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# Delayed surgical treatment of bilateral cervical facet joint dislocations

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**Abstract**
Few cases of patients with bilateral cervical facet dislocations which remained undiagnosed and, hence, untreated, have been described in literature.
We present 3 cases of bilateral facet joint dislocation with delayed diagnosis of over six months, with no neurological deficits, that were surgically reduced and fixed using a posterior-anterior-posterior approach.
The presence of a bone fusion at the level of the deformity entailed the need to perform posterior and anterior releases, reduction and stabilization, by a combined approach.
We emphasize the importance of early recognition of potentially unstable cervical injuries, in order to minimize the risk of developing subsequent deformity and neurological impairment, and avoid the need for technically demanding salvage surgical procedures.

**Keywords:** Cervical vertebrae, dislocations, bilateral facet dislocation, cervical trauma

## Introduction
A significant percentage of cervical injuries are not diagnosed at the time of the initial evaluation (5 to 20%) [1-3], mostly in polytrauma patients having undergone an inadequate or incomplete radiological study, as well as in asymptomatic patients when first sustaining the injury[4]. Bilateral facet dislocations are unstable cervical spine injuries, very often associated with permanent neurological deficits. The conservative treatment of cervical fracture dislocations is controversial [5-6]. Most patients undergo closed reduction with traction [7-8] and, subsequently, surgical fixation [9]. Rarely do these lesions go undiagnosed, recognized and surgically treated in a delayed manner. An injury is considered to be "old" when it is recognized at least 3 weeks after the injury [10]. We present 3 cases of bilateral cervical facet joint dislocation with delayed recognition. After diagnosis, patients underwent open reduction and surgical fixation using a posterior-anterior-posterior approach.

## Case presentation
### Case 1
An 80-year-old female was taken to the hospital with neck pain after falling in a bus. In the emergency room (ER) she presented no radiating upper limb pain or neurological deficit. X-rays were interpreted as being normal. The patient was discharged and painkillers were prescribed. Upon persistence of cervical pain one year after the initial injury, she was reevaluated and presented limited cervical motion. A new X-ray showed a C5-C6 anterolisthesis and widening of the interspinous space (figure 1). The MRI revealed a bilateral facet joint dislocation of C5-C6 (figure 2). The patient underwent surgical reduction and fixation of the deformity using a posterior-anterior-posterior approach (figure 3). The patient's cervical pain improved and she was symptom-free 4 weeks after the procedure. The follow-up X-ray showed a stable fusion with correct sagittal cervical alignment (figure 4).

