UNITED HOSPITAL
Care Par Excellence
Jayanagar, Bangalore

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Focus On SPINE SURGERY

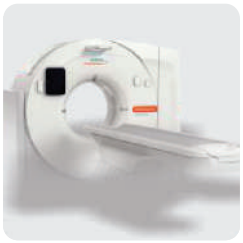
EDITORIAL BOARD

ISSUE HIGHLIGHTS

Message from the Chairman & Managing Director

Dr. Vikram Siddareddy
Chairman and
Managing Director

"The philosophy of United Hospital is to implement safe, leading-edge care and to develop medical professionals to give our patients care par excellence. In order to realize this philosophy, the hospital has set stringent standards in all our processes. In this past year we have been able to prove our mettle and gain the trust of our patients. We have also been recognized for our work on various platforms.We are launching this periodic newsletter to introduce our expert panel of doctors and their outstanding clinical achievements."



Message from the Executive Director

Dr Shanthkumar Muruda
Executive Director

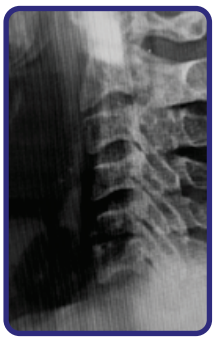
We are redefining healthcare in United Hospital Bengaluru, a trusted name in comprehensive tertiary care services. Our facilities are state of the art and all our processes are patient centric. Within months of inauguration of our hospital we have acquired both NABL and NABH certifications .This ensures confidence in doctors and patients working with us. We offer quality services in Trauma, Critical care and Super Speciality surgeries.

Cervical C5/C6 Spondylodiscitis with C5 Vertebral collapse & Myelopathy in a patient with uncontrolled Diabetes Mellitus and with Renal Failure

Dr. Subodh M Shetty
MBBS, MS Ortho
Senior Consultant Spine Surgeon

Dr. Subodh M Shetty graduated from Kasturba Medical College, Manipal in 1992. His basic orthopedic training was at KMC, Manipal, and JNMC, Belgaum. He worked at City Hospital and Research Centre with Prof Shantharam Shetty at Mangalore. In Lilavati Hospital, Mumbai worked as spine fellow under Prof P S Ramani.
He got trained in minimally invasive spine surgery at Fujita Health University in Japan. His training in pediatric spine surgery and deformity correction was in Germany. He has attended international conferences in Japan, Switzerland, Netherlands and updated himself in recent trends in spine surgery. He is an expert in treating slipped disc problems of the neck and lower back using minimal invasion techniques. He has been treating pediatric spine problems.

A 53 yrs old Businessman with uncontrolled Diabetes Mellitus and acute Renal Failure with Septic Foci in urinary bladder developed weakness of all four limbs with severe neck pain and swaying of gait and was progressive in nature.

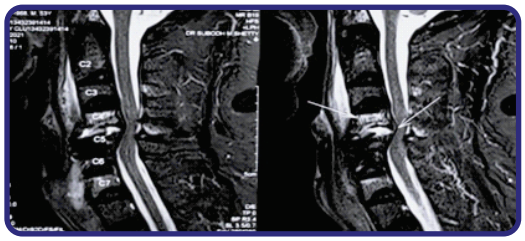


{C5/C6 Spondylodiscitis}

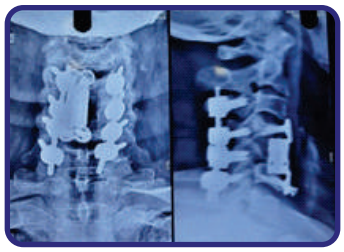
After the X-Ray and MRI was done, the diagnosis was confirmed to be collapse of the vertebral body with Spondylodiscitis of C5/C6 and epidural abscess compressing the spinal cord resulting in Mylomalacia at C5/C6 disc level and Quadriparasis.

Here the challenges were of uncontrolled Diabetes and impending Renal failure was a threat to the implantation at the infected site and at the same time the threat of further deterioration of spinal cord function had to be prevented before it causes irreversible spinal cord damage.

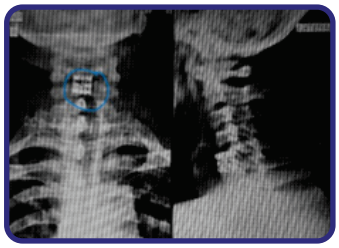
So as planned it was a 2 stage procedure. In the 1st stage the spinal cord was approached anteriorly at C5/C6 disc level and the debridement of all the dead tissues firstly was done so that the spinal cord was decompressed and the void created in the spinal column was stabilized using a Titanium gadget at C5/C6 level. Post surgery the diabetes and the renal function was kept under control.



