

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.elsevier.com/locate/radcr](http://www.elsevier.com/locate/radcr)

## Case Report

# Unusual post-traumatic aortic rupture in a paraglide pilot – A case report

Leopold Bakoń, MD, PhD<sup>a,\*</sup>, Ryszard Pacho, MD, PhD<sup>a,b</sup>, Aleksander Leszczyński, MD<sup>c</sup>

<sup>a</sup> Department of Radiology, Military Institute of Aviation Medicine, 54/56 Krasieńskiego Street, 01-755 Warsaw, Poland

<sup>b</sup> II Department of Clinical Radiology, Medical University of Warsaw, Warsaw, Poland

<sup>c</sup> Department of General and Oncological Surgery, Szpital w Szczecinku, Szczecinek, Poland

## ARTICLE INFO

## Article history:

Received 15 February 2019

Revised 5 March 2019

Accepted 6 March 2019

Available online 1 April 2019

## Keywords:

Aortic rupture

Post-traumatic aortic injury

Paraglider accident

Aviation accident

## ABSTRACT

Post-traumatic aortic injuries are more common in victims of aircraft accidents than in motor vehicle accidents, and are a leading cause of on-site and delayed mortality, regardless of cause. In this case report, we present a history of a nearly isolated aortic post-traumatic injury in a victim of a paragliding accident. The rarity of this case lies in 2 factors, that is, the lack of the other life-threatening injuries usually present in high-energy accidents, and an unusual, exfoliative type of injury not matching more closely the typical classifications made use of currently in clinical practice.

© 2019 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license.

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## Introduction

Post-traumatic aortic injury (PTAI) does not happen often [1], but is one of the major causes of mortality in victims of motor vehicle accidents (MVAs) and falls from heights. The frequency of occurrence of PTAIs is higher among victims of aircraft accidents than in MVAs, being present in 41.9% of autopsy reports in the sphere of general aviation [2], as well as 38.1% where helicopter accidents are concerned [3]. This compares with a level of 34% in autopsies relating to fatal motor vehicle accidents [4].

Major classifications of PTAIs most commonly used in clinical practice are that proposed by Azizzadeh et al [5], as well

as a newer one from Starnes et al [6]. Both classifications offer a 4-type grading of PTAIs that ranges from intimal tears up to complete rupture of the aortic wall with extravasation into the mediastinum. These classifications serve to rank cases in terms of risk of death and choice of preferred management method – from medical, conservative treatment in minimal injuries through to endovascular treatment with stentgraft implantation in 3 of the types of PTAI.

The majority of PTAIs occurs at a typical site in the aortic isthmus, and the grading here is from intimal tear, via intramural hematoma and large intimal flap, through to pseudoaneurysm or complete rupture.

In this case report, we describe a case of PTAI as the leading, single serious, injury in a paraglide pilot, which does not

