Case Report

Multiple contiguous spinous process fractures, a case report and literature review

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ABSTRACT

Contiguous spinous process fractures are an extremely rare event with only a few cases described in the literature. They are usually stable lesions treated with analgesic medication, immobilization, physical activity restriction for 4 to 6 weeks and close surveillance. These fractures appear to have a significant risk of nonunion, despite the good reported results. We report a case of a 61 years-old male patient who suffered eight contiguous spinous process fractures following a tractor accident.

Introduction

Clay-shovelers’ fracture, an isolated spinous process fracture of the cervical or thoracic vertebrae, is an uncommon condition that was first reported in the early 20th century [1–3]. However, the occurrence of several contiguous spinous process fractures is even rarer, with only a few reported cases in the literature (Table 1). It typically occurs in the lower cervical or upper thoracic spine. In these cases, deceleration and shear forces caused by trapezius, rhomboids, and the ligamentum nuchae contraction probably exert repetitive traction on their attachment sites to the spinous processes, resulting in several fractures. There are also reports of spinous process fractures in osteoporotic bones and in renal transplanted patients on steroids [4].

We present a case of multiple spinous process fractures in the thoracic spine, with an extension from T5 to T12. To the best of our knowledge, there are only ten cases of contiguous spinous process fractures described in the literature (Table 1) and this study presents itself as the largest bibliographic review on the subject. In this way, it is possible to draw objective conclusions about the clinical presentation, treatment and natural evolution of these fractures.

Case report

A 61 years-old male patient was admitted at the emergency department after falling from a tractor with direct back trauma. At presentation the patient had moderate pain complaints, with mild edema in the dorsal region and pain on spinous processes palpation,
without irradiation. On neurological examination, there were no perceptible deficits, with preserved mobility and strength of the upper and lower limbs and no bladder or bowel dysfunction.

Computed tomography (CT) revealed a complex fracture pattern, with minor compression fractures of T7, T8, T12 and L2 vertebral bodies and 8 contiguous spinous process fractures in the thoracic spine, with an extension from T5 to T12 (Fig. 1).

The patient was kept under observation in the emergency department for 24 h and was discharged home with a prescription for a nonsteroidal anti-inflammatory drug (NSAID) analgesic, and a Jewett brace for 6 weeks. He gradually recovered with nonoperative management and, after 24 months of follow up, the patient did not have any functional limitation in his daily life activities and presented pain improvement from 7/10 to 1/10 according to the Visual Analogue Score (VAS). Effectively, the majority of the spinous process fractures have evolved to nonunion, which had no influence on the clinical improvement of the patient.

Discussion

Isolated spinous process fractures are most commonly described at T1 level, followed by C7, T2, T3, and C6, with 16 % of these injuries involving more than one spinous process [2,3]. The mechanisms of injury can be due to direct trauma to the posterior aspect of the spine but also because of repetitive muscle and ligament stresses due to shoveling by manual laborers. Although shovel load was previously common, these injuries are now rare due to agricultural machineries. Nowadays, falls and road traffic accidents are the most likely causes of these fractures. Recently they have also been reported in relation to sports practice (e.g. volleyball and golf) (Table 1) [5]. These lesions seem to be more common in male patients, namely between the ages of 38 and 61 years-old (Table 1). Even though clay-shovelers’ fractures are stable, dynamic radiographies (flexion and extension views) can be performed to search for associated instability [6,7], especially in situations associated with cervical fractures. Computed tomography (CT) of the cervical and thoracic spine may be useful to better characterize the spine fracture as well as possible surrounding associated injuries [5]. Magnetic resonance imaging (MRI) can provide additional important findings, including the existence of posterior paraspinal muscular injury (edema), disruption of the supraspinous and/or interspinous ligaments, bone marrow edema, extensive prevertebral edema and fluid (hemorrhage) [7].

These injuries are usually stable although associated with significant pain complaints. It is imperative to combine analgesic medication, immobilization and close surveillance of these patients’ pain evolution. NSAID exposure is known as a potential risk factor for developing a delayed union or nonunion, so has increasing age. In this case report, the patient only consumed NSAIDs for the first 3 days after the trauma, and subsequently required only paracetamol medication for pain relief.

In conclusion, contiguous spinous process fractures are very rare lesions resulting from direct trauma or repetitive muscle and ligament traction on the spinous processes. This type of lesion is treated conservatively without the need for surgical intervention [5]. Immobilization and physical activity restriction for 4 to 6 weeks generally leads to good outcomes [5]. Frequent non-consolidation of spinous processes with subsequent evolution to nonunion has been reported, despite the absence of significant correlation with clinical outcomes, as in this case report [8].

