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Case Report

A case of Galen vein thrombosis occurring after bilateral acetabular fractures in the Tibet plateau — what can we learn?

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ABSTRACT

Hypoxia leads to increased red blood cells and blood viscosity at high altitude while moderate trauma increases coagulation in blood. Under the above-mentioned conditions, venous sinus thrombosis is more likely to occur. A patient suffering bilateral acetabular fractures together with the gradual disturbance of consciousness was admitted to our hospital. Though computed tomography arteriogram (CTA) of the brain displayed normal blood vessels; bilateral thalamus and brainstem infarction were found on head computed tomography (CT) and Galen vein thrombosis on cerebral computed tomography venography (CTV). Dehydration and tracheotomy were immediately conducted with antiplatelet, anticoagulant and neurotrophic medicine administered to the patient. After three days' treatment, the patient's consciousness gradually improved and eventually became clear enough to leave the hospital. On follow-up, no dysfunction was documented.

Introduction

Tibet is located in the plateau region with an average altitude of 4000 m. Hypoxia leads to increased red blood cells and blood viscosity at a high altitude[1] and moderate trauma increases coagulation in blood.[2] Under the above conditions, it is more likely to develop venous sinus. As a serious condition, Galen vein thrombosis if not treated in time will cause severe complications, even death. The trauma complicated by Galen vein thrombosis is rarely reported, and neither is Galen vein thrombosis occurring in regions of high altitude.

Case report

The patient underwent a traffic accident and his characteristics are shown in Table 1. Axial computed tomography (CT) scan of the hip showed bilateral acetabular fractures (Fig. 1A) while normal brain was found on axial CT scan of the head. On admission the patient demonstrated an entirely clear consciousness. However, on next day his consciousness decreased and gradually worsened with a Glasgow score of 8 points. Nervous system examination showed grade 3 muscle strength and high tension. Bilateral Babinski sign was positive. Head CT was reviewed, showing bilateral thalamus and brain stem infarct (Fig. 1B and C). Though computed tomography arteriogram (CTA) of the brain displayed normal blood

Table 1
Summary of patient's main characteristics.

Parameters	
Age (years)	45
Region	Tibet, China
Mechanism of injury	Motor vehicle accident
Hb (g/L)	191
Hypertension (mmHg)	169/111
The number of platelet	341×10^{12}
Bad habits	Smoking and drinking
Used hemostatic	Yes
Used dehydrating agent	No

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vessels (Fig. 1D), Galen vein thrombosis (Fig. 1E) was found on cerebral computed tomography venography (CTV). The patient was given mannitol 250 ml, 3 times a day for dehydration, aspirin 100 mg and plavix 75 mg once a day, low molecular weight heparin injection 5000 units and edaravone 30 mg twice a day, and tracheotomy treatment. After three days, the patient's consciousness gradually improved. After one week, low molecular weight heparin injection was stopped and two weeks later, the consciousness of the patient was entirely clear. When he left the hospital, GCS reached 15 points with normal bilateral muscle strength and muscle tension as well as negative bilateral pathological sign. Both pelvic X-ray film (Fig. 2A) and axial CT scan of the hip (Fig. 2B)

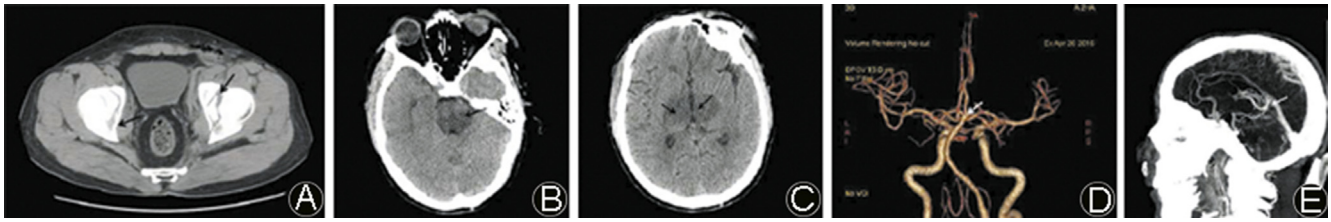

Fig. 1. A: Axial CT scan of the hip showing bilateral acetabular fractures on admission. B, C: Axial CT scan of the head showing bilateral thalamus and brainstem infarction. D: Computed tomography arteriogram of the brain showing normal blood vessels. E: Computed tomography venography of the brain showing Galen vein thrombosis.

