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Anterior cervical discectomy and fusion with and without plate augmentation for degenerative diseases: A prospective comparative study

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Abstract
Background: Cervical disc herniation is commonly treated by anterior cervical discectomy and fusion (ACDF). Cervical plate fixation may decrease the micro-movement of the cervical spine, enhance the fusion rate, and correct the spinal curve to physiologic lordosis.
Aim and Objectives: The current work aimed to assess the operative outcomes of anterior cervical discectomy and fusion augmented by anterior plating compared with anterior cervical discectomy and fusion alone for the treatment of single or multilevel degenerative cervical disc herniation.
Patient and method: This work has been performed upon 30 adult cases with single or multilevel degenerative cervical disc herniations were divided equally and randomly into two groups: Group A was subjected to anterior cervical discectomy and fusion, Group B was subjected to anterior cervical discectomy and fusion augmented with anterior plating in the department of Neurosurgery, Tanta University Hospitals between February 2022 and February 2023.
Results: ACDF alone was done to 15 cases, 15 patients were with ACDF augmented by plate fixation. The Neck Disability Index **(**NDI) of the myelopathic patients in group A ranged from 30% to 50 % with a mean value of 38.33 ± 10.41%, in group B ranged from 25% to 30% with a mean value of 27.50 ± 3.54% before surgery. The postoperative NDI in group A ranged from 10% to 30% with a mean value of 18.33 ± 10.41%, and in group, B ranged from 10% to 15% with a mean value of 12.50 ± 3.54%. The pain was evaluated using an 11-point Visual Analog Scale. The preoperative (VAS) for neck pain in group A ranged from 4 to 9 with a mean value of 6.40 ± 1.35, and for brachialgia, and ranged from 5 to 10 with a mean value of 7.93 ± 1.33. In group B, it ranged from 5 to 8 with a mean value of 6.60 ± 1.12 for neck pain, and from 7 to 10 with a mean value of 8.07 ± 1.03 for brachialgia. The post-operative Visual Analogue Score (VAS) for neck pain in group A ranged from 1 to 3 with a mean value of 1.93 ± 0.70, and for brachialgia ranged from 1 to 3 with a mean value of 1.93 ± 0.80. In group B, the post-operative (VAS) ranged from 1 to 3 with a mean value of 1.93 ± 0.70 for neck pain, and from 1 to 3 with a mean value of 2.0 ± 0.65 for brachialgia.
Conclusion: This study revealed the efficacy, advantages, and limitations of two techniques used in the management of cervical degenerative disc disease.

Keywords: ACDF, degenerative cervical disc diseases, plate fixation, cage alone

Introduction
Cervical disc herniation results from the displacement of the nucleus pulposus of the intervertebral disc at the cervical level, which may result in direct compression of the spinal cord or impingement of nerve roots. Herniation of the nucleus pulposus (HNP) at the cervical level often results in radiculopathy, marked by compression and inflammation of the cervical nerve root near the neural foramen. Cervical HNP can be generally classified into four types: disc bulge, protrusion, extrusion, and sequestration [1].
Prolapse, in general, is considered to be the result of posterolateral annular stress compounded by natural degeneration of the disc [2]. The pathophysiology of herniated discs is thought to be a combination of mechanical compression of the nerve by the bulging nucleus pulposus and a local increase in inflammatory cytokines [3, 4].

Compressive forces can result in varying degrees of microvascular damage, which can range from mild compression producing obstruction of venous flow that causes congestion and edema, to severe compression, which can result in arterial ischemia [4].

Cervical disc herniation is commonly treated by anterior cervical discectomy and fusion (ACDF) if conservative treatment has failed. Cervical intervertebral disc replacement with a cage achieves immediate load-bearing support to the anterior column, restoration of disc height, and foraminal decompression and facilitates interbody fusion [5]. One of the complications of ACDF using a cage is the cage subsidence. Postoperative cage subsidence may occur during the follow-up period leading to subsequent foraminal stenosis. Patients may show recurrence of radiculopathy and axial neck pain after surgery [6]. Cervical plate fixation may decrease the micromovement of the cervical spine, enhance the fusion rate, and correct the spinal curve to physiologic lordosis [7].