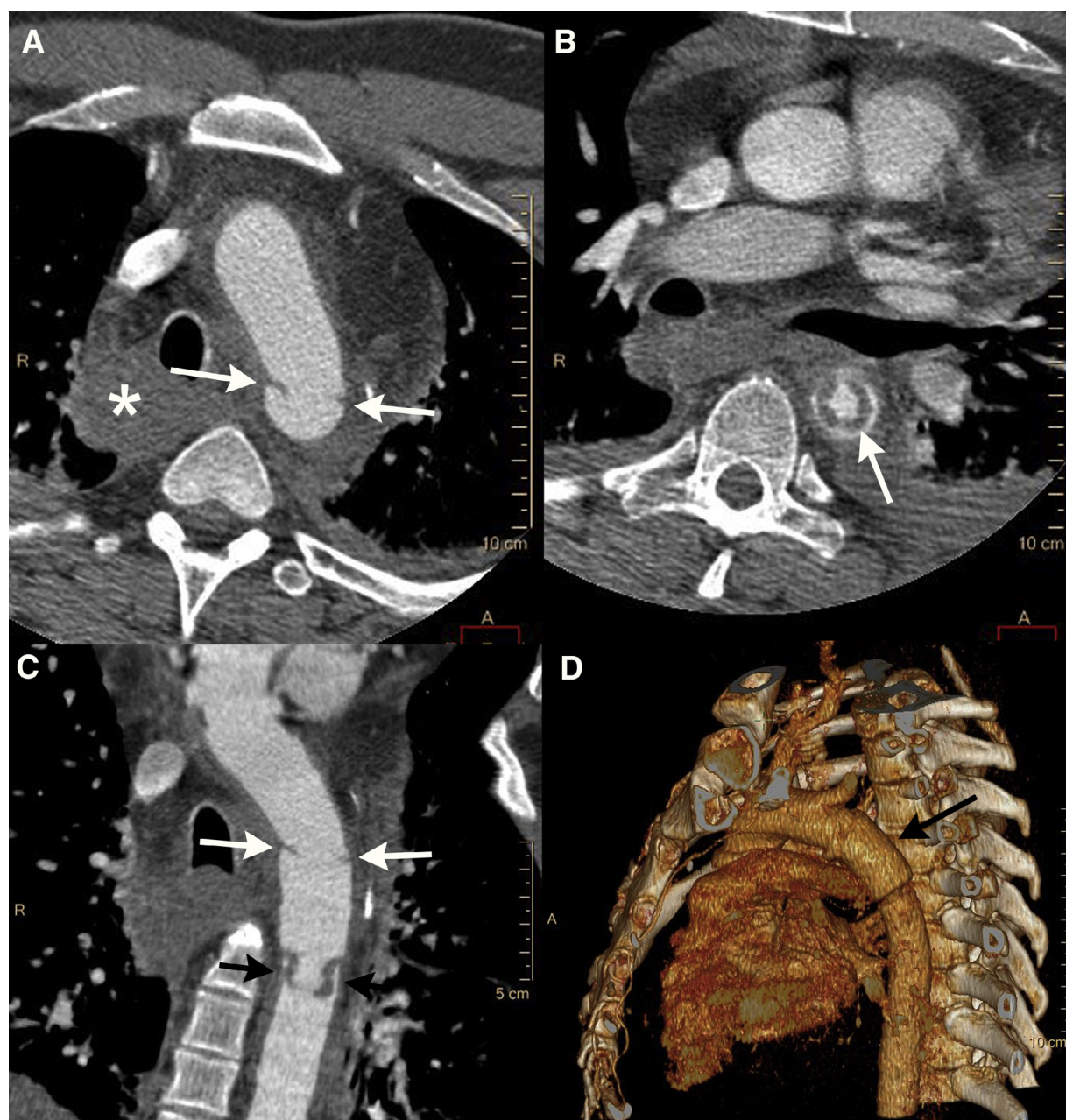
Competing Interests: The authors have declared that no competing interests exist.

\* Corresponding author.

E-mail address: [Leopoldbakon@gmail.com](mailto:Leopoldbakon@gmail.com) (L. Bakoń).

<https://doi.org/10.1016/j.radcr.2019.03.010>

1930-0433/© 2019 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



**Fig. 1 – The post-traumatic aortic rupture. (A) Site at which laceration begins (arrows), with asterisk indicating mediastinal haematoma. (B) Intimal flap at end of laceration (arrow). (C) Curved reformation showing initial side of PTAI (white arrows) and end of PTAI (black arrows). (D) Volume rendered image of PTAI (black arrow).**