{ MRI showing spinal cord compression with epidural abscess}



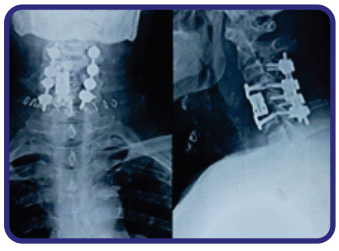
{Follow up x-ray with good stability & fusion}



{ First stage procedure}

In the first stage the goal was to decompress the cord , maintain the spinal column height and control infection and this was done as a intermediary procedure .

The second stage procedure was planned once the infection was controlled and during second stage procedure the Titanium cage was removed to achieve the stability and fusion of the unstable cervical spine .The Cervical plate and screw was fixed anteriorly and the lateral mass was fixed through posteriorly.



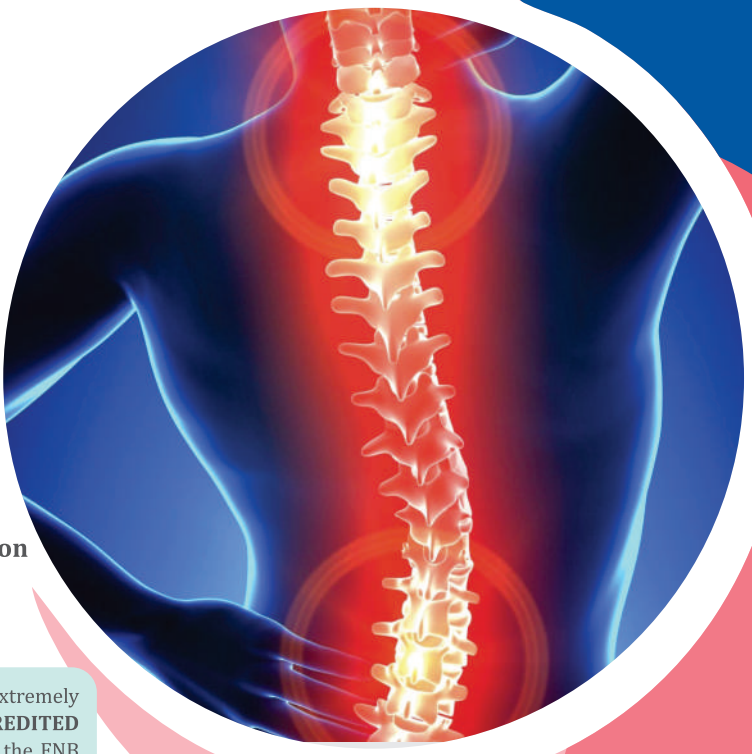
{Second stage procedure}

The patient is walking with full muscle power without any swaying of Gait and he is performing his day to day activities with all confidence

Here the challenge was to perform the the surgery on a uncontrolled diabetic and renal failure patient and at the same time to achieve stability of the spinal column and also get the spinal cord function back.

To conclude we could achieve the goal of spinal cord function and stability is a achievement by itself for the patient and myself. I also would like to appreciate the grit and commitment of the patient's daughter for the confidence entrusted on me.

Spinal Problems: Current Concepts; Interesting Case Presentation



Dr. Yogesh K. Pithwa
MBBS, MS Ortho, DNB Ortho
D. Ortho, MNAMS Ortho
FNB (Spine Surgery)
Senior Consultant Spine Surgeon

Needless to say, the margins for error in spine surgery being extremely narrow, Dr. Yogesh K. Pithwa is the **FIRST INDIAN OFFICIALLY ACCREDITED AS A SUPERSPECIALIST IN SPINE SURGERY** by being conferred the FNB Spine Surgery degree. Besides having nearly 20 YEARS OF EXPERIENCE in carrying out advanced spine surgery with absolute finesse, he is also keenly academically oriented. He is a Faculty of AOSpine, a renowned international organization that trains young and budding spine surgeons across the world. He has also published numerous scientific articles related to his research on spinal problems so as to elevate the quality of spine care.

