

ANTERIOR CERVICAL RECONSTRUCTION USING TITANIUM MESH CAGES

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Background: Surgical management of cervical lesions with reconstruction procedures has remarkably expanded the options available in the last decade. Anterior cervical corpectomy with titanium mesh reconstruction is one of the effective method of cervical spine reconstruction.

Methods: We studied 17 consecutive cases in whom corpectomy and decompression was performed. Fusion with titanium mesh cages filled with local bone pieces were placed inside the cage. **Results:** Clinical status improved in 13 patients whereas in 3 it remained unchanged, based on Nurick's classification. At 3 months follow up, 13 (76.4%) patients reported successful arm pain relief and 12 (70.5%) with neck pain relief with visual analog score below five. Complications included cage in kyphosis, radiculopathy, cage subsidence and wound infection.

Conclusion: Outcome after cervical fusion procedures with a titanium mesh cage lead to early and good stability of the cervical spine, excellent neurological improvement, low risk of complication and rare need for endogenous bone graft harvest avoiding donor site morbidity, less postoperative pain and decreased hospital stay and cost.

Keywords: Cervical Spine, Reconstruction, Titanium Mesh Cage

INTRODUCTION

The development of anterior cervical approach as well as a variety of internal fixation devices gradually expanded the options available for surgical management of cervical lesions. Anterior cervical surgery now represents one of the most frequently performed spinal procedures. It involves disc space, removal of a single vertebra or several vertebrae if the pathology involves beyond the level of disc space.^{1,2}

Spinal instability resulting from trauma, neoplasia, degenerative diseases and inflammatory process is the commonest cause of motor and sensory deficits in the limbs resulting in paraplegia or quadriplegia or radiculopathies. These conditions not only make the patient bed-ridden and dependent but also make the quality of life of the patient poor.^{3,4}

Anterior cervical corpectomy offers the most direct approach for neurological decompression and effective reconstruction of weight bearing vertebral column, stabilization and reconstruction of the cervical spine.^{5,6}

MATERIAL & METHODS

From September 2003 to May 2005, seventeen consecutive cases underwent corpectomy, decompression and fusion with titanium mesh cages filled with local bone graft.

Criteria for inclusion consisted of consecutive patients who presented with unremitting radicular arm pain, with or without neck pain, and / or a neurological deficit that correlated with appropriate level and side of neural compression on MRI or CT secondary to degenerative diseases, infection, neoplasia or trauma. (Figure 1a & 1b)



Fig 1a. MRI scan saggital T2 weighted image demonstrating anterior epidural compression at C5 level

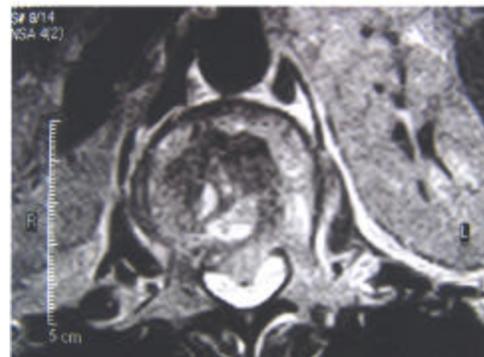


Fig. 1b. MRI scan axial T2 weighted image showing anterior epidural compression at C5 level.

Neck pain was graded using a 10-point visual analog scale. Follow up ranged every 3 months. Neurological outcomes were assessed using Nurick's Grades. (Table 1)

Table 1. Nurick's Grades

Nurick's Grade	Definitions
Grade – 0	Root signs and symptoms no evidence of cord involvement
Grade – I	Signs of cord involvement normal gait
Grade – II	Mild gait involved able to be employed
Grade – III	Gait abnormality prevents employment but ambulant without support
Grade – IV	Able to ambulate with assistance
Grade – V	Chair bound or bedridden

X-rays of cervical spine were taken every 3 months to check the position and fusion of the cage. (Figure 2)



Fig 2. Plain radiograph showing titanium mesh cage placement at C5 level

RESULTS

A total of 17 cages were implanted in 17 patients. The frequency of symptoms and signs were as shown in Table 2.

Clinical status improved in 14 patients whereas in 3 it remained unchanged based on Nurick classification. Two patients in grade III improved to grade I (n = 1) and grade II (n = 1). Out of 12 in grade IV, 10 patients improved to grade II (n=1) and

grade III (n=9) while 2 patients remained unchanged. Out of 3 patients in grade V, 2 improved to grade IV and one remained unchanged. (Table 3)

Table 2. Frequency of Signs and Symptoms

Signs & Symptoms	Percentage
Neck Pain	(12) 70.58%
Radiculopathy	(11) 66.70%
Myelopathy	(06) 35.29%

Table 3. Improvement in Nurick's Grades

Nurick's Grade	Pre operative No. of Patients	Post operative No. of patients
Grade – I	0	1
Grade – II	0	2
Grade – III	2	9
Grade – IV	12	4 (n=2 unchanged)
Grade – V	3	1 (unchanged)

At 3 months follow up 13 (76.4%) reported successful arm pain relief with 12 (70.5%) showing neck pain relief with visual analog score below five.

