

# World Journal of *Clinical Cases*

*World J Clin Cases* 2022 August 26; 10(24): 8432-8807



**EDITORIAL**

- 8432 Evolution of *World Journal of Clinical Cases* over the past 5 years  
*Muthu S*

**OPINION REVIEW**

- 8436 NF- $\kappa$ B: A novel therapeutic pathway for gastroesophageal reflux disease?  
*Zhang ML, Ran LQ, Wu MJ, Jia QC, Qin ZM, Peng YG*

**MINIREVIEWS**

- 8443 Obligate aerobic, gram-positive, weak acid-fast, nonmotile bacilli, *Tsukamurella tyrosinosolvans*: Minireview of a rare opportunistic pathogen  
*Usuda D, Tanaka R, Suzuki M, Shimozawa S, Takano H, Hotchi Y, Tokunaga S, Osugi I, Katou R, Ito S, Mishima K, Kondo A, Mizuno K, Takami H, Komatsu T, Oba J, Nomura T, Sugita M*
- 8450 Diffusion tensor imaging pipeline measures of cerebral white matter integrity: An overview of recent advances and prospects  
*Safri AA, Nassir CMNCM, Iman IN, Mohd Taib NH, Achuthan A, Mustapha M*
- 8463 Graft choices for anterolateral ligament knee reconstruction surgery: Current concepts  
*Chalidis B, Pitsilos C, Kitridis D, Givissis P*
- 8474 Overview of the anterolateral complex of the knee  
*Garcia-Mansilla I, Zicaro JP, Martinez EF, Astoul J, Yacuzzi C, Costa-Paz M*
- 8482 Complication of lengthening and the role of post-operative care, physical and psychological rehabilitation among fibula hemimelia  
*Salimi M, Sarallah R, Javanshir S, Mirghaderi SP, Salimi A, Khanzadeh S*

**ORIGINAL ARTICLE****Clinical and Translational Research**

- 8490 Pyroptosis-related genes play a significant role in the prognosis of gastric cancer  
*Guan SH, Wang XY, Shang P, Du QC, Li MZ, Xing X, Yan B*

**Retrospective Study**

- 8506 Effects of propofol combined with lidocaine on hemodynamics, serum adrenocorticotrophic hormone, interleukin-6, and cortisol in children  
*Shi S, Gan L, Jin CN, Liu RF*
- 8514 Correlation analysis of national elite Chinese male table tennis players' shoulder proprioception and muscle strength  
*Shang XD, Zhang EM, Chen ZL, Zhang L, Qian JH*

- 8525** Clinical value of contrast-enhanced ultrasound in early diagnosis of small hepatocellular carcinoma ( $\leq 2$  cm)

*Mei Q, Yu M, Chen Q*

- 8535** Identification of predictive factors for post-transarterial chemoembolization liver failure in hepatocellular carcinoma patients: A retrospective study

*Yuan M, Chen TY, Chen XR, Lu YF, Shi J, Zhang WS, Ye C, Tang BZ, Yang ZG*

- 8547** Clinical significance of half-hepatic blood flow occlusion technology in patients with hepatocellular carcinoma with cirrhosis

*Liu D, Fang JM, Chen XQ*

- 8556** Which octogenarian patients are at higher risk after cholecystectomy for symptomatic gallstone disease? A single center cohort study

*D'Acapito F, Solaini L, Di Pietrantonio D, Tauceri F, Mirarchi MT, Antelmi E, Flamini F, Amato A, Framarini M, Ercolani G*

#### Clinical Trials Study

- 8568** Computed tomography combined with gastroscopy for assessment of pancreatic segmental portal hypertension

*Wang YL, Zhang HW, Lin F*

#### Observational Study

- 8578** Psychological needs of parents of children with complicated congenital heart disease after admitting to pediatric intensive care unit: A questionnaire study

*Zhu JH, Jin CD, Tang XM*

#### Prospective Study

- 8587** Quantitative differentiation of malignant and benign thyroid nodules with multi-parameter diffusion-weighted imaging

*Zhu X, Wang J, Wang YC, Zhu ZF, Tang J, Wen XW, Fang Y, Han J*

#### Randomized Controlled Trial

- 8599** Application of unified protocol as a transdiagnostic treatment for emotional disorders during COVID-19: An internet-delivered randomized controlled trial

*Yan K, Yusufi MH, Nazari N*

- 8615** High-flow nasal cannula oxygen therapy during anesthesia recovery for older orthopedic surgery patients: A prospective randomized controlled trial