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Table 1

| Author                      | Year of publication | Age/sex | Level of involvement (number) | Etiology               | Treatment                                      |
|-----------------------------|---------------------|---------|-------------------------------|------------------------|------------------------------------------------|
| Kose KC [8],                | 2006                | 58/M    | T5-T10 (6)                    | Automobile accident    | Hyperextension brace for 3 months              |
| Solaroğlu et al. [3]        | 2007                | 32/M    | C6, C7 (2)                    | Automobile accident    | Cervical collar for 4 weeks                    |
| Unay et al. [4]             | 2008                | 39/M    | C7, T1 (2)                    | Osteoporosis           | Cervical collar for 6 weeks                    |
| Kang and Lee [5]            | 2009                | 40/M    | T1, T2 (2)                    | Golf player            | Immobilization for 8 weeks                    |
| Akhaddar et al. [9]         | 2011                | 40/not known | T2-T8 (7)                  | Automobile accident    | Immobilization for 6 weeks                    |
| Umredkar et al. [10]        | 2011                | –       | G6, T4 (6)                    | Automobile accident    | Cervical collar for 4 weeks                    |
| Kim et al. [6]              | 2012                | 45/F    | C6, C7 (2)                    | Golf player            | Cervical collar for 6 weeks                    |
| Akhaddar and Mandour [11]   | 2013                | 29/F    | C6-T9 (11)                   | Automobile accident    | Immobilization for 6 weeks                    |
| Han and Sohn [12]           | 2014                | 34/M    | C4-T8 (12)                   | Motorcycle accident    | Cervical collar and thoraco-lumbar brace for 4 weeks |
| Upadhyaya et al. [7]        | 2016                | 45/M    | C7-T6 (7)                    | Automobile accident    | Cervical collar and thoracic brace for 8 weeks |
| Present case report         | 2020                | 61/M    | T5-T12 (8)                   | Tractor fall           | Thoraco-lumbar brace for 6 weeks              |
Approval code issued by the institutional review board (IRB)

This study is only a retrospective description of a clinical case and a narrative review, it does not present any type of change in conduct or follow-up. Therefore, approval by the IRB or ethics committee is not required.

Statement of informed consent

The patient was informed that data concerning the case would be submitted for publication and agreed with the creation and publication of this article.

Declaration of competing interest

The authors declare that there are no conflicts of interest.
References

[1] H.G. Hakkal, Clay shoveler’s fracture, Am. Fam. Physician 8 (1) (1973) 104–106 [published Online First: 1973/07/01].

[2] J.J. Cancelmo Jr., Clay shoveler’s fracture. A helpful diagnostic sign, Am. J. Roentgenol. Radium Ther. Nucl. Med. 115 (3) (1972) 540–543, https://doi.org/10.2214/ajr.115.3.540 [published Online First: 1972/07/01].

[3] I. Solaroglu, E. Kaptanoglu, O. Okutan, et al., Multiple isolated spinous process fracture (clay-shoveler’s fracture) of cervical spine: a case report, Ulus. Travma Acil Cerrahi Derg. 13 (2) (2007) 162–164 [published Online First: 2007/08/09].

[4] K. Unay, O. Karatoprak, N. Sener, et al., A clay-shoveler’s fracture with renal transplantation and osteoporosis: a case report, J. Med. Case Rep. 2 (2008) 187, https://doi.org/10.1186/1752-1947-2-187 [published Online First: 2008/06/04].

[5] D.H. Kang, S.H. Lee, Multiple spinous process fractures of the thoracic vertebrae (clay-shoveler’s fracture) in a beginning Golfer: a case report (Phila Pa 1976), Spine 34 (15) (2009) E534–E537, https://doi.org/10.1097/BRS.0b013e3181e983b6 [published Online First: 2009/07/01].

[6] S.Y. Kim, S.K. Chung, D.Y. Kim, Multiple cervical spinous process fractures in a novice golf player, J. Korean Neurosurg. Soc. 52 (6) (2012) 570–573, https://doi.org/10.3340/jkns.2012.52.6.570 [published Online First: 2013/01/25].

[7] G.K. Upadhyaya, A. Shukla, V.K. Jain, et al., Contiguous multiple cervicothoracic spinous process fractures in an adult: a case report, J. Clin. Orthop. Trauma 7 (1) (2016) 45–49, https://doi.org/10.1016/j.jcot.2015.04.010 [published Online First: 2016/02/26].

[8] K.C. Rose, Case report: the impact of pseudoarthrosis on clinical outcome in isolated spinous process fractures of six adjacent level thoracic vertebrae, MedGenMed 8 (1) (2006) 67 [published Online First: 2006/08/18].

[9] A. Akhaddar, A. El-asri, M. Bouscetta, Multiple isolated thoracic spinous process fractures (clay-shoveler’s fracture), Spine J. 11 (5) (2011) 458–459, https://doi.org/10.1016/j.spinee.2011.03.004 [published Online First: 2011/04/19].

[10] A. Umredkar, S. Sura, S. Mohindra, Multiple contiguous isolated spinous process fracture (clay-shoveler’s fracture) of the cervicothoracic spine, Neurol. India 59 (5) (2011) 788–789, https://doi.org/10.4103/0028-3886.86579 [published Online First: 2011/10/25].

[11] A. Akhaddar, C. Mandour, Multiple contiguous cervicothoracic clay-shoveler’s fractures (from C6 to T9 spinal vertebrae), Pan Afr. Med. J. 16 (2013) 128, https://doi.org/10.11604/pamj.2013.16.128.3531 [published Online First: 2013/01/01].

[12] S.R. Han, M.J. Sohn, Twelve contiguous spinous process fracture of cervico-thoracic spine, Korean J. Spine 11 (3) (2014) 212–213, https://doi.org/10.14245/kjs.2014.11.3.212 [published Online First: 2014/10/28].