Complications included cage in kyphosis in 1 patient, radiculopathy 1, cage subsidence 1 and wound infection in 1 patient.

Follow up three monthly imaging studies showed no cage instability, cage dislodgement or pseudoarthrosis.

DISCUSSION

Early diagnosis and management in such cases not only reduces the magnitude of pain and neurological damage, but also leads to a better prognosis. Corpectomy of the affected vertebral body in such cases followed by the insertion of cage is a routinely practiced procedure all over the world.^{7,8}

The authors of several clinical studies have evaluated the outcome of patients who have undergone cervical corpectomy and have shown variable grades of improvement.^{9,10,11,12}

Titanium mesh cages are used in single and multilevel cervical discectomy for maintaining spinal curvature and increasing graft fusion rate. They also provide immediate stabilization, reduce or eliminate pain, promote bone fusion between the vertebra adjacent to the cage by allowing bone growth through the cage, re establish and maintain the intervertebral space, reduce the average hospitalization time, and allow a quicker return to work.^{13,14}

CONCLUSION

Outcome after corpectomy and cervical fusion procedures with a titanium mesh cages gives early and good stability of the cervical spine, excellent neurological improvement, low risk of complication and rare need for endogenous bone graft harvest

avoiding donor site morbidity, less postoperative pain and decreased hospital stay and cost.

REFERENCES

1. Cho DY, Lee WY, Sheu PC. Treatment of multilevel cervical fusion with cages. *Surg Neurol.* 2004;62(5):378-85.
2. Hwang SL, Lin CL, Lieu AS, Lee KS, Kuo TH, Hwang YF et al. Three-level and four-level anterior cervical discectomies and titanium cage-augmented fusion with and without plate fixation. *J Neurosurg Spine.* 2004;1(2):160-7.
3. Moreland DB, Asch HL, Clabeaux DE, Castiglia GJ, Czajka GA, Lewis PJ et al. Anterior cervical discectomy and fusion with implantable titanium cage: initial impressions, patient outcomes and comparison to fusion with allograft. *Spine J.* 2004;4(2): 184-91.
4. Cauthen JC, Theis RP, Allen AT. Anterior cervical fusion: a comparison of cage, dowel and dowel-plate constructs. *Spine J.* 2003;3(2): 106-17.
5. Hee HT, Majd ME, Holt RT, Whitecloud 3rd TS, Pienkowski D. Complications of Multilevel Cervical Corpectomies and Reconstruction With Titanium Cages and Anterior Plating. *J Spinal Disord Tech* 2003;16(1): 1-8.
6. Kandziara F, Pflugmacher R, Schäfer J, Born C, Duda G, Haas NP et al. Biomechanical comparison of cervical spine interbody fusion cages. *Spine* 2001;26(17): 1850-7.
7. Thalgott JS, Xiongsheng C, Giuffre JM. Single stage anterior cervical reconstruction with titanium mesh cages, local bone graft and anterior plating. *Spine J.* 2003;3(4): 294-300.
8. Profeta G, de Falco R, Ianniciello G, Profeta L, Cigliano A, Raja AI. Preliminary experience with anterior cervical microdiscectomy and interbody titanium cage fusion (Novus CT-Ti) in patients with cervical disc disease. *Surg Neurol.* 2000;53(5): 417-26.
9. Majd ME, Vadhva M, Holt RT. Anterior cervical reconstruction using titanium cages with anterior plating. *Spine.* 1999; 24(15): 1604-10.
10. Hacker RJ, Cauthen JC, Gilbert TJ, Griffith SL. A prospective randomized multicenter clinical evaluation of an anterior cervical fusion cage. *Spine.* 2000;25(20): 2646-54.
11. Narotam PK, Pauley SM, McGinn GJ. Titanium mesh cages for cervical spine stabilization after corpectomy: a clinical and radiological study. *J Neurosurg.* 2003;99(2 Suppl): 172-80.
12. Kanayama M, Hashimoto T, Shigenobu K, Oha F, Ishida T, Yamane S. Pitfalls of anterior cervical fusion using titanium mesh and local autograft. *J. Spinal Disord Tech.* 2003;16(6): 513-8.
13. Daubs MD. Early failures following cervical corpectomy reconstruction with titanium mesh cages and anterior plating. *Spine.* 2005; 30(12):1402-6.
14. Ramani PS, Sharma A, Jituri S, Muzumdar DP. Anterior instrumentation for cervical spine tuberculosis: an analysis of surgical experience with 61 cases. *Neurol India.* 2005;53(1):83-9.

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