DOI 10.26724/2079-8334-2026-1-95-272-276
UDC 616.721.2-002+613.67:617+617.57/.58-001.45-089.81

Khoroshun E.M.[1], Panasenko S.I.[2], Makarov V.V.[1], Nehoduiko V.V.[1], Tertyshnyi S.V.[3,4], Chernobil B.M., Kerbazh N.R.[2]
Military Medical Clinical Centre of the Northern Region of the Command of Medical Forces, Armed Forces of Ukraine, Kharkiv, [1]Kharkiv National Medical University, Kharkiv
[2]Poltava State Medical University, Poltava, [3]Military Medical Clinical Centre of the Southern Region of the Command of Medical Forces, Armed Forces of Ukraine, Odesa
[4]Odesa National Medical University, Odesa

A CASE OF A GUNSHOT WOUND TO THE PHARYNX

e-mail: tertyshnyi.sergey@gmail.com

The purpose of the study was to demonstrate the specific features of managing an isolated through-and-through gunshot wound of the neck involving the pharynx, with defects of the lateral pharyngeal walls and the epiglottis. Patient S., 48 years old, sustained a gunshot injury while wearing body armor and a helmet during a small-arms engagement. Following the injury, he remained at his position for seven days, during which only prehospital first aid was provided. On the seventh day after injury, the patient was evacuated to a temporary medical facility, where wound debridement was performed. Two hours later, he was transferred to the Northern Region Military Medical Clinical Center. The diagnosis was established as follows: isolated through-and-through gunshot wound of zone II of the neck, penetrating the pharynx, with defects of the lateral pharyngeal walls, injury to the epiglottis, and a soft tissue defect of the neck. Surgical intervention was performed and included tracheostomy, secondary surgical debridement of the anterior neck wounds, necrectomy, laryngeal exploration, and tamponade of the oropharyngo-hypopharynx. In the neck region an additional procedure was carried out consisting of a mini-laparotomy and placement of a Witzel gastrostomy to provide enteral nutrition. On the second day after admission, the patient was transferred to the next level of medical care. This clinical case illustrates an extremely rare gunshot injury of zone II of the neck with near-complete destruction of the pharynx. High-quality prehospital care provided over a seven-day period under tactical conditions prevented the development of wound infection, aspiration, and asphyxia. At the Role III level, a minimally sufficient surgical approach was deliberately chosen to preserve native tissues for subsequent reconstructive procedures which allowed to prevent patient's life-threatening complications.

Key words: neck gunshot wound, pharynx gunshot injury, diagnosis, surgical management of neck gunshot wounds.

Хорошун Е.М., Панасенко С.І., Макаров В.В., Негодуйко В.В., Тертишний С.В., Чернобіль Б.М., Кербаж Н.Р.

ВИПАДОК ВОГНЕПАЛЬНОГО КУЛЬОВОГО НАСКРІЗНОГО ПОРАНЕННЯ ГЛОТКИ

Метою дослідження була демонстрація особливостей менеджменту ізольованого вогнепального кульового наскрізного поранення шиї з ушкодженням глотки, дефектом бокових стінок глотки та надгортанника. Клінічний випадок стосується пацієнта С., 48 років, який отримав вогнепальне поранення в бронежилеті та шоломі під час стрілкового бою. Знаходився на позиції протягом 7 діб після поранення, під час яких надавалася лише домедична допомога. На сьому добу доставлений до медичного тимчасового формування, де було проведено обробку рани. Через 2 год доставлений до Військово-медичного клінічного центру Північного регіону. Встановлено ізольоване вогнепальне кульове наскрізне поранення II зони шиї з проникаюче у глотку, дефектами бокових стінок глотки, ушкодженням надгортанника; дефектом м`яких тканин шиї. Виконана операція: вторинна хірургічна обробка ран шиї, гастростомія за Вітцелем. На другу добу після надходження пацієнт був переведений на наступний рівень надання медичної допомоги. Виконано було трахеостомію, вторинну хірургічну обробку ран передньої поверхні шиї, некректомію, ревізію гортані, тампонаду рото-гортаноглотки. На шиї було виконано оперативне втручання в обсязі: мінілапаротомія, гастростомія по Вітцелю для харчування пораненого. На другу добу після надходження пацієнт був переведений на наступний рівень надання медичної допомоги. Клінічний випадок демонструє вкрай рідкісне вогнепальне поранення II зони шиї з практично повною руйнацією глотки. Якісне проведення домедичної допомоги протягом 7 діб в тактичних умовах розвиток ранової інфекції, аспірації та асфіксії. Автори висловлюють стосовно адекватності та своєчасності хірургічної тактики на третьому рівні надання медичної допомоги задля збереження власних тканин для подальшої пластики та операцій, що запобігають розвиткові тяжких ускладнень.

