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# Cervical spinous process fractures: The Spectrum Of Injuries

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## Citation

G Dickason, N Motsitsi. *Cervical spinous process fractures: The Spectrum Of Injuries*. The Internet Journal of Spine Surgery. 2007 Volume 4 Number 2.

## Abstract

**Objective:** To define the spectrum of injuries associated with cervical spinous process fractures as well as the management strategies.

**Materials and Methods:** retrospective study over a three- year period. A total of 17 patients were analysed. The male to female ratio: 8:1. The age range was 17 - 57 years. The mechanisms of injury were ; motor-vehicle accidents, fall from a height, gunshot injuries, and a falling wall.

**Results:** Most patients who had injuries were males. The lower cervical spine is the area most commonly involved. There was one case of isolated cervical spinous process involvement and one case of upper and lower cervical spine involvement. Sixteen patients had additional vertebral column involvement. About half of the patients had other body injuries. Five of the patients ( 29%) who had associated cervical spine injuries needed cervical fusion.

**Conclusion:** Spinous process fractures may be associated with other serious injuries. Thorough diagnostic work-up is mandatory in patients who sustained high-risk injuries. Spinous process fractures of the cervical spine may be one aspect of a serious injury.

## INTRODUCTION

Fractures of the cervical spinous processes are relatively rare injuries. Isolated cervical spinous processes fractures are even rarer ; most reported cases are case reports. Sixteen percent of isolated spinous processes fractures of the cervical spine involve more than one level [3]. Isolated cervical spinous process fractures are commonly referred to as clay-shoveler's fractures: this is a misnomer.

X. Jordana et al. [11] defined a clay-shoveler's fracture as 'an oblique , vertical break that affects the spinous processes from C6 to T3, but is most commonly found to involve C7, or both C7 and T1, and occasionally only T1'. It is a mechanical or repetitive stress fracture [4]. Occasionally, the fracture can be acute. They are generally considered stable injuries.

The purpose of this study is to define and analyze the spectrum of injuries associated with fractures of the cervical spinous processes and suggest management strategies.

## MATERIALS AND METHODS

**Institutional setting:** The study was done in a secondary tertiary institution.

**Type of study:** retrospective study, from March 2005 to March 2008.

**Study population:** All adult patients referred to the Spinal Unit over a three – year period. The information was obtained from clinical and Radiological records. No approval from the ethics committee is necessary for retrospective studies.

**Figure 1**

Table 1: Demographic data, associated injuries, cervical spinous process fractures and management

Patient no.	Age	Sex	Mechanism of injury	Spinous process fractures	Associated spinal fractures	Other injuries	Flexion/Extension views	Further management
1	24	M	wall fell on patient	C5,C6	L2 compression fracture occipital condyle fracture	open tibia and fibula fracture mandible fracture pelvis fracture	not recorded	conservative (i-spine) lumbar spine fusion
2	57	F	Motor Vehicle Accident (MVA)	C7	Teardrop fracture C3, C5	chest injury humerus fracture patella fracture	stable	conservative
3	32	M	MVA	C6,C7,T1,T2	L1 chance fracture C3 body fracture	chest injury head injury	not recorded	Transfer to home county
4	28	M	fell from height	C4	C4,C5 uniface dislocation	none	unstable	C4,C5 fusion
5	24	F	MVA	C6	C2 lamina fracture bilateral	none	stable	conservative
6	36	M	MVA	C6	C7 body fracture	none	unstable	C6-T1 fusion
7	17	M	MVA	C6,C7	none	none	stable	conservative
8	20	M	MVA	C3,C4	C4 Teardrop fracture	none	unstable C4,C5 anterior	C4,C5 fusion
9	22	M	MVA	C6,C7,T2,T3	compression fractures of T2,T3,T4	scalp injury	stable	conservative
10	30	M	Gunshot wound neck	C6	C6 lateral mass fracture	Left vertebral artery injury	not recorded	conservative

**Figure 2**

Patient no.	Age	Sex	Mechanism of injury	Spinous process fractures	Associated spinal fractures	Other injuries	Flexion/Extension views	Further management
11	30	M	MVA	C7	C6 teardrop fracture C6 lamina fracture C7 lamina fracture C6,C7 facet fractures T10,T11 compression fractures	none	stable	conservative
12	32	M	MVA	C4,C5	C2 body fracture C3 teardrop fracture C6 transverse process fracture	none	stable	conservative
13	28	M	MVA	C4,C5	C5,C6 instability	base of skull fracture	unstable	C5,C6 fusion
14	28	M	MVA	C6,C7,T1,T2	L1 fracture C3 body fracture	rib fractures	stable	conservative
15	26	M	MVA	C6	C6,C7 bifacet dislocation	none	not recorded	posterior wiring
16	43	M	MVA	C6,C7	T1 compression fracture T5 compression fracture C2 lamina fracture	manubrio-sternum dislocation	stable	conservative
17	36	M	MVA	C7	C2 odontoid type 2 fracture C1 lateral mass fracture	scalp laceration base of skull fracture pneumothorax	stable	conservative

Population demography: total number of the study population= 17.  
Average age ( the range) = 30 years ( 17 - 57 years).  
Male to female = 8:1

**RESULTS**

Fractures of the cervical spinous processes affect patients in their third decade. Males outnumber females 8 to 1. The mechanisms of injuries were motor vehicle accidents (n =

14), fall from a height ( n = 1), gunshot wounds (n = 1), and others( 1 patient had a wall falling on him). The most commonly involved area of the cervical spine is the lower cervical spine ; 16 ( 94%) patients. Only one case involved the upper and lower cervical spine. There was one case of an isolated fracture of the cervical spine.

Sixteen patients ( 94%) had additional injuries to the vertebral column. Three patients had involvement of the upper thoracic spinous processes. The number of spinous processes involved varied from one to four per patient. Eight ( 47%) patients had injuries involving other areas of the body. The spectrum of injuries and definite management of the cervical spine are shown in the accompanying table.

**DISCUSSION**

Fractures of the cervical spinous processes signify severe injury. The majority of additional injuries involve the vertebral column: cervical spine (n = 10), base of skull ( n = 3), cervico-thoracic ( n = 2), cervico-lumbar( n = 2), lumbar ( n = 1), and thoracic ( n = 1). Approximately half of the patients had injuries involving the areas of the body other than the vertebral column. Isolated spinous process fractures of the cervical spine are relatively rare : 1/17 ( 5.9%) in our study. The number of vertebral spinous process involvement gives no clue as to the stability of the cervical spine.

There are currently four recognized mechanisms of injury that can cause fractures of the cervical spine processes [ 5,3]: hyperextension , hyperflexion, direct blow, and repetitive stress. Fractures of the spinous processes due to a direct blow to the back of the neck, may have associated laminar fractures [9]. These types of injuries may be unstable and present with delayed neurological deficits.

Spinous process fractures of the cervical spine are considered to be in the category of severe fracture-dislocations [ 9]. They may be one aspect of a significant injury. Thorough investigations is mandatory especially if the mechanism of injury is considered high-risk. However, some spinous process fractures are caused by low-energy injuries and almost invariably stable injuries [ 1,2,10]. These stable fractures may be symptomatic especially if there is non-union [ 6, 7].

The limitations of our study are; it is a retrospective study, and the number of cases are few.

**CONCLUSION**

Fractures of the cervical spinous processes may represent

serious injuries. The number of involved spinous process fractures gives no indication about the stability of the cervical spine. Isolated cervical spinous processes are rare injuries.

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