

Neurologically Intact Patient Following Bilateral Facet Dislocation: Case Report and Review of Literature

Vikram Chakravarthy, BS,¹ Jeffrey P. Mullin, MD, MBA,² E. Emily Abbott, MD, MS,²
James Anderson, MD,³ Edward C. Benzel, MD²

¹University of Missouri-Kansas City School of Medicine, Kansas City, MO

²Department of Neurosurgery, Neurological Institute, Cleveland Clinic, Cleveland, OH

³Department of Neurosurgery, The MetroHealth System, Cleveland, OH

ABSTRACT

Background: Complete spinal cord lesions and quadriplegia occur in 50%-84% of patients with bilateral facet dislocation. We present a patient who suffered both bilateral facet dislocation and bilateral pedicle fractures while remaining neurologically intact. Based on this case and our literature review, we hypothesize that bilateral facet dislocations without neurological deficits are accompanied by significant associated fractures that facilitate the maintenance of cervical spine canal patency.

Case Report: After a fall down a flight of stairs, an 86-year-old woman presented to the hospital complaining of neck pain. She denied numbness and weakness of her extremities. On physical examination she was neurologically intact without focal sensory or motor deficits and with normal reflexes throughout. Computed tomography (CT) of her neck demonstrated bilateral C5-C6 facet dislocation with locking of the C6 superior articular process dorsal to the C5 inferior articular process, as well as corresponding bilateral C6 pedicle fractures. Additional acute fractures were identified on the thoracic CT. Magnetic resonance imaging demonstrated no spinal cord compression, edema, or hemorrhage. The patient had a C6-C7 anterior cervical discectomy and allograft fusion and a C5-T1 anterior cervical plate with screw fixation.

Conclusion: Because bilateral facet dislocations without neurological deficits are rare, the most appropriate surgical intervention is not evident. We believe the best choice as a first step is an anterior cervical discectomy and allograft fusion with plating.

INTRODUCTION

Complete spinal cord lesions and quadriplegia occur in 50%-84% of patients with bilateral facet dislocation.^{1,2} The most common causes of bilateral facet dislocation include motor vehicle accidents, sports accidents, falls, and direct head-loading injuries. The mechanism of injury is universally related to hyperflexion of the neck.³⁻⁶ Ivancic et al studied cervical spinal cord injury resulting from bilateral facet dislocation via a biomechanical model developed using cadavers without a history of cervical spine trauma or disease.³ They found that following bilateral facet dislocation, the C3-C4 segment underwent the greatest dynamic narrowing of the spinal canal, while the C5-C6 segment and C7-T1 segment were associated with less dynamic narrowing. Ivancic et al also demonstrated that with stenotic cervical spinal canals, up to 88% of the canal is affected by spinal cord compression, whereas in patients with normal cervical canal diameter, the maximum cord compression seen was 35% of the canal.

In our review of the literature, we identified 3 cases of patients with bilateral facet dislocation who remained neurologically intact. In each of these cases, the patients' dislocations were associated with significant fractures of either the pedicle or lamina.^{2,4,7} We present a patient who suffered both bilateral facet dislocation and bilateral pedicle fractures while remaining neurologically intact. Based on this case and our literature review, we hypothesize that bilateral facet dislocations without neurological deficits are accompanied by significant associated fractures that

Address correspondence to
Edward C. Benzel, MD
Chairman, Department of Neurosurgery
Neurological Institute
Cleveland Clinic
9500 Euclid Avenue, S4
Cleveland, OH 44195
Tel: (216) 444-7381
Email: benzele@ccf.org

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facilitate the maintenance of cervical spine canal patency.

