

# UNUSUAL MECHANISM OF INJURY OF A ‘HANGMAN’S FRACTURE’

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## Introduction

Accidents are the fourth leading cause of deaths in the United Kingdom with a higher proportion occurring in the second and third decades of life (1). Cervical spine trauma follows a bimodal distribution, with younger generations involved mainly in road traffic accidents and sports injuries whereas the elderly as a result of falls. Cervical spine fractures accounts for only 20-30% of all spine fractures with 10-20% resulting in spinal cord injury. Rev S. Houghton first described the traumatic spondylolithesis of the axis seen in judicial hangings in 1866. He calculated the fall in feet required to produce the fracture taking into account the patient’s weight in pounds (2). Wood-Jones in 1913 then described the typical fracture pattern that resulted from judicial hangings where the knot was secured submentally producing a hyperextension distraction injury to the cervical spine, causing a bilateral fracture through the pars interarticularis of the C2 pedicle (2). It was not until 1965 that Schneider first termed this fracture a ‘Hangman’s fracture’ (3). Minimally displaced fractures are largely benign fractures that heal with conservative treatment and without significant long-term sequelae (4), with a quoted union rate of 98% (5). This case report details an unusual mechanism of injury with potentially life threatening consequences that occurred whilst go-karting.

## Case Report

An 18 year old female was involved in a go-karting accident in which the scarf she was wearing became entangled within engine mechanism of the go-kart whilst she was traveling at approximately 20mph. The scarf tightened suddenly causing a significant soft tissue injury to the neck as well as a sudden backwards wrenching movement of the neck against the seat, causing a hyperextension and distraction force to the cervical spine. She was able to stop the go-kart and take her helmet off and experienced no loss of consciousness with only minor pins and needles in both hands. She attended the Accident and Emergency Department by car where a hard collar and blocks were applied. On examination she was tender over the upper midline cervical region with no obvious step deformity. There were significant fabric burns to the anterior aspect of the neck with no airway compromise. Neurological examination of the limbs was normal with no deficit identifiable. X-rays of the cervical spine revealed a fracture through the pars interarticularis of C2 with less than 2mm displacement and no significant angulation (Figure 1). She was managed in a SOMI brace for 6

weeks. Subsequently she progressed to union and at 8 month follow-up had a full range of flexion and extension that is pain free (Figure 2). She has now returned to full sporting activities.



Figure 1 (Initial)



Figure 2 (8 months)

Classification	Mechanism of injury	Description	Management
Grade 1	Extension injury	Displacement < 2mm.	Conservative
Grade 2	Extension injury	Displacement >2mm and angulation.	Surgery
Grade 3	Flexion injury	C2-3 facet joint subluxation/dislocation.	Surgery

Table 1: Effendi Classification of Hangman’s Fracture

## Discussion

The mechanism of a ‘Hangman’s fracture’ is classically described as hyperextension with distraction of the cervical spine (3). However, nowadays it typically results from a fall or road accident in which there is a direct blow to the chin, producing a marked hyperextension of the neck with axial loading of the cervical spine. This creates two vectors of force which results in fractures through both pedicles of C2 with subsequent anterior dislocation of the vertebral body. Neurological injury to the spinal cord or nerve roots is relatively rare as the fractured pedicles and anterior movement of the C2 vertebral body acts to widen the spinal canal, as was the case in this patient. The most widely adopted classification of such fractures is by Effendi et al (6) (Table 1), and is based on the

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degree of displacement. Type 1 is minimally displaced and minimally angulated, type 2 significantly displaced and angulated and type 3 is as type 2 but with locked facets.

Type 1 can be managed conservatively with a 98% union rate described (5), with the concern that the fracture may displace becoming type 2 and 3 and require surgery.

This case highlights an increasing prevalence of well-described fracture patterns occurring through more unusual mechanisms and frequently as a result of the varied leisure pursuits undertaken by the general public. Health care professionals should be aware and vigilant of unusual presentations. It also highlights potential safety issues surrounding such recreational pursuits in view of an ever-increasing litigious society.

## References

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