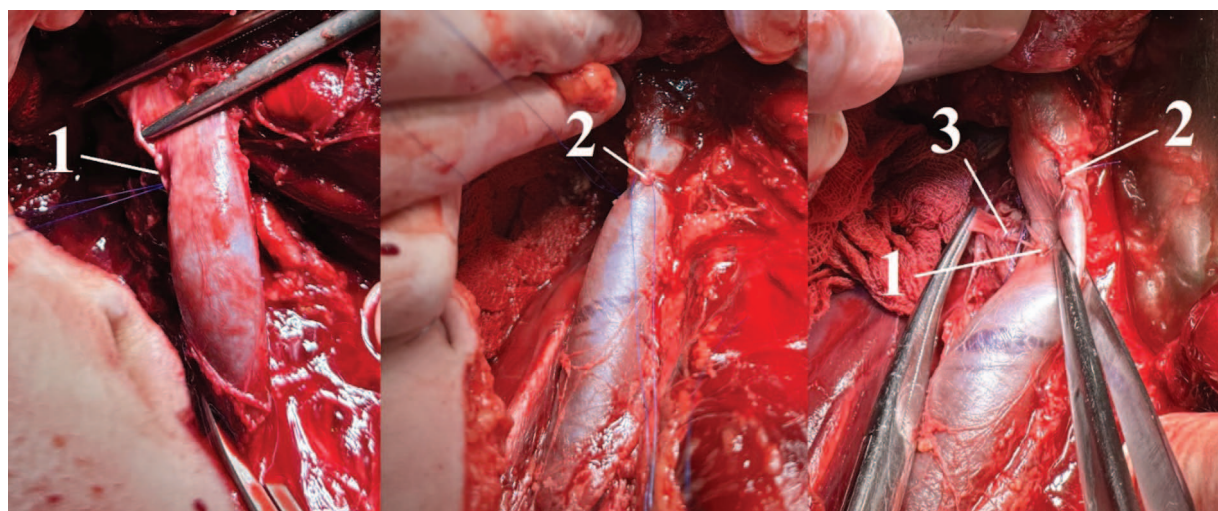
Photos taken by the authors

Fig. 3. Abdominal cavity revision, presence of retroperitoneal hematoma (A); clamping of the left kidney vessels after hematoma exposure (B). 1 — retroperitoneal hematoma; 2 — vascular clamps on the renal artery and the renal vein; 3 — injury to the right renal hilum



Photos taken by the authors

Fig. 4. Clamping of the inferior vena cava (A), with visualization of defects in its wall (B). 1 — defect in the anterior wall; 2 — defect in the wall at the site of avulsion of the right renal vein



Photos taken by the authors

Fig. 5. Suturing of defects in the wall of the inferior vena cava (IVC) and the stump of the right renal vein. 1 — suturing of the wall defect at the site of avulsion of the right renal vein; 2 — suturing of the anterior wall defect; 3 — oversewing of the right renal vein stump

The renal bed was dried, and hemostasis was additionally controlled.

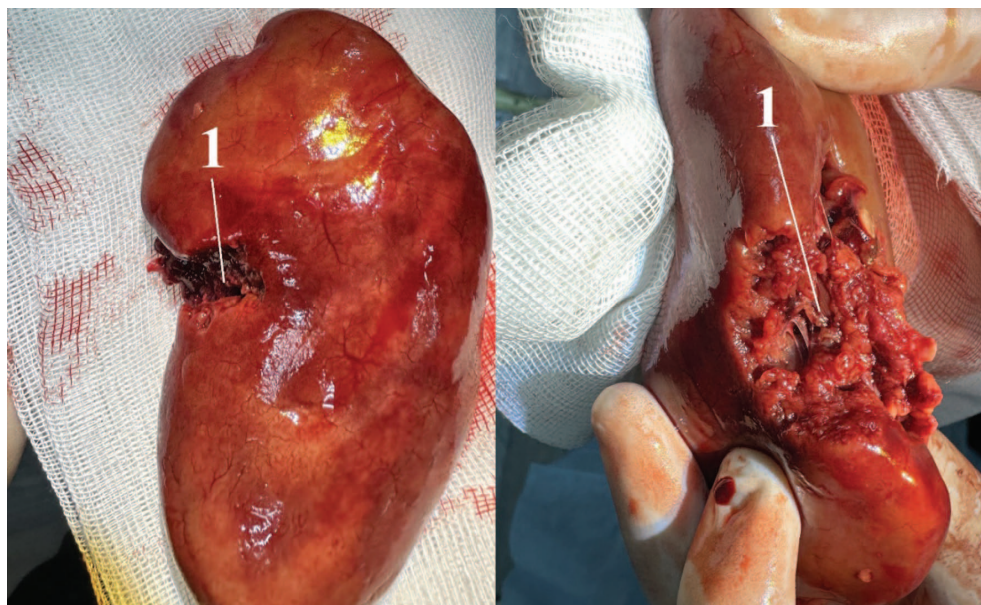
Sixth stage. Completion of the operation. The abdominal cavity was irrigated with antiseptic solutions. Given the high risk of developing intra-abdominal hypertension, the massive blood loss, and the planned re-exploration (if necessary), a decision was made to complete the operation by creating a laparostomy using a sterile plastic film and gauze pads.