Patients and Methods

This study was a prospective comparative study, and was performed upon 30 adult cases with single or multilevel degenerative cervical disc herniations were divided equally and randomly into two groups: Group A was subjected to anterior cervical discectomy and fusion, Group B was subjected to anterior cervical discectomy and fusion augmented with anterior plating in the department of Neurosurgery, Tanta University Hospitals between February 2022 and February 2023. Case characteristics were retrospectively gathered from the hospital and surgical room records. The authors omitted cases with incomplete information. Cases data, diagnoses, and treating outcomes were privately kept and cases were marked by codes. Informed consent was attained from all cases preoperatively.

Inclusion criteria

Symptomatic Single and multilevel cervical disc prolapse. After the failure of conservative medical treatment to control symptoms. (From 4 to 8 weeks in the absence of motor neurological deficit).

Exclusion criteria

Cervical trauma within the past 4 weeks, Patient with continuous ossified posterior longitudinal ligament, osteoporotic diseases, ongoing cervical infection, and cervical spine neoplasia.

Preoperative protocol

All cases were assessed and exposed to clinical history, general and neurological examinations, and routine laboratory tests. Special attention was given to knowing the distribution of pain to identify the affected root, and detection of motor and sensory deficits if present for documentation. Two pain scoring systems were used to record the patient's pre-operative degree of pain in a numerical fashion to be compared with the post-operative state to evaluate surgical outcome: Visual Analogue Scale (VAS) for both neck pain and brachialgia and The Neck Disability Index (NDI) for patients with motor power affection.

Radiological investigations: All cases were pre-operatively exposed to radiological assessment via X-ray in both anteroposterior and lateral views, CT scan, and MRI imaging.

The surgical procedure: All patients were treated in the supine position with the head in an extended position, and the hands were tied down ward underneath general anesthesia. There after confirmative the impacted level via the C-Arm, a transverse skin incision was made on the right side of the neck between the midline and medial border of the sternomastoid muscle. Subcutaneous dissection provided a larger surgical field, then the platysma was opened by blunt dissection. An avascular dissection plane was developed between the trachea and esophagus medially and the carotid sheath laterally. After the anterior vertebral column was exposed and peri vertebral fascia was opened by blunt dissection or. After that, another localizing lateral radiograph was taken to confirm the proper level. The longus colli muscles were elevated carefully and retraction was achieved via (cloward spreader). The disc space was opened and evacuated after a distraction by (Caspar Vertebral Distractor). PLL was opened by 1 mm Kerrison's rongeurs. Bone spurs that press on the nerve root were removed using 1 or 2 mm Kerrison's rongeurs using curette both end plates of upper and lower cervical vertebrae were prepared by removing the outer cortical layer of bone. After determining the size, the cage was filled with auto bone graft and inserted into the evacuated disc space under the guidance of C- ARM in the cage group. While in the plate group osteophytes were removed from the anterior aspect of the vertebra. Screws were used to fix the plate to the spine under the guidance of C-ARM. The screws were angled away from the graft. Then the wound was closed in layers.

Follow up

Post-operative care: All patients were encouraged to walk as tolerated. The post-operative patients' return to their normal daily activities depends on the overall medical condition with neurological & overall recovery. All patients were discharged within one day of surgery.

Clinical outcome: The follow-up period ranged from 3-12 months. First, the follow-up visit was 1 week after surgery and was mainly focused on the patient's recovery and mobility, and the integrity of the wound. The second follow-up visit was 2 weeks after surgery to remove stitches. The following visits were at 1 month, 3 months, 6 months, and 1 year after surgery. The postoperative results were based upon a subjective assessment by the same 2 scaling schemes used pre-operatively: The visual analog scale (VAS) and The Neck disability index (NDI).

