Case Report

Translaminar screw of C1 for the reinforcement of subaxial cervical spine reconstruction

ABSTRACT

Translaminar screws in the cervical spine have been mostly employed at C2 level when conventional trajectories are challenging. However, reports in the literature of translaminar screw of C1 are remarkably anecdotal. We aimed to report a case using C1 translaminar in addition to C1 lateral mass screws for the reinforcement of subaxial cervical spine reconstruction. We present a 22-year-old female patient, who developed persistent cervical pain, and computed tomography scan demonstrated lytic lesions of the vertebral bodies and lateral masses from C3 to C6. Magnetic resonance imaging showed spinal cord compression without myelopathy. Surgical biopsy was inconclusive, and an oncological vertebral instability led to surgical stabilization. Laminectomy and bilateral facetectomy of levels involved was achieved, instrumentation from C1 to T3 and reconstruction with posterolateral fibula bilaterally, and without occipital fixation. A third satellite rod was placed using C1-2–7 translaminar screws. Translaminar screw of C1 is a feasible alternative for increasing the strength of the construct.

Keywords: Axial spine, craniovertebral junction, reconstruction, stabilization, translaminar screw

INTRODUCTION

Translaminar screws of the cervical spine have provided a good alternative to the conventional lateral masses or transpedicular screws during very challenging scenarios with low risk of neurovascular complications. These trajectories have been mostly employed at C2 and C7 levels in clinical practice.[1] However, the available literature reporting C1 translaminar screws are remarkably anecdotal. The C1 translaminar screw was firstly described by Floyd and Grob[2] in 2000, and until now has not been widely used only having reports of biomechanical[3] and radiological morphometric[4] analyses, with scarce clinical applications published.[5,6]

In osteolytic lesions affecting the subaxial cervical spine, a wide decompression and stabilization is sometimes required to prevent or correct deformity and guarantee realignment. On the one hand, the reinforcement of the posterolateral reconstruction by adding additional fixation points in a poor bone quality and low quantity of usable trajectories is necessary. On the other hand, avoiding the inclusion of the occipital bone in the construct has advantages in motion preservation and complication avoidance. We aimed to report a case using C1 translaminar in addition to C1 lateral mass screw for reinforcement of subaxial cervical spine reconstruction.

CASE REPORT

A 22-year-old female patient developed persistent neck pain in the aftermath of a minor fall and lost 6 kg of weight in 6 months. At the neurological examination, the patient had a M3 palsy of deltoid and biceps muscles on the right

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Submitted: 31-Dec-21 **Accepted:** 02-Apr-2022
Published: 13-Jun-22

Access this article online	
Website: www.jcvjs.com	Quick Response Code
DOI: 10.4103/jcvjs.jcvjs_168_21	

How to cite this article: Carelli LE, Girão A, Cabrera JP. Translaminar screw of C1 for the reinforcement of subaxial cervical spine reconstruction. J Craniovert Jun Spine 2022;13:201-3.

side and a M4 strength muscle on the same left-sided muscles, associated with Hoffman' reflex (+) bilaterally. No other muscle weaknesses were observed, and no sensorial and sphincter disturbances were present. The computed tomography (CT) scan demonstrated lytic lesions of vertebral bodies and lateral masses from C3 to C6 with mild segmental kyphosis [Figure 1]. The magnetic resonance imaging showed spinal cord compression without myelopathy. Surgical biopsy was performed; however, the result was inconclusive, while the spinal instability neoplastic score was 15 points consequent to severe instability [Figure 2], leading to surgical stabilization.

Wide laminectomy and bilateral facetectomy of the involved levels were achieved, and instrumentation from C1 to T3 with reconstruction using posterolateral fibula bilaterally, and without occipital fixation in the construct. A third rod was placed as a satellite rod using right-sided C1-2–7 translaminar screws [Figure 3]. Successful postoperative clinical and neurological course was observed, and a postoperative X-ray [Figure 4] and CT scan showed proper placement of instrumentation and a bicortical C1 translaminar screw [Figure 5]. The patient did not develop any new neurological worsening and is expecting the result of the histopathological study for the decision of a complimentary anterior approach accordingly, if needed.

DISCUSSION

The translaminar screw has served as a valuable salvage alternative when a traditional transpedicular screw in the axis vertebrae is very challenging,[6] increasing the risk of neurovascular damage, especially in children with variants of the normal anatomy or craniovertebral junction malformations. For the atlas, there are other possible alternative trajectories different from the lateral mass screw of C1, but requiring high level of expertise and experience such as the supralaminar C1 lateral mass screw.[7] When the reinforcement of the instrumentation is needed, the double C1 ipsilateral mass screws[8] not being an affordable alternative at any spine center.

