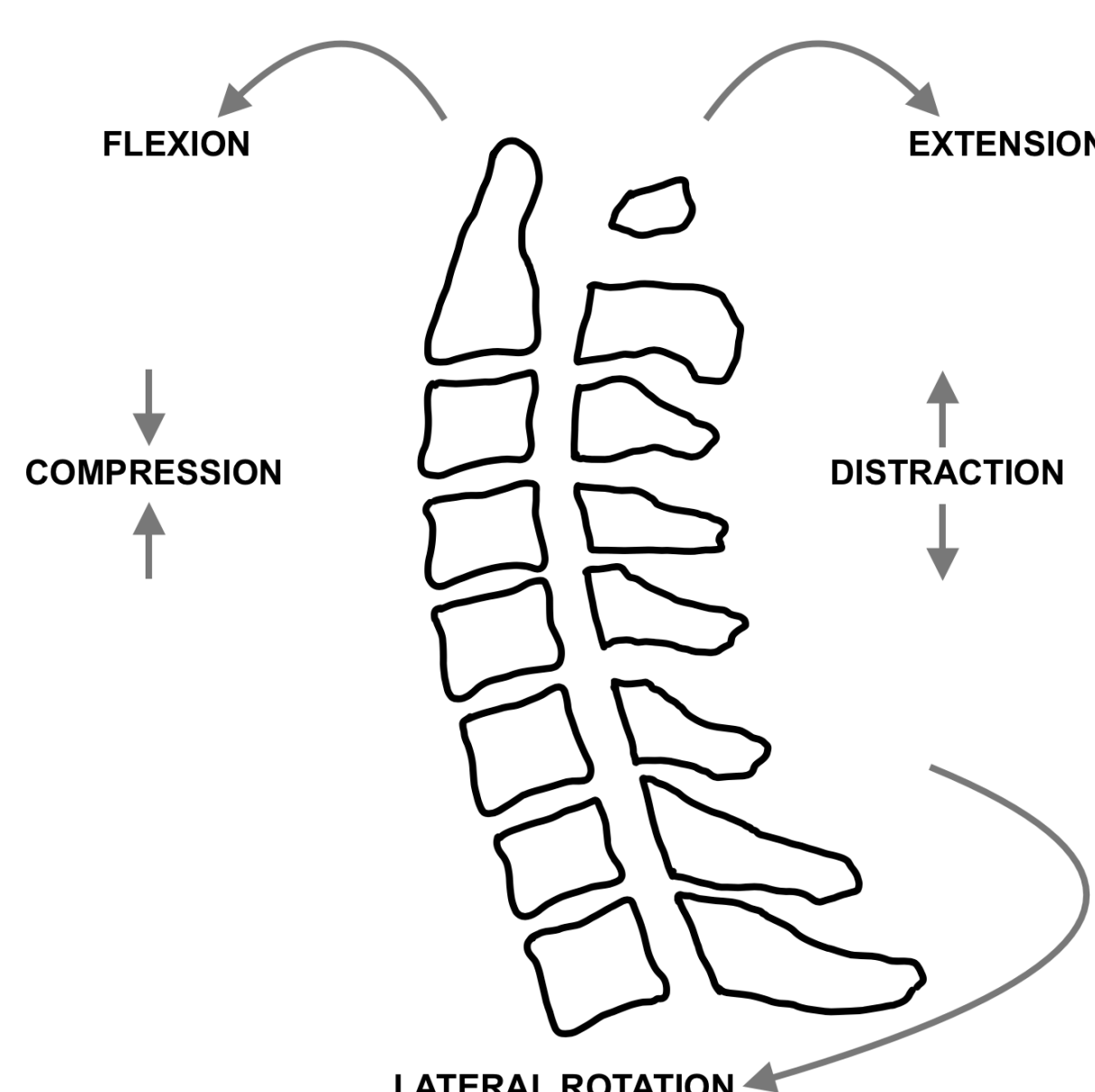


## INTRODUCTION

Defects of the cervical spine and resulting spinal instability are associated with significant morbidity and mortality:

- Spinal cord damage
- Vertebral artery injury
- Devastating neurological injury

These risks make reestablishment of spinal stability particularly important.



