

**Original research article****A study to assess the complications of anterior cervical plating with titanium Cage and LSC****<sup>1</sup>Dr. Anuj Manjunath, <sup>2</sup>Dr. Kiran Tej, <sup>3</sup>Dr. Channabasava**<sup>1,2</sup>Spine Fellow, Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore, Karnataka, India<sup>3</sup>Assistant Professor, Department of Orthopedics, Raichur Institute of Medical Sciences, Raichur, Karnataka, India**Corresponding Author:**

Dr. Anuj Manjunath

**Abstract**

The natural course of cervical radiculopathy due to degenerative diseases is generally favorable. Majority of patients with time may have spontaneous resolution of symptoms. Patients whose pain does not naturally resolve require some form of intervention. After obtaining written informed consent, inpatient of Department of Orthopaedics fulfilling the inclusion and exclusion criteria. Demographic data, history, clinical examination and details of investigations and interventions will be recorded in the study proforma. Patient were divided into two groups as surgeon choice, first group includes 15 patients who had been managed with anterior cervical plate with titanium cage. The second group included 15 patients who had been managed with locking standalone cage. Out of the 32 patients who participated in the study, the following complications were noted. 2 post-operative wound site infections were noted, one in a patient who belonged to the LSC implant group and the other from the APC implant group (6.66% each). These 2 cases requires regular dressings and healed by secondary intention.

**Keywords:** Anterior cervical plating, titanium cage, LSC**Introduction**

Spine provides motions in three dimensions and maintains the balance of the head, trunk, and the pelvis through the muscles, ligaments, intervertebral disc and facet joints <sup>[1]</sup>.

A cervical radiculopathy is the most common symptom of cervical disc herniation. Contributing factors may include some combination of disc herniation, osteoarthritis of uncovertebral and facet joints, decreased intervertebral height and spondylolisthesis of cervical vertebrae <sup>[2]</sup>.

The natural course of cervical radiculopathy due to degenerative diseases is generally favorable. Majority of patients with time may have spontaneous resolution of symptoms <sup>[3]</sup>.

Patients whose pain does not naturally resolve require some form of intervention. Surgery is indicated for compressive cervical radiculopathy with persistent radicular pain after failure of conservative treatment and progressive or profound motor weakness <sup>[4]</sup>.

**Methodology****Study design:** Prospective study.**Sample size:** 30 cases (15+15).**Inclusion criteria**

1. Age between 30 years and 70 years.
2. Patients having single or double level extruded cervical disc disease with failed conservative management.
3. Patient having cervical disc disease with severe radiculopathy with failed conservative management.
4. Patient having cervical disc disease with severe cervical myelopathy with failed conservative management.
5. Patients willing to give Informed Consent.

**Exclusion criteria**

1. Age less than 30 years and more than 70 years.
2. Medically unfit patients.
3. Patients having more than 3 level cervical disc disease.
4. Patients having OPLL (Ossification of posterior longitudinal ligament).
5. Patients having traumatic cervical injuries.
6. Patients having pathological fractures with cervical radiculopathy or myelopathy.

7. Patients having neurological disorders.

After obtaining written informed consent, inpatient of Department of Orthopaedics fulfilling the inclusion and exclusion criteria. Demographic data, history, clinical examination and details of investigations and interventions will be recorded in the study proforma.

Patient were divided into two groups as surgeon choice, first group includes 15 patients who had been managed with anterior cervical plate with titanium cage. The second group included 15 patients who had been managed with locking standalone cage .The anterior cervical approach was used. The cartilaginous end plates of the upper and lower end plates were removed after inter body distraction under microscopic view the removal of the posterior osteophytes was associated with the incision of the posterior longitudinal ligament. After adequate decompression of two consecutive levels, cages were inserted in the distracted inter vertebral spaces with or without plate under fluoroscopic control. All patients were managed postoperatively with immobilization with cervical collar for 2-3 months.

Patient will be followed post operatively for functional and radiological assessment at 3months, 6months and 12 months.

Results

Table 1: Age Distribution

Variable	Category	Number	Percentage
Age	31-40 years	8	25%
Age	41-50 years	18	56.25%
Age	51-60 years	5	15.63%
Age	>60 years	1	3.12%

Majority of the patients in our study, i.e. 18 patients (56.25 %) were in the age group of 41-50 years, the majority of people are over 40 years (75).