Radiological follow-up: This was achieved by doing a plain X-ray of cervical spine anteroposterior and lateral views for all patients before discharge and after 9 months. C.T. cervical spine with 3-dimensional reconstruction for all patients to estimate the degree of fusion after 6 months.

Results

The age of the patients ranged from 33 to 65 years in group A, and in group B the age of the patients ranged from 33 to 60 years. The male-to-female ratio in the cage group was 66:34 and in the plate group was 60:40. Neck pain and brachialgia were the most common presenting complaints occurring in all patients (100%) of both study groups. 3

Patients in the cage group and 2 patients in the plate group were myelopathic and had sensory system affection on examination. In group A, 13.3% of patients had C3-C4 disc herniation, 6.7% had C4- C5 disc herniation, 20% had C5-C6 disc herniation, 26.7% had C6-C7 disc herniation, 6.7% had C4-C5/C5-C6 disc herniation, and 26.7% had C5-C6/C6- C7 disc herniation. In group B, 6.7% of patients had C3-C4 disc herniation, 6.7% had C4-C5 disc herniation, 26.7% had C5-C6 disc herniation, 26.7% had C6-C7 disc herniation, 13.3% had C4-C5/C5-C6 disc herniation, and 20% had C5-C6/C6-C7 disc herniation. The preoperative Visual Analogue Score (VAS) for neck pain of the patients in group A ranged from 4 to 9 with a mean value of 6.40 ± 1.35, and for arm pain or brachialgia ranged from 5 to 10 with a mean value of 7.93 ± 1.33. In group B, the preoperative Visual Analogue Score (VAS) of the patients ranged from 5 to 8 with a mean value of 6.60 ± 1.12 for neck pain, and from 7 to 10 with a mean value of 8.07 ± 1.03 for brachialgia. The post-operative Visual Analogue Score (VAS) for neck pain of the patients in group A ranged from 1 to 3 with a mean value of 1.93 ± 0.70, and for brachialgia ranged from 1 to 3 with a mean value of 1.93 ± 0.80. In group B, the post-operative Visual Analogue Score (VAS) of the patients ranged from 1 to 3 with a mean value of 1.93 ± 0.70 for neck pain, and from 1 to 3 with a mean value of 2.0 ± 0.65 for brachialgia. At the final follow up Visual Analogue Score (VAS) for neck pain of the patients in group A ranged from 1 to 2 with a mean value of 1.27 ± 0.46, and for brachialgia ranged from 1 to 2 with a mean value of 1.47 ± 0.52. In group B, the final follow-up Visual Analogue Score (VAS) of the patients ranged from 1 to 2 with a mean value of 1.40 ± 0.51 for neck pain, and from 1 to 2 with a mean value of 1.33 ± 0.49 for brachialgia. The preoperative Neck Disability Index of the myelopathic patients in group A ranged from 30% to 50 % with a mean value of 38.33 ± 10.41%, and the preoperative Neck Disability Index of the myelopathic patients in group B ranged from 25% to 30% with a mean value of 27.50 ± 3.54%. The postoperative Neck Disability Index of the myelopathic patients in group A ranged from 10% to 30% with a mean value of 18.33 ± 10.41%. The postoperative Neck Disability Index of the myelopathic patients in group B ranged from 10% to 15% with a mean value of 12.50 ± 3.54%. At the final follow up Neck Disability Index of the myelopathic patients in group A ranged from 5% to 20% with a mean value of 11.67 ± 7.64, while in group B ranged from 5% to 5% with a mean value of 5.0 ± 0.0%. The operative time in group A ranged from 55 minutes to 75 minutes for single with a mean value of 66.50 ± 6.69 minutes for single level, and from 100 minutes to 120 minutes with a mean value of 108.0 ± 8.37 minutes for double level. In group B, it ranged from 65 minutes to 90 minutes for single with a mean value of 77.0 ± 7.53 minutes for single level, and from 115 minutes to 140 minutes with a mean value of 126.0 ± 9.62 minutes for double level. The p-value was 0.007 for the single level and 0.016 for the double level. No remarkable intraoperative incidents were encountered in both group. The operative time was significantly longer in the plate group (mean time 77.0 ± 7.53 minutes for single level and 126.0 ± 9.62 for double level) than in the cage group (mean time 66.50 ± 6.69 minutes for single level and 108.0 ± 8.37 for double level). Intraoperative blood loss was less in the cage group, however insignificant in both groups. Transient dysphagia occurred in 1 case in the cage group and 2 cases in the plate group. Transient postoperative hoarseness of voice occurred in 1 case in the cage group and 3 cases in the plate group. Postoperative hospital stay was nearly equal in both groups (mean time 1.55 days for group A and mean time 2.25 days for group B).