Ключові слова: вогнепальне поранення шиї, вогнепальне поранення глотки, діагностика, хірургічне лікування вогнепальних ран шиї.

Funding. *The study is a fragment of the research project "Development of modern methods of diagnosis and treatment of purulentseptic complications in combat surgical trauma", state registration No. 0120U101834.*

The epidemiology and structure of neck injuries vary considerably, which can be explained by the heterogeneity of injured patient populations receiving medical care. In many reports, insufficient attention is paid to the overall incidence of neck injuries, the proportion of multiple and combined injuries, rates of immediate and early mortality, and, ultimately, the proportion of patients who reach the stage of qualified or specialized medical care.

According to the literature, vascular injury occurs in approximately 25 % of penetrating neck wounds. Among these cases, the carotid arteries are

affected in about 80 %, the vertebral arteries in 43 %, and veins in 20 %. Aerodigestive tract injuries are reported in 23–30 % of patients. Injuries to the pharynx and esophagus are less common than injuries to the larynx and trachea; however, both are associated with a mortality rate of approximately 20 %. Damage to the spinal cord, cranial nerves VII–XII, peripheral nerve roots, and the brachial plexus occurs in less than 1 % of cases [1, 4, 7, 9, 15].

The danger of neck injuries lies in their immediate and long-term consequences, which can be significant due to the dense arrangement of important anatomical structures in a confined space without proper protection by the musculoskeletal system. Neck injuries involving damage to the larynx and trachea that pose an immediate threat to life are classified as extremely severe injuries [3, 10, 13].

The distribution of otorhinolaryngological organ injuries according to the type of wounding agent is as follows: bullet wounds account for 32.2 %, fragment wounds for 66.1 %, and other mechanisms for 1.7 %. Regarding anatomical localization, injuries of the nose and paranasal sinuses are observed in 42.8 % of cases (maxillary sinus – 88.0 %, frontal sinus – 11.6 %, sphenoid sinus and ethmoid labyrinth – 0.4 %); injuries of the external, middle, and inner ear in 39.5 %; and neck injuries (with involvement of the pharynx, larynx, and cervical esophagus) in 17.7 %. Multiple injuries to ENT organs were documented in every fifth case [1, 2, 5]. Therefore, it is extremely important to recognize serious damage in time and provide adequate treatment.

The purpose of the study was to demonstrate the specific features of managing an isolated through-and-through gunshot wound of the neck involving the pharynx, with defects of the lateral pharyngeal walls and the epiglottis.

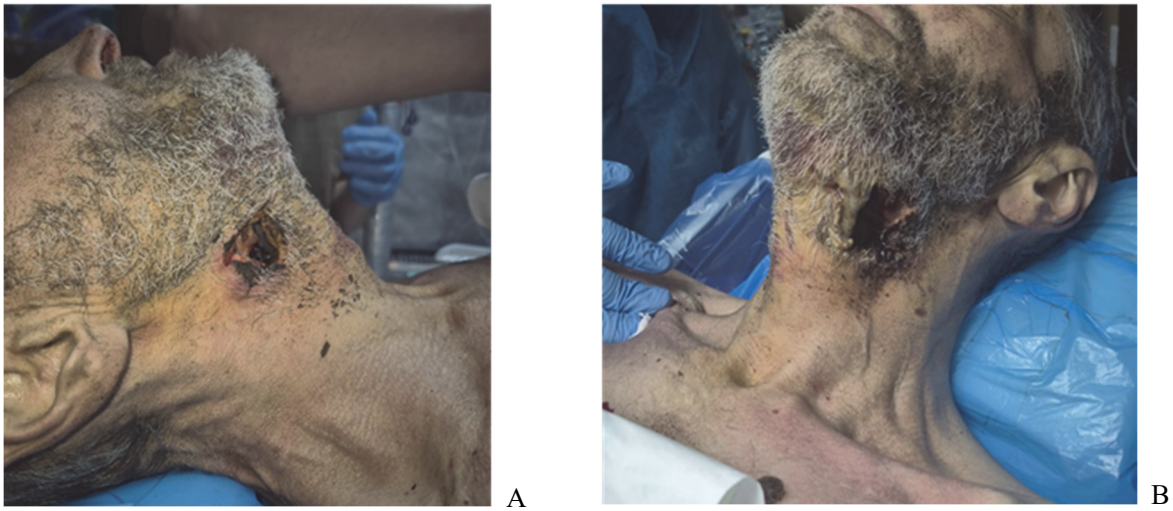
Materials and methods. To describe a specific clinical case, written consent was obtained from the patient, which he provided while conscious upon admission to the medical facility, regarding permission to use data from his clinical examination, diagnosis, treatment, as well as a photograph without identifying the individual for scientific purposes.