*Li XN, Zhou CC, Lin ZQ, Jia B, Li XY, Zhao GF, Ye F*

#### SYSTEMATIC REVIEWS

- 8625** Assessment tools for differential diagnosis of neglect: Focusing on egocentric neglect and allocentric neglect

*Lee SH, Lim BC, Jeong CY, Kim JH, Jang WH*

**CASE REPORT**

- 8634** Exome analysis for Cronkhite-Canada syndrome: A case report  
*Li ZD, Rong L, He YJ, Ji YZ, Li X, Song FZ, Li XA*
- 8641** Discrepancy between non-invasive prenatal testing result and fetal karyotype caused by rare confined placental mosaicism: A case report  
*Li Z, Lai GR*
- 8648** Paroxysmal speech disorder as the initial symptom in a young adult with anti-N-methyl-D-aspartate receptor encephalitis: A case report  
*Hu CC, Pan XL, Zhang MX, Chen HF*
- 8656** Anesthetics management of a renal angiomyolipoma using pulse pressure variation and non-invasive cardiac output monitoring: A case report  
*Jeon WJ, Shin WJ, Yoon YJ, Park CW, Shim JH, Cho SY*
- 8662** Traumatic giant cell tumor of rib: A case report  
*Chen YS, Kao HW, Huang HY, Huang TW*
- 8667** Analysis of two naval pilots' ejection injuries: Two case reports  
*Zeng J, Liu XP, Yi JC, Lu X, Liu DD, Jiang YQ, Liu YB, Tian JQ*
- 8673** Beware of the DeBakey type I aortic dissection hidden by ischemic stroke: Two case reports  
*Chen SQ, Luo WL, Liu W, Wang LZ*
- 8679** Unilateral lichen planus with Blaschko line distribution: A case report  
*Dong S, Zhu WJ, Xu M, Zhao XQ, Mou Y*
- 8686** Clinical features and progress of ischemic gastritis with high fatalities: Seven case reports  
*Shionoya K, Sasaki A, Moriya H, Kimura K, Nishino T, Kubota J, Sumida C, Tasaki J, Ichita C, Makazu M, Masuda S, Koizumi K, Kawachi J, Tsukiyama T, Kako M*
- 8695** Retinoblastoma in an older child with secondary glaucoma as the first clinical presenting symptom: A case report  
*Zhang Y, Tang L*
- 8703** Recurrent herpes zoster in a rheumatoid arthritis patient treated with tofacitinib: A case report and review of the literature  
*Lin QX, Meng HJ, Pang YY, Qu Y*
- 8709** Intra-abdominal ectopic bronchogenic cyst with a mucinous neoplasm harboring a *GNAS* mutation: A case report  
*Murakami T, Shimizu H, Yamazaki K, Nojima H, Usui A, Kosugi C, Shuto K, Obi S, Sato T, Yamazaki M, Koda K*
- 8718** Effects of intravascular photobiomodulation on motor deficits and brain perfusion images in intractable myasthenia gravis: A case report  
*Lan CH, Wu YC, Chiang CC, Chang ST*

- 8728** Spontaneous acute epidural hematoma secondary to skull and dural metastasis of hepatocellular carcinoma: A case report  
*Lv GZ, Li GC, Tang WT, Zhou D, Yang Y*
- 8735** Malignant melanotic nerve sheath tumors in the spinal canal of psammomatous and non-psammomatous type: Two case reports  
*Yeom JA, Song YS, Lee IS, Han IH, Choi KU*
- 8742** When should endovascular gastrointestinal anastomosis transection Glissonian pedicle not be used in hepatectomy? A case report  
*Zhao J, Dang YL*
- 8749** VARS2 gene mutation leading to overall developmental delay in a child with epilepsy: A case report  
*Wu XH, Lin SZ, Zhou YQ, Wang WQ, Li JY, Chen QD*
- 8755** Junctional bradycardia in a patient with COVID-19: A case report  
*Aedh AI*
- 8761** Application of 3 dimension-printed injection-molded polyether ether ketone lunatic prosthesis in the treatment of stage III Kienböck's disease: A case report  
*Yuan CS, Tang Y, Xie HQ, Liang TT, Li HT, Tang KL*
- 8768** High scored thyroid storm after stomach cancer perforation: A case report  
*Baik SM, Pae Y, Lee JM*
- 8775** Cholecystitis-an uncommon complication following thoracic duct embolization for chylothorax: A case report  
*Dung LV, Hien MM, Tra My TT, Luu DT, Linh LT, Duc NM*
- 8782** Endometrial squamous cell carcinoma originating from the cervix: A case report  
*Shu XY, Dai Z, Zhang S, Yang HX, Bi H*
- 8788** Type 2 autoimmune pancreatitis associated with severe ulcerative colitis: Three case reports  
*Ghali M, Bensted K, Williams DB, Ghaly S*
- 8797** Diffuse uterine leiomyomatosis: A case report and review of literature  
*Ren HM, Wang QZ, Wang JN, Hong GJ, Zhou S, Zhu JY, Li SJ*