A 34-year old male, car driver by occupation, presented with right upper limb radiculopathy of 2 months' duration. Despite non-operative treatment, his pain didn't subside and had reached a stage where he could not even sleep at night due to the pain. MRI [Fig2A] revealed significant disk at C5- 6 [Fig2B] level on right side with relatively mild right neuroforaminal compromise at C4-5 [Fig2C] level and a moderate right posterolateral osteophyte at C3-4 [Fig2D] level. Right wrist dorsiflexion weakness corroborating with C6 nerve root lesion localized the symptomatic level to C5-6 disk. In view of his occupation as a driver and in view of pre-existing adjacent segment degeneration, ideal treatment would be to do a motion preserving surgery such as C5-6 total disk replacement. However, preoperative kyphosis [Fig1] is a contraindication for cervical total disk replacement. Weighing out all the options with their risks and benefits, patient was extensively counselled about the same. Accordingly, an informed decision to go ahead with C5-6 total disk replacement was taken, and the surgery carried out. Till last follow-up, patient is doing fine; his pain is relieved, and he has resumed his occupation without any kind of hindrance! Even his cervical kyphosis resolved post-surgery [Fig3]. This case highlights the need to weigh all treatment options in an individualized manner and having an informed collective decision with the patient in these situations.

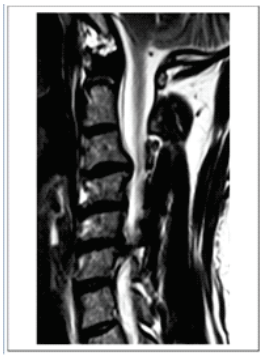


Fig 2A

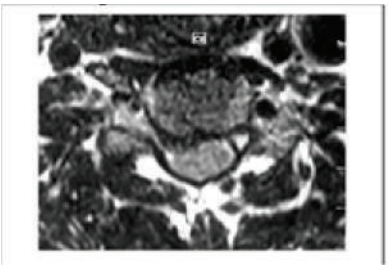


Fig 2B: C5-6 disk

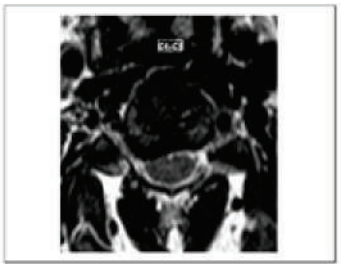


Fig 2C: C4-5 disk

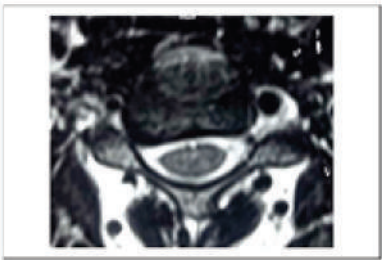


Fig 2D: C3-4 disk

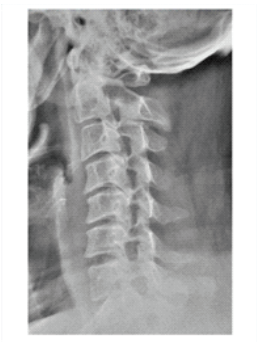


Fig 1

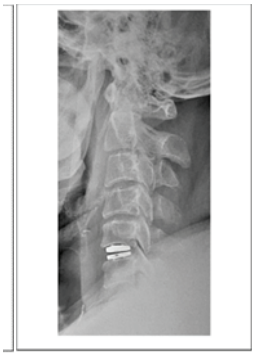


Fig 3

Management of cervical monoradiculopathy due to prolapsed intervertebral disc, an institutional experience

Dr. Amresh S Bhaganagare
MBBS, MS, MCh (Neuro Surgery)
Consultant Neurosurgeon

Dr. Amresh Bhaganagare completed his MBBS at JN Medical College Belgaum, Karnataka. Presently, he is a Consultant Neurosurgeon in several hospitals in Bangalore including United Hospital Jayanagar. His specialties include Skull Base, Spine Surgery and Endoscopic Neurosurgery.

ABSTRACT

Background:

Cervical radiculopathy is the common clinical entity, often caused by "wear and tear" changes that occur in the spine. In the younger population, cervical radiculopathy is a result of a disc herniation or an acute injury causing foraminal impingement of an exiting nerve, whereas in the older individuals, it is due to foraminal narrowing from osteophyte formation, decreased disc height, and degenerative changes of the uncovertebral joints anteriorly and of the facet joints posteriorly. In most (75%–90%), cervical radiculopathy responds well to conservative treatment, whereas the remaining patients, who fail to achieve acceptable recovery with conservative modalities, alone need surgical decompression of the nerve root. Surgical interventions can be categorized into anterior and posterior approaches to the spine. Our study is focused on the surgical outcome of anterior discectomy with fusion versus posterior cervical discectomy with foraminotomy for cervical monoradiculopathy.

