

Case Report

A great misfortune: second traumatic spinal cord injury

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Objective: A second and a separate traumatic spinal cord injury, which results in neurological deterioration, is very rare. In this report we describe a patient who became tetraplegic after sustaining a second spinal trauma.

Case report: A 27-year-old female had a C₇–T₁ dislocation after a motor vehicle accident. She was neurologically intact and she had undergone a posterior fusion between C₆–T₂. She made a complete recovery. Eight months after her initial trauma, she sustained a second motor vehicle accident causing a C₅ burst fracture.

Conclusion: Second traumatic spinal cord injury is a rare entity. Motor vehicle accidents are the most common cause of this type of injury. Whatever the treatment strategy is, the best treatment modality for traumatic spinal cord injury is prevention.

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Introduction

Traumatic injuries are a major public health problem, imposing a greater burden on modern society than other diseases, but also are the most preventable ones.¹ Head and spinal cord injuries, in particular, are the leading causes of morbidity and mortality in developed and developing countries. Especially in developing countries lack of prevention programs, disorganised and inappropriate therapy facilities and protocols carry an enormous personal and economic cost. In Turkey, traffic accidents are the primary cause of spinal cord injuries, accounting for about 35.4% of cases. Falls are the second leading cause, followed by diving injuries.^{2–4} Advances in acute care, intensive care and long term management have improved survival and life expectancy in these patients, even in developing countries. Despite these efforts traumatic spinal cord injury remains as a major social event, which can be prevented through organised education programs like THINK FIRST.

Individuals who have previously had a spinal fusion and sustain a second traumatic spinal cord injury are very rare.^{5,6} This report describes a C₅ tetraplegic, who was initially neurologically intact after sustaining a spinal injury 8 months previously and had undergone posterior fusion; after suffering a second traumatic

spinal cord injury, she had a C₅ complete lesion. It will also emphasise the importance of patient selection in surgical fusion and its unavoidable complications in a second traumatic spinal cord injury.

Case report

A 27-year-old female was involved in a road accident causing a C₇–T₁ dislocation and was admitted to a rural hospital. She was neurologically intact at initial neurological examination. She underwent posterior fusion between C₆–T₂. The postoperative period was uneventful; she made a complete recovery and continued her activities of daily life and began to work.

Eight months after her initial injury, the patient sustained a second motor vehicle accident causing a spinal cord injury. She was admitted to a department of neurosurgery 12 h after trauma with a C₅ complete lesion. Radiographic evaluation revealed a C₅ fracture–dislocation. The patient was placed in skull callipers with skeletal traction up to 10 kg. After the achievement of a reduction, she underwent a C₄–C₇ instrumented anterior fusion. Following stabilisation of the spine she was subsequently transferred to the NSIC at Stoke Mandeville Hospital, UK rehabilitation facility for comprehensive interdisciplinary rehabilitation.

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Eleven years after the spinal cord injury she functionally requires assistance for all activities of daily living, suprapubic catheterisation and transfers, except for some automatic wheelchair skills, oral-facial hygiene and eating are made possible with the help of a hand orthosis.

Discussion

A second and separate traumatic spinal cord injury at a more cephalad level, which results in neurological deterioration is atypical and unique. Sliva *et al*⁶ reported a case of a second traumatic spinal cord injury in a previously rehabilitated and functionally independent paraplegic. This patient was also treated with a posterior spinal fusion with Luque rod placement between C₇–T₃. After the second trauma he had a vertebral subluxation of C₅ on C₆ with locked facet on the left and underwent a second posterior spinal fusion of C₅–C₆.

In our patient, on analyzing the first operation, this posterior spinal fusion between C₆–T₂ might be regarded as an unnecessary operation in a patient without any neurological involvement. If we criticise our operation, a four level screw fixation for a one level fracture dislocation can be regarded as more than needed. This operation was performed 8 years ago and in the meantime our strategy has changed. There is wide, inappropriate and overuse of metallic implants in spinal surgery, even in one level simple discectomy.^{7–11} This strategy has resulted in many unnecessary fused segments in the cervical spine. There is strong evidence that fused segments in the cervical spine have a significant effect on the remaining free-motion segments. This evidence has been presented in both biomechanical and clinical studies.^{12–14}

McMillan and Stauffer¹⁵ have reported an association between the presence of fused cervical segments and the predisposition to acute traumatic instability at adjacent levels. One of the findings of this study is that the area of instability was within two levels of the fusion. With no movement at the previously fused segments, a second injury could possibly produce exaggerated movement at the cephalad mobile cervical segments, causing a disruption of the vertebral column and a traumatic myelopathy.⁶ These findings are also consistent with this case.

Surgical enthusiasts deliberate about certain advantages of iatrogenic fusion. The most popular assertions are that surgical fusions reduce pain, improve stability, improve overall prognosis, facilitate nursing care and reduce hospitalisation time.^{16–20} There is no definitive study confirming these claims. As Panjabi mentioned: 'The arguments for cervical spine fusion following trauma may be summarised as follows: There is virtually no convincing evidence in the literature to support this procedure. However there is no significant evidence to the contrary.'