**LETTER TO THE EDITOR**

- 8805** Comment on "Posterior reversible encephalopathy syndrome in a patient with metastatic breast cancer: A case report"  
*Kunić S, Ibrahimagić OĆ, Kojić B, Džananović D*

**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Ahmed Mohamed Ahmed Al-Emam, PhD, Associate Professor, Department of Pathology, King Khalid University, Abha 62521, Saudi Arabia. amalemam@kku.edu.sa

**AIMS AND SCOPE**

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

*WJCC* mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

**INDEXING/ABSTRACTING**

The *WJCC* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for *WJCC* as 1.534; IF without journal self cites: 1.491; 5-year IF: 1.599; Journal Citation Indicator: 0.28; Ranking: 135 among 172 journals in medicine, general and internal; and Quartile category: Q4. The *WJCC*'s CiteScore for 2021 is 1.2 and Scopus CiteScore rank 2021: General Medicine is 443/826.

**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: *Ying-Yi Yuan*; Production Department Director: *Xu Guo*; Editorial Office Director: *Jin-Lei Wang*.

**NAME OF JOURNAL**

*World Journal of Clinical Cases*

**ISSN**

ISSN 2307-8960 (online)

**LAUNCH DATE**

April 16, 2013

**FREQUENCY**

Thrice Monthly

**EDITORS-IN-CHIEF**

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

**PUBLICATION DATE**

August 26, 2022

**COPYRIGHT**

© 2022 Baishideng Publishing Group Inc

**INSTRUCTIONS TO AUTHORS**

<https://www.wjgnet.com/bpg/gerinfo/204>

**GUIDELINES FOR ETHICS DOCUMENTS**

<https://www.wjgnet.com/bpg/GerInfo/287>

**GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH**

<https://www.wjgnet.com/bpg/gerinfo/240>

**PUBLICATION ETHICS**

<https://www.wjgnet.com/bpg/GerInfo/288>

**PUBLICATION MISCONDUCT**

<https://www.wjgnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>

## Analysis of two naval pilots' ejection injuries: Two case reports

Jia Zeng, Xiao-Peng Liu, Jia-Cheng Yi, Xiang Lu, Dan-Dan Liu, Yan-Qing Jiang, Yan-Bing Liu, Jian-Quan Tian

**Specialty type:** Critical care medicine

**Provenance and peer review:** Unsolicited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0  
Grade B (Very good): B  
Grade C (Good): C  
Grade D (Fair): 0  
Grade E (Poor): 0

**P-Reviewer:** Gupta A, India; Shojiguchi N, Japan

**Received:** March 15, 2022

**Peer-review started:** March 15, 2022

**First decision:** April 19, 2022

**Revised:** April 20, 2022

**Accepted:** July 16, 2022

**Article in press:** July 16, 2022

**Published online:** August 26, 2022



**Jia Zeng, Xiang Lu, Dan-Dan Liu, Yan-Qing Jiang, Yan-Bing Liu,** Department of Aviation Disease, Naval Medical Center of PLA, Shanghai 200052, China

**Xiao-Peng Liu, Jian-Quan Tian,** Department of Psychology, Naval Medical Center of PLA, Shanghai 200052, China

**Jia-Cheng Yi,** Department of Clinical Medicine, School of Basic Medicine, Hebei Medical University, Shijiazhuang 050017, Hebei Province, China

**Corresponding author:** Jian-Quan Tian, MD, Chief Physician, Department of Psychology, Naval Medical Center of PLA, No. 338 Huaihai West Road, Changning District, Shanghai 200052, China. [psychologist@vip.163.com](mailto:psychologist@vip.163.com)

### Abstract

#### BACKGROUND

Recently, two naval pilots in a two-seat trainer jet were forced to eject urgently due to sudden mechanical failure during night-time training. They were both successfully rescued and sent to the hospital for emergency treatment. In this study, we investigate their ejection injuries and recovery process.