Materials and Methods:

Ours is a retrospective study including patients of one level unilateral posterolateral cervical disc prolapse with radiculopathy operated in Department of Neurosurgery, Bangalore Medical College and Research Institute between 2012 and June 2016. The hospital records, imagings, operation notes, and follow-up records were reviewed and analyzed. One hundred and fourteen patients of cervical monoradiculopathy were investigated and operated, 76 operated by anterior cervical discectomy with fusion (ACDF), and 38 operated
by posterior cervical laminoforaminotomy (PCL).

Results:

The average operation time in 76 patients of ACDF group was 178 min and in 38 patients of PCL group was 72 min. Sixty-nine (91%) patients of ACDF and 38 (100%) patients of PCL had symptomatic relief but statistically ($P > 0.5$) was not significant. Three patients in ACDF group had hoarseness of voice due to recurrent laryngeal nerve palsy and there were no fresh permanent neurological deficits in any patients of PCL group over a follow-up period of 36 months. The average postoperative hospital stay was 5 days in ACDF group and 3 days in PCL group. The average intraoperative blood loss was <50 ml in ACDF group and 650 ml in PCL group. The need of analgesic for pain arising from bone graft site in ACDF group was comparable with operative site pain in PCL group.

Conclusions:

PCL is a simple approach, yields gratifying results, and is a promising alternative in selected cases of cervical monoradiculopathy due to disc prolapse.

Keywords:

Anterior cervical discectomy and fusion, cervical monoradiculopathy, posterior cervical laminoforaminotomy

INTRODUCTION:

Cervical radiculopathy affects 85 out of 100,000 people and is the result of nerve being irritated as it leaves the spinal canal. It is characterized by radiating pain from the neck to the area of body supplied by corresponding nerve root [Table 1]. Weakness and lack of coordination in the arm and hand can also occur. Disc herniation accounts for 20%–25% of the cases of cervical radiculopathy. In the older patients, cervical radiculopathy is often a result of foraminal narrowing from osteophyte formation, decreased disc height, and degenerative changes of the uncovertebral joints anteriorly and of the facet joints posteriorly. Factors associated with increased risk include heavy manual labor requiring the lifting of more than 25 pounds, smoking, and driving or operating vibrating equipment.

The patient's history and clinical examination alone can diagnose cervical radiculopathy in over 75% of cases.[1] The most common symptom associated with radiculopathy is arm pain or paresthesia in the dermatomal distribution of the affected nerve. Magnetic resonance imaging (MRI) scan is the investigation of choice. No exact criteria have been defined that obviate the patient to a particular course of treatment. The majority of patients diagnosed with cervical radiculopathy (75%–90%) will improve with nonoperative management.[2,3] When patients fail nonoperative management or otherwise meet inclusion criteria for surgery, there are multiple options available for the operative intervention of cervical radiculopathy. General practice deems that patients with clinically significant motor deficits, debilitating pain that is resistant to conservative modalities and/or time, or instability in the setting of disabling radiculopathy are indications for surgery. In addition, urgent surgery is indicated in a subset of patients. Patients who have an acute profound neurologic deficit with obvious pathology generally require surgery in an urgent manner. Spinal alignment, stability, balance, and surgeon's preferred technique, all play a role in the decision of which operation to perform.[4] Surgical interventions can be narrowed down into two large categories: anterior and posterior approaches to the spine.

Anterior cervical discectomy and fusion (ACDF) using Smith–Robinson approach affords the ability to restore cervical lordosis, predictably decompresses the nerve root by indirectly increasing disk height with bone graft in intervertebral space leading to neural foraminal widening, and use of anterior plating implants which preserves position of the graft, thereby increasing the fusion rates. Complications of anterior surgery include persistent swallowing problems and recurrent laryngeal nerve injury (1%), especially when approached from right side. Moreover, operative pain at the bone graft harvesting site.