CASE REPORT

After a fall down a flight of stairs, an 86-year-old woman presented to the hospital complaining of neck pain. She denied numbness and weakness of her extremities. Physical examination showed that she was neurologically intact without focal sensory or motor deficits and had normal reflexes. A computed tomography (CT) scan of her neck demonstrated bilateral C5-C6 facet dislocation with locking of the C6 superior articular process dorsal to the C5 inferior articular process, as well as corresponding bilateral C6 pedicle fractures (Figures 1 through 3). The C6 pedicles fractured at their bases through the calcified C6-C7 disc space and into the ventral superior endplate of C7 without causing significant loss of height. Additional acute fractures were identified on the thoracic CT, including a fracture through the T5-T6 calcified anterior longitudinal ligament extending into the inferior endplate of T5 and the superior endplate of T6. Magnetic resonance imaging (MRI) demonstrated no spinal cord compression, edema, or hemorrhage. Because the patient's clinical condition was neurologically intact, we decided to temporize the patient in a rigid cervical collar only, without any applied traction.

An anterior cervical plate at C6-C7 was planned to help stabilize the spine prior to moving the patient into



Figure 2. Initial computed tomography scan. Midline cuts of sagittal cervical spine demonstrating apparent canal stenosis due to C5-C6 facet dislocation.

a prone position for definitive fixation and fusion. However, once the ventral spine was exposed, a modification of the surgical plan was made, and the ventral operation was the only procedure performed. As the ventral spine came into view, the fractures were



Figure 1. Initial computed tomography scan. Paramedian cuts of sagittal cervical spine demonstrating C5-C6 facet dislocation and C6 pedicle fracture.

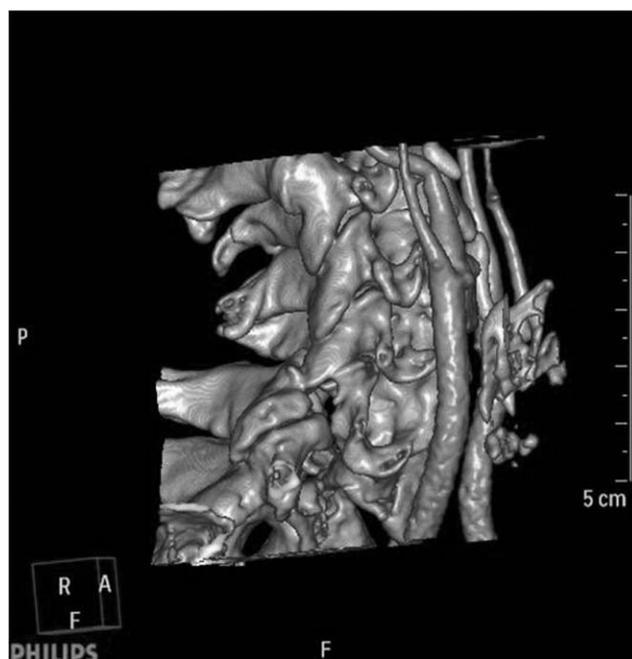


Figure 3. Initial computed tomography 3-dimensional reconstruction demonstrating C5-C6 facet dislocation from the anterior oblique view.



A.



B.

Figure 4. Postoperative radiographs showing (A) lateral swimmer's view and (B) anteroposterior view after C5-T1 anterior cervical discectomy and fusion.

observed. No distraction was applied across the disc space. A No. 11 blade scalpel and curette were used to remove the disc material that was grossly disrupted upon surgical inspection. The posterior longitudinal ligament was found to be intact upon removal of the disc material. A 7-mm graft was placed at C6-C7. Eight 18-mm variable self-tapping screws were used to stabilize the plate across 4 vertebrae, from C5-T1 (Figure 4). The C5-C6 and the C7-T1 disc spaces were observed to be autofused, eliminating the need to fuse these segments and facilitating the acquisition of a substantial moment-arm length without sacrificing operative time or requiring another operation (ie, dorsal instrumented fusion). Intraoperative and post-placement x-rays showed appropriate location and angle of instrumentation.

In summary, the patient had a C6-C7 anterior cervical discectomy and allograft fusion (ACDF) and a C5-T1 anterior cervical plate-screw fixation. The patient's postoperative course was complicated by the development of deep vein thrombosis in her right lower extremity. She was discharged to rehabilitation on postoperative day 6 and started anticoagulation therapy on postoperative day 7. In rehabilitation, she was noted to have oropharyngeal dysphagia that improved over time. At her 2.5-month follow-up appointment, she was doing well and fusion was demonstrated on her cervical x-rays.