Table 2: Sex distribution among patients

Category	Variable	Number	Percentage
Gender	Male	20	62.5%
	Female	12	37.5%

Of the total number of 32 patients, 20 (62.5%) were males and 12 (37.5 %) were females i.e. there was an overall male preponderance seen in this study.

Table 3: Level of Involvement

Diagnosis		Number	Percentage
Level of Involvement	C3 C4 IVDP	1	3.1
	C4 C5 IVDP	2	6.3
	C4C5, C5C6 IVDP	5	15.6
	C5 C6 IVDP	18	56.3
	C5 C6, C6 C7 IVDP	2	6.3
	C6 C7 IVDP	4	12.5
	Total	32	100.0

IVDP at C5-C6 level was seen to be the most common level of involvement and was seen in 18 of the 32 patients (56.3%). 4 patients (12.5%) had IVDP C6-C7, two patients (6.3%) had IVDP C4-C5 and seven patients (21.88%) had a 2 level disc prolapse. (5 patients had IVDP C4-C5, C5-C6, and 2 patients had IVDP C5-C6, C6-C7). There was no worsening of neurology in any of the patients following surgery.

Out of the 32 patients who participated in the study, the following complications were noted. 2 post-operative wound site infections were noted, one in a patient who belonged to the LSC implant group and the other from the APC implant group (6.66% each). These 2 cases requires regular dressings and healed by secondary intention.

One patient in the LSC group showed mild dysphagia post operatively (6.67%) which was no longer present at 6 weeks post operatively. While, 4 patients of the APC group showed dysphagia post operatively (26.6%), 3 of which subsided by 6 weeks post operatively and 1 patient had dysphagia upto 12 weeks post operatively, which subsided later. The difference in dysphagia between the 2 groups was statistically significant (p value<0.05). Two patients had transient recurrent laryngeal nerve palsy, on each in the LSC group and the APC group (6.67% each) was no longer present at 6 weeks post operatively.

Adjacent disc degeneration was developed in 1 patient of LSC group (6.67%) and 2 patients of the APC group (13.33%). Cage subsidence was noted in 3 patients of the LSC group (20%) and 1 patient of the

APC group (6.67%). The difference in the cage subsidence between the 2 groups was statistically significant (p value<0.05). CSF Leak in one patient in LSC group, who developed mild headache which reduced by the end of 5<sup>th</sup> post-operative day.

Table 4: Complications in Both Implant Groups

Complications	Implant	
	Locking Standalone Cage	Anterior Cervical Cage With Plate
Dysphagia	1	4
Transient Recurrent Laryngeal Nerve Palsy	1	1
Adjacent Segment degeneration	1	2
Cage Subsidence	3	1
CSF Leak	1	0
Wound Infection	1	1

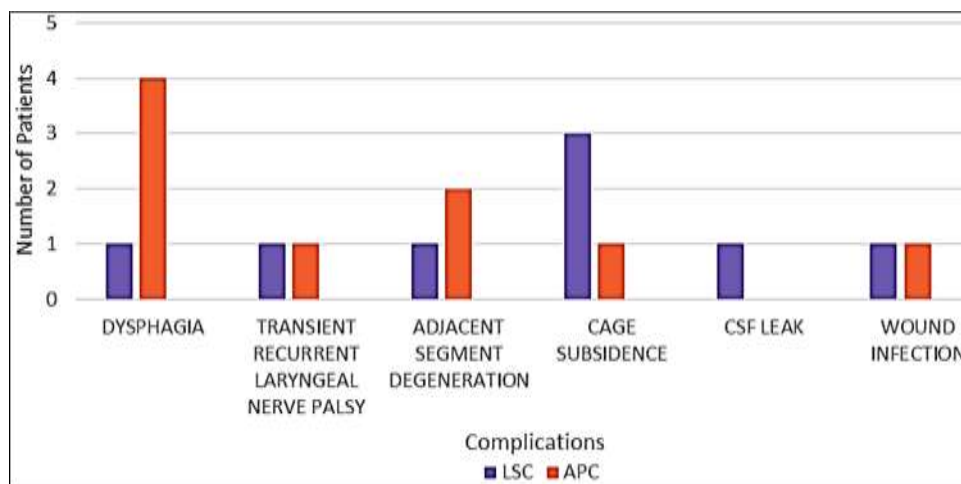


Fig 1: Complications in Both Implant Groups

**Discussion**

ACDF is established as the gold standard procedure for cervical radiculopathy and myelopathy. ACDF with anterior cervical plate has been shown to be an effective method of fusion. However, given the post-operative complications that have been attributed to the presence of an anterior plate, there has been a rising interest in the use of locking stand-alone cages that do not require plate fixation. Each method has its own advantages and disadvantages and our study was done with the intention of comparing the functional and radiological outcomes of these 2 implant groups. Several studies have shown that ACDF with anterior cervical plate is associated with dysphagia, adjacent segment degeneration and greater intra operative blood loss compared to stand alone cage, while the stand alone cage shows higher rates of cage subsidence, decreased post-operative disc height and less restoration of cervical lordosis [5].

