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Mesh Cage *Vs* Plate Screw Stabilisation in Single Level Discectomy in Cervical Disc Prolapse

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Abstract

Background: Surgical considerations for symptomatic cervical disc prolapse are many. Anterior cervical discectomy and fusion is the gold standard. Using cage, peek cage, mesh cage with or without plate screws are surgeon's choice. The anterior cervical approach is direct, addresses the pathology and retains the biomechanics comparing posterior approach which is at least partially hampering the facet joints. Minimally invasive procedures are now technically demanding and challenging as well.
Objective: The study aims to assess the outcome of surgery using mesh cage with or without plate and screws stabilisation.
Method: This is a retrospective study which was conducted in a single private hospital (Comfort Hospital), Dhaka, Bangladesh. Total of 94 cases was included in the study. Of this population 70 were male and 24 were female. Results: Out of 94 patients- 88 patients had a satisfactory outcome. 3 patients needed revision surgery for palate-screw readjustment. 1 patient had a mesh cage infection. 2 patients had adjacent level disc prolapse.
Conclusion: Use of a mesh cage for the single-level cervical disc is safe and effective in comparison to plate-screws stabilisation. Achievement of fusion is the same in two groups although using only mesh cage is minimally invasive having shorter hospital stay, less blood loss and quick recovery.

Keywords: Mesh cage; Discectomy; Cervical; Disc

Introduction

Jürgen Harms and Lutz Biederman developed surgical titanium mesh in 1986. Smith, Robinson and Cloward first described anterior discectomy and fusion in a separate paper for the treatment of diseases affecting the cervical spine [1,2]. Modifications of these pioneering techniques were identified in the literature in the following decades, with the most notable inclusion of anterior plating by Orozco and Llovet Topes [3]. Multiple authors who followed reported excellent results regarding anterior discectomy with or without fusion for the treatment of single-level cervical pathology [4-10]. For degenerative spinal diseases, anterior cervical discectomy and fusion (ACDF) have been one of the most usually performed procedures [11]. Historically the anterior cervical fusion has been used to treat multiple cervical spine degenerative diseases,

including secondary weakness to trauma or infection. It is most commonly done after removal of herniated discs, osteophytes, or corpectomy. Screw loosening, screwing back out, and breaking of screws or plates remain clinical hardware-related complications that warrant concern. Such problems are thought to be caused in part by bone resorption during fusion; this mechanism leads to the collapse of the graft, which imposes an increased bending moment at the interface of the screw-plate and precipitates fatigue and eventual build failure. Titanium mesh cage style is cylindrical, with optional rings for reinforcement. The wide openings have excellent endplate to promote interface healing. For many years, surgical titanium mesh has been used extensively in cervical disc prolapse discectomy. Previous authors documented the use of operational titanium mesh for fusion in a model of human deformity and anterior lumbar interbody fusion in a model of human circumferential lumbar fusion [12-15]. Titanium mesh cages have become common and it is minimally invasive as well. Recently, anterior cervical reconstruction using an anterior plated titanium mesh cage has been implemented as an effective and safe technique that provides immediate, solid anterior column support while reducing complications in the hardware. This research had the aim of evaluating the outcome of both place screw stabilisation and mesh cage surgery. We have therefore retrospectively analyzed the surgical outcomes of 94 patients who underwent surgery using mesh cage and plate screws.

Objective

The study aims to assess the outcome of surgery using mesh cage with or without plate and screws stabilisation.

Methodology

Study type: Retrospective study
Study place: A single private hospital (Comfort Hospital), Dhaka, Bangladesh
Study period: 2009 to 2019
Sample size: Total of 94 patients. Of this population 70 were male and 24 were female (Figure 1)

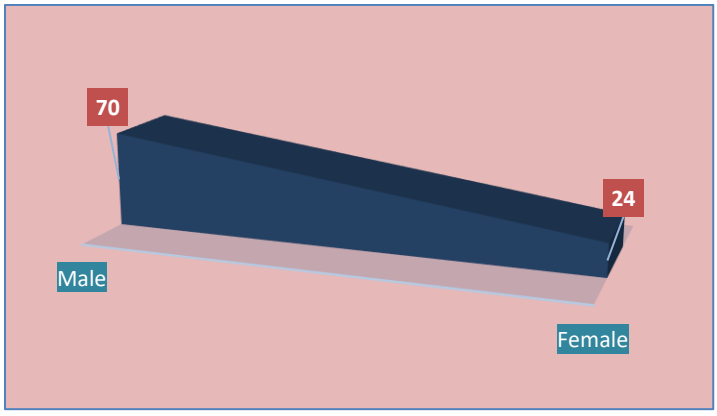

Figure 1: *Ratio of male and female patients.*

Inclusion criteria:

- Having single-level cervical discogenic pain
- Not improved by more than six weeks of conservative treatment

Exclusion criteria: Having more than one level cervical disc prolapse

Results

Out of 94 patients- 88 patients had a satisfactory outcome (Figure 2).

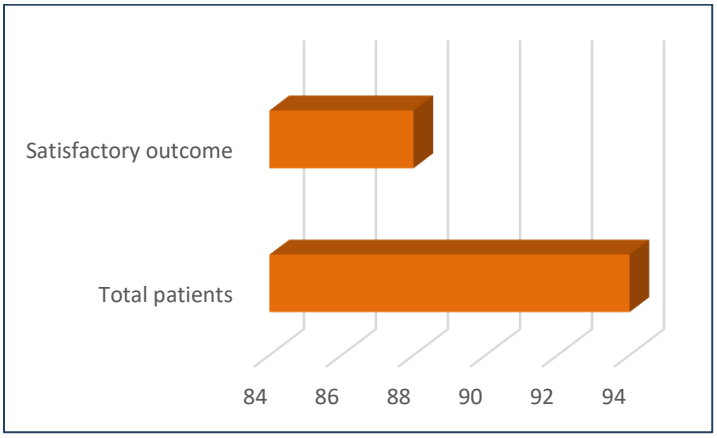

Figure 2: *Level of the outcome.*

The complication rate, that three patients needed revision surgery for plate screw readjustment. One patient had mesh cage infection and two patients had adjacent level disc prolapse (Figure 3).