Posterior cervical laminoforaminotomy (PCL) is performed by exposing the junction of the lamina and facet joint at the affected level. A high-speed burr is then used to open a window in the lamina and remove the medial one-third of the facet joint, thus exposing the affected nerve. If necessary, the nerve can be carefully and gently retracted to expose and remove a fragment of herniated disc. The posterior operation has the benefit of maintaining spinal alignment and not requiring a fusion. This, theoretically, prevents the breakdown of the adjacent level. The primary complication with this procedure is neck pain, presumably secondary to muscle dissection.[5] Certain risk factors such as advanced age, cervical kyphosis, and previous surgery may predispose patients to progressive degeneration and spinal deformity.[6] One of the most important limitations to the posterior surgery is the amount of bony decompression that can safely be achieved. Since this procedure does not allow for indirect decompression through distraction, the nerve must be directly decompressed. If there is a large amount of bony foraminal stenosis, this may not be possible without destabilization of the

Table 1: Patterns of nerve root compression syndromes

Nerve root	Pain pattern	Weakness	Reflexes
C2	Occipital, eyes		
C3	Neck, trapezius		
C4	Neck, trapezius		
C5	Shoulder, lateral upper extremity	Deltoid	
C6	Lateral forearm, first two digits	Biceps	Biceps absent
C7	Posterior forearm, third digit	Triceps	Triceps absent
C8	Medical forearm, fourth and fifth digit	Finger abduction, grip	

MATERIALS AND METHODS

Ours is a retrospective study of 114 patients of one level unilateral posterolateral cervical disc prolapse with radiculopathy operated in Department of neurosurgery, Bangalore Medical College and Research Institute between 2012 and June 2016. The hospital records, imagings, operation notes, and postoperative follow-up records were reviewed and analyzed. We operated upon 114 patients with unilateral cervical monoradiculopathy, aged between 31 and 59 years, 80 were men and 34 were women. Of the 114 patients operated, 94 had failed to respond to conservative modalities alone and 20 had disabling radiculopathy with clinically significant neurological deficits necessitating early surgical decompression. All patients had preoperative MRI scan of cervical spine, which showed unilateral intervertebral disc prolapse at [Table 2] C6–C7 level in 73 (64%) patients, C5–C6 level in 26 (23%), C4–C5 level in 8 (7%), C7–T1 level in 5, (4%) and C3–C4 level in two patients.

SURGICAL APPROACH

The approach was decided by operating surgeon based on patient's age, radiological features exhibiting cervical spine curvature, and extent of disc prolapse with or without bony foraminal stenosis due to osteophytes. Seventy-six patients were operated by anterior cervical discectomy with autologous iliac crest bone graft and ACDF and 38 patients were operated by PCL.

ACDF was done under X-ray C-arm guidance to localize the level of surgery, using Smith–Robinson approach from right side of neck in all cases, and autologous iliac crest bone graft was harvested and anterior cervical plating was done. The intervertebral space was distracted in all patients with speader and posterior longitudinal ligament was sharply dissected and any extruded disc fragment was removed with the help of nerve hook. Average duration of operation was 178 min and 69 (91.8%) patients had pain relief. Three patients developed hoarseness due to recurrent laryngeal nerve palsy. Throat pain and difficulty in swallowing were seen in most of the patients which decreased over time. However, pain at bone graft harvesting site was the one which was most troubling for all patients.

PCL was done under X-ray C-arm guidance, through posterior vertical midline skin incision over the neck with unilateral subperiosteal muscle dissection followed by laminoforaminotomy using electronic microdrill and laminotomy was done extending laterally up to junction of lamina and facet and microscopic discectomy done. There is always profuse venous bleed due to opening of epidural venous plexuses. The average intraoperative blood loss was 650 ml and postoperative blood transfusion was necessary in eight patients. We had intraoperative cerebrospinal fluid (CSF) leak due to nerve root dural rupture in 12 cases, where it was not possible to achieve primary suturing and local muscle patch was used. Two patients had postoperative suture site CSF leak and needed re-exploration and fascia lata and tissue plasminogen activator glue for patching the defect. All (38; 100%) patients of PCL had relief of radicular pain. Three patients had sensory loss corresponding to nerve root retracted due to neuropraxia, which later recovered. The average duration of operation was 72 min.