**Figure 1:** Visualization of stresses placed on the cervical spine correlating with required dimensions and axes of stability

Typical operative techniques to reconstruct these defects include utilization of autologous or allogeneic nonvascularized bone graft, or arthrodesis with instrumentation.

Vascularized bone grafts via microvascular free tissue transfer are less frequently described for this reconstructive application.

The fibula free flap (FFF) is a commonly used bony flap for head and neck reconstruction and has proven utility in this application.<sup>1</sup>

Previous studies have identified numerous advantages of vascularized bone grafts over other techniques:<sup>1-3</sup>

- Faster bony union
- Immediate response to stress forces
- Better strength

These studies propose these added benefits outweigh the risks, especially in the following situations:<sup>4,5</sup>

- Multilevel intervertebral fusion
- High risk of nonunion
- Postoperative radiation anticipated

This report aims to describe this rare utilization of the FFF for reconstruction of a cervical spine defect due to oncologic pathologic destruction.

## METHODS

Multi-institutional retrospective case series reviewing patients who underwent cervical spine reconstruction with a fibula free flap (FFF).

Patient demographic information, co-morbidities, levels of cervical spine defects, and free flap complications were collected.

A report describing one of the patient's cases from presenting symptoms to operative management is also included.

## CASE REPORT

A 79-year-old male presenting with right-sided weakness was found to have a destructive lesion of the cervical vertebral bodies on imaging.



**Figure 2:** CT imaging in the sagittal view demonstrating the destructive mass of the anterior cervical spine.

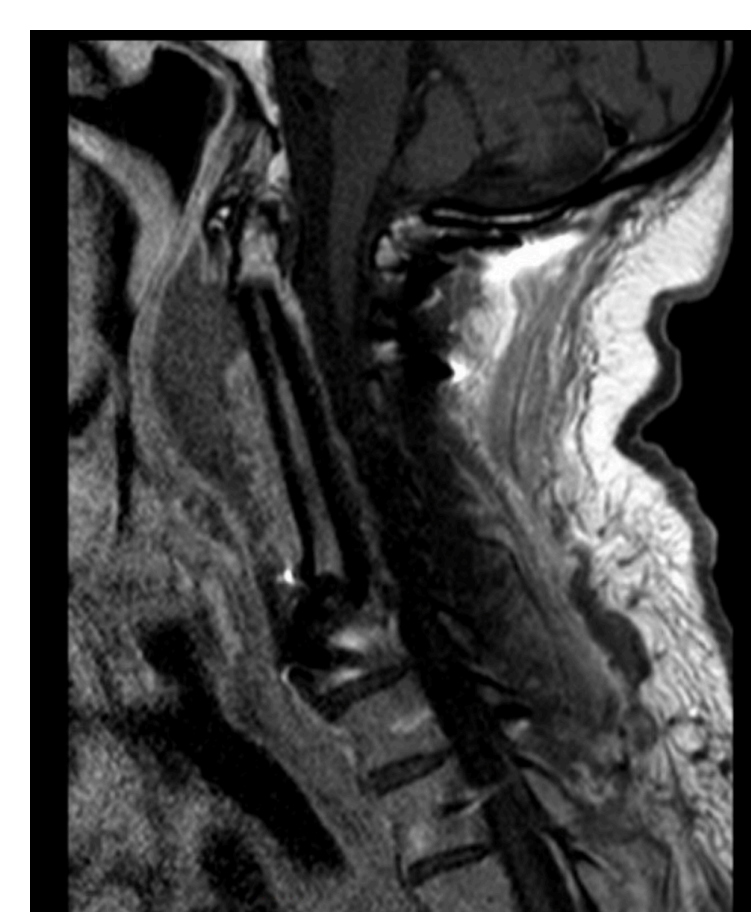
C2-C7 corpectomy was completed in a staged manner to remove the tumor along with the eroded cervical spine.