Commission of the Ethics of Kharkiv National Medical University (No, 16-C, 17, December, 2024) approved this clinical case research protocol with compliance. The investigation was conducted in compliance with the Declaration of Helsinki and subsequent additions.

Patient S., 48 years, sustained a gunshot injury on November 15, 2024 at approximately 07:00 while wearing body armour and a helmet during a small-arms engagement. Following the injury, he remained at his position for seven days, during which only prehospital first aid was provided due to difficult tactical conditions and the absence of evacuation capability.

On the seventh day after injury (the 21st, November, 2024), the patient was evacuated to a temporary Role I medical facility, where wound debridement was performed, aseptic dressings were applied, tetanus toxoid was administered, and antibiotic prophylaxis was initiated. Two hrs later he was transferred to the

Military Medical Clinical Centre of the Northern Region of the Command of Medical Forces Armed Forces of Ukraine (MMCC NR CMF AFU), Kharkiv, where he underwent a wide-ranging examination. The emergency tracheostomy was performed in the anti-shock therapy unit.



A B

Fig. 1. External appearance of the gunshot wound of the neck. A – right anterolateral surface of the neck; B – left anterolateral surface of the neck.

After further diagnostic evaluation, the patient was admitted to the ENT department of MMCC NR CMF AFU. The patients' condition was serious stable. He was conscious, with satisfactory nutrition. The diagnosis was established as follows: isolated through-and-through gunshot wound of zone II of the neck, penetrating the pharynx, with defects of the lateral pharyngeal walls, injury to the epiglottis, and a soft tissue defect of the neck.

At admission, the patient complained of pain in the neck wound area, aphonia, respiratory difficulty, and general weakness. Clinical and laboratory examinations were performed, including complete blood count, urinalysis, blood biochemistry, and

coagulation profile. Multisided computed tomography (MSCT) of the head and neck was conducted using a "Revolution EVO" scanner ("GE HealthCare" (General Electric), 2021, USA) with a slice thickness of 0.5 mm, max power 72 kW and max current 600 mA.

Surgical management included secondary surgical debridement of the neck wounds and placement of a Witzel gastrostomy. On the second day after admission, the patient was transferred to the next level of medical care.

Results of the study and their discussion. On admission, the complete blood count revealed leukocytosis of 11.2×10⁹/L. The general appearance of the patient's gunshot wounds of the neck (patient S., 48 years old) at admission on day 7 after injury is shown in Fig. 1.

The performed MSCT investigation of the head and neck allowed to reveal the following findings: through-and-through pharyngeal injury, bilateral soft tissue defects of the neck, tracheostomy in situ (Fig. 2).