There is no definitive study comparing both surgical and spontaneous fusion regarding kinematics

and biomechanical aspects of free-motion segments in a second cervical trauma.

An important aspect in our patient is that the decision for a posterior spinal fusion through which the second traumatic spinal cord injury became a devastating one, may not have been necessary. Therefore treating surgeons must also 'THINK FIRST' when they are using metallic implants for fusions.²¹ The THINK FIRST²² organisation cannot be limited to public education only; surgeons must also be involved in this program and must be updated to make an accurate decision in using metallic implants. This is especially important in developing countries, where metallic implants are 'popular' and are overused in many peripheral hospitals.

References

- 1 Hu R, Mustard CA, Burns C. Epidemiology of incident spinal fracture in a complete population. *Spine* 1996; **21**: 492–549.
- 2 Karacan I *et al*. Traumatic spinal cord injuries in Turkey: A nation-wide epidemiological study. *Spinal Cord* 2000; **38**: 697–701.
- 3 Dincer F *et al*. Traumatic spinal cord injuries in Turkey. *Paraplegia* 1995; **33**: 531–533.
- 4 Karamehmetoglu SS *et al*. Traumatic spinal cord injuries in Istanbul, Turkey: An epidemiological study. *Paraplegia* 1995; **33**: 469–471.
- 5 Sakae T, Bourke J, Bedbrook GM, Kakulas BA. Fifty years survival after cervical fracture and fusion. *Paraplegia* 1983; **21**: 249–257.
- 6 Sliva JA, Lim AC, Roth EJA. Second traumatic spinal cord injury: associated risk factors. *Paraplegia* 1992; **30**: 288–291.
- 7 Russeger L, Monstadt H, Wenz F. First experiences with a distractible titanium implant in ventral cervical surgery. *Eur Spine J* 1997; **6**: 70–73.
- 8 Samandouras G, Shafafy M, John Hamlyn P. A new anterior cervical instrumentation system combining an intradiscal cage with an integrated plate: an early technical report. *Spine* 2001; **26**: 1188–1192.
- 9 Profeta G *et al*. Preliminary experience with anterior cervical microdiscectomy and interbody titanium cage fusion (Novus CT-Ti) in patients with cervical disease. *Surg Neurol* 2000; **53**: 417–426.
- 10 Heidecke V, Rainov NG, Burkert W. Anterior cervical fusion with the Orion locking plate system. *Spine* 1998; **23**: 1796–1802.
- 11 Kostuik JP, Connolly PJ, Esses SI, Suh P. Anterior cervical plate fixation with the titanium hollow screw plate system. *Spine* 1993; **18**: 1273–1278.
- 12 Goel VK, Clark CR, McGowan D, Goyal S. An in-vitro study of the kinematics of the normal injured and stabilised cervical spine. *J Biomech* 1984; **17**: 363–376.
- 13 Sances A *et al*. The biomechanics of spinal injuries. *CRC Crit Rev Biomed Bioeng* 1984; **11**: 1–65.
- 14 Dohler JR, Kahn MRH, Hughes SPE. Instability of the cervical spine after anterior interbody fusion. *Arch Orthop Trauma* 1984; **104**: 247–250.
- 15 McMillan M, Stauffer ES. Traumatic instability in the previously fused cervical spine. *J Spinal Disorders* 1991; **4**: 449–454.

- 16 Bravo P *et al.* Outcome after vertebral fractures with neurological lesion treated either surgically or conservatively in Spain. *Paraplegia* 1993; **31**: 358–366.
- 17 Odendaal T. Injuries of the cervical spinal cord. The Ga-Rankuwa Hospital experience. *S Afr Med J* 1991; **80**: 75–79.
- 18 Hamburger C, Festenberg FV, Uhl E. Ventral discectomy with pmma interbody fusion for cervical disc disease: long-term results in 249 patients. *Spine* 2001; **26**: 249–255.
- 19 Alvarez JA, Hardy Jr RW. Anterior cervical discectomy for one- and two-level cervical disc disease: the controversy surrounding the question of whether to fuse, plate or both. *Crit Rev Neurosurg* 1999; **28**: 234–251.
- 20 Blauth M *et al.* Ventral interbody spondylodesis in injuries of the cervical spine. Indications surgical technique and results. *Zentralbl Chir* 1998; **123**: 919–929.
- 21 Robertson JT. The rape of spine. The rape of the spine. *Surg Neurol* 1993; **39**: 5–12.
- 22 Eyster EF, Kelker DB, Porter RW. Think First: The National Head and Spinal Cord Injury Prevention Program. In Wilkins RH, Rengechary SS (eds). *Neurosurgery*. 2nd edn. McGraw Hill: New York, 1996, 2603–2606.