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Cervical Disc Prolapse – Clinical Presentation, Management, Post Operative Outcome and Complications

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Abstract:
Aims: *To Study and Analyze the Clinical presentation, Management, post operative outcome and complications in a series of patients with cervical disc prolapse who underwent anterior cervical discectomy and bone graft fusion with Titanium Recon plating between JANUARY 2013 to DECEMBER 2014 at Government General Hospital Guntur.*

Objectives

1. *to Study and Analyze the Clinical presentation, Management, post operative outcome and complications in a series of patients with cervical disc prolapse.*
2. *To assess and compare our own results, using standard anterior cervical discectomy with bone graft fusion with Titanium Recon plating as a better surgical procedure than ACDF alone in the treatment of cervical disc prolapse.*

I. Introduction

The cervical disc prolapse with myelopathy, radiculopathy and myelo radiculopathy has been discussed in the neurosurgical literature for decades. Sir Victor Horsley[24] decompressed the cervical spinal cord of a patient with progressive cervical spondylotic myelopathy in 1901.The anterior treatment of cervical disc problems was reported by Bailey and Bagdley[5] in 1960. Robinson and Smith [54] first described the most widely used anterior operation in 1955 and made a further excellent report in 1958[61]. Cloward[11] described his anterior operation using a bone plug technique in 1958. Caspar developed a trapezoidal rigid plate with bicortical screws in 1980 for use in cervical spine

[67] Prevalence of cervical disc prolapse increases significantly with age with 15% affected at 34 years of age, 60% at 54 years, and to 90% at 65 years and older. Peak incidence is observed in 4th and 5th decades with males more affected than females. Clinical symptoms can be due to central disc extrusion with cord compression, cervical radiculopathy or cervical spondylotic myelopathy & myeloradiculopathy.

II. Material And Methods

Forty seven patients with cervical disc prolapse at one or multiple levels have been admitted, evaluated and operated by Anterior cervical discectomy with bone graft fusion and plating at government General Hospital, Guntur during the period January 2013 to December 2014. All these patients underwent detailed clinical evaluation and their neurological deficits have been recorded. The clinical presentations have been classified as radiculopathy, myelopathy and myeloradiculopathy. All these patients have been investigated with plain X-rays cervical spine and MRI of cervical spine. Postoperatively these patients have been followed up for first 15 days and there after every month by detailed clinical evaluation and postoperative x-rays cervical spine to assess the graft fusion and postoperative outcomes.

Inclusion Criteria
Patients with cervical disc prolapse with neurological deficits'.

Exclusion criteria

- Cases with severe comorbid conditions preventing surgical intervention
- Cases with infection, bone disease, neoplasm, pathological fractures.
- Cases with previous cervical surgery

- Cases with congenital and spinal anomalies
- Cases with traumatic cervical spine injuries.

III. Results

During January 2013 to December 2014, 155 cervical spine cases were operated, out of which 47 cases belonged to cervical discectomy with bone graft fusion and plating. The incidence of these cases among cervical spine surgery in the present study is 30.32%

Age Incidence

Related to the age, maximum observed in between 40 – 50 years, minimum age noted at 22 years, maximum 72 years.

Sex incidence

Male – Female incidence showed the male preponderance with 38 cases and female with 9 cases

Clinical Presentation : The relative incidence of symptoms and signs

Myelo Radiculopathy	: 20	: 42.55%
Myelopathy	: 18	: 38.29%
Radiculopathy	: 9	: 19.14%

Spinal Level Involvement

Spinal level

Maximum involved at the level of C_{5-6} taking the percentage of 48.93%;

C_{6-7} 36.17%, C_{4-5} 17.02%;		
Single levels	: 44	- 93.61%
Two levels	: 3	- 6.38%
Three levels	: nil	- 0%

Post operative outcome

Following surgery, patients were evaluated by Odom's criteria[42], Pre and post operative MRC grading[71] of muscle power and Nurick grading[26]. According this criteria, 37 out of 47 had an excellent outcome; 6 had a good outcome; 3 had fair outcome and 1 had poor out come.