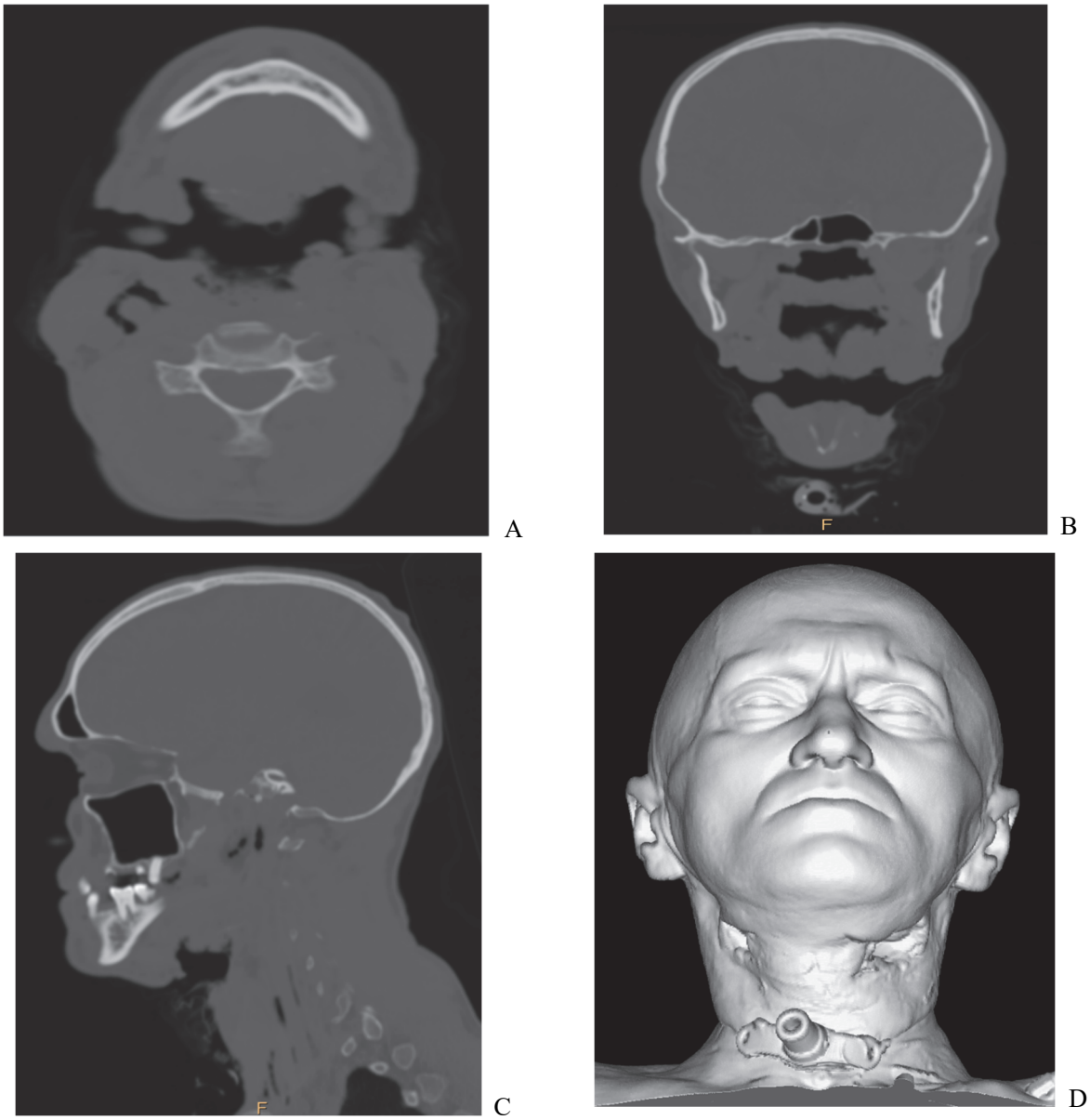


Fig. 2. MSCT findings of the head and neck in patient S., 48 years. A – axial view; B – coronal view; C – sagittal view; D – 3D reconstruction.

The videoesophagoscopy of patient S. performed at admission revealed the absence of a pharynx with bilateral soft tissue defects (Fig, 3 A).

Surgical intervention included tracheostomy, secondary surgical debridement of the anterior neck wounds, necrectomy, laryngeal exploration, and tamponade of the oropharyngo-hypopharynx.

Key technical aspects of the tracheostomy, performed in the anti-shock therapy unit under local anesthesia with 2 % lidocaine solution (4.0 ml), included sharp and blunt dissection to expose the anterior tracheal wall following skin incision. The trachea was incised with a scalpel between the IV and V tracheal rings (Fig. 3 C). A size 8 tracheostomy tube was inserted. Tracheobronchial toilet was performed. Bilateral breath sounds were auscultated. The wound was sutured, and an aseptic dressing was applied. Bleeding was moderate and ceased spontaneously during the procedure. The operation was completed without complications.