Intraoperative transfusion. During the operation, a hemotransfusion protocol was initiated: delivering 1000 mL of packed red blood cells and 1000 mL of fresh frozen plasma (FFP). Reinfusion was not performed. The total volume of infusion-transfusion

therapy was approximately 4000 mL (crystalloids, colloids, blood components).

Postoperative diagnosis. Combined injury to the chest and abdomen. Blind penetrating fragment wound to the chest in the left suprascapular region, resulting in left-sided hemopneumothorax. Blind penetrating fragment wound to the abdomen in the right lumbar region, with injury to the left kidney, the IVC, and the formation of a retroperitoneal hematoma. Severe post-hemorrhagic anemia. Traumatic shock grade II. Left-sided nephrectomy. Laparostomy.

Immediate postoperative period. After the operation, the patient was transferred to the anesthesia and intensive care unit of the MMG for prolonged mechanical



Photos taken by the authors

Fig. 6. Resected right kidney. 1 — injury site of the right renal hilum

ventilation. The condition stabilized: hemodynamics was stable (HR 85 bpm, BP 110/70 mmHg), RR 12/min, SpO₂ 96% on mechanical ventilation. Control blood test: hemoglobin 100 g/L, red blood cells $3.2 \times 10^{12}/L$, hematocrit 30%. Anemia was corrected. Infusion, antibacterial, and analgesic therapy were continued, and thromboprophylaxis (low molecular weight heparins) was started 6 h after surgery in the absence of signs of bleeding.

Evacuation. Due to the staged treatment protocol, 6 h after surgery a decision was made to medically evacuate the patient to a specialized rear hospital for further treatment and closure of the laparostomy. The patient was evacuated, accompanied by an anesthesiologist-intensivist, on prolonged mechanical ventilation. The pleural drain and laparostomy were left in place. Therapy was continued in the intensive care unit for 3 days. The patient was stabilized, extubated, and had clear consciousness. He was then evacuated to a specialized hospital in the Russian Federation.

DISCUSSION

The presented clinical case provides a compelling illustration of modern combat trauma — a combined fragment wound of the chest and abdomen with injury to vital structures (lung, major vessels, parenchymal organ). Analysis of this case allows us to identify the key aspects that determined the favorable outcome and to discuss complex issues of surgical management in such injuries.

The primary determinant of the favorable outcome in this case was the rapid evacuation of the wounded soldier to a stage providing qualified and specialized care. The 30-min interval from injury to arrival in the

operating room is critically important for patients with ongoing intra-cavitary bleeding. As emphasized in analyses of medical care organization in modern conflicts, bringing specialized surgical teams closer to the combat zone and using high-speed evacuation assets make it possible to save wounded soldiers who, in previous wars, died on the battlefield or at forward medical stations [7, 14]. In this case, evacuation was carried out by standard medical units, which aligns with the modern concept of medical support [4].

The second key factor was accurate diagnosis and triage upon admission. Despite the extreme severity of the patient's condition, a minimal set of diagnostic procedures (two-view chest/abdominal radiography, FAST protocol, rapid blood test), provided a means to accurately establish the nature of the injuries, which comprised a penetrating abdominal wound with kidney injury, a massive retroperitoneal hematoma, and a pneumothorax. The FAST protocol played a decisive role in this case, confirming the presence of blood in the retroperitoneal space in the absence of free fluid in the abdominal cavity, thereby directing the diagnostic search in the right direction [5]. The detection of severe anemia provided an objective indicator of blood loss.

The third factor that directly influenced the outcome was the appropriate and timely decision by the consultation team to perform an emergency operation. The presence of signs of ongoing bleeding (unstable hemodynamics, worsening anemia) combined with instrumental findings constituted an absolute indication for urgent surgical intervention. The participation of a vascular surgeon, who was part of the reinforcement team, in the consultation made it possible to perform the complex stage of IVC reconstruction [11, 17].

Surgical approach and technique

Drainage of the pleural cavity as the first stage was fully justified. Eliminating the tension pneumothorax allowed the lung to expand, thereby improving oxygenation before the main, most traumatic stage of the abdominal operation.