#### CASE SUMMARY

We analyzed the clinical data of the traumatic condition and recovery process from ejection injuries of two pilots who ejected from a failed trainer jet and survived. After being successfully rescued and sent to the hospital, they were diagnosed with multiple ejection injuries, including eye trauma, limb bone and joint injury, rib and spine injury, and so on. Both cases underwent fluid replacement, acid suppression, nutritional support, hemostasis, bone metabolism improvement, phlegm elimination, psychological measurement, blood circulation promotion and detumescence, physical therapy, and external fixation with braces for 1 mo before being discharged from hospital. They then recuperated in a sanatorium for 2 mo, and the related laboratory tests and supplementary examinations show that they recovered from all the above injuries. After successfully passing the psychological test and physical examination, they returned to flight duty 3 mo after ejection.

#### CONCLUSION

The causes and conditions of ejection injury in the pilots were very complex. Although they finally recovered quickly and were released, it also serves as a reminder that attention should be paid to pilots' ejection and parachute training in order to significantly reduce ejection injury and improve the ejection success rate. In addition, air defense support personnel should strengthen search and rescue

and on-site emergency measures, and locate and rescue pilots in distress as early as possible to reduce subsequent injuries.

**Key Words:** Aerospace medicine; Pilots; Aviation accidents; Wounds and injuries; Case report

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

**Core Tip:** The ejection injuries to pilots are usually very complex. We analyzed two pilots' traumatic condition and recovery process after they were ejected from a failed trainer and survived. After being successfully rescued, they were diagnosed with multiple ejection injuries and underwent a series of treatments for 1 mo. They then recuperated for 2 mo, and the related tests and examinations show that they recovered from injuries. After passing the psychological test and physical examination, they successfully returned to flight duty. Attention should be paid to pilots' ejection training in order to reduce ejection injury and improve the ejection success rate. In addition, aviation rescuers should strengthen search techniques to locate and rescue pilots in distress as early as possible to reduce injuries.

**Citation:** Zeng J, Liu XP, Yi JC, Lu X, Liu DD, Jiang YQ, Liu YB, Tian JQ. Analysis of two naval pilots' ejection injuries: Two case reports. *World J Clin Cases* 2022; 10(24): 8667-8672

**URL:** <https://www.wjgnet.com/2307-8960/full/v10/i24/8667.htm>

**DOI:** <https://dx.doi.org/10.12998/wjcc.v10.i24.8667>

## INTRODUCTION

Ejection is an important way for pilots to escape planes in case of emergency, but the incidence of injury accompanying ejection escape is also very high[1-3]. As the conditions of ejection injuries are complex and diverse, it is very important to study ejection injuries and take targeted first-aid measures to save the lives of pilots in distress[4].

Recently, two naval pilots in a two-seat trainer jet were forced to eject urgently due to sudden mechanical failure during night-time training. The flight speed during the ejection was about 700 km/h, which was within the flight envelope. The ejection mode was rocket-assisted through-canopy ejection. At the moment of ejection, they experienced transient loss of consciousness. They were both successfully rescued and sent to the hospital for emergency treatment. After being diagnosed with multiple ejection injuries, they recuperated in a sanatorium for 2 mo, and the related laboratory tests and supplementary examinations show that they recovered from their injuries. After successfully passing the psychological test and physical examination, they returned to flight duty 3 mo after ejection. Their injury conditions and recovery process are presented below.

## CASE PRESENTATION

### Chief complaints

**Case 1:** A male flight cadet in the front cabin, 20-years-old, with total flight time of 300 h, suffered from multiple injuries to the whole body 2 h after ejection.

**Case 2:** A male flight instructor in the rear cabin, 40-years-old, with total flight time of 1700 h (including 280 h in the current aircraft model), suffered from multiple injuries to the whole body 11 h after ejection.

### History of present illness

**Case 1:** Due to mechanical failure, the pilot ejected and parachuted from the front cabin of the trainer jet with transient loss of consciousness. He had recovered consciousness by the time he landed. He experienced chest pain, back pain and other body pains, and limited movement of the right ankle. Two hours after ejection, he was found by the villagers and sent to the local hospital by ambulance.

**Case 2:** Due to mechanical failure, the pilot ejected and parachuted from the rear cabin of the trainer jet with transient loss of consciousness. He regained consciousness after landing. He felt pain all over his body and limited movement of the left knee. Eleven hours after ejection, he was found and sent to the local hospital by ambulance.

**History of past illness**

No other abnormal health conditions were reported in both cases.

**Personal and family history**

Both cases had no specific history of genetic diseases.

**Physical examination**

**Case 1:** The pilot was found with blueness and bilateral swelling on the eyelids; a splinter hemorrhage in the right conjunctiva, and swelling and percussion pain (+) in the neck, back, and waist; tenderness (+) in the T3-T5 and T8 vertebral spinous process; slightly limited thoracic vertebral extension; tenderness (+) and percussion pain (+) in the right hypochondriac region; swelling in the right ankle, tenderness (+) in the right lateral ankle and posterior ankle, slightly limited varus, and right lower limb muscle strength 4 +; and multiple skin abrasions on the back, waist, and extremities.

**Case 2:** The pilot was found with bilateral edema of the eyelids and a small splinter hemorrhage in the right conjunctiva; multiple abrasions on the face, bilateral forearm and legs, and swelling and bruising on the posterior-lateral left thigh; cyanosis of the skin, and swelling, tenderness (+), and immobility around the left knee joint.

**Laboratory examinations**

**Case 1:** Aspartate aminotransferase 53 U/L, procalcitonin 0.51 ng/mL, indirect bilirubin 22.65  $\mu$ mol/L, creatine kinase 175 IU/L, C-reactive protein (CRP) 8.1 mg/L, phosphocreatine kinase isoenzyme 33 U/L, and lactate dehydrogenase 360 U/L.

**Case 2:** Creatine kinase 1133 IU/L, creatinine 101  $\mu$ mol/L, CRP 22.5 mg/L, phosphocreatine kinase isoenzyme 22 U/L, and lactate dehydrogenase 277 U/L.

**Imaging examinations**

**Case 1:** Magnetic resonance imaging (MRI) showed: C3/4 and C4/5 intervertebral disc herniation; mild compression fractures of T3-T5 and T8 vertebral bodies; bone marrow edema of T1-T8 vertebral bodies and L5/S1 intervertebral disc herniation; laceration of anterior talofibular ligament of the right ankle; local Grade 1 injury of Achilles tendon of right ankle; bone marrow edema of right calcaneus; and soft tissue edema around right ankle. Chest computed tomography (CT) showed incomplete fractures of multiple right ribs (anterior ribs 5-9) (Figure 1A-D).

**Case 2:** MRI showed: Lumbar disc herniation of L3/4; thoracic T3 vertebral hemangioma.

---

**FINAL DIAGNOSIS**

---

**Case 1**

Ocular trauma, subconjunctival hemorrhage (right); cervical disc herniation (C3/4, C4/5); multiple thoracic vertebral compression fractures (T3-T5, T8); incomplete fracture of multiple right ribs; Achilles tendon injury (right, Grade 1); laceration of anterior talofibular ligament of ankle (right); calcaneal contusion (right); and soft tissue injury in right ankle and lower back.

**Case 2**

Ocular trauma, subconjunctival hemorrhage (right eye); left medial femoral condylar bone contusion with bone marrow edema; multiple injuries to posterior tendons and ligaments of left thigh; acute kidney injury; thoracic T3 vertebral hemangioma; and lumbar disc herniation (L3/4).

---

**TREATMENT**

---

After admission, the two injured pilots were treated with fluid replacement, acid suppression, nutritional support, hemostasis, bone metabolism improvement, phlegm elimination, psychological measurement, blood circulation promotion and detumescence, physical therapy, and external fixation with braces for 1 mo before being discharged from hospital.

---

**OUTCOME AND FOLLOW-UP**

---

After discharge, they recuperated in a sanatorium for 2 mo, the related laboratory tests and supple-

mentary examinations show that they recovered from all injuries. Psychological assessment: Healthy. Physical fitness test: Qualified. They were released 3 mo after the ejection (Figure 1E-H).

## DISCUSSION

Congestive bilateral eyelid and right eyeball conjunctiva were potentially caused by the effects of continuous negative gravity (-G) conditions on visual function[5]. The analysis showed that both pilots were suspended upward when the danger occurred. At this time, -G caused blood to flow to the head, which led to the congestion of bulbar conjunctiva, increased the secretion of lacrimal glands, and caused eyelid edema and blurred vision. Continuous -G can also cause: (1) Changes in visual function; increased secretion of the lacrimal glands can lead to blurred vision; edema of the lower eyelid, shifting upward to cover the pupil and cause difficulty in opening the eyes, can lead to the temporary loss of vision; and conjunctiva rupture and hemorrhage, causing blood-stained tears to accumulate in the conjunctival sac, results in the redness of the visual field. The congested lower eyelid shifted upward to cover the pupil, and strong light irradiation led to the redness of visual field. Retinal circulation stagnation and hypoxia, and the lower eyelid covering the pupil, led to the loss of central vision; edema of the orbital tissue and disorder of the coordinated movement of the extraocular muscles led to diplopia; (2) Congestion in the reflux area of the superior vena cava can result in the congestion and edema of the neck and face, as well as subcutaneous hemorrhage points; (3) With the diaphragm in an upward position, ventilation blood flow imbalance can lead to dyspnea; (4) Increased intracranial pressure can lead to headache and distension of the head, as well as increased blood pressure; and (5) Increased carotid sinus pressure can lead to an abnormal heart rate.