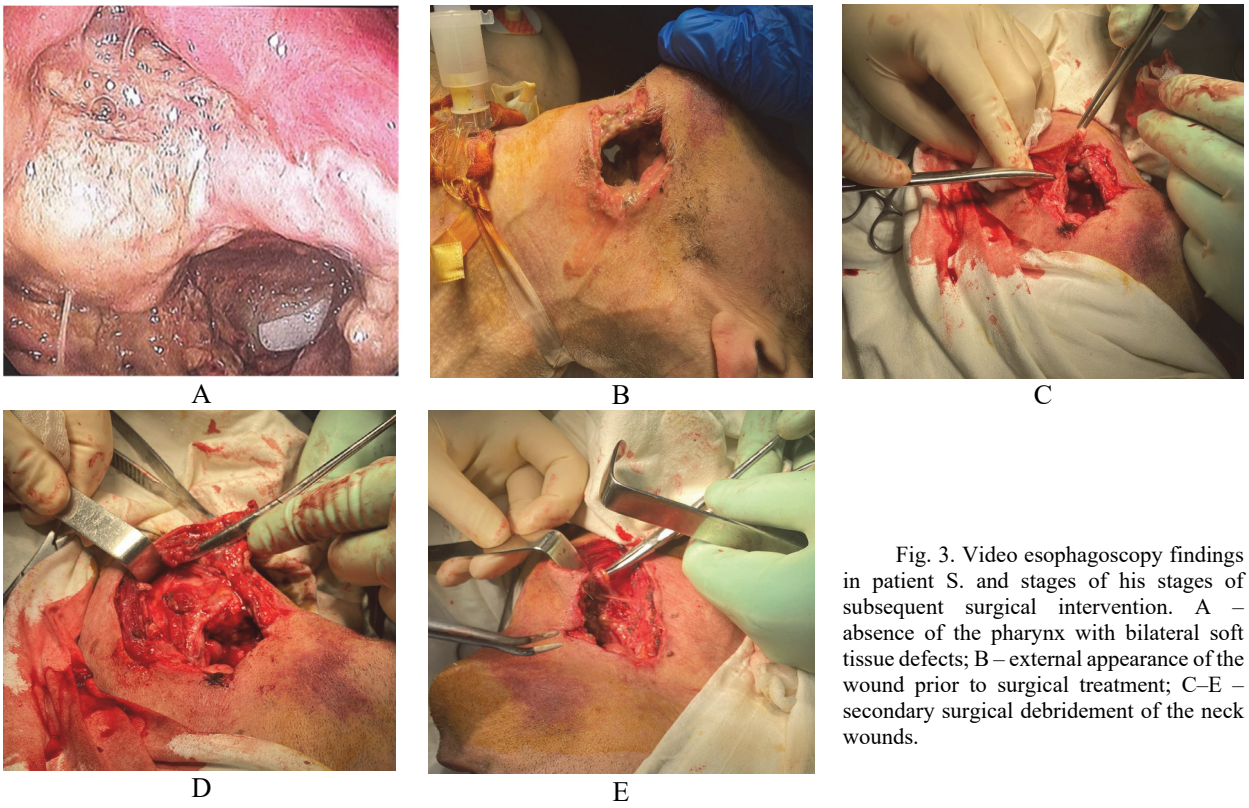


Fig. 3. Video esophagoscopy findings in patient S. and stages of his stages of subsequent surgical intervention. A – absence of the pharynx with bilateral soft tissue defects; B – external appearance of the wound prior to surgical treatment; C–E – secondary surgical debridement of the neck wounds.

Key technical aspects of the secondary surgical debridement, performed under general anesthesia with mechanical ventilation, included bilateral surgical access via incisions along the anterior border of the sternocleidomastoid muscle (Fig. 3 D, E). The larynx was exposed by blunt and sharp dissection and subsequently inspected. An infected through-and-through gunshot wound of the anterior neck surface was identified, with a massive soft tissue defect involving the anterior and both lateral walls of the laryngopharynx, the base of the tongue, the epiglottis, the hyoid bone, and injury to both submandibular salivary glands. Gentle necrectomy was performed. The procedure was completed with tamponade of the oropharyngo-hypopharynx.

After completion of the main surgical stage in the neck region, an additional procedure was performed consisting of a mini-laparotomy and placement of a Witzel gastrostomy to provide enteral nutrition.