The discovery of a tense, pulsatile retroperitoneal hematoma during laparotomy dictated the need for its immediate exploration. According to the principles of military field surgery and the recommendations of leading specialists, central retroperitoneal hematomas (Zone I), especially those that are pulsatile or rapidly expanding, must be opened to identify the source of bleeding [11, 12]. In this case, this was the only correct decision, allowing the detection and control of life-threatening bleeding from the major vessels.

The combined injury to the IVC (avulsion of the renal vein and a through-and-through defect of the wall) represents an extremely complex surgical situation. Historically, mortality for IVC injuries has been reported to be high, reaching 50–70% [8, 10, 21, 22]. However, current trends favor an active reconstructive approach. Ligation of the IVC below the renal veins may sometimes be acceptable, but ligation above the renal veins or in cases of injury to the renal veins is associated with a high risk of severe venous insufficiency, thrombosis, and renal dysfunction [13, 20]. Therefore, suturing of the IVC defects is the operation of choice.

The key technical maneuver that ensured success was the intravenous administration of heparin before vascular clamping. This helped prevent thrombosis at the clamping site and in the distal venous bed, which is critically important for preventing massive thromboembolic complications in the postoperative period [20].

The use of atraumatic suture material (6/0 polypropylene) and a parietal suture technique allowed the defects to be reliably closed without significantly narrowing the vessel lumen. This is consistent with modern requirements for vascular suture [12, 15, 23]. In this specific case, given the small size of the defects, there was no need for plastic materials (autologous vein or synthetic patches), which simplified and expedited the intervention.

Avulsion of the renal artery and vein from the main vessels, combined with shattering of the renal hilum, makes any attempt at organ-preserving surgery (vascular reconstruction and nephropexy) obviously futile and dangerous. In the setting of ongoing bleeding and unstable hemodynamics, any delay in removing the non-viable organ could cost the patient his life. The nephrectomy performed was the only correct decision in this situation [11].

Completion of the operation with the placement of a laparostomy. Massive blood loss (over 2 L from the retroperitoneal space alone), a prolonged surgical

procedure, and massive hemotransfusion all create a high risk for the development of intra-abdominal hypertension syndrome, abdominal compartment syndrome, and postoperative infectious complications [6]. Laparostomy helps avoid these complications, provides an opportunity for re-exploration of the abdominal cavity (if necessary), and allows for definitive closure after the patient's condition stabilizes in a specialized hospital.

The transfusion of 2 L of blood components (packed red blood cells and FFP) represents an adequate replacement for the massive blood loss. The 1:1 ratio of red blood cells to fresh frozen plasma aligns with current hemotransfusion protocols aimed at correcting coagulopathy and preventing the development of disseminated intravascular coagulation.

Evacuation to the next stage

Stabilization of the patient's condition after surgery made it possible to safely evacuate him to a rear hospital. This is standard practice for forward hospitals, which are not designed for the long-term management of such complex patients. The primary mission of the forward stage was accomplished: the patient's life was saved and conditions were created for further restorative treatment [7, 15, 16].

Thus, the presented case demonstrates the optimal interaction of all components of the military medical support system: rapid evacuation, accurate diagnosis, a timely and technically flawless surgical intervention within a multidisciplinary approach, and appropriate evacuation to the designated facility.

CONCLUSION

The presented clinical observation demonstrates the successful provision of specialized surgical care to a serviceman in a MMG (Level 2+ of medical care) with an extremely severe combined fragment wound of the chest and abdomen, massive blood loss, and injury to the IVC and renal vessels. This case confirms that, given rapid evacuation, the presence of a multidisciplinary team (including a vascular surgeon), and adequate equipment, a MMG can successfully perform complex reconstructive interventions on major vessels.

The key elements of success included strict adherence to the DCS principles, timely diagnosis of the bleeding source, skilled surgical technique (suturing of IVC defects under systemic heparinization, nephrectomy), adequate infusion-transfusion therapy, and complication prevention through the placement of a laparostomy.

The examined treatment experience of the wounded soldier confirms the need for further improvement of the medical evacuation system, equipping forward

hospitals with vascular instruments and consumables, and training military surgeons in emergency vascular surgery. Only a comprehensive approach, implemented

within a unified medical evacuation support system, makes it possible to achieve favorable outcomes in the most severe category of wounded patients.

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<https://doi.org/10.29001/2073-8552-2025-40-4-220-226>

Authors' contributions. All authors confirm that their contributions meet the ICMJE criteria for authorship. The primary contributions are distributed as follows: Anton N. Kazantsev — performance of the surgical intervention, manuscript writing and editing; Pavel S. Bushlanov — literature search and analysis, illustrations preparation; Nodar G. Shengelia — concept and design, literature analysis; Aron I. Chaava — literature analysis, manuscript editing. All authors approved the final version of the article.

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