Discussion

In this study, thirty patients with degenerative cervical disc prolapse were enrolled in The Neuro-surgery dep., at Tanta University Hospital in the interval between February 2022 and February 2023. Group A was subjected to anterior cervical discectomy and fusion, Group B was subjected to anterior cervical discectomy and fusion augmented with anterior plating

In our study, neck pain, and brachialgia were present in all patients of both groups (100%) pre-operatively. 17% of patients had myelopathy and sensory system affection in the form of numbness or hypoesthesia (3 patients in ACDF without plate group and 2 patients in ACDF with plate). Zhou, J. et al. study (8) had similar figures, where all patients suffered neck pain. However, 70% had radicular pain, 39%were myelopathic. Li, Z. et al series [9] results were also close to those in ACDF without plate patients, all patients had radicular pain and neck pain (100%). Myelopathy was found in 20% of patients. In ACDF with plate group, all patients had neck pain (100%). 95% of patients complained of radicular pain. Only 10% of patients had myelopathy.

Regarding levels of disc herniations coped with Zhou, J. et al. study [8] which stated in group A, 35% of patients had C3-C4 disc herniation, 45% had C4-C5 disc herniation, 56% had C5-C6 disc herniation, 49% had C6-C7 disc herniation, 39% of patients underwent single-level ACDF, 35% of patients underwent double level ACDF, 25% of patients underwent triple level ACDF. In group B, 34% of patients had C3-C4 disc herniation, 42% had C4-C5 disc herniation, 58% had C5-C6 disc herniation, 47% had C6- C7 disc herniation, 45% of patients underwent single-level ACDF, 30% of patients underwent double level ACDF, 25% of patients underwent triple level ACDF. In Perrini, P. et al series (10), forty-four interventions were performed at the C5-C6-C7 levels (47% of patients underwent double level ACDF without plate and 10% underwent double level ACDF with plate); 27 at C4-C5-C6 levels (19% patients underwent double level ACDF without plate and in 15% underwent double level ACDF with plate); 7 at C3-C4-C5 levels (5% patients underwent double level ACDF without plate and in 4% underwent double level ACDF with plate)

In concern pre and post-operative VAS and NDI results were similar to those which were obtained in Li, Z. et al. study [9], after ACDF without plate, VAS for brachialgia and NDI scores decreased from 6.0 ± 1.7 and 16.9 ± 3.0 % to 1.7 ± 0.6 and 10.7 ± 2.1 %, respectively, while after ACDF with plate fixation VAS and NDI scores decreased from 6.1 ± 1.6 and 17.0 ± 2.9 % to 1.8 ± 0.5 and 10.5 ± 2.1 %, respectively. Kim SY. et al series [11] had the mean pre-op VAS score was 7.08±2.02 in the one-level cage-only group and 7.89±1.85 in the cage-with-plate fixation group. The follow-up mean VAS at 24 months was 2.46±2.06 in the one-level cage-only group and 3.18±2.21 in the cage-with-plate fixation group, both of which represent a tangible improvement. In the two-level fusion groups, the pre-op mean VAS score was 7.67±2.15 in the cage-only group and 6.5±1.85 in the cage-

with-plate fixation group. The follow-up mean VAS at 12 months was 3.57±1.94 in the two-level cage-only group and 5.12±1.34 in the cage-with-plate fixation group. Although the VAS score was significantly lower in the cage-only group (p=0.026), the follow-up mean VAS at 24 months was not significantly different. Moreover, the pre-op mean NDI score was 33.42±14.93 in the one-level cage-only group and 38.79±13.07 in the one-level cage-with-plate fixation group (p=0.173). The mean NDI score was significantly lower in the cage-only group at 3-month follow-ups (26.16±13.93 and 34.05±12.75, p=0.039), 12-month follow-ups (26.74±10.42 and 34.05±12.33, p=0.025), and 24-month follow-ups (19.33±10.72 and 28.57±12, p=0.005). The pre-op mean NDI score was 37.0±18.12 in the two-level cage-only group and 38.20±13.84 in the cage-with-plate fixation group (p=0.846). A slightly higher improvement in VAS score is noted in our study after a shorter period. In Nemoto, O. et al series [12], preoperatively the neck and arm VAS scores were 4.3 ± 1.4 and 6.4 ± 1.2, respectively, in group A, and 4.5 ± 1.3 and 6.5 ± 1.1, respectively, in group B. After surgery, the VAS scores for the neck and arm decreased significantly in both groups. At 12 months after surgery, the neck and arm VAS scores were 1.50 ± 0.60 and 0.5 ± 0.5, respectively, in group A, and (1.3 ± 0.6 and 0.6 ± 0.5, respectively), in group B.

The operative time results were consistent with the results in Zhou, J. et al. study [8], which stated that compared to ACDF without a plate group, the operative time in ACDF with a plate group was longer. The ACDF without plate group mean operative time was 69.3 ± 9.6 minutes for a single level, and in double level mean operative time was 117.2 ± 12.3 minutes, while for ACDF with plate group, the mean operative time was 83.7 ± 7.7 minutes for a single level and 138.5 ± 14.1 minutes for double level.

The amount of blood loss was quite similar to many of the published studies, In Tabaraee, E. et al. series [13], the mean intraoperative blood loss was 36.5 ± 19.5 ml in the cage group. While the mean intraoperative blood loss was 71.9 ± 31.2 ml in the plate group. However, both groups had negligible blood loss with no clinical significance.

Regarding post-operative complications in this study, transient dysphagia occurred in one patient (6.7%) in group A, and 3 patients (20%) in group B. In Zhou, J. et al. series [8] one case had transient dysphagia in the cage group (1.9%), which was completely cured after 3 months. In the plate group, 5 cases suffered from dysphagia (10.5%), all cases were cured after 3 months except one case had permanent dysphagia. In Li, Z. et al series [9] cases had transient dysphagia in the cage group (6.4%), which was completely cured after 3 months, except one case had permanent dysphagia. In the plate group, 13 cases suffered from dysphagia (18.6%), all cases were cured after 3 months except 4 cases had permanent dysphagia. P value was significant between the two groups. Similar results were found in the Perrini, P. et al. series [10] which reported that (0.04%) of the cage and 0.9% of the plate group had transient dysphagia.

Regarding postoperative hoarseness of voice, it occurred in one case in the cage group (6.7%) and two cases (13%) in the plate group in our study, but was transient in all 3 cases and improved after 2 weeks in 2 cases and 2 months in the third case. Zhou, J. et al. series [8] reported no patients complained of hoarseness of voice in both groups. In Li, Z. et al series [9], postoperative hoarseness of voice happened in 4.4% of cases after ACDF without a plate and 4.3% of cases after ACDF with a plate, both treated conservatively.