Postoperative diagnosis: isolated through-and-through gunshot wound of zone II of the neck penetrating the pharynx, with a massive defect of the anterior and both lateral walls of the laryngopharynx, the base of the tongue, the epiglottis, the hyoid bone, injury to both submandibular salivary glands, and soft tissue damage of the neck.

On the second day after admission, the patient was transferred to the next level of medical care. Subsequently, 30 days later, the patient was referred for treatment abroad to undergo reconstructive and restorative surgery.

To discuss the result of the abovementioned clinical case we believe it's worth stress that the contemporary nature of warfare has led to the emergence and increasing frequency of injuries at the hospital level that were previously considered incompatible with life or had not been described in the scientific literature. Such injuries primarily represent a challenge for the tactical medical level, as combat medic training programs cannot realistically anticipate all possible variations of injuries to specific anatomical regions and are therefore inherently universal in nature. Under these conditions, the acquisition of medical competence by individuals without formal medical education becomes critically important—in other words, the ability to apply standard skills in nonstandard situations [6, 11].

It was precisely this high level of competence that was demonstrated during the prehospital management of this patient, which prevented the development of wound infection, asphyxia, and aspiration—complications typical of this clinical scenario—over a seven-day period.

According to statistical data, zone II of the neck is most frequently affected, as it is relatively accessible for surgical exploration. This observation is consistent with the present case and does not contradict published literature [5, 8, 9, 13].

A distinctive feature of this case was the delayed admission, occurring seven days after injury, during which time the patient neither ate nor drank. For this reason, tracheostomy and gastrostomy were performed upon admission.

Given the extent of the injury, with near-complete absence of the oropharynx, and the prolonged interval since trauma, secondary surgical debridement was undertaken to remove necrotic tissue as a preparatory stage for subsequent reconstructive and restorative surgery.

It should be noted that modern highly kinetic

bullets with unpredictable flight trajectories used in real combat conditions can cause surgical and diagnostic problems [12, 14]. In this regard, we emphasize the medical value of the neck, the anatomical structure of which is extremely complex, since it is filled with vital organs. Moreover, in combat conditions, even a minor penetrating bullet wound can damage adjacent organs, as well as nerves and blood vessels [12]. A bullet, which is characterized by translational and rotational motion, has high kinetic energy, which leads to significant damage to vital organs, which we observed in the presented clinical case [12, 14]. Of extreme danger is the significant risk of developing secondary injuries to the hollow organs of the neck in cases of wounds with high-velocity bullets, which is extremely dangerous due to the potential increase in the severity of the injury [12].

We strongly believe that this clinical case is the first case in our clinical practice of an oropharyngeal injury with destruction of the anterior and lateral walls.

Limitations. We used the following restrictions during the patient S. surgical treatment: from this clinical case description we excluded options of his wound clinical treatment in combat conditions, as well as the specifics of ENT diagnosis and the provision of specialized care.

Conclusion

This clinical case demonstrates an extremely rare gunshot injury of zone II of the neck with near-complete destruction of the pharynx. High-quality prehospital care provided over a seven-day period under tactical conditions prevented the development of wound infection, aspiration, and asphyxia. At the Role III level, surgical strategy was deliberately limited to the minimally sufficient scope, aimed at preserving native tissues for subsequent reconstructive procedures and preventing life-threatening complications during rearward evacuation of the patient.

Prospects for further research include further improvement of diagnostic and therapeutic surgical technologies for similar operations performing in patients with pharynx gunshot bullet through wound injuries as well as the extension of the experience of similar surgical tactics to related episodes of bullet injuries to the neck organs and nearby vital organs and tissues.

References

1. Atlas boyovoyi khirurhichnoyi travmy (dosvid antyterorystychnoyi operatsiyi/operatsiyi obyednanykh syl). Pid. red. V.I. Tsimbalyuk. Kharkiv: Collegium, 2021. 385 [in Ukrainian].
2. Atlas promenevoyi diahnostyky vohnepalnykh poranen. Pid. red. V.I. Tsimbalyuk. Vinnytsya: TVORY, 2024. 472 [in Ukrainian].
3. Gumenyuk KV, Gangal II, Karpenko KK. Nadannya vysokospetsializovanoyi medychnoyi dopomohy viyskovosluzhbovtsyam Zbroynykh Syl Ukrayiny miniinvazyvnymy renthenendovaskulyarnymy metodykamy. Zaporizkyy medychnyy zhurnal. 2021; 23(3): 375-380. doi: 10.14739/2310-1210.2021.3.223139 [in Ukrainian].
4. Medychna dopomoha uchasnykam boyovykh diy. Pid. red. O.M. Khvysyuk, V.H. Marchenko, B.V. Mykhaylov. Kharkiv: DISA Plyus, 2019. 576 [in Ukrainian].
5. Nastanovy z voyenno-polovoyi khirurhiyi. Pid. red. K.V. Humenyuk, S.O. Korol, R.V. Hybalo. Kyyiv: Vydavnytstvo Lyudmyla, 2024. 572 [in Ukrainian].
6. Alnemare AK. Age-Specific Differences in Laryngotracheal Trauma Characteristics: A Retrospective Study of Clinical Profiles, Outcomes, and Mortality Risk. J Clin Med. 2024; 13(12): 3508. doi: 10.3390/jcm13123508.
7. Evans C, Chaplin T, Zelt D. Management of Major Vascular Injuries: Neck, Extremities and Other Things that Bleed. Emerg Med Clin North Am. 2018 Feb;36(1):181-202. doi: 10.1016/j.emc.2017.08.013.
8. Fawaz R, Dagain A, Pons Y, Haen P, Froussart F, Caruhel JB. Head Face and Neck Surgeon Deployment in the New French Role 2: The Damage Control Resuscitation and Surgical Team. Mil Med. 2023; 188(9-10): 2868-2873. doi: 10.1093/milmed/usac329.
9. Noh D, Choi JH. Outcomes of open neck injuries. J Trauma Inj. 2022; 35(3): 168-172. doi: 10.20408/jti.2021.0056.
10. Quax MLJ, Eefting D, Jansen JC, Blok JJ. A "Final Destination injury": Penetrating trauma of the neck and a pneumomediastinum by a metal part shot from a lawnmower. Trauma Case Rep. 2020 Dec 11;31:100379. doi: 10.1016/j.tcr.2020.100379.
11. Quinn J, Panasenko SI, Leshchenko Y, Gumeniuk K, Onderková A, Stewart D. et al. Prehospital Lessons From the War in Ukraine: Damage Control Resuscitation and Surgery Experiences From Point of Injury to Role 2. Mil Med. 2024; 189(1-2): 17-29. doi: 10.1093/milmed/usad253.
12. Rhee PM, Moore EE, Joseph B, Tang A, Pandit V, Vercruysse G. Gunshot wounds: a review of ballistics, bullets, weapons, and myths. J Trauma Acute Care Surg. 2016; 80(6): 853-867. doi: 10.1097/TA.0000000000001037.
13. Tsur N, Dudkiewicz D, Talmy T, Radomislensky I, Givon A, Katorza E. et al. Battlefield Neck Injuries: Contemporary Insights From the Israeli National Trauma Registry. J Am Coll Emerg Physicians Open. 2025; 6(4): 100211. doi: 10.1016/j.acepjo.2025.100211.
14. Tsymbaliuk V, Lurin I, Gumeniuk K, Herasymenko O, Furkalo S, Oklei D. et al. Modeling of wound ballistics in biological tissues simulators. Medicni Perspektivi. 2023; 28(1): 37–48. doi: 10.26641/2307-0404.2023.1.275866.
15. Witzenhausen M, Brill S, Schmidt R, Beltzer C. Current mortality from war injuries-A narrative review. Chirurgie (Heidelb). 2024; 95(7): 546-554. doi: 10.1007/s00104-024-02081-2.

Conflict of interest. The authors have no conflicts of interest to declare.

ORCID: Khoroshun E.M. https://orcid.org/0000-0003-1258-1319, Panasenko S.I. https://orcid.org/0000-0003-2952-1670, Makarov V.V. https://orcid.org/0000-0002-4224-0294, Nehoduiko V.V. https://orcid.org/0000-0003-4540-5207, Tertyshnyi S.V. http://orcid.org/0000-0002-4949-5409, Chernobil B.M. https://orcid.org/0009-0004-4784-4937, Kerbazh N.R. https://orcid.org/0000-0002-7722-9896.

Article received: 25.03.2025.