Table 2: Level of unilateral cervical disc prolapse and the approach used at each level

Intervertebral level	Patients (%)	Approach	
		ACDF	PCL
C3-C4	2	2	0
C4-C5	8 (7)	8	0
C5-C6	26 (23)	22	4
C6-C7	73 (64)	44	29
C7-T1	5 (4)	0	5
Total	114	76	38

ACDF - Anterior cervical discectomy and fusion; PCL - Posterior cervical laminoforaminotomy

RESULTS

The average operation time [Table 3] in 76 patients of ACDF group was 178 min and in 38 patients of PCL group was 72 min. Sixty-nine (91%) patients of ACDF and 38 (100%) patients PCL had symptomatic relief but statistically ($P > 0.5$) was not significant. Three patients of ACDF had hoarseness of voice due to recurrent laryngeal nerve palsy and there was no fresh permanent neurological deficits in any patients of PCL over a follow period of 36 months. The average hospital stay was 5 days in ACDF group and 3 days in PCL group. The average intraoperative blood loss was <50 ml in ACDF group and 650 ml in PCL group. The need of analgesic for pain arising from bone
graft site in ACDF group was comparable with operative site pain in PCL group.

Table 3: Surgical outcome in 114 patients of cervical monoradiculopathies operated

Approach	*n*	Average operative time (min)	Relief of pain (%)	Residual deficits	Pain at operative site (%)	Pain at bone graft site (%)	Recurrent laryngeal palsy	Postoperative CSF leak	Hospital stay after operation (days)
ACDF	76	178	69 (91)	0	0	68 (90)	3	0	5
PCL	38	72	38 (100)	0	29 (76)	0	0	2	3

ACDF - Anterior cervical discectomy and fusion; PCL - Posterior cervical laminoforaminotomy; CSF - Cerebrospinal fluid

DISCUSSION

Operations for cervical disc herniation are some of the most gratifying operations done by neurosurgeons. The posterior approach was started by Spurling and Scoville in 1944 and the procedure was refined by Scoville to the keyhole facetectomy. The anterior operation was begun in 1955 by Robinson and Smith and a variation on the anterior approach was done by Cloward 3 years later. Many series of such anterior operations have been published, and all authors have noted gratifying results and over the ensuing years the popularity of the anterior operation, with or without fusion, has greatly increased. Instrumentation further increased the popularity of anterior discectomy as the fusion procedure became simplified.

The proponents of ACDF, Korinth et al., in 2006 studied 293 patients comparing anterior and posterior procedures for soft disc herniations and found superiority with the anterior technique. Herkowitz et al. compared the efficacy of ACDF with PCL in 33 patients. This group was then followed for a mean of 4.2 years. The authors alternated procedures on a comparable patient population and found that 95% of the patients in the ACDF group had positive outcomes, while 75% of the posterior surgery group had positive outcomes. The difference was not statistically significant and therefore showed that both anterior and posterior procedures for cervical radiculopathy have excellent efficacy when indicated correctly.

The proponents of PCL, Dohrmann and Hsieh[14] analyzed the long-term outcomes of anterior versus posterior approaches for cervical disc herniation in 6000 patients, of which 2888 (48.1%) had anterior operations (anterior cervical discectomies, with or without fusion) and 3112 (51.9%) patients were operated on posteriorly (laminoforaminotomies/"keyhole" facetectomies). Although initially equal, in long-term follow-up, patients who had anterior operations had 80% good/excellent results, whereas patients with the posterior approach had 94% good/excellent results. The difference was significant ($P < 0.05$). The probable explanations for such a difference may be that the posterior operation visualizes the cervical nerve root more completely; however, good visualization of the nerve root is obtained with the anterior operation as well; therefore, another explanation may be that the nerve root in the foramen is decompressed over a greater distance. Perhaps the extensive opening of the bony foramen, converting it from a bony "tunnel" into a bony "trough," decreased the possibility of nerve root compression from future disc material or future compression from osteophytic growth, narrowing the foramen.

In our series, the surgical approach was decided by operating surgeon based on patients age, level of the disc space affected, curvature of the spine. Patients of any age with disc prolapse at C4–C5 and above were all operated by ACDF, younger patients with C5–C6 level and below with soft sequestrated disc were preferably operated by PCL. The operative time in ACDF was definitely longer than the PCL group. The average postoperative hospital stay in PCL group was shorter then ACDF group, inspite of higher intraoperative blood loss and eight patients needing blood transfusion. The reason for longer stay in ACDF group was throat pain and difficulty in swallowing in most of the patients. The pain of bone graft harvest site in ACDF group was comparable to the pain of muscle dissection of PCL group. Reexploration for postoperative CSF leak was necessary in two patients of PCL group. Three patients in ACDF group had hoarseness due to unilateral recurrent nerve palsy and there was no deficits in PCL group over a follow-up. period of 36 months.

CONCLUSIONS

PCL is a simple approach, yields gratifying results and is a promising alternative in selected cases of cervical monoradiculopathy due to disc prolapse.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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