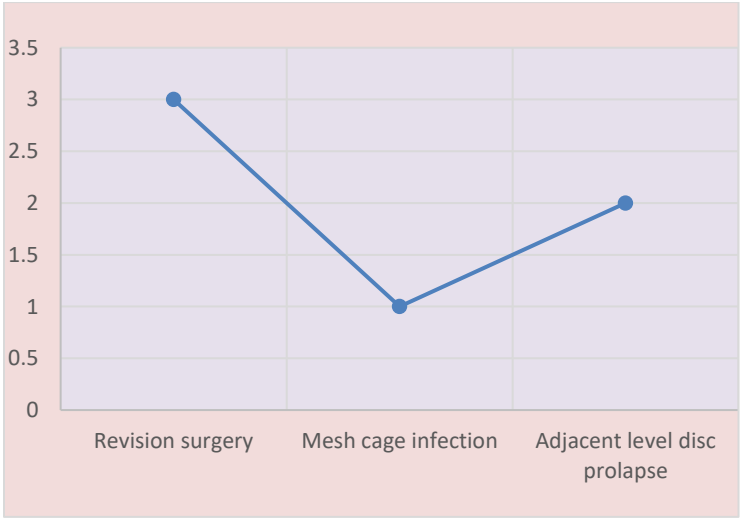

Figure 3: *Complication rates in patients of both type of surgery.*

In the mesh cage surgery case, it took only 60-120 minutes and the hospital stay was not more than 2-3 days. But the plate screws

surgery took 100-220 minutes and the patients needed to stay a bit longer times in the hospital (Table 1) (Figures 4-6).

Table 1: *Operation time length and hospital stay in both type of surgery.*

Type of Surgery	Operation time	Hospital stay
Mesh Cage only	60-120 minutes	2-3 days
Plate-Screws	100-220 minutes	3-4 days

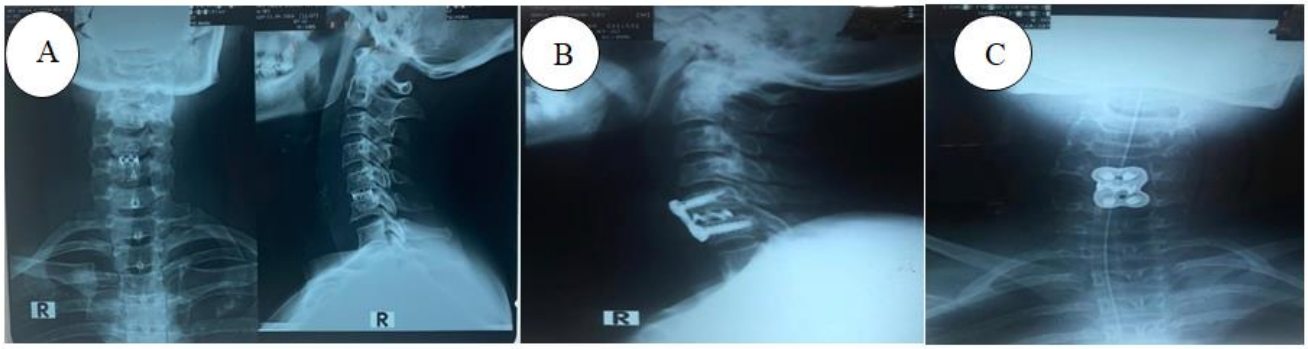

Figure 4(A,B,C): *Images of postoperative X-ray of the cervical spine showing a titanium mesh cage.*

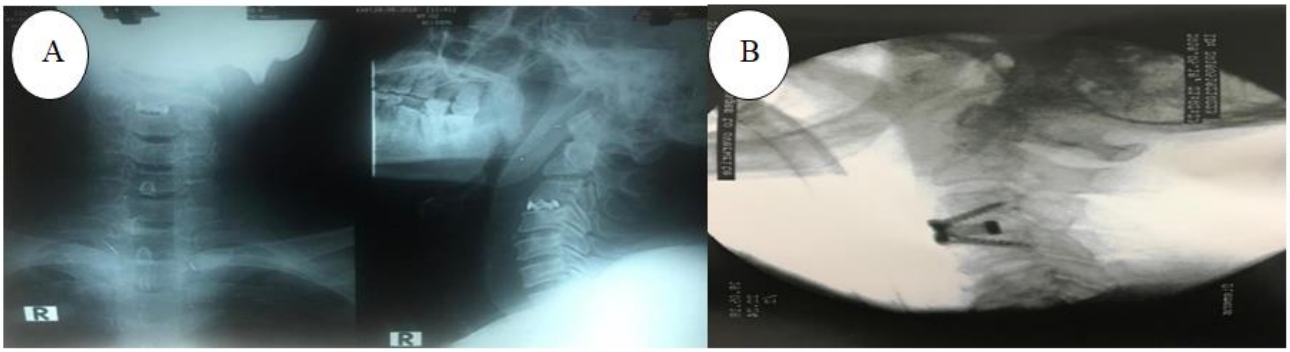

Figure 5(A): *X-ray of the cervical spine showing a mesh cage with plate screw.* ***5(B):*** *X-ray of the cervