

Comparative Study between Fusion and Non-Fusion Techniques in Anterior Cervical Discectomy: Bone Cement Versus Cervical Cage

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Abstract

Background: A prospective comparative study between fusion and non-fusion techniques in anterior cervical discectomy (ACD) evaluating the results achieved using polymethylmethacrylate (PMMA) as a non-fusion and cervical cage (PEEK) as a fusion following single level ACD.

Patients and Methods: A total of 40 patients, divided into two groups of 20 patients each, group (A); having PMMA used for disc replacement and group (B) cervical (PEEK) cage placement after ACD.

Results: Of both groups are evaluated regarding: (1) Clinical outcome according to Odom's criteria (2) Radiological outcome and inter body fusion, (3) Simplicity and postoperative morbidity of each procedure and (4) Complications related to each technique. Patients were followed up for a mean period of 10 months. Group (A) presented excellent and good clinical outcome in 85% at 6 months and 90% at 12 months. Radiological none fusion was noticed in 80% of patients and partial fusion occurred in 20% of cases at 12 months postoperative interval cage migration in 5% (one patient) into adjacent vertebral bodies which needed surgical removal and replaced by cage after causing partial collapse of the disc space height. No other graft related complications, progressive deformity or instability were reported. Group (B) achieved 90% excellent and good clinical outcome at 6 and 12 months respectively. Fusion rate of 85% at 6 months and increased to 95% at 12 months. No other cage related complications were reported.

Conclusion: Clinical outcome in both group is related to the surgical decompression technique and preoperative neurological status of the patients e.g. cervical spondylotic myelopathy (CSM), cervical spondylotic radiculopathy (CSR) or both than to the use of either disc replacement by fusion (PEEK) cage or non fusion by bone cement (PMMA). The use of interbody fusion cage is preferred owing to their ability to function as load-sharing devices and to adequately fix the spine and increase segmental stiffness thus achieve acceptable fusion rate and low complication when compared with PMMA graft.

Key Words: Cervical cage – PEEK – Polymethylmethacrylate – Anterior cervical discectomy – Cervical spondylotic myelopathy – Cervical spondylotic radiculopathy.

Introduction

DISC replacement and fusion made great controversy since the introduction of anterior cervical discectomy for treating cervical disc prolapse in the 1950s. However, the use of disc replacement material was good for maintaining the disc space height, preventing future kyphosis and keeps the patency of the intervertebral foramen [1].

Although, good results with cervical anterior discectomy alone not using disc replacement and fusion, most surgeons prefer to apply a disc replacement material with good results [2]. Anterior cervical discectomy and fusion still the gold standard for managing most symptomatic central / paracentral cervical spine degenerative pathological changes. It has a good record of high fusion rates and clinical improvement while causing little morbidity. Patients benefit from less hospitalization, few complications, and rapped return to normal activities [3].

Autologous bone graft (iliac crest or fibula) was described initially and applied after ACD but there are more complaint from the morbidity resulting from the donor graft site, so many researches have to find another suitable material for disc replacement [4]. The needed goals after anterior cervical discectomy were: Maintaining the disc height and alignment; prevention of potential kyphosis that could occur without grafting; provide a room for nerve root exit; minimize the risk of future instability [5].

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Aim of the study:

The aim of the work is to compare the results following the use of bone cement as a non-fusion technique and cervical cage as a fusion technique, following single level anterior cervical discectomy. These two techniques will be compared regarding simplicity of the procedure, stability of the cervical spine, postoperative morbidity and hospital stay.

Patients and Methods

Our prospective study was performed on 40 patients complaining from single level cervical degenerative disc changes that were unresponsive to conservative therapy for 8-12 weeks. The patients were operated upon in the Neurosurgery Department in Cairo University Hospitals between October 2011 to August 2013. Forty patients were divided into group (A) 20 patients had bone cement (non-fusion) for disc replacement and group (B) 20 patients had cervical cage (fusion).

All patients were subjected to neurological examination history, taking and neuroradiological investigations preoperatively in the form of plain X-ray and MRI of the cervical spine. Postoperative follow-up clinically according to Odom's criteria (after 6 & 12-months) and radiologically: X-ray of cervical spine (in 2nd day postoperatively and after 6-months), and MRI of cervical spine (after 5-months & 10 months).

Inclusion criteria:

- Single level cervical disc disease candidates for ACD.
- Radiculopathy, myelopathy or both.
- Failure of conservative treatment for 8-12 weeks.
- Surgically fit patients.