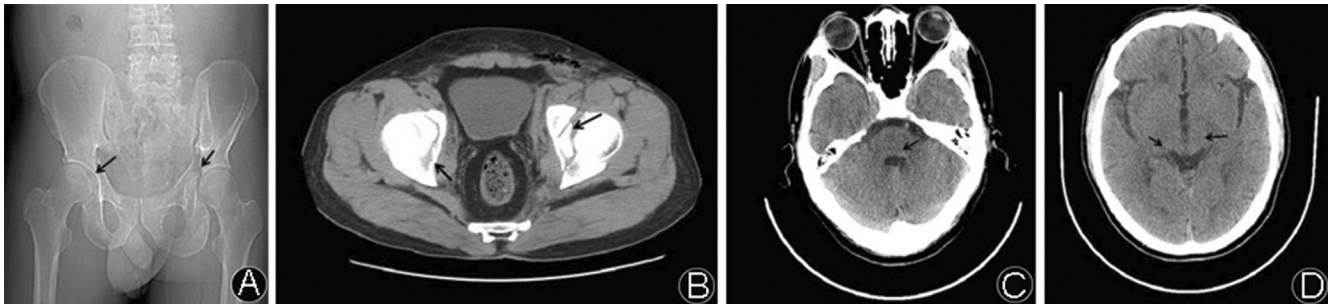

Fig. 2. A: Pelvic X-ray film showing bilateral acetabular fractures when the patient left the hospital. B: Axial CT scan of the hip showing bilateral acetabular fractures when the patient left the hospital. C, D: Axial CT scan of the head showing no infarction when the patient was discharged.

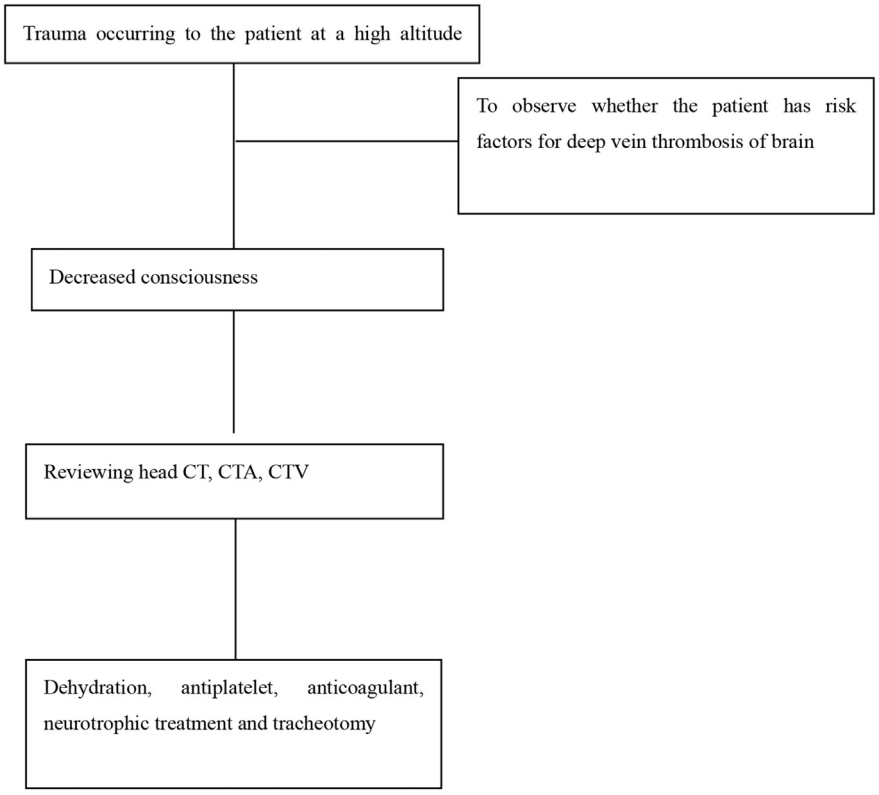

Fig. 3. Observation of whether deep vein thrombosis of brain occurred to the traumatic patient and treatment.

showed bilateral acetabular fractures while no infarction was found on the axial CT scan of the head (Fig. 2C and D). With stopped Plavix while continued aspirin, after one month, the patient's follow-up demonstrated a completely recovered nerve function.

