Trauma Case Reports xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Trauma Case Reports

journal homepage: www.elsevier.com/locate/tcr

Case Report

Transpedicular direct osteosynthesis of hangman's fracture from a mini-open exposure as a less invasive procedure: A technical note

Viktor Zsolt Kovari*, Attila Josvai, Andras Csokay

Hungarian Defense Forces Medical Centre, Department of Neurosurgery, 44. Robert Karoly krt., 1134 Budapest, Hungary

ARTICLE INFO

Keywords:
Hangman's fracture
Transpedicular osteosynthesis
Mini open
Less invasive
Minimally invasive

ABSTRACT

This surgical technical case report presents initial clinical experience and preliminary results with a less invasive surgical solution for selected hangman's fracture. A well-known stabilization technique (i.e. direct transpedicular osteosynthesis) was applied through a minimally invasive small incision transmuscular posterior approach guided by a standard C-arm fluoroscopy. This mini-open approach to C2 vertebra allows similar dissection, visualization of the bony landmarks, visual control of the transpedicular screw path drilling, tapping and screw insertion to the standard posterior cervical spine approach. At the same time it has the benefits of less invasive procedures.

Introduction

In this technical case report C2 direct transpedicular osteosynthesis from mini-open access without navigation is presented.

Traumatic spondylolisthesis of the axis, or so called hangman's fracture, is a common type of cervical fracture [1,4,12].

The fracture classification is based on Effendi's and Levine-Edwards' system.

Surgical treatment options are C2–C3 anterior cervical discectomy and fusion (ACDF), posterior C2–C3 (or C1–C3 depending on the degree of instability) fixation and C2 direct transpedicular osteosynthesis, or the combination of anterior and posterior fixations [2,3,7,8,10,11]. Only C2 direct transpedicular osteosynthesis provides motion preservation, although the application of this technique is questionable in highly unstable fractures [5,6,12].

There are several articles describing similar percutaneous intraoperative O-arm or Iso-C3D fluoroscopy assisted, computed navigation based, direct transpedicular screw fixation methods of Type II, Type IIa and even Type I C2 traumatic spondylolisthesis [9,13].

There is only one article which presents a percutaneous C2 hangman's fracture direct osteosynthesis guided by standard intraoperative C-arm fluoroscopy without spinal navigation [12].

Case

35-year-old woman, who was injured in a motor vehicle accident, was neurologically intact on site. Later on both hands gripping strength decreased. Computed Tomography (CT) scan revealed a bilateral pediculo-isthmic component fracture of the axis with 7 mm anterior dislocation, 24° tilting and lower posterior corner fracture of the body of the C2 vertebra (Fig. 1). Magnetic Resonance Imaging (MRI) showed no spinal cord compression, no myelopathy, no cord edema, no sign of disc rupture between C2 and C3 vertebrae (Fig. 2). The C2 vertebral fracture was classified, according to Levine-Edward's classification, as Type IIa. Due to the

* Corresponding author.
E-mail address: viktor.zs.kovari@gmail.com (V.Z. Kovari).

http://dx.doi.org/10.1016/j.tcr.2017.10.025
Accepted 27 October 2017

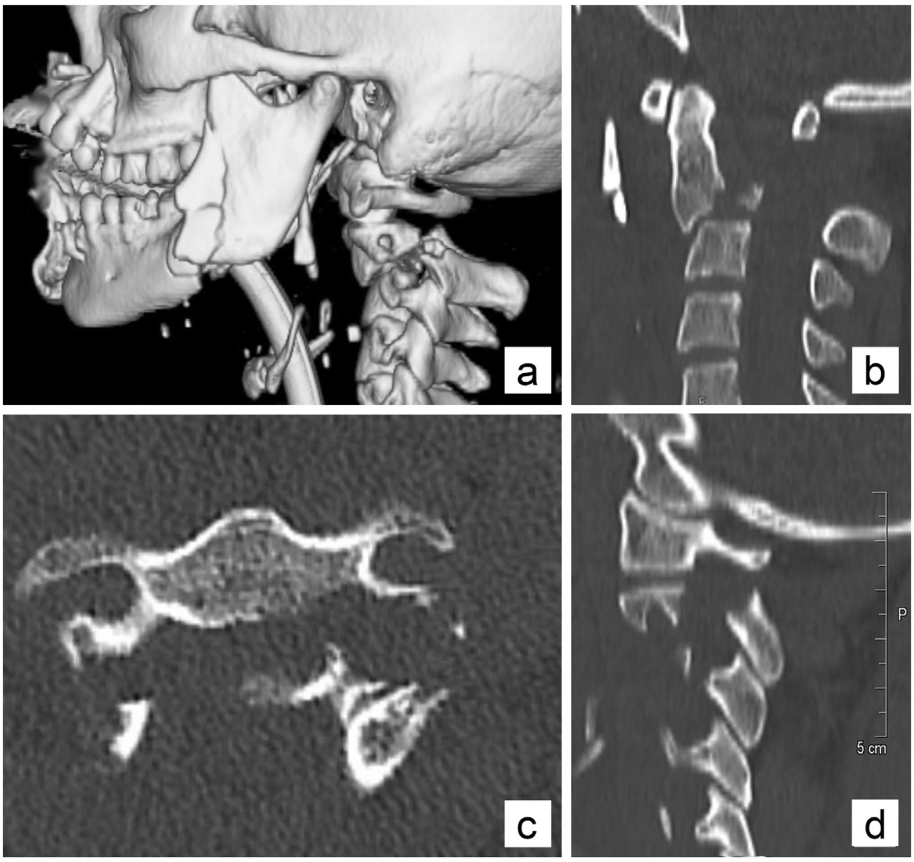

Fig. 1. Initial three dimensional (3D) reconstruction of craniofacial and cervical spine CT scan shows the multiple fracture of the maxilla and the mandibula beside the dislocated traumatic spondylolisthesis of the axis (a). Mid-sagittal (b), axial (c), left sagittal (d) CT images present the hangman's fracture.

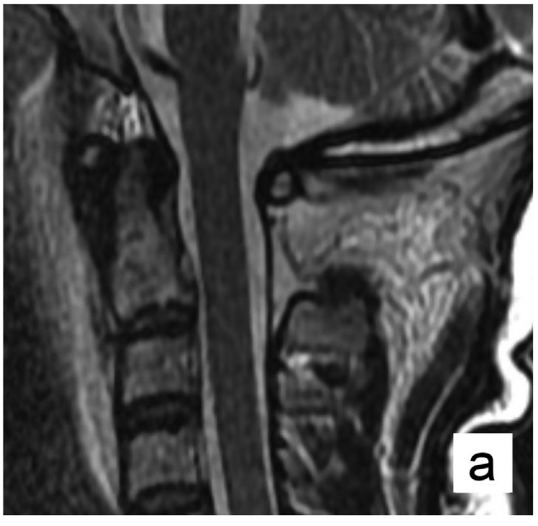

Fig. 2. Preoperative MRI T2 sequence mid-sagittal slice reveals no damage to intervertebral disc between C1 and C2 vertebrae.

tracheostomy which had to be performed because of concomitant multiple open fractures of the mandible, maxilla a ventral approach for the C2 unstable hangman's fracture was out of question. We decided first to perform a posterior fixation choosing direct transpedicular osteosynthesis which provides a chance for motion preservation between C2 and C3, knowing that a ventral stabilization might be necessary later on (sacrificing the segmental motion).