LITERATURE REVIEW

Numerous case reports in the literature present bilateral facet dislocation with significant neurological

deficits; however, only 3 cases report no neurological deficits.^{2,4,7} These cases are summarized here to add clarity.

Patient 1

Baker and Grubb presented a case of a 59-year-old man with C6-C7 bilateral facet dislocation who suffered bilateral fractures of the lateral masses and lamina of C4-C6 following a motor vehicle accident.⁴ Traction was initially unsuccessful; however, under fluoroscopic control, partial reduction was attained. Follow-up imaging studies demonstrated an enlarged canal at C5-C6, so traction was continued for several days and operative management was declined. The patient completed a 6-month course with a halo brace and remained neurologically intact at 2-year follow-up. Imaging demonstrated good alignment of his cervical spine.

Patient 2

Kim et al presented a case of an 84-year-old man whose fall down a flight of stairs resulted in bilateral C3-C4 facet dislocation and associated displaced bilateral C3 lamina fractures.² The patient presented with posterior neck pain. The patient was placed under traction with Gardner-Wells tongs, and closed reduction was achieved. The patient then underwent a posterior cervical fusion using a unilateral lateral mass plate with spinous process wiring from C2-C4 for stabilization and complete reduction.

Patient 3

Menku et al presented a case of a 35-year-old man with bilateral C5-C6 facet and bilateral C6 pedicle fractures and total spondyloptosis at the C6-C7 level.⁷ He had a 1-stage anterior and posterior reduction and fusion stabilization procedure, including realignment of the spine in extension from C4 to C7 without traction.⁷

DISCUSSION

Each of the aforementioned cases was managed differently. One did not require an operation. In 2 cases traction was not employed, and 1 case required both ventral and dorsal fixation. Irrespective of procedure management, all 4 patients presented as neurologically intact and remained so throughout their follow-up courses. One case achieved complete reduction with Gardner-Wells tongs traction and without subsequent surgical intervention.⁴ Despite the increased risk of complications with prolonged traction, Baker and Grubb achieved manual reduction without complication.⁴ Kang, in contrast, mentions the 540-degree approach, in which a ventral decompression is followed by dorsal reduction and fusion and ventral fusion.⁸ Menku et al employed this technique for primary reduction.⁷

Razack et al emphasized the importance of using traction to reduce fractures prior to entering the operating room.⁵ Their review presents the largest series of single-level bilateral facet injuries to date.⁵ Razack et al treated all patients (n=22) with traction followed by single-level ACDF with bone graft and Synthes plate (Synthes, Inc.). They included 3 patients with minor facet subluxation who were neurologically intact. The authors concluded an anterior approach has many advantages compared to a posterior approach in treating bilateral facet fracture-dislocations. One of the most critical reasons to perform a ventral fusion is to avoid losing reduction of the fracture-dislocation while turning the patient into the prone position.⁵ A ventral approach also provides the theoretical advantage of retropulsed disc fragment resection with decompression.⁵ Kang stressed the importance of early MRI to rule out spinal cord compression and disc herniation.⁸ Of the 4 cases presented, only 2 had an MRI.² In these 2 cases, traction was not employed.

Bilateral facet dislocations with locked facets are a well-documented entity most often associated with

significant neurological injury. Our patient sustained such an injury but remained neurologically intact. We believe her clinical examination, in which she presented no neurological deficit, can be explained by the presence of her accompanying bilateral pedicle fractures.

CONCLUSION

In all of the cases presented here, bilateral facet dislocation was associated with significant vertebral fractures that maintained canal patency. When they accompany facet fractures, bilateral pedicle fractures enlarge the spinal canal, minimizing the risk of spinal cord compression and neurological injury.

Because of the rarity of bilateral facet dislocations without neurological deficit, the most appropriate surgical intervention is not evident. In the 4 cases presented, the interventions differed radically. We believe that an ACDF with plating is usually the best choice as a first step. This intervention usually should be accompanied by a dorsal fixation and fusion, as was originally planned in our case.

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