Exclusion criteria:

- Traumatic patients.
- Association with spinal deformity.
- Patients having osteopenia.
- Motor neuron disease.
- Active malignancy.
- Non-discogenic source of symptoms e.g. tumor and ossification of posterior longitudinal ligament (OPLL).
- Rheumatoid disease of the cervical spine.
- Lesions extending posterior to the vertebral body in which corpectomy is the choice of anterior decompression.
- Unfit for surgery.

Investigations:

- Plain X-ray dynamic views of cervical spine.
- Magnetic Resonance Imaging (MRI).
- Neurophysiological tests.
- Routine laboratory investigations: CBC, PT and PC, INR, RBS, serum Na and K as well as urea, creatinine, ALT, and AST were performed as a part of preoperative preparation.

Surgical treatment:

Forty patients suffering from single level cervical degenerative disc disease who ranged from 43 to 73 years of age underwent single level discectomy in our department between October 2011 and August 2013. After being admitted, the patients were divided into two groups:

- Group A: Included 20 patients had bone cement for disc replacement (Non-Fusion Technique).
- Group B: Included 20 patients had interbody cage-augmented ACDF (Fusion Technique).

Operative procedure:

We used general anesthesia for all patients, patients were positioned supine with mild head extension. A transverse or longitudinal incision was used in right-sided approach. The platysma muscle was cut. Blunt dissection is used to expose the ventral aspects of the vertebral bodies. We use electrocautery to divide The prevertebral fascia and longus coli muscles. To confirm the operative levels Intraoperative fluoroscopy is used. We placed bilateral retraction blades under the medial edges of the longus coli muscle. Casper's vertebral spreader was used to distract adjacent vertebral bodies. Operating microscope was used for appropriate discectomy, to decompress the spinal cord and nerve root we remove the hypertrophied posterior longitudinal ligament and drill the osteophyte if present. Based on the extent of the discectomy defect.

In group A: Drilling through the adjacent vertebrae was performed via the disc space aiming to create a ball and socket-like joints between the bone cement grafts with the rostral and caudal vertebrae without fusion. This was followed by application of a small piece of gel foam to the dural surface and the bone cement was injected (in its semi-fluid form) into the disc space followed by thorough irrigation to avoid any thermal injury to the cervical cord during irrigation, distraction was released gradually while the bone cement was getting hard to get good impaction of the graft, to be followed by fluoroscopic image, then the wound was closed in layers.

In group B: The suitable cervical cage was applied after being loaded with bony particles either artificial or obtained from adjacent vertebral bodies to be followed by the release of the distraction. PEEK cage were used in all patients, the wound was then closed in layers.

Postoperative care:

All 40 patients had a hospital stay ranging from 1 to 5 days postoperatively. Neck collar was used for two weeks to limit the pain associated with cervical movement.

Outcome measures:

Clinical follow-up: Before surgery and immediate postoperative, six months and 12 months. The patient's subjective perception of overall satisfaction with the outcome of the procedure was graded according to Odom's criteria as excellent, good, fair or poor shown in Table (1).

Table (1): Odom's criteria

Excellent	All preoperative symptoms relieved, abnormal findings improved.
Good	Minimal persistence of preoperative symptoms, abnormal findings unchanged or improved.
Fair	Definite relief of some preoperative symptoms, other symptoms unchanged or slightly improved.
Poor	Symptoms and signs unchanged or exacerbated.

Radiologically:

- 2nd day X-ray of cervical spine AP and lateral view postoperative assessment was done to assess alignment and place of the interbody device.
- MRI postoperative performed 5 and 10-months after surgery showing good or bad discectomy with or without residual compression of the spinal cord and/or nerve root. Also to show fusion or non-fusion.
- Fluoroscopy X-ray dynamic views of cervical spine to assess the motion segment.
- X-ray dynamic views of cervical spine 6-months post operative assessment of the fusion was based on the presence or absence of motion between the spinous processes of the fused levels on flexion and extension views. Successful fusion was defined according to the following criteria: (1) the absence of motion between the spinous processes on flexion-extension radiographs and the absence of any dark halo around a cage on both antero-posterior and lateral radiographs; or (2) presence of bridging bone anterior or posterior to the cage.

Complications: Including dysphagia, root or cord injury, recurrent laryngeal nerve injury, esophageal perforation, vascular injury, CSF fluid leakage, infection, hematoma, graft migration, and subsidence.

Results

Post-operative follow-up for all patients: Clinically according to Odom's criteria (immediate, after 6 and 12-months) and radiologically: X-ray of cervical spine (in 2nd day postoperatively and after 6-months), and MRI of cervical spine (after 5 and 10 months).

Clinical presentation:

In group A: 15 patients were presenting with radiculopathy, two myelopathy and three with myeloradiculopathy. In group B, 16 patients were presenting with radiculopathy, two with myelopathy and two with myeloradiculopathy shown in Table (2).

Table (2): Clinical presentation.

Clinical presentation	Group A		Group B	
	No	%	No	%
Radiculopathy	15	75	16	80
Myelopathy	2	10	2	10
Radiculomyelopathy	3	15	2	10

Prolapsed disc levels:

- In group A: Showed cervical disc prolapse in C3-4 in two cases (10%), C4-5 in five cases (25%), C5-6 in ten cases (50%) and C6-7 in three cases (15%).
- In group B: Showed cervical disc prolapse in C3-4 in three cases (15%), C4-5 in three cases (15%), C5-6 in 12 cases (60%) and C6-7 in two cases (10%) shown in Table (3).

Table (3): Prolapsed disc levels.

Prolapsed disc levels	Group A		Group B	
	No	%	No	%
C3-4	2	10	3	15
C4-5	5	25	3	15
C5-6	10	50	12	60
C6-7	3	15	2	10

Clinical outcome:

Clinical improvement was assessed according to Odom's criteria.

Immediate post-operative:

- In group (A) clinical improvement post-operative was achieved as follows: Excellent in 11 patients (55%), Good in four patients (20%), Fair in three patients (15%) and Poor in two patients (10%) (Fig. 1).
- In group (B) clinical improvement post-operative was achieved as follows: Excellent in 13 patients (65%), Good in three patients (15%), Fair in three patients (15%) and Poor in one patient (5%) (Fig. 2).



Fig. (1): Postoperative plain X-ray lateral view of cervical spine showing C5-6 PMMA graft with proper height.



Fig. (2): Postoperative plain X-ray lateral view of cervical spine showing C6-7 cervical cage with good restoration of disc height and cervical lordosis.

Six-months post-operative:

- In group (A) clinical improvement post-operative was achieved as follows: Excellent in 15 patients (75%), Good in two patients (10%), Fair in one patient (5%) and Poor in two patients (10%).

- In group (B) clinical improvement post-operative was achieved as follows: Excellent in 16 patients (80%), Good in two patients (10%), Fair in one patient (5%) and Poor in one patient (5%).

12-months post-operative:

- In group (A) clinical improvement post-operative was achieved as follows: Excellent in 16 patients (80%), good in two patients (10%), Fair in one patient (5%) and poor in one patient (5%).
- In group (B) clinical improvement postoperative was achieved as follows: Excellent in 17 patients (85%), good in one patient (5%), Fair in one patient (5%) and Poor in one patient (5%).

*Radiological post-operative assessment:**2nd day X-ray for the cervical spine:*

- In group (A) 2nd day X-ray of cervical spine was achieved as follows: 17 patients (85%) good placement of the bone cement with proper height of disc space and good alignment, in three patients (15%) reducing of disc space height with mal-alignment of the bone cement in regard to the anterior border was observed.
- In group (B) 2nd day X-ray of cervical spine was achieved as follows: 19 patients (95%) good placement of the cage with proper height of disc space and alignment, while one patient (5%) mal alignment of the cage.

5 & 10-months post-operative MRI:

- In group (A): 18 patients (90%) show good dicectomy and well decompression, restored foraminal height and free nerve root. Two patients (10%) have minimal residual cord compression without any neurological deficit.
- In group (B): 17 patients (85%) show well decompression, restored foraminal height and free nerve root. Three patients (15%) have mild residual cord compression without corresponding neurological deficit.

Fusion rate:

- In group (A) non-fusion was noticed after 12-months interval in 16 patients (80%) appearing in cervical X-ray and partial fusion was noticed in four patients (20%).
- In group (B) fusion was recorded after 6-months in 17 patients (85%) along the whole area of the disc space and the fusion rate increased after 12-months in 19 patients (95%), while partial fusion was noticed in one patient (5%).