Table-1: Summary statistics of Neuric grade in pre and post operative states

	Neuric Grade	**N**	**Mean**	**SD**	**Minimum**	**Maximum**
	Pre operative	47	4.13	0.9	3	5
	Post operative	47	3.66	1.185	2	5

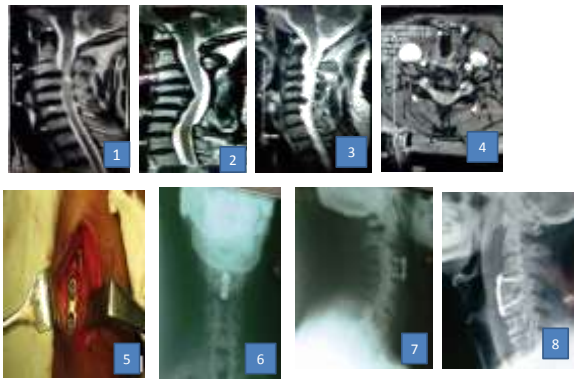
Table-7 :Comparison of mean parameters of Neuric Grades, MRC Muscle Power Grades of pre and post operative states with age

	Mean score		Z-Value		P-value		Inference	
Parameter	Operation				Age			
	< 50	≥50	<50	≥50	<50	≥50	<50	≥50
	4.06	4.29						
Neuric grade	Pre		-3.7	-2.8	<0.01	<0.01	HS	HS
	Post	3.64	3.71					

	UL-MRC			Pre		2.67		2.64													
	Muscle									-3		-2		<0.01			<0.05		HS		S
	Power Grade			Post		2.94		2.93													
	LL-MRC																				
	Muscle			Pre		2.39		2.43		-3.6		-2.2		<0.01			0.03		HS		S
	Power Grade			Post		3.18		3.14													
	UL-Upper Limb, LL-Lower Limb HS-Highly Significant													S-Significant							

Bone graft fusion rates in our study were 75%, 95.74% and 100% at end of 4 months, 4 to 8 months and 8-12 months respectively when compared to 64% (< 4 months), 89% (4-8 months) and 94% (8-12 months) for ACDF and 70% (< 4 months), 93% (4-8 months) and 98% (8-12 months) for ACDFP in RJ Mobbs[50] et al study. Maximum fusion rates have been observed between 5 – 8 months of post operative period.

complications :		
1.	Mortality	Nil
2.	Nil	
3.	Disc space infection	2
4.	Implant removal	2(uncontrolled disc space infections)
5.	CSF leaks	2 (improved with lumbar drains)
6.	Recurrent laryngeal nerve palsy	2(neuropraxia improved with steroids)
7.	Oesophageal injury	Nil
8.	Tracheal injury	Nil
9.	Cervical sympathetic injury	Nil
10. Vasular injury		Nil
11. Kyphosis		Nil
12. Non union		Nil
13. Dysphagia		Nil
14. Neurological deterioration		Nil
15. Donor site complications		Nil



1. Mri Sagittal Section : C3-C4 Pivd
2. Mri Sagittal Section : C4-C5 Pivd
3. Mri Sagittal Section : C5-C6 Pivd
4. Mri Axial Section: C5-C6 Pivd
5. Intraoperative Photographs Showing Bone Graft With Plates And Screws Insitu
6. Post Operative X-Rays Showing Bone Graftwith Plates And Screws Insitu At C3-C4 Level
7. Post Operative X-Ray C-Spine Lateral View Of C3-4 Fixation
8. Post Operative X-Ray C-Spine Lateral View Of C4-5 Fixation

IV. Discussion

A prospective study of 47 cases with cervical disc prolapsed who undergone anterior cervical discectomy and autogenous bone graft fusion with plating is carried out at Government General Hospital, Guntur from January 2013 to December 2014.

All the cases were operated by a single surgeon, to avoid the inter surgeon bias. An analysis of clinical presentation, mode of management, post operative outcome and complications are discussed below.

Clinical Presentation

TABLE – 8

	Present study	**Lunsford Study**
Myelo Radiculopathy	42.55%	41%
Myelopathy	38.29%	40%
Radiculopathy	19.14%	19%

Disc Involvement :

Regarding Disc distribution this study showed the C_{5-6} -48.93%; C_{6-7} –36.17%; C_{4-5} -17.02% and C_{3-4} - 4.25% respectively.

In Lunsford[32] et al (28) reported the similar representation with C_{5-6}-48%; C_{6-7}-37%; C_{4-5} -10%.which is comparative with the present study.

In Caspar[72] et al study the disc involvement is as follows c_{5-6} – 45.5%, C_{6-7} -36.2%, C_{4-5}-11.4%,C_{3-4} -3%. Which is comparative with the present study

Postoperative Outcome:

Coming to the post operative surgical out come and results, based on preoperative and postoperative MRC[71] muscle power gradings, Nurick[26] gradings and utilizing the criteria set out by Odom[42] et al, out of a total 47 patients, 78.72% had excellent outcome, 12.76% had good outcome, 6.38% had fair out come. 2.12% had poor out come. When compared with white cloud series based on Odoms criteria which showed the 70% good and excellent

Results, 17% Fair Results, 9%, Poor Results This Study Shows		Better Results.
In	Aronson[4] Study Which Showed 87% Good	And Excellent Out
Come,10%	Fair Outcome, 3 % Poor Outcome Which Are Comparable With Our	
Study.		
	53	

In Ralph J. Mobbs, K.C chandran[50] and P Prakasha rao study the post operative outcome is as follows. Excellent 78%, good 14%, fair 7%, poor 1 % which are comparable with our present study.

