Unintentional strangulation by a cervical collar after attempted suicide by hanging

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We report the case of a young man who attempted suicide by hanging and whose neurological status deteriorated until the cervical collar, that had been correctly placed by the prehospital team, was removed. We discuss the physiopathological mechanisms leading to death in hanging that is, a blockage of the blood stream to the brain leading to vasogenic and cytotoxic cerebral edema rather than asphyxia or spinal fracture. Our case supports the early removal of neck stabilization devices that can dangerously harm the patient after an attempted suicide by hanging, by increasing intracerebral pressure.

A 32-year-old man was found by his wife only 2 min after he had attempted suicide by hanging in his garage. When the prehospital team arrived, he was unconscious with agonal respiration. He was quickly intubated, lightly sedated and mechanical ventilation was instituted. A lightweight foam collar was placed around his neck and he was immediately transferred to the intensive care unit. On admission the Glasgow Coma Score was 9, arterial blood pressure was 145/80, heart rate was 122 bpm, respiratory rate was 22 breaths per min and arterial oxygen saturation reached 100% on an inspiratory oxygen fraction of 50%. The patient was placed in the semi-recumbent position and sedation—a regimen of two short-acting drugs combining propofol and remifentanil—was withdrawn. Two hours later the patient was still unconscious and his Glasgow Coma Score had dropped to 5. Computed tomography scan of the head and neck showed diffuse brain oedema without cervical spine injury. The cervical collar was considered useless and was removed. Significant neck swelling was observed on both sides of the ligature mark, just below the straps of the cervical collar (figure 1). Thereafter, the patient unexpectedly recovered in a few hours, although no new treatment had been introduced. Eventually, he was discharged on hospital day 8 without serious neurological sequelae.

Hanging is one of the most commonly used methods for suicide worldwide, with a fatality rate of over 70%. Although the majority (80–90%) of the patients who reach hospital alive survive,1 misconceptions about the pathophysiology of hanging may impair their management. Contrary to popular belief, hanging death is not commonly caused by asphyxia or spinal fracture but rather by blockage of the blood stream to the brain. Venous drainage from the head may be obstructed just by turning the head to one side or by applying a mass above 1.3 kg on the neck. A mass of 5 kg may be sufficient to obstruct carotid arteries, but the force to block the stream of the vertebral arteries has been calculated as corresponding to a compression by a mass of 7.5 kg performed at the level of the mandible angle.2 By contrast, a mass of more than 20 kg is required to stop tracheal airflow. This explains why death by hanging can occur unexpectedly fast (within 2 min), and that 50% of fatal cases are not fully suspended.1,2 For instance, prisoners have been reported to successfully commit suicide by hanging under their beds with just the weight of the head suspended by sheets.

The lethal ‘hangman’s fracture’ (bilateral fractures of the pars interarticularis of the C2 vertebra) has classically been described in judicial hanging. In this setting, the body is fully suspended and the length of the drop, and so the applied force, is sufficient to produce a subluxation of C2 and C3 vertebrae. However, spinal injuries are actually seldom encountered in patients surviving an attempted suicide by hanging.3 In the latter, the victim is usually found to have both feet touching the ground. Nevertheless, partial suspension hanging—when the victim is found kneeling or standing—is as effective as a method for committing suicide as full suspension hanging.

Although the neck should be stabilised at the scene, neck stabilisation devices may significantly increase intracranial pressure, which may have a potentially devastating effect on cerebral perfusion.3,4 Early brain oedema resulting from anoxic vasogenic and cytotoxic mechanisms is one of the hallmark neurological findings in post-hanging encephalopathy. In this setting, venous congestion is even worse when cervical veins are obstructed while arterial circulation is maintained and further aggravates vasogenic brain oedema.4 Cervical collars that may exert an extrinsic compression on the vasculature of the neck should be avoided or removed early after attempted suicide by hanging.

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REFERENCES
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