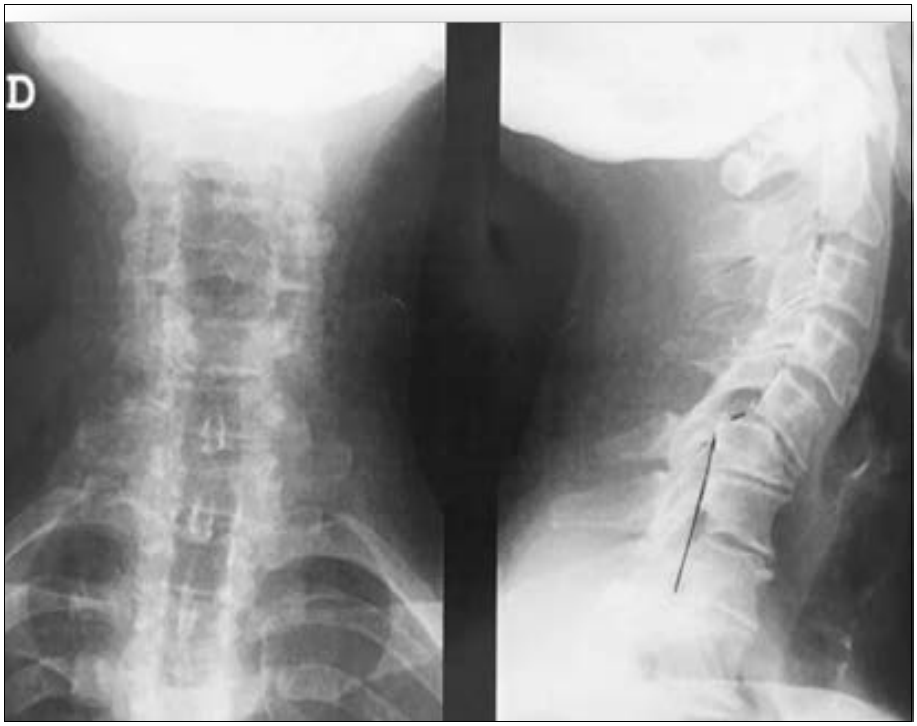


**Fig 1:** Cervical x-rays showing C5-C6 anterolisthesis

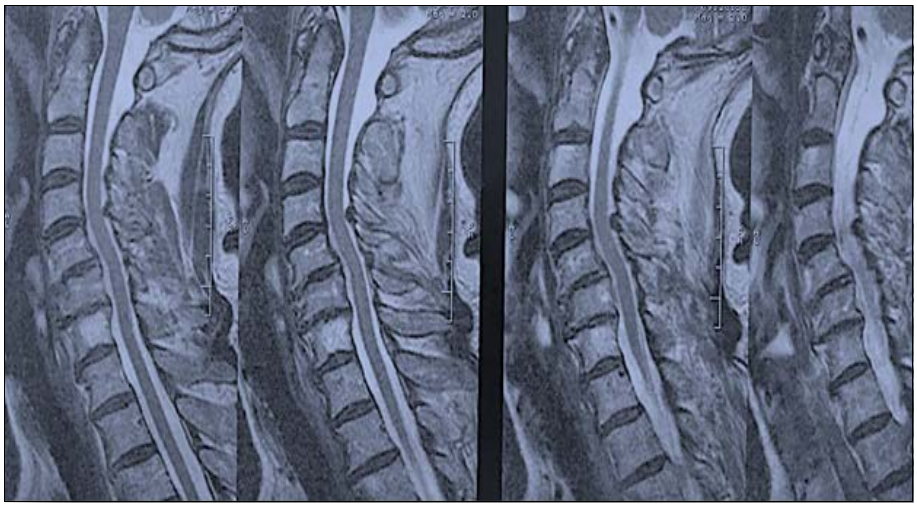

**Fig 2:** MRI showing chronic dislocation without signal changes within spinal cord

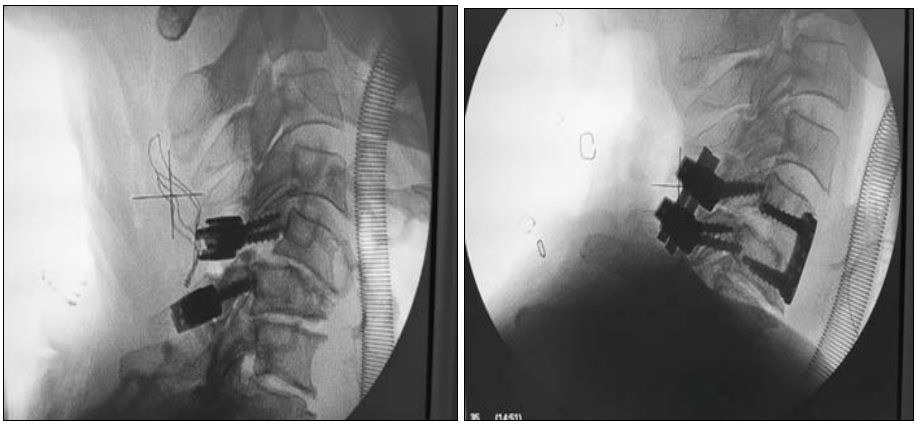

**Fig 3:** Intraoperative lateral cervical fluoroscopy views

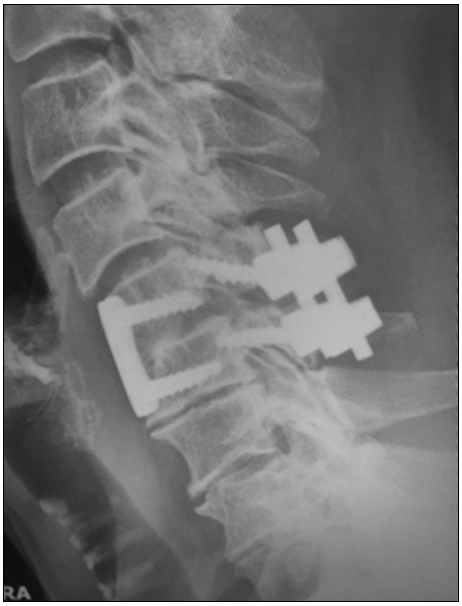

**Fig 4:** Final follow up x-ray

**Fig 5:** Lateral radiograph showing C5-C6 subluxation

**Case 2**

A 63-year-old male fell from a height of around two meters and experienced neck pain with tingling sensations in the right upper limb. There was no motor weakness of the limbs. At that time, he was evaluated at an ER, where cervical x-rays were performed and reported as normal. The patient was discharged and was prescribed pain medication and showed gradual neck pain improvement. Six months after the injury, the patient was referred to our department, complaining of neck pain that radiated to the right shoulder.