In this study mortality rate is 0%. In this study there is no graft extrusion, graft collapse or graft migration (0%) when compared to other series like Graham[19] in which graft extrusion is about 5 – 6% and 1% in Ralph J. Mobbs[50] etal study.In this study we encountered 2 (4.25%) patients with disc space infections which could not be controlled with conserative management and eventually lead to removal of Implants and debridement in the two patients and later the infection is controlled and patients had been discharged without neurological deterioration when compared to (1%)disc space infection, (1%) implant removal in Ralph J. Mobbs[50], chandran and prakasarao series.

In this study we encountered 2 patients with CSF leaks in the immediate post operative period who were managed with antibiotics and placement of lumbar drains and discharged uneventfully which were not reported in other similar series.In this study we encountered 2 patients with transient recurrent laryngeal nerve paresis(Neuropraxia) which improved with over a period of 1 month when compared to (1%)recurrent laryngeal nerve injury in Bulger[9] series.In our study no oesophageal, tracheal, or cervical sympathetic injury have ocurred which have been reported in Graham[19] and Jew series.In our study no vascular injury had ocurred as reported in white cloud[6] series.In our study no postoperative kyphosis(0%) is seen when compared to 3 patients reported in Ralph J. Mobbs[50] etalstudy.In our study cases with non union is(0%) when compared to 9 patients with Non union as reported in Ralph J. Mobbs[50] study.In our study cases with dysphagia is nil (0%) when compared to 6 patients with dysphagia as reported in Ralph J. Mobbs[50] study.In our study neurological deterioration is (0%) when compared to 1.3% as reported in Flynn study and 1 in Ralph J. Mobbs[50] etal study.

In our study donor site complications like infection, localised pain and meralgia paraesthetica is nil (0%) when compared to 22%(meralgia paresthetica – 14%; localized pain – 8%) in Jeffrey[25] series and 8 patients in Ralph J. Mobbs[50] etal study.

TABLE – 11

Complications	Present Study	Grahams[19]	Bulger[9]	Flynn[17]	Jeffery[25] Series	Ralph J. Mobbs [50] etal study	White Cloud[69] Series
Mortality	Nil (0%)	--	--	--	--	--	--
Graft migration/ Extrusion/Collapse	2 (4.25%)	5 -6 %	--	--	--	1	--
Disc space Infection	2% (4.25%)	--	--	--	--	1	--
Implant removal	2% (4.25%)	--	--	--	--	1	--
CSF leaks	2%(4.25%)	--	--	--	---	---	--
Recurrent	2(4.25%)	--	1%	--	--	- - -	--
Laryngeal Nerve Injury							
Oesophageal Injury	0%	present					--
Tracheal injury	0%	present					--
Cervical sympathetic injury	0%	Present					--
Vasular injury	0%	NIL	NIL	NIL	NIL	NIL	present
Kyphosis	0%	--	--	---	---	3	--
Nonunion	0%	--	--	--	--	9	--
Dysphagia	0%	--	--	---	---	6	---
Neurological deterioration	0%	---	--	1.3%	---	1	---
Donor site complications	0%	--	--	--	22%	8	--

These results showed that anterior cervical discectomy with autogenous bone graft fusion with plating appears to be an effective method of management for most cases of cervical disc prolapse with better post operative outcomes and less complications when compared with other methods of management facilitating better graft stability and fusion as shown by most of the similar series including the present study.

V. Conclusion

- Cervical disc prolapse is a degenerative condition of cervical spine affecting mostly the individuals aged between 40 -50 years with tendencytowards male preponderance affecting males more than females.
- The commonest clinical presentation is myeloradiculopathy followed by myelopathy followed by radiculopathy in the descending order ofpresentation.
- The commonest disc affected is C5 - C6 followed by C6 - C7 followed by C4 - C5 in the descending order of frequency.
- Anterior cervical discectomy with autogenous bone graft with plating appears to be the most effective method of management for most cases of cervical disc prolapsed with better postoperative out comes and less complications when compared with other methods of management facilitating better graft stability and fusion as shown by most of the similar series including the present study.
- We conclude that a conservative construct utilizing a single screw per vertebral body and a simple one hold plate system appears to be strong enough to afford stability in nontraumatic lesions of sub axial spine comparable to other currently used constructs.
- This is time efficient and could be cost effective and had considerably less metal burden on the spine .Our results also suggest that in single level lesions this construction can be used safely with complete success

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