In our study, no cases were complicated by pseudo arthrosis, cage subsidence, or hardware failure, as fusion occurred in all cases in our study. This was the same result as in Zhou, J. et al. series [8] reported no patient (4.8%) in either group experienced any complications related to hardware. Li, Z. et al series [9], reported no cases in group A suffered from implant complications, but twelve patients experienced cage subsidence (9.8%). In group B, five patients had complications related to implant (5.2%), and nine patients suffered from cage subsidence (7.2%). In Tabaraee, E. et al. series [13], only one patient had pseudo arthrosis in the cage group (1.9%).

In this study, no cases were complicated by adjacent segment disease or worsening myelopathy or radiculopathy. These results also match the results in Zhou, J. et al. series (8) in which there was no mention of complications. On the contrary, Li, Z. et al series [9] reported four cases after ACDF without plate complicated with ASD (9.8%), and eight cases (16.3%) were complicated with ASD in the plate group. In Tabaraee, E. et al. series [13], one case was complicated with ASD in group A (1.9%), while in group B two cases had ASD (4.9%).

In this study, the minimal time before discharge was 48 hours postoperatively, The obtained results are consistent with the results of Perrini, P. et al. series [10], which mentioned that mean hospital stay was 2.30 ± 0.54 days in the cage group and 2.41 ± 0.59 days in plate group.

Regarding fusion rate, all 30 patients in both ACDF without plate and ACDF with plate groups had the same fusion rate (100%). The obtained results are consistent with the results of Zhou, J. et al. series [8], the fusion rate was 100% in both groups and also in Ji, G. Y. et al. series [14], the fusion rate was 100% in both groups.

Conclusion

Our randomized clinical trial showed no significant differences between the cage group and plate group in terms of improvements in the NDI, VAS scores, and fusion rate. However, cases treated with the cage only were associated with a slightly lower risk of postoperative dysphagia and hoarseness of voice, shorter operative time, and less blood loss compared with those cases with the anterior plate fixation for ACDF. Overall, the results showed that the cage was more effective, reliable, and safe than the cage and anterior plating in the treatment of CDDD.

Table 1: Comparison between the two studied groups according to neck disability index

Neck disability index	Group A (n = 3)		Group B (n = 2)		Test of Sig	p
	No.	%	No.	%		
Pre-operative						
Minimal	0	0.0	0	0.0	χ^2= 0.833	^{FE}p= 1.000
Moderate	2	66.7	2	100.0		
Severe disability	1	33.3	0	0.0		

Cripple	0	0.0	0	0.0		
Min. – Max.	30.0-50.0		25.0-30.0		U= 0.500	0.200
Mean ± SD.	38.33 ± 10.41		27.50 ± 3.54			
Median (IQR)	35.0 (32.50-42.50)		27.50 (25.0 – 30.0)			
Post-operative						
Minimal	0	0.0	0	0.0	χ^2= 0.833	^{FE}p= 1.000
Moderate	2	66.7	2	100.0		
Severe disability	1	33.3	0	0.0		
Cripple	0	0.0	0	0.0		
Min. – Max.	10.0-30.0		10.0-15.0		U= 2.0	0.800
Mean ± SD.	18.33 ± 10.41		12.50 ± 3.54			
Median (IQR)	15.0 (12.50-22.50)		12.50 (10.0-15.0)			
After 6 months						
Minimal	2	66.7	2	100.0	χ^2= 0.833	^{FE}p= 1.000
Moderate	1	33.3	0	0.0		
Severe disability	0	0.0	0	0.0		
Cripple	0	0.0	0	0.0		
Min. – Max.	5.0-20.0		5.0-5.0		U= 1.0	0.400
Mean ± SD.	11.67 ± 7.64		5.0 ± 0.0			
Median (IQR)	10.0 (7.50-15.0)		5.0			

Table 2: Comparison between the two studied groups according to mean visual analogue score