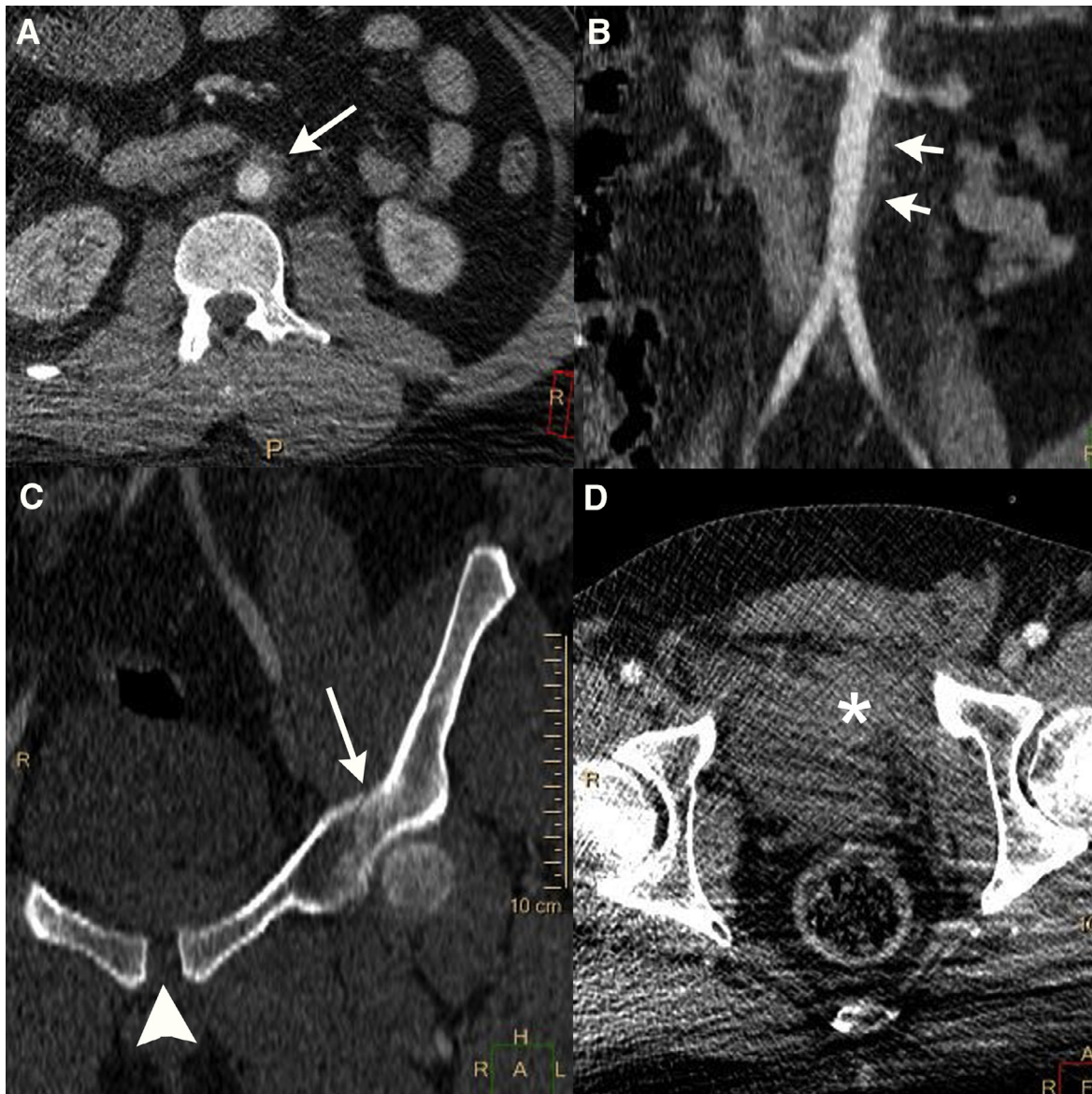
fit into the aforesaid typical classifications proposed in the literature [5,6].

### Case report

A case of serious injury during recreational paragliding is presented here. The accident happened in a relatively flat area lacking elevations that might act as place of lift-off, and thus finding those involved in accident to attach the paraglider to a 4-wheel, all-terrain vehicle by means of a line 18 m long. The

paraglider pulled by this vehicle was lifted into the air to the full extent of the line, and then began to lift the vehicle, with the effect that its driver was dropped, nevertheless sustaining only minor injuries not requiring hospitalisation. However, the continued attachment of the paraglider to the vehicle resulted in the former being downed. The crash to the ground thus took place from a height of at least 18 m.

The paraglide pilot was transported to Szczecinek Hospital immediately, proved to be stable on admission, and was moved to the Radiology Department for a multislice computed tomography scan (MSCT). The examination was performed on a GE *Lightspeed Ultra* CT scanner in spiral mode, with the poly-



**Fig. 2(- A) Axial slice showing small haematoma around abdominal aorta (arrow). (B) Coronal reformat showing small haematoma around abdominal aorta (arrow). (C) Fracture of pubic bone (arrow) and symphysis-widening (arrowhead). (D) Axial slice showing suprapubic haematoma (asterisk).**

trauma protocol applied to include the head, cervical spine, thorax, abdomen, and pelvis. The overall examination comprised a native phase without contrast medium (CM), as well as arterial and porto-venous phases following administration of CM Iomeron 300 (Bracco Imaging) (80 mL at a rate of 4 mL/s into the antecubital vein).

PTAI in the aortic isthmus was observed (Fig. 1A-D). The laceration site was 15 mm below the left subclavian artery branch. Below it, the aortic lumen was seen to be widened slightly, while the aortic wall was thinner along a length of 46 mm (Fig. 1C). Observed below that was a circular flap of exfoliated intima narrowing the aortic lumen (Fig. 1B). This type of PTAI is closest to type III after Azzizadeh [5] or to the type

involving the large intimal flap, under the newer classification from Starnes [6].

There was also a small haematoma around the abdominal aorta, with minimal lumen irregularities and no signs of active extravasation (as in type I after Azzizadeh [5]), as well as minimal aortic injury after Starnes [6], in zones II and III (Fig. 2A,B).

Other abnormalities observed were mediastinal haematoma and pleural effusion (Fig. 1A), left-pubic bone fracture with symphysis dehiscence of 15 mm classified to Young-Burgess APC I with a small retroperitoneal haematoma (Fig. 2C and D).