Motion segment:

- In group (A) motion was noticed after 6 and 12-months interval in 16 patients (80%) appearing in fluoroscopy X-ray dynamic views of cervical spine and no motion noticed in 4 patients (20%).
- In group (B) no motion was noticed after 6 and 12 months interval in all patients appearing in fluoroscopy X-ray dynamic views of cervical spine.

Complications:

The overall reported complications in this study are listed in Table (4).

- In group (A) eight patients developed complications as follows: Three patients developed transient dysphagia for few days. Two patients with persistent neck pain for more than 3-months but they improved with physiotherapy. There was one patient with transient hoarseness of voice resolved after 10-days. One patient had one-month postoperative a anteriorly migrated graft that led to surgery for removal of the migrated graft and was replaced by cage. One patient complicated 2-days postoperative by superficial wound infection that was treated by antibiotic therapy.
- In group (B) six patients developed complications as follows: Two patients developed transient dysphagia for few days. There was one patient with transient hoarseness of voice resolved after one-week. Three patients with persistent neck pain for 2-months but they improved and no graft related complication.
- However, there was no operative mortality, or postoperative mal-function related to the decompressed neural tissue also there were no cases of hematoma, nerve, tracheal, vascular, spinal cord, dural or esophageal injuries in both group.
- The mean hospitalization time of both groups 3-days (range 1-5 days).

Table (4): Incidence of complications in both groups.

Complications	Group A		Group B	
	No	%	No	%
Transient dysphagia	3	15	2	10
Transient hoarseness	1	5	1	5
Persistent neck pain	2	10	3	15
Infection	1	5	0	0
Migration	1	5	0	0
Re-surgery	1	5	0	0

Discussion

The approaches for surgical treatment of cervical degenerative disorders are basically two: Anterior and posterior. Each technique has its advantages and drawbacks. The controversy which of the two approaches is better cannot be generalized but must always be related to the target pathology. It is important to recognize whether the compressing structure is anterior or posterior to the neural structures. The pathology should be treated where it is. Thus, an anterior neural compression is better removed from an anterior approach and a posterior compression from a posterior approach [6].

Some patients are candidates for either type of procedure, and some are best treated by one approach and not the other. The surgeon's choice will primarily depend on (a) The pathoanatomy of the individual patient; (b) The relative success of the chosen approach for achieving the goals of surgery, given the specific pathoanatomy; (c) The relative risk for complications (short and long term) accompanying each approach; (d) The patient's symptoms; and (e) The surgeon's experience. These factors relate to guidelines used to assist the surgeon in choosing the best surgical treatment option for his patient [7].

Anterior cervical discectomy and fusion considered the most applicable technique for managing most symptomatic central/paracentral cervical spine degenerative pathological changes. It has a high fusion rates and clinical success with little morbidity. Patients benefit from short duration of hospitalization, less complications, and rapid return to normal activities [4].

The undesirable effects of ACDF include loss of motion at the treated level and leading to increase stresses at adjacent levels, which lead to accelerated symptomatic degeneration.

Demography:

In our study, in both groups males to females were 27 to 13 with an average age 58 years. Male predominance was also found in Lali S. [8] male to female were 7/4 with an average age 43.7 years. Also in Umberto A. et al. [9] male to female 26/19 with an average age 47 years. Only in Domagoj C. et al. [10] male to female was 16/17.

Symptoms and signs:

In our study in both groups the average duration of symptoms was 15 months (range, 6 to 24 months) for patient with disc herniation.

In Rudolf Bertagnoli [11] the average duration of symptoms was 12.5 months (range 2.5 to 23 months) for patients with disc herniation and in Bengt et al. [12] it was 18 months (range 8 to 28 months).

In our study, in group (A) the most common symptoms was neck pain (100%), brachialgia (75%), numbness (55%), motor weakness (40%) and sphenetic trouble (10%). In group (B) the most common symptoms was neck pain (100%), brachialgia (90%), numbness (40%), motor weakness (35%) and sphenetic trouble (5%).

In Umberto A, et al. [9] neck pain was also the most common symptoms occurring in 80% of his patients, brachialgia 60% and weakness in 40% of patients out of 120 patients of their study.

In our study, in group (A) the most common signs was Hyporeflexia (75%), sensory affection (50%), motor weakness (40%), hyperreflexia (25%), spasticity (25%), pathological reflexes (10%) and ankle clonus (10%). In group (B) the most common signs was hyporeflexia (70%), sensory affection (60%), motor weakness (35%), hyperreflexia (20%), spasticity (20%), pathological reflexes (10) and ankle clonus (10%).