	Visual analogue score	Group A (n = 15)	Group B (n = 15)	U	p
Neck pain	**Pre-operative**				
	Min.-Max.	4.0-9.0	5.0-8.0	101.50	0.653
	Mean ± SD.	6.40 ± 1.35	6.60 ± 1.12		
	Median (IQR)	6.0 (5.50-7.0)	7.0 (6.0-7.50)		
	Post-operative				
	Min.-Max.	1.0-3.0	1.0-3.0	112.50	1.000
	Mean ± SD.	1.93 ± 0.70	1.93 ± 0.70		
	Median (IQR)	2.0 (1.50-2.0)	2.0 (1.50-2.0)		
	Final follow up				
	Min.-Max.	1.0-2.0	1.0-2.0	97.50	0.539
	Mean ± SD.	1.27 ± 0.46	1.40 ± 0.51		
	Median (IQR)	1.0 (1.0-1.50)	1.0 (1.0-2.0)		
Brachialgia	**Pre-operative**				
	Min.-Max.	5.0-10.0	7.0-10.0	108.50	0.870
	Mean ± SD.	7.93 ± 1.33	8.07 ± 1.03		
	Median (IQR)	8.0 (7.0-9.0)	8.0 (7.0-8.50)		
	Post-operative				
	Min.-Max.	1.0-3.0	1.0-3.0	106.50	0.806
	Mean ± SD.	1.93 ± 0.80	2.0 ± 0.65		
	Median (IQR)	2.0 (1.0-2.50)	2.0 (2.0-2.0)		
	Final follow up				
	Min.-Max.	1.0-2.0	1.0-2.0	97.50	0.539
	Mean ± SD.	1.47 ± 0.52	1.33 ± 0.49		
	Median (IQR)	1.0 (1.0-2.0)	1.0 (1.0-2.0)		

Table 3: Comparison between the two studied groups according to post-operative complication

	Group A (n = 15)		Group B (n = 15)		χ^2	^{FE}p
	No.	%	No.	%		
CSF leak	0	0.0	0	0.0	–	–
Adjacent segment disease	0	0.0	0	0.0	–	–
Dysphagia	1	6.7	3	20.0	1.154	0.598
Cage subsidence	0	0.0	0	0.0	–	–
Pseudo arthrosis	0	0.0	0	0.0	–	–
Infection	0	0.0	0	0.0	–	–
Hoarseness of voice	1	6.7	2	13.3	0.370	1.000
Horner's syndrome	0	0.0	0	0.0	–	–
Worsening myelopathy	0	0.0	0	0.0	–	–
Hard ware failure	0	0.0	0	0.0	–	–