There were no signs of brain damage, cranial haematoma, or fractures of the cervical spine. No thoracic, lumbar spine, or

rib fractures were observed either, nor any lacerations of other internal organs.

Following the MSCT diagnostics, the patient was transferred to a higher reference hospital immediately for endovascular repair – thoracic aortic stent-graft implantation. This proved successful, ensuring the patient's full recovery.

## Discussion

As has been shown previously [7], aviation accidents in the course of paragliding are less common than other noncommercial accidents, and are associated with lesser mortality. In around two-thirds of cases, injuries sustained during paragliding entail fractures of the spine and lower extremities [8,9]. Traumatic lesions in the thorax and abdomen are found to be less common than in other types of aviation accident [7,10], though the ratio of hospitalisations to deaths is in fact significantly higher than in cases involving other kinds of commercial or noncommercial aircraft.

Unlike in MVAs [11], in which the frequency of occurrence of PTAI does not exceed 1%, in fatal aviation accidents the frequency of occurrence of PTAI is at the 38%-42% level [2,3,7]. Given the high on-site mortality, the literature lacks detailed information on survival rates in PTAI cases among the victims of aviation accidents. In MVAs, survival rates are between 10% and 20% [11].

The present case report is concerned with an unusual PTAI in a victim of paragliding accident. The rare nature of this case first reflects the way in which the PTAI was almost isolated, with only minor injuries of other organs, and as lack of fractures involving the spine, ribs or lower extremities. In this case, there were only 2 other injuries, that is, minimal abdominal aortic injury qualifying for medical treatment in line with current trends [6], and a partially unstable pelvic fracture. The second unusual aspect relates to exfoliative aortic laceration resembling more localised dissection, as opposed to the typical blunt aortic injury presented in the literature [5,6].

Available data on paragliding accidents support the contention that the major diagnostic focus in such cases should

be on injuries of the spine and lower extremities, given their higher frequency of occurrence. However, the case presented here demonstrates the value of complex MSCT with CM in all accidents involving paragliding, given the fact that hidden, life-threatening pathologies may be revealed in this way.

## REFERENCES

- [1] Schulman CI, Carvajal D, Lopez PP, Soffer D, Habib F, Augenstein J. Incidence and crash mechanisms of aortic injury during the past decade. *J Trauma*:664–7. doi:10.1097/TA.0b013e318031b58c.
- [2] Wiegmann DA, Taneja N. Analysis of injuries among pilots involved in fatal general aviation airplane accidents. *Accid Anal Prev* 2003;35(4):571–7.
- [3] Taneja N, Wiegmann DA. Analysis of injuries among pilots killed in fatal helicopter accidents. *Aviat Space Environ Med* 2003;74(4):337–41.
- [4] Teixeira PGR, Inaba K, Barmparas G, Galinos C, Toms C, Noguchi TT, et al. Blunt thoracic aortic injuries: an autopsy study. *J Trauma*:197–202. doi:10.1097/TA.0b013e3181df68b3.
- [5] Azizzadeh A, Keyhani K, Miller CC, Coogan SM, Safi HJ, Estrera AL. Blunt traumatic aortic injury: initial experience with endovascular repair. *J Vasc Surg*:1403–8. doi:10.1016/j.jvs.2009.02.234.
- [6] Starnes BW, Lundgren RS, Gunn M, Quade S, Hatsukami TS, Tran NT, et al. A new classification scheme for treating blunt aortic injury. *J Vasc Surg*:47–54. doi:10.1016/j.jvs.2011.07.073.
- [7] Baker SP, Brady JE, Shanahan DF, Li G. Aviation-related injury morbidity and mortality: data from U.S. Health Information Systems. *Aviat Space Environ Med*:1001–5. doi:10.3357/ASEM.2575.2009.
- [8] Lautenschlager S, Karli U, Matter P. Paragliding accidents—a prospective analysis in Swiss mountain regions. *Z Unfallchir Versicherungsmed* 1993(Suppl 1):S55–65.
- [9] Lang TH, Dengg C, Gabl M. Accidents with the “paraglider”. *Sportverletz Sportschaden*:115–9. doi:10.1055/s-2007-993676.
- [10] Fasching G, Schippinger G, Pretscher R. Paragliding accidents in remote areas. *Wilderness Environ Med* 1997;8(3):129–33.
- [11] Neschis DG, Scalea TM, Flinn WR, Griffith BP. Blunt aortic injury. *N Engl J Med*:1708–16. doi:10.1056/NEJMra0706159.