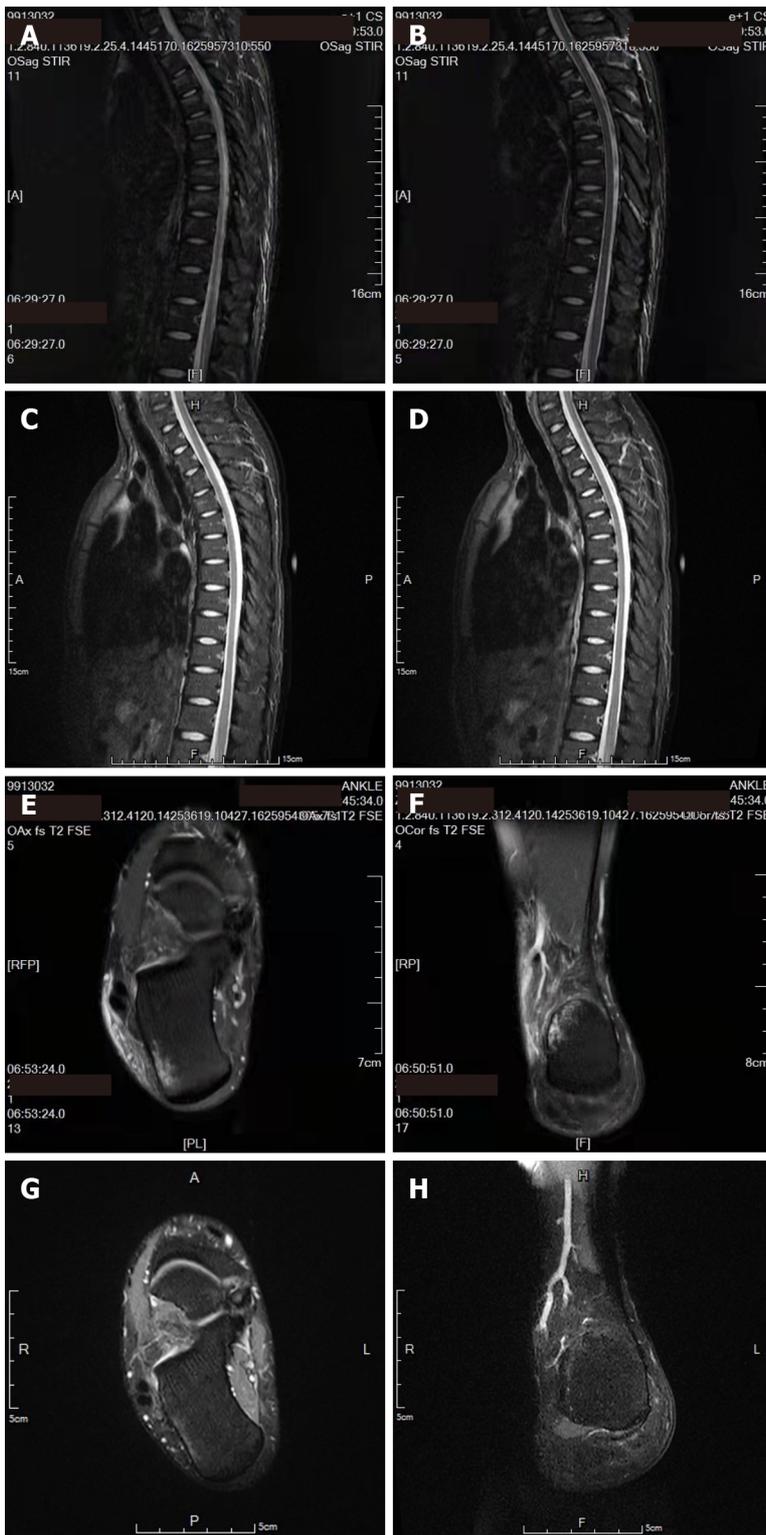
Temporary loss of consciousness, spinal injury, head and neck injury and limb injury were likely due to the overload value during ejection, which may have reached about 20 G, with a high growth rate of G value and short action time. The ejection through the canopy increased the G value and G growth rate significantly. After ejection from the aircraft and before the parachute opens, the person-chair system or human body may rotate under the impact of the high-speed airflow. The inertial centrifugal force may cause equipment, such as oxygen masks, gloves, flight boots, and pistols to fall off, and the headband of the mask may injure the neck[4-6]. The high-speed airflow may also cause hypoxia and frostbite in pilots[3,4]. Both pilots experienced the transient loss of consciousness during ejection, and only recovered their consciousness during parachuting. The cadet in the front cabin had multiple thoracic vertebral compression and rib fractures, and a cervical disc herniation, while the instructor in the rear cabin had a cervical and lumbar disc herniation; it is considered that they were already displaced at the time of ejection. The mask and helmet caused minor injuries to the head and neck, and the cadet in the front cabin incurred neck strangulation and limb injury due to the displacement and collision of the limbs and loss of consciousness during ejection.

Parachute-opening injury is more common at the exerting parts of harness system, such as the scapula, chest and waist, and perineum, which can cause sternum, rib, spine, and limb fracture and dislocation, as well as visceral injuries[7]. The pilots presented multiple fractures to the right ribs, which was considered to have been caused by the parachutes opening. Meanwhile, parachuting is not excluded from being the cause of spinal injury in both patients.

Sprains and contusions to the lower limb joints and ligaments are mostly caused by landing. The cadet in the front cabin suffered from a right Achilles tendon injury; laceration of the anterior talofibular ligament of the right ankle; right calcaneal bone contusion; and soft tissue injury in the right ankle, back, and waist. The instructor in the back cabin suffered from left medial femoral condylar bone contusion with bone marrow edema, and multiple injuries to the posterior tendons and ligaments of the left thigh [8]. Moreover, the incident occurred in a jungle mountain area at night, so the poor visibility, more numerous obstacles, and improper landing posture could have aggravated the injuries. Both cases were found with abnormal enzyme labeling and elevated CRP at the time of admission, which were caused by muscle injury and systemic inflammatory reaction after injury. The instructor in the back cabin also showed abnormal creatinine and slightly increased urinary microproteins, which was related to his landing on the top of a mountain, longer rescue time, prolonged lack of water, and insufficient strength. The laboratory indexes all improved after active treatment.

### **Aeromedical concerns**

The causes of ejection injury in these cases are complex. The two pilots carried out the ejection properly. Fortunately, they did not suffer from any visceral or fatal disability injuries, and recovered quickly and were released. However, it also serves as a reminder that attention should be paid to pilots' ejection and parachute training. Before ejection, the flight parameters should be controlled within the ejection envelope (safe flying height and descent rate) as much as possible. The perfect mastery of ejection skills by pilots may contribute to significantly reduced ejection injury and improved ejection success rate[9, 10]. Meanwhile, air defense support personnel should strengthen search and rescue and on-site emergency measures, and locate and rescue pilots in distress as quickly possible to reduce subsequent injuries[11].



DOI: 10.12998/wjcc.v10.i24.8667 Copyright ©The Author(s) 2022.

**Figure 1** Magnetic resonance imaging contrast in case 1 before and after treatment. A and B: Magnetic resonance imaging (MRI) of thoracic vertebra in case 1 before treatment; C and D: MRI of thoracic vertebra in case 1 after treatment; E and F: MRI of ankle joint in case 1 before treatment; G and H: MRI of ankle joint in case 1 after treatment.

## CONCLUSION

Attention should be paid to pilots' ejection and parachute training in order to significantly reduce ejection injury and improve the ejection success rate. In addition, air defense support personnel should strengthen search and rescue and on-site emergency measures, and locate and rescue pilots in distress quickly to reduce subsequent injuries.

---

## FOOTNOTES

**Author contributions:** Zeng J and Liu XP contributed equally to this work; Zeng J and Tian JQ designed the study; Zeng J, Yi JC, Liu DD, Jiang YQ, Lu X, and Liu YB collected and analyzed the clinical data; Zeng J and Yi JC wrote the manuscript; Tian JQ revised the manuscript.

**Supported by** Key Projects of Medical Service Scientific Research of the Navy Medical Center, No. 20M2302.

**Informed consent statement:** We obtained consent from all patients or their relatives for the publication of this report.

