Medical lessons from a historical case: The disappearance of King Charles IV

Abstract
Traumatic injury to the brain and its vessels is a major part of medical practice across the world. Its management however has long historical origins, but those beginnings can still teach clinical practitioners about the basic care of an injured patient. We present a little known historical medical case that to this day provides an example of best practice management resulting in successful clinical outcome. Charles IV (1316–1378) was Holy Roman Emperor between 1347 and 1378. During his reign, he disappeared for four months and returned a disfigured hunchback. There has been considerable controversy as to the cause of both his physical change and disappearance. We propose the most likely cause is from an unfortunate consequence of his love of jousting. Despite the damage and management of the traumatic injury endured by Charles IV occurring over 600 years ago, there are still lessons of his clinical management relevant to this day.

Keywords
Charles IV, paralysis, jousting, cervical injury, trauma, management

Background
Crowned in 1347 at the age of 31 years, Charles IV was the first Bohemian King and Holy Roman Emperor. However, in the autumn of 1350, he vanished for four months for unknown reasons.

Case report
Anthropologist, Emanuel Vlcek, found evidence of inflammatory disease in a detailed analysis of the skeleton of Charles IV.1 On the left side of cervical vertebrae (C3, C4 and C5), there are the remains of a haematoma suggesting a serious accident. We propose this most likely accounted for his disappearance from public view for four months.

Love of jousting
The King was known to be an avid jouter and often participated in tournaments anonymously, managing to do so behind his helmet visor which covered his face.2 To conceal his identity from the opponent he would often be presented as an unknown knight. The Pope, Clement VI, knew of this and wrote to the King advising him to refrain from such practices which he thought were unbecoming of a sovereign (as were he felt the short, tight garments Charles IV would often wear).3 The King however did not heed the Pope’s wishes and continued jousting.

The injury
In October 1350, Charles IV travelled to Italy to compete in a jousting tournament where he was beaten by his opponent and suffered a blow to his head causing him to fall violently off his horse.4 It is likely his protective heavy steel helmet pierced into his cervical spine and played a part in breaking his jaw, symmetrically, fracturing his temporomandibular joints.1 His blood vessels suffered traumatic injury causing significant localised haematomas. Thus, rather than protecting the King’s head, the helmet probably contributed to

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worsening his injury causing his lower face and tongue to swell making it difficult for him to breathe and swallow. His skeleton remains show his clavicle has an abnormal curvature and his upper limb girdle bones have the typical position of someone following a severe whiplash injury. These injuries may well have played a part in the head tilt shortly after his accident.

**Management**

Being an active sportsman, the King was in optimal physical condition which undoubtedly aided his survival in the early critical stages of his lesions. However, the injury was severe with the King bleeding from his mouth and the swelling restricting his breathing. An Italian doctor at the scene attempted to arrest the bleeding and relax the King’s chin. The doctor secured the jaw fracture by tying a gold or silver wire between the teeth. He also had to deal with the torn mucus membrane, periosteum and skin lacerations. To ensure the bones would heal in the right place, he placed a bandage around the chin to tighten the whole jaw, all in the absence of anaesthesia.

As the King was now severely weakened, his throne was vulnerable to invasion. It would have been imperative to return the injured King to his country in the utmost secrecy. His return journey, long and arduous, was undoubtedly excruciating for him.

On arrival in Prague, Charles IV would have been rested on a wooden base and turned regularly to prevent bed sores. With his jaw tied, his diet would have been soft but with the necessary nutritional content. He would have been cleansed regularly by herbs such as thyme and clove to prevent infections.

**Discussion**

Charles IV survived because of fast and effective onsite intervention and clinical care. Such immediate onsite management of patients improves mortality and morbidity even today. Speed of intervention in trauma cases is known to improve outcome, particularly in head injury and haemorrhage where the first few hours are critical.

While his helmet would have protected his head, its design with sharp features and heavy steel makes it more likely to extend his neck at the time of impact worsening his whiplash injury and with the sharp point of the helmet cutting into his cervical spine leading to temporary limb paralysis. There is some evidence that a helmet increases the mass to the head and may increase the likelihood of a neck injury. Clearly, a steel jousting helmet would have been very heavy. Modern day helmets are produced from light-weight materials designed to absorb impact. Their shapes are smooth with no sharp points.

Bedbound patients are at high risk of skin sores. Medical institutions today provide specialised air beds that automatically alter skin pressure. Preventing skin breakdown would have necessitated regularly turning and as his skin remained largely intact this suggests excellent bed management by the Kings’ physician.

Patients with acute limb paralysis following trauma can recover if the spinal cord is intact. Inflammatory or haemorrhagic swelling of the cord will cause paralysis but is temporary and recoverable. However, to return to fitness a considerable amount of physical rehabilitation is required. Charles IV physically recovers almost entirely, eventually returning to jousting. Clearly, he would have had access to a daily, if rudimentary, physiotherapy regime.

Charles IV’s skeleton shows evidence of excellent healing. Unfortunately, he was left with noticeable physical defects (Figure 1). The King was no longer a tall, handsome man, rather he was hunched over, head tilted to his left and needed to rotate his entire torso just simply to turn his neck. To hide his scars, he grew a beard.

**Conclusion**

Despite significant injuries and medieval knowledge of medicine, rapid and correct intervention enabled Charles IV to survive and rule over his people for a further 28 years. This case teaches current day clinicians important lessons about modern management
of trauma cases. Helmets need to be light but strong. Trauma cases can lead to significant neurological and vascular injury and need to be managed immediately to improve clinical outcome, and intensive rehabilitation can be highly effective.

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