The X-ray showed a fused C5-C6 bilateral facet joint dislocation without movement in dynamic views (figure 5). MRI revealed central spinal canal stenosis at the C5-C6 level and high signal intensity in the spinal cord in T2-weighted imaging (figure 6).

Surgical treatment was proposed and the patient gradually became symptom-free after posterior-anterior-posterior reduction and fixation. Plain X-ray film images obtained six months after surgery showed good reduction and stability (figure 7).

**Fig 6:** MRI showing kyphosis and impression of spinal cord at the level of deformity

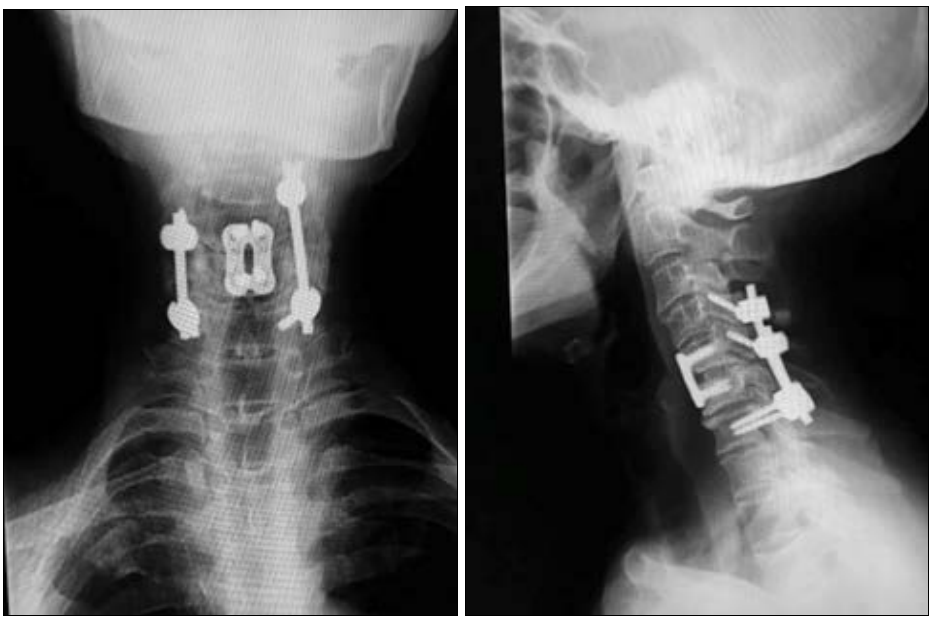

**Fig 7:** Plain x-ray imaging six months after surgery

**Case 3**

A 27-year-old male victim of cervical-thoracic trauma secondary to a car accident. Patient presented with neck stiffness but no associated neurological deficits. Radiographically, he presented a C6-C7 fracture-dislocation, with grade I listhesis, with fracture of the left facet (figure 8). Due to the patient's reluctance to undergo surgery because he was not very symptomatic, the surgical treatment ended up being postponed for 8 months. The patient underwent surgical reduction and fixation of the deformity using a posterior-anterior-posterior approach (figure 9). Patient experienced good clinical evolution and only occasional mild neck pain on long trips. The follow-up X-ray showed a stable fusion.

**Fig 8:** CT scan showing C6-C7 fracture-dislocation..

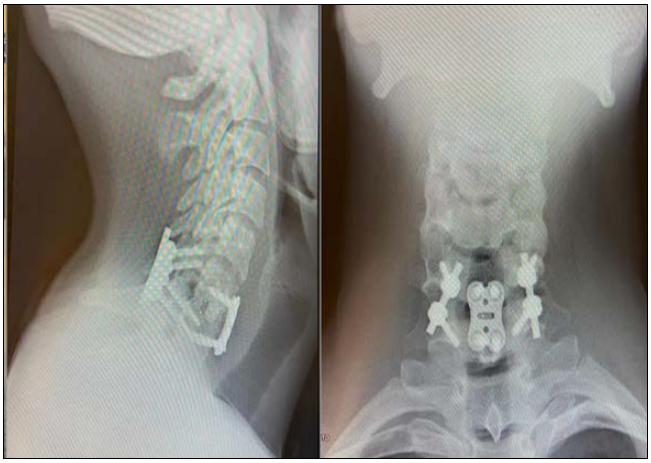

**Fig 9:** Plain x-ray imaging two months after surgery.

**Procedure**

Under general anesthesia, the surgery was performed in three stages.

**Stage 1. Posterior cervical release**

Firstly, the patient was positioned prone after application of Mayfield clamps. A posterior midline cervical approach with bilateral facetectomy was performed. Depending on the level, C5C6 bilateral mass screws (case 1) or C6 bilateral mass screws and C7 pedicle screws (case 3) were inserted. In case of technical difficulties (case 2), we decided for a longer fusion by placing a screw in the C5 right lateral mass, another in the C4 left lateral mass, and pedicle screws in C7. The wound was closed and dressings applied.

**Stage 2. Anterior cervical release**

The patient was then flipped to the supine position. We used a standard Smith-Robinson right sided cervical approach with resection of the anterior bone bridge, index level discectomy, reduction of the dislocation, insertion of an interbody cage or tricortical iliac graft, and fixation with an anterior cervical plate. The anterior wound was definitely closed over a drain.

**Stage 3. Posterior cervical fixation**

The patient was again turned to the prone position. Appropriate sized and bent rods were placed and compression was applied so as to completely correct the deformity and restore the cervical sagittal alignment. The posterior wound was definitely closed over a drain.

**Discussion**

We present 3 cases of bilateral facet joint dislocation with delayed diagnosis, with no neurological deficits, that were surgically reduced and fixed using a posterior-anterior-posterior approach. Rare are the cases described in literature of patients with bilateral facet dislocation which remained undiagnosed and, hence, untreated. Two of our cases were not initially detected.

These represent unstable cervical injuries that can cause persistent cervical pain, as well as progressive deformity that can entail delayed neurological deficits.

Several studies show a high percentage of cervical injuries that go unrecognized during the initial evaluation. In a study involving 740 patients with cervical injuries, the diagnosis was either not performed or was performed at a later date in 34 patients (4.6%) [1]. Ten of the 34 patients (29%) developed permanent deficits resulting from delayed or non-identification of their injuries. In another review of 253 patients with 274 spinal injuries, delayed diagnoses were documented in 22.9% of cervical spine and 4.9% of toracolumbar spine injuries[3]. By means of a protocol, Sengupta *et al.* recommend using MRI in addition to standard cervical X-rays and CT scan to evaluate patients with cervical injuries [11].

Reducing dislocations at least 72 hours after their occurrence is one of the biggest challenges we face in treating such injuries using closed means[8]. Literature backs performing a closed reduction of cervical facet dislocations in patients that are awake and alert [12, 13]. However, the success rate rapidly decreases with an increased time lapse between the injury and the attempted reduction [10].

Most spine surgeons consider open reduction with or without decompression after an unsuccessful closed

reduction or in the presence of an MRI-documented herniated disk [7]. The cases presented in this report are rare by the time elapsed between the injury and its diagnosis and subsequent treatment (more than 6 months in three cases). Given the elapsed time since the initial injury, subsequent deformity and the presence of an anterior fusion between the cervical vertebral bodies and posterior fusion in the facet joints, we opted for an open reduction. Few authors show satisfactory results after surgical treatment of neglected cervical facet joint dislocations [14]. Except for one case, Korres *et al.* presented excellent fusion rates and pain resolution following surgery in all 16 patients that had sustained an "old" sub-axial cervical injury, including cases of dislocation [14]. In another study of neglected bilateral facet joint dislocations, the reduction and fusion was performed in 12 patients, in all of whom bone fusion and neurological improvement were achieved [15].

The treatment of delayed cervical facet fracture dislocations is controversial, as current literature does not offer a clear solution for managing such occurrences. Several authors describe different treatment methods using anterior, posterior or combined approaches [15-17]. Bartels *et al.* suggested performing a posterior facetectomy followed by decompression and anterior fusion as well as posterior fixation in cases of bilateral facet joint dislocation over 8 weeks after the injury [16]. Hassan *et al.* performed a posterior and anterior approach in most patients, with satisfactory outcomes in all of them [15]. Payer *et al.* used an anterior-posterior-anterior approach in one case of bilateral facet joint dislocation with no neurological deficits 10 weeks after the trauma [17]. Lee *et al.* reported that, in patients with no neurological deficits, an anterior approach was more often used, while combined approaches were chosen for cases of bilateral facet joint dislocation [18].

## Conclusion

We have described three cases of delayed bilateral cervical facet joint dislocation which were subjected to a posterior-anterior-posterior reduction and fixation. The presence of a bone fusion at the level of the deformity entailed the need to perform posterior and anterior releases, reduction and stabilization, by a combined approach.

We emphasize the importance of early recognition of potentially unstable cervical injuries, in order to minimize the risk of developing subsequent deformity and neurological impairment, and avoid the need for technically demanding salvage surgical procedures.

## Conflict of interest

The authors declare that there is no conflict of interest in carrying out this work.

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