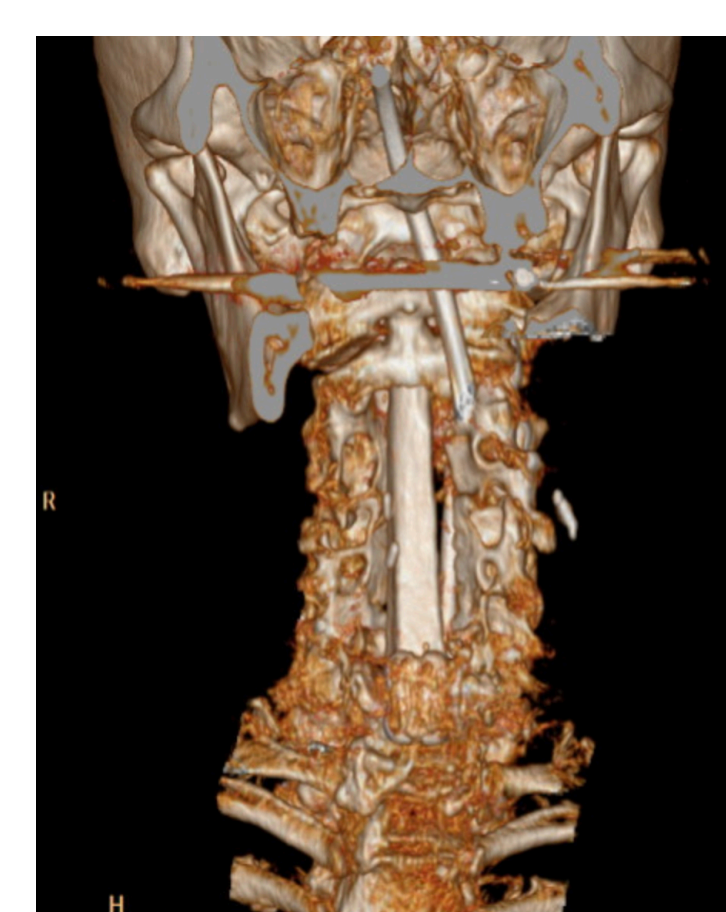
**Figure 3:** Preoperative 3D-rendered CT imaging demonstrating the complete cervical spine defect after tumor removal

The complete cervical spine defect was then reconstructed with a FFF. The proximal end was modified into a trough to fit into the dens.

The patient tolerated the operation well and had no immediate postoperative complications. The FFF healed without complications and post-operatively he developed an improved neurologic function.



**Figures 4 (left) and 5 (right):** Postoperative imaging demonstrating the FFF inset into the cervical spine defect



## RESULTS

A total of 1,187 fibula free flaps across 8 different institutions were reviewed. Twelve patients underwent cervical spine reconstruction with a fibula free flap.

Average age was 51 years with range of 12 to 79 years. There were five male (42%) and seven female (58%) patients. Six patients reported neurological deficits preoperatively.

Defect etiology	Percent of patients
Infection	50% (n=6)
Oncologic	25% (n=3)
Trauma	8% (n=1)
Other	17% (n=2)

**Table 1:** Cervical spine defect etiologies of included patients

Three patients had a history of radiation therapy to the cervical region, resulting in cervical spine infection and subsequent defect.

Level of defect involvement	Percent of patients
C4	58% (n=7)
C5	75% (n=9)
C6	67% (n=8)

**Table 2:** Percentages of patients with certain cervical spine levels involved in defect

On average, four levels of the cervical spine were reconstructed. Six patients required both anterior and posterior cervical fusion.

Postoperative outcome	Percent of patients
Improved neurologic deficits	33% (n=2)
Unchanged neurologic deficits	67% (n=4)
Fistula and wound infection	8% (n=1)
Exposed hardware	17% (n=2)

No patients had non-union of the FFF bony segments postoperatively.

## CONCLUSION

FFF reconstruction for cervical spine defects has been rarely described in the literature.

This case series demonstrates that a vascularized fibula bone graft is an excellent reconstructive option for cervical spine defects.

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