**Conflict-of-interest statement:** The authors declare that they have no conflicts of interest.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

**Country/Territory of origin:** China

**ORCID number:** Jia Zeng 0000-0001-5201-4526; Xiao-Peng Liu 0000-0021-8124-2946; Jia-Cheng Yi 0000-0021-9413-0801; Xiang Lu 0000-0002-8128-7718; Dan-Dan Liu 0000-0003-1947-2369; Yan-Qing Jiang 0000-0012-3824-9462; Yan-Bing Liu 0000-0002-1171-8314; Jian-Quan Tian 0000-0002-3101-6180.

**S-Editor:** Yan JP

**L-Editor:** Filipodia

**P-Editor:** Yan JP

---

## REFERENCES

- 1 **Pavlović M**, Pejović J, Mladenović J, Cekanac R, Jovanović D, Karkalić R, Randjelović D, Djurdjević S. Ejection experience in Serbian Air Force, 1990-2010. *Vojnosanit Pregl* 2014; **71**: 531-533 [PMID: 25039105 DOI: 10.2298/vsp130517044p]
- 2 **McBratney CM**, Rush S, Kharod CU. Pilot ejection, parachute, and helicopter crash injuries. *J Spec Oper Med* 2014; **14**: 92-94 [PMID: 25399374]
- 3 **Manen O**, Clément J, Bisconte S, Perrier E. Spine injuries related to high-performance aircraft ejections: a 9-year retrospective study. *Aviat Space Environ Med* 2014; **85**: 66-70 [PMID: 24479262 DOI: 10.3357/ASEM.3639.2014]
- 4 **Dikshit MB**. To Err is Human Case Reports of Two Military Aircraft Accidents: Possible mechanisms of human failure. *Sultan Qaboos Univ Med J* 2010; **10**: 120-125 [PMID: 21509093]
- 5 **Miles JE**. Factors Associated with Delayed Ejection in Mishaps Between 1993 and 2013. *Aerosp Med Hum Perform* 2015; **86**: 774-781 [PMID: 26388083 DOI: 10.3357/AMHP.4057.2015]
- 6 **AlAbdulwahab SS**, Kachanathu SJ, AlSunaidi ASN. A cross-sectional study on fear-avoidance beliefs and chronic low back pain in fighter pilots. *Int J Crit Illn Inj Sci* 2021; **11**: 29-32 [PMID: 34159134 DOI: 10.4103/IJCHS.IJCHS\_95\_19]
- 7 **Du C**, Mo Z, Tian S, Wang L, Fan J, Liu S, Fan Y. Biomechanical investigation of thoracolumbar spine in different postures during ejection using a combined finite element and multi-body approach. *Int J Numer Method Biomed Eng* 2014; **30**: 1121-1131 [PMID: 24827805 DOI: 10.1002/cnm.2647]
- 8 **Nakamura A**. Ejection experience 1956-2004 in Japan: an epidemiological study. *Aviat Space Environ Med* 2007; **78**: 54-58 [PMID: 17225484]
- 9 **Stemper BD**, Storvik SG, Yoganandan N, Baisden JL, Fijalkowski RJ, Pintar FA, Shender BS, Paskoff GR. A new PMHS model for lumbar spine injuries during vertical acceleration. *J Biomech Eng* 2011; **133**: 081002 [PMID: 21950895 DOI: 10.1115/1.4004655]
- 10 **Stemper BD**, Yoganandan N, Pintar FA, Shender BS, Paskoff GR. Physical effects of ejection on the head-neck complex: demonstration of a cadaver model. *Aviat Space Environ Med* 2009; **80**: 489-494 [PMID: 19456013 DOI: 10.3357/ASEM.2422.2009]
- 11 **Epstein D**, Markovitz E, Nakdimon I, Guinzburg A, Aviram E, Gordon B, Shapira S, Sharon S, Steinfeld Y, Miller A, Lipsky AM. Injuries associated with the use of ejection seats: a systematic review, meta-analysis and the experience of the Israeli Air Force, 1990-2019. *Injury* 2020; **51**: 1489-1496 [PMID: 32430195 DOI: 10.1016/j.injury.2020.04.048]



Published by **Baishideng Publishing Group Inc**  
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA  
**Telephone:** +1-925-3991568  
**E-mail:** [bpgoffice@wjgnet.com](mailto:bpgoffice@wjgnet.com)  
**Help Desk:** <https://www.f6publishing.com/helpdesk>  
<https://www.wjgnet.com>