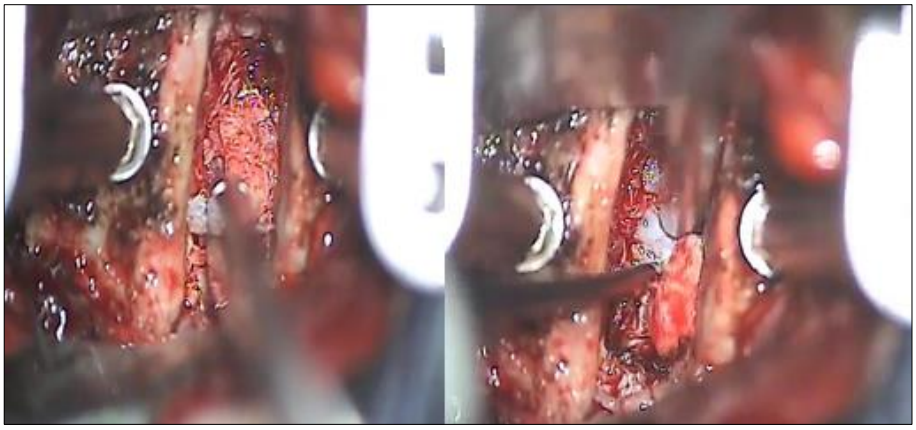

Fig 1: Intra operative removing of disc fragment

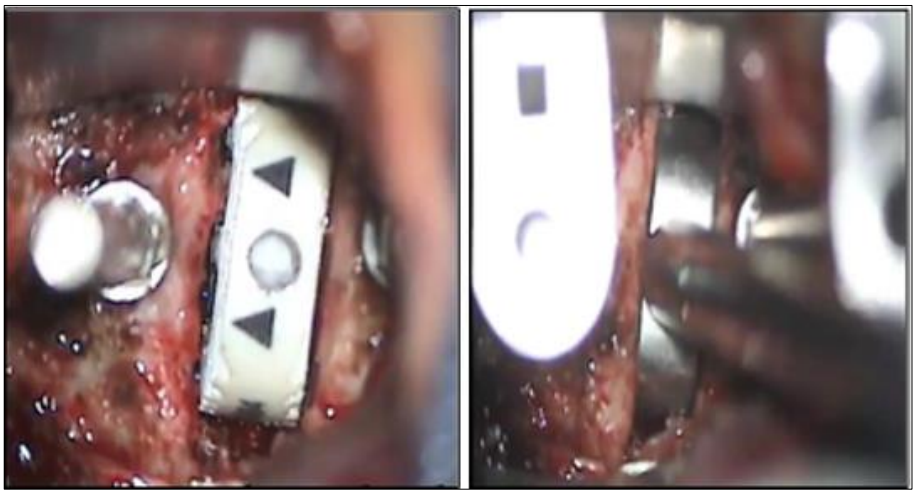

Fig 2: Intra operative images of insertion of the cage which contained bone graft into evacuated disc space

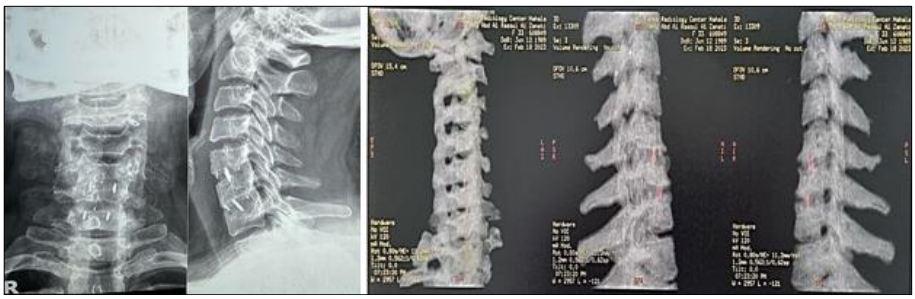

Fig 3: Postoperative cervical spine X-ray A-P and lateral views and 3D CT showing bony fusion at level of C5-C6, C6-C7

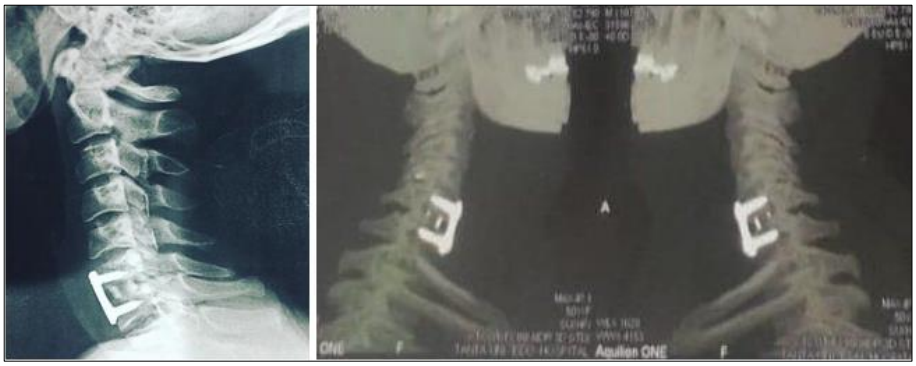

Fig 4: Postoperative cervical spine X-ray lateral view AND 3D CT showing bony fusion after 9 months of operation at level of C6-C7

Declaration
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All participants in the research agree to publish.

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