In the study by Adamson [13], in which common signs were hyporeflexia in (87%), lower limb spasticity in 50%, then gait disturbances in 45%. Sensory level was present in 40% and posterior column troubles in 30% of cases out of 100 patients of his study.

Prolapsed disc levels:

C5-6 represent the most common operated levels in group A (50%) and group B (60%).

This also coincides with the series of Chang et al. [14] were 28 cases had C5-6 (51%) affection and 17 (31%) cases had C6-7 affection.

Surgical technique:

In our study, in both groups we approached the cervical spine from the right side. The majority of surgeons prefer the right sided approach which is usually more comfortable for right-handed surgeon inspite that the risk of recurrent laryngeal nerve injury may be greater [15]. Some authors recommended approaching cervical spine through the left side for the sake of safety of the recurrent laryngeal nerve [16].

In our study, in group (A) drilling via disc space to the vertebral body above and the vertebral body below creating a ball and socket like joint between

bone cement and both vertebrae. In agreement with Hazem Mostafa et al. [17] drilling through the adjacent vertebrae was performed via the disc space aiming to create a ball and socket-like joints between the bone cement grafts with the rostral and caudal vertebrae without fusion.

In our study, in group (B) the cages were filled with bone particles (artificial or obtained from adjacent vertebral bodies) to obtain rapid fusion and to achieve secondary stability to prevent kyphotic changes in the segment in agreement with Bengt et al. [12] reported in their study the role of anterior cervical discectomy and fusion (ACDF) in restoring disc height and increasing the area of the foramen.

Opening of Posterior Longitudinal Ligament (PLL):

In our study, in both groups the PLL was routinely opened especially with acute soft disc prolapse to achieve adequate removal of extruded disc fragment. This was agreed by Hadley and Sonntag [18] they mentioned that opening of the PLL should be done to investigate the epidural space for extruded disc fragment and to assure complete decompression of neural elements. On the other hand, Yamamoto et al. [19] and Watter & Levinthal [20] believe that routine resection of PLL produce cervical instability and favors extradural hemorrhage and postoperative cervical and interscapular pain.

Operative time and hospital stay:

In our study in both group have demonstrated short hospital stay with shorter operative time. Mean hospital stay after operation was 3 days (range 1-5 days).

In Umberto Agrillo [9] demonstrated that ACDF by cage can result in significantly shorter operative time and hospital stay. The mean hospital stay after operation was 1.51 days (range 1-2 days).

Clinical outcome:

In our study, clinical improvement was assessed according to Odom's criteria.

Immediate post-operative:

In group (A) clinical improvement post-operative was achieved as follows: Excellent in 11 patients (55%), Good in four patients (20%), Fair in three patients (15%) and Poor in two patients (10%). Immediate post-operative. In group (B) clinical improvement post-operative was achieved as follows: Excellent in 13 patients (65%), Good in three patients (15%), Fair in three patients (15%)

and Poor in one patient (5%). Immediate post-operative.

6-months post-operative:

In group (A) clinical improvement post-operative was achieved as follows: Excellent in 15 patients (75%), Good in two patients (10%), Fair in one patient (5%) and Poor in two patients (10%). In group (B) clinical improvement postoperative was achieved as follows: Excellent in 16 patients (80%), Good in two patients (10%), Fair in one patient (5%) and Poor in one patient (5%).

12 months post-operative:

In group (A) clinical improvement post-operative was achieved as follows: Excellent in 16 patients (80%), Good in two patients (10%), Fair in one patient (5%) and poor in one patient (5%). In group (B) clinical improvement postoperative was achieved as follows: Excellent in 17 patients (85%), Good in one patient, Fair in one patient (5%) and Poor in one patient (5%).

In our study patients of group (A) had Excellent/good clinical outcomes in a rate of (85%) to (90%) within 6 to 12 months respectively. Nearly the same as the clinical outcomes that provided by different authors who used the same surgical technique for disc replacement by (PMMA) which were Excellent/good in a rate of (87.5%) to (95%) after 6 months and from (90%) to (98%) after 12-months [21,22].

In our study patients of group (B) had Excellent/good clinical outcomes in a rate of (90%) within 6 and 12-months. Nearly the same as the clinical outcomes that provided by different authors who used the same surgical technique for disc replacement by (Cage) which were excellent/good in a rate of (53%) to (92%) after 6 months and from (90%) to (95%) after 12 months [20,16,23].