The translaminar screw of C1 is technically much more difficult compared to translaminar screws in other levels of the cervical spine, requiring a careful preoperative assessment of the vertebral artery course by additional imageneological exams to avoid misplacement causing injury in special in the superior border of the lamina where the vertebral artery groove is situated.[9] Placing a translaminar screw in C1 is feasible, according to the measurements of length, width, and height of the posterior arch, making possible the insertion of two screws in a crossing manner. However, there are a 11% of the posterior arch of C1 is not suitable for screwing with safety.[10] In addition, the measured bicortical diameter on CT

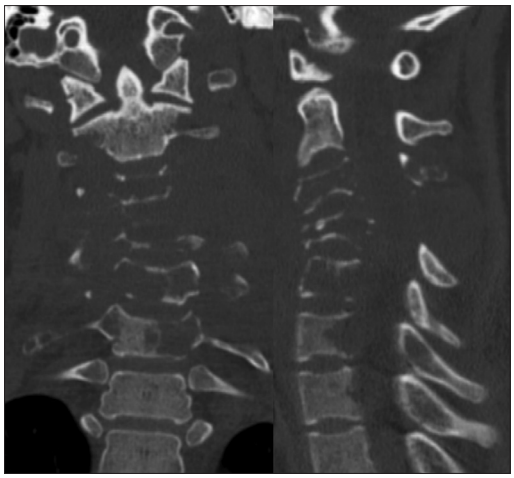

Figure 1: Preoperative CT scan showing osteolytic lesions of C3-6 vertebras with lateral masses involvement. CT - Computed tomography

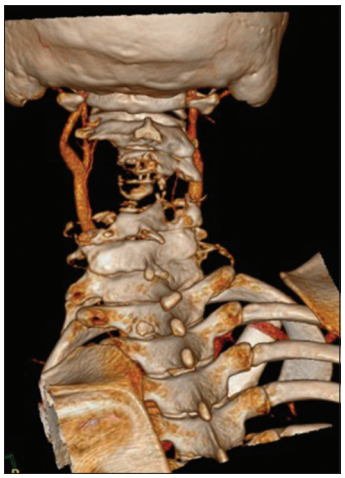

Figure 2: Preoperative 3D CT scan demonstrating a high grade vertebral instability. 3D - three-dimensional; CT - Computed tomography

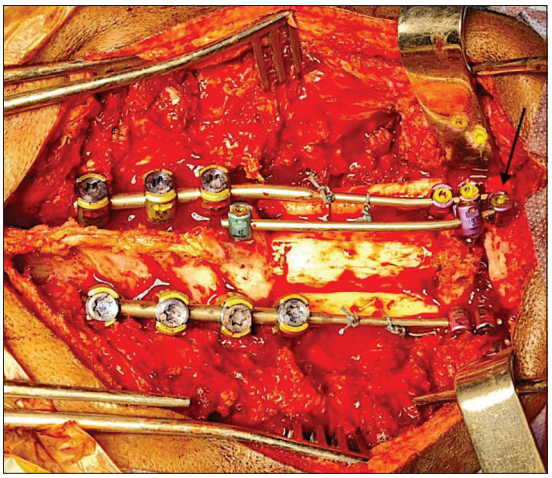

Figure 3: Intraoperative photograph showing the satellite rod placed on the translaminar screws of C1-2-7 (arrow in C1) and the posterolateral subaxial reconstruction using fibula at both sides

Figure 4: Postoperative radiograph evincing the C1-T3 construct without inclusion of the occipital bone

scan makes it possible with acceptance over the 80% of the one side translaminar C1 screw and over 75% bilaterally.[6] In our case, a lamina of C1 of at least 24 mm of length and over 4 mm of width made the insertion of a 3.5 mm × 22 mm polyaxial screw with safety, possible in the first attempt.

During the reconstruction of the subaxial cervical spine by a posterior-only approach, increasing the stiffness of the construct is highly desirable by adding additional points of fixation and rods. In this case report, six points of fixation were achieved in C1-2 vertebras without involvement of the occipital bone and therefore maintaining the flexion–extension movement of the head despite a long-segment fixation decreasing the risk of pseudarthrosis as well as avoidance of any healing problem at that level.

CONCLUSION

The C1 translaminar screw could be part of the armamentarium for the treatment of complex cervical spine cases when additional points of fixations are needed. In addition, it could be a good alternative for unaffordable C1 lateral mass screws since it has more imageneological and biomechanical than clinical support. Further studies should be done to better understand the spectrum of applications and rate of failure.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

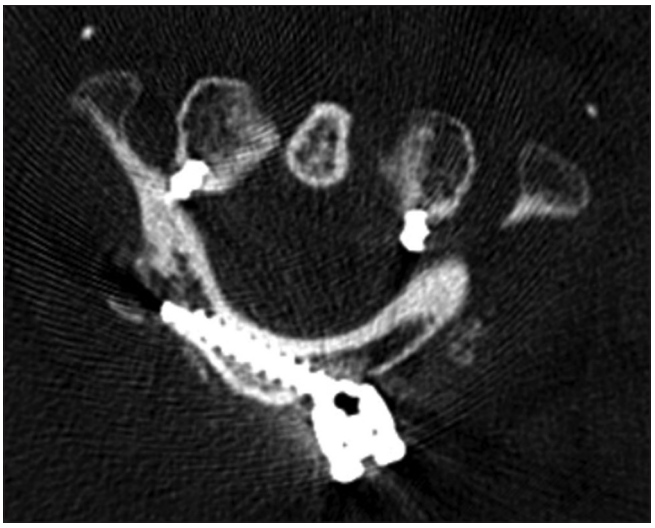

Figure 5: Postoperative CT scan showing a right sided bicortical C1 translaminar screw well placed in addition to bilateral lateral masses screws. CT - Computed tomography

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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