Post-operative dysphagia is the most common complication of ACDF. The exact mechanism of dysphagia is unknown. Fountas *et al.* suggested that esophageal injury, soft tissue edema, hematoma and adhesion formation around the cervical plate are the potential contributors to the development of dysphagia. Fogel and McDonnell demonstrated in their meta-analysis that removal of an anterior plate and lysis of associated oesophageal adhesions significantly reduced rates of post-operative dysphagia in patients who have undergone ACDF. In our study, there is a higher rate of post-operative dysphagia (26.6%) in the plate with cage group compared to 6.7% in the cage alone group which was statistically significant (p value<0.05) [6].

Biomechanical studies have revealed that ACDF with a conventional cage plate technique affects the mechanical properties of the intervertebral discs at the adjacent levels to the fusion. There is increased stress and mobility in the adjacent segments after fusion, which potentially contributes to accelerated adjacent segment degeneration. ASD is associated with accelerated disc degeneration as well as sagittal malalignment, which may necessitate additional treatment months to years after the index surgery. The higher rate of ASD in the cage with plate technique is due to the proximity of the plate to the adjacent intervertebral disc. So, theoretically, the cage alone technique has a decreased rate of adjacent segment degeneration AO. In our study, adjacent segment degeneration rate was higher (13.33%) in the patients who underwent cage with plate procedure compared to 6.67% in patients who underwent stand-alone cage procedure [7, 8].

**Conclusion**

ACDF with the stand alone cage is associated with reduced incidence of post-operative dysphagia and adjacent segment degeneration compared to the anterior cervical cage with plate group, with the

additional benefits of shorter operative time and lesser intra operative soft tissue damage.

## References

1. Kwon WK, Kim PS, Ahn SY, *et al.* Analysis of associating factors with C2-7 sagittal vertical axis after two-level anterior cervical fusion: comparison between plate augmentation and stand-alone cages. *Spine (Phila Pa 1976)*. 2017;42:318-325.
2. Li Z, Zhao Y, Tang J, *et al.* A comparison of a new zero-profile, stand-alone Fidji cervical cage and anterior cervical plate for single and multilevel ACDF: a minimum 2-year follow-up study. *Eur Spine J*. 2017;26(4):1129-1139.
3. Kawakami M, Tamaki T, Yoshida M, Hayashi N, Ando M, Yamada H. Axial symptoms and cervical alignments after cervical anterior spinal fusion for patients with cervical myelopathy. *J Spinal Disord*. 1999;12(1):50-56.
4. John C Quinn, MD Paul D, Kiely MCh FRCh, Darren R, Lebl MD, Alexander P, *et al.* Anterior surgical treatment of cervical spondylotic myelopathy *HSS Journal*. 2015;11:15-25. Doi: 10.1007/s11420-9408-6
5. Zoe B, Cheung MD MS1, Sunder Gidumal BA1, Samuel White BA1, John Shin MD1, Kevin Phan MD MSc MPhil1, *et al.* Comparison of Anterior Cervical Discectomy and Fusion With a Stand-Alone Interbody Cage Versus a Conventional Cage-Plate Technique: A Systematic Review and Meta-Analysis-Global *Spine Journal*. 2019;9(4):446-455. Doi: 10.1177/2192568218774576
6. Fountas KN, Kapsalaki EZ, Nikolakakos LG, *et al.* Anterior cervical discectomy and fusion associated complication. *Spine (Phila Pa 1976)*. 2007;32(21):2310-2317.
7. Fogel GR, McDonnell MF. Surgical treatment of dysphagia after anterior cervical inter body fusion. *Spine J*. 2005;5(2):140-144.
8. Ahn SS, Paik HK, Chin DK, Kim SH, Kim DW, Ku MG. The fate of adjacent segments after anterior cervical discectomy and fusion: the influence of an anterior plate system. *World Neurosurg*. 2016;89:42-50.