Fusion rate:

In our study, in group (A) non-fusion was noticed after 6 and 12 months interval in 16 patients (80%) appearing in cervical X-ray and partial fusion was noticed in 4 patients (20%). Nearly the same as the fusion rate that provided by different authors who used the same surgical technique for disc replacement by PMMA which were partial fusion in a rate of 8% to 16% after six months and from 20% to 30% at 12 months [21,24,25].

In group (B) fusion was recorded after 6 months in 17 patients (85%) along the whole area of the disc space and fusion rate increased after 12-months in 19 patients (95%) while partial fusion was

noticed in one patient (5%). Nearly the same as the clinical outcomes that provided by different authors who used the same surgical technique for disc replacement by (Cage) which were the solid fusion in a rate of 75% to 91% after 6 months and from 95% to 100% after 12 months [9,26,27].

Complications:

In our study, in group (A), eight patients developed complications as follows: Three patients developed transient dysphagia for few days, two patients with persistent neck pain for more than three months but they improved with physiotherapy. There was one patient with transient hoarseness resolved after ten days. One patient had one month post-operative a anteriorly migrated graft that led to further surgery to removal the migrated graft and was replaced by cage. One patient complicated two day postoperative by superficial wound infection treated by antibiotic therapy.

On comparing these complications to those mentioned by El-Shafie [21] in his study of 24 patients had PMMA graft inter position following ACD reported additionally, graft migration into adjacent vertebral bodies in 25% of patients at 12 months interval with no. related symptoms and no other graft related complications.

In group (B), six patients developed complications as follows: Two patients developed transient dysphagia for few days. There was one patient with transient hoarseness of voice resolved after one week. Three patients with persistent neck pain for two months but they improved and no graft related complication.

Similar complications that mentioned by Frederic S, et al. [23] in their group of 60 patients treated with cervical cage placement after ACD without cage related complications just 9 patients (15%) had transient hoarseness of voice and dysphagia resolved in few weeks.

Motion segment:

In our study, there were motion in operative segment in group (A) 16 patients (80%) and there were no motion in operative segment in group (B) in all patients. Van dent Bent et al. [24] there were motion in operative segment in cases operated by ACD non fusion by PMMA in 60% of patients. Out of 30 patients of their study and there were no motion in operative segment in cases operated by ACDF by cage in all patients, out of 50 patients of their study.

Umberto A, et al. [9] randomly assigned 45 patients requiring one cervical level between C3-

4 and C7-T 1 for a soft-disc herniation, presenting symptoms included radiculopathy, mild myelopathic symptoms and neck pain. Anterior microsurgical discectomy was performed with interbody cervical cage insertion. Flexion extension radiographs obtained 6 and 12 months after surgery revealed no evidence of motion in any case.

In our study in group (A) to preserve on the motion operative segment should be drill through the adjacent vertebral surfaces of the disc space thus creating a ball and socket-like joint between the bone cement graft and both rostral and caudal vertebrae.

Conclusion:

The following are the main conclusions that can be derived from this work:

- Clinical outcome in both group is related to the surgical decompression technique and preoperative neurological status of the patients e.g. CSM, CSR or both than to the use of either disc replacement by fusion cage or non fusion by bone cement (PMMA).
- The risk of subsidence can be minimized by avoiding aggressive removal of the bony end-plate, using proper cage size and avoidance of over distractions and forceful implantation of the cage.
- Non-fusion technique of group (A) drilling through the adjacent vertebrae was performed via the disc space aiming to create a ball and socket-like joints between the bone cement graft with the rostral and caudal vertebrae. Non-fusion after ACD plays an important role in preserving the motion operative segment and also avoid extrusion of the PMMA graft.
- The use of both PMMA and cervical cage are safe, effective and simple techniques for disc replacement after ACD having few rate of morbidity and material related complications.
- The use of interbody fusion cage is preferred due to their ability to function as load-sharing devices and to adequately fix the spine and increase segmental stiffness thus achieve acceptable fusion rate and low complication when compared with PMMA graft.
- There is a significant relationship between patients with age above 55 years and worse outcomes in both groups.
- There is a significant relationship between patients with cervical spondylotic myelopathy and more worse outcomes than patients with cervical spondylotic radiculopathy in both groups.
- There is a significant relationship between patients with preoperative stability and favourable outcomes in both groups.

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دراسة مقارنة للطريقة الأمامية لجراحة الغضروف العنقي باستخدام الالتحام العظمي وبدون (مقارنة الأسمنت العظمي بالقفص الصناعي)

قامت هذه الدراسة بعرض مراجعة لما تضمنته المراجع العلمية في دراسة مستوفاة عن تشريح الفقرات العنقية، العوامل البيوميكانيكية ومسببات أمراض الغضروف العنقي مثل تآكل غضاريف الرقبة، الانزلاق الغضروفي العنقي والزوائد العظمية التأكلية. فإن الانزلاق الغضروفي العنقي وخشونة الفقرات من الأمراض الشائعة عند البالغين وهناك ثلاث أعراض رئيسية للانزلاق الغضروفي العنقي، وهي آلام الرقبة، اعتلال جذور الأعصاب واعتلال النخاع. لم يكن الأسلوب الجراحي لأمراض الفقرات العنقية آمناً حتى عام ١٩٥٠م، حيث استخدم (رينسون وسميث)، (كلوارد) و(بيلى) الأسلوب الجراحي العنقي الأمامي الذي أتاح إزالة الضغط عن النخاع الشوكي وجذور الأعصاب وهو سهل وآمن.

شملت هذه الدراسة أربعين مريضاً يعانون من انزلاق غضروفي عنقي على مستوى واحد، وتم تقسيمهم إلى مجموعتين الأولى تم فيها إجراء جراحة إزالة الغضروف العنقي باستخدام الميكروسكوب الجراحي من الأمام مع وضع أسمنت عظمي وذلك في عشرين مريضاً ومجموعة أولى، والثانية تم فيها إجراء جراحة لإزالة الغضروف العنقي من الأمام باستخدام الميكروسكوب الجراحي مع وضع قفص صناعي عنقي وذلك في عشرين مريضاً (مجموعة ثانية).

أجريت الجراحات بمستشفيات جامعة القاهرة في الفترة ما بين أكتوبر ٢٠١١ إلى أغسطس ٢٠١٣، ومتابعة المرضى في الفترة ما بين أكتوبر ٢٠١١ إلى أبريل ٢٠١٤.

تم عمل الفحص الإكلينيكي وعمل الأشعة المتابعة لجميع المرضى قبل إجراء الجراحة والمتابعة بعد الجراحة في الفترة ما بين (٦ أشهر إلى ١٢ شهر).

وتم عمل أشعة عادية على الفقرات والعنقية في اليوم الثاني وبعد ٦ أشهر بعد العملية وكذلك تم عمل أشعة رنين مغناطيسي على الفقرات العنقية بعد ٥ شهور و ١٠ شهور.

وقد أظهرت نتائج هذه الدراسة أن:

- الانزلاق الغضروفي العنقي بين الفقرة الخامسة والسادسة هو الأكثر شيوعاً.
- شكوى المرضى الشائعة تكون آلام بالرقبة والذراعين.
- تم عمل الأشعة العادية المتحركة للفقرات العنقية في جميع المرضى، وتعتبر أشعة الرنين المغناطيسي الاختبار الأول لتشخيص الانزلاق الغضروفي العنقي.
- إزالة الغضروف العنقي من الأمام مع وضع قفص عنقي يوفر فرصة كبيرة لالتحام الفقرات (٩٠-١٠٠٪) ويعطى نتائج إكلينيكية مرضية وتماثل النتائج الإكلينيكية لإزالة الغضروف العنقي من الأمام ووضع عظم صناعي.
- يحافظ عدم الالتحام العظمي مع وضع الأسمنت العظمي بين الفقرات على مجال الحركة بين الفقرات العنقية بالمقارنة بالالتحام العظمي بوضع القفص الصناعي.
- عواقب الأسلوب الجراحي العنقي الأمامي تشمل بحة في الصوت وصعوبة في البلع وتختفي تلقائياً بعد فترة (أسبوع إلى أسبوعين).
- عندما يقل سن المريض عن خمسين عاماً عند إجراء الجراحة تكون النتائج النهائية أفضل.
- الأفضل للمريض عند إزالة الغضروف العنقي من الأمام بوضع قفص عنقي، وذلك لأنه يعطى فرصة كبيرة للالتحام الفقرات فيعمل على ثبات العمود الفقري وأيضاً أقل عواقب بعد الجراحة عندما يقارنه بالأسمنت العظمي.