Discussion

In the Tibet plateau, hypoxia increases the red blood cells and hemoglobin, expands blood viscosity, reduces blood flow,[1,3] and finally leads to slight circulatory disorders. Elevated altitude leads to increased possibility of cerebral infarction after the trauma.[2,4] However, few relevant documents have reported on the prevention of cerebral infarction. On admission, the patient presented with entirely clear consciousness and normal brain shown on head CT. One day later disturbance of consciousness occurred in the patient. At this time, if cerebral infarction had not been suspected so as to timely review the head CT, the patient might have missed the best treatment time, which could lead to serious sequelae of the body.[5–7] Our experience is that once disturbance of consciousness occurred, we immediately reviewed the head CT. When the brain infarction was found or suspected, the CTA and CTV were timely examined.[8,9] As CTA revealed nothing abnormal, we excluded cerebral infarction caused by arterial thrombosis. CTV examination revealed whether venous thrombosis led to cerebral infarction. If the brain suffers deep vein thrombosis, timely treatment must be provided. Galen vein thrombosis, as the most common deep vein thrombosis, results in increased intracranial pressure and the blood-brain barrier damage, leading to cerebral edema and venous infarction. Galen vein thrombosis developed bilateral thalamus and brainstem infarction, which if not treated timely often results in sequela or even death. The patient was cured by anti-thrombosis and anticoagulation which prevent thrombus from forming. Other major therapeutics included neurotrophic treatment and tracheotomy. Since brainstem infarction was associated with the gag reflex barriers, it was necessary to establish an open airway. Generally the patient would not develop sequelae if treated timely. Through this case, we did obtain some experience. First, some risk factors that may induce deep vein thrombosis after trauma were understood. Specifically, the risk factors include a hemoglobin concentration (g/L) > 180, more than 5 years' living in the plateau, diseases such as diabetes, hypertension, heart disease, limited mobility due to injured lower extremity, an increase in the number of platelet, bad habits including smoking and drinking, hemostatic or dehydrating agent, and an old age. Second, it is unnecessary to excessively use hemostatic agents in order to reduce the possibility of cerebral infarction provided that the traumatic patient is at a high altitude. Third, detection and treatment must be given timely. Fourth, timely reviewing the head CT or MRI is paramount if the patient demonstrates disturbance of consciousness (Fig. 3). The above-mentioned process could help reduce the incidence of traumatic cerebral infarction and sequelae in plateau. Nevertheless, trauma isn't an inevitable factor in Galen vein thrombosis since it may also be caused by the patient's innate problems.

Conflict of interest

The authors ascertain they have no financial or other conflicts of interest in relation to this research and its publication.

References

1. Cheng S, Chng SM, Singh R. Cerebral venous infarction during a high altitude expedition. *Singap Med J*. 2009;50:e306–308.
2. Burggraf M, Payas A, Kauther MD, et al. Evaluation of clotting factor activities early after severe multiple trauma and their correlation with coagulation tests and clinical data. *World J Emerg Surg*. 2015;10:43. http://dx.doi.org/10.1186/s13017-015-0038-1.
3. Fujimaki T, Matsutani M, Asai A, et al. Cerebral venous thrombosis due to high-altitude polycythemia. Case report. *J Neurosurg*. 1986;64:148–150. http://dx.doi.org/10.3171/jns.1986.64.1.0148.
4. Martinelli I. Unusual forms of venous thrombosis and thrombophilia. *Pathophysiol Haemost Thromb*. 2002;32:343–345.
5. Martinelli I. Cerebral vein thrombosis. *Thromb Res*. 2013;131(Suppl 1):S51–S54. http://dx.doi.org/10.1016/S0049-3848(13)70022-7.
6. Bushnell C, Saposnik G. Evaluation and management of cerebral venous thrombosis. *Continuum (Minneap Minn)*. 2014;20:335–351. http://dx.doi.org/10.1212/01.CON.0000446105.67173.a8.
7. Wu X, Wu W, Wu J, et al. A 72-year-old man presenting with progressive lower limb weakness and unconsciousness. Thrombosis of the vein of Galen. *Ann Saudi Med*. 2014;34:450. http://dx.doi.org/10.5144/0256-4947.2014.450.
8. Chow ML, Cooke DL, Fullerton HJ, et al. Radiological and clinical features of vein of Galen malformations. *J Neurointerv Surg*. 2015;7:443–448. http://dx.doi.org/10.1136/neurintsurg-2013-011005.
9. Jain NK, Swaika S, Thomas B, et al. Varying clinical and imaging outcomes in patients with spontaneous thrombosis of vein of Galen malformation—a report of two cases. *Childs Nerv Syst*. 2015;31:809–813. http://dx.doi.org/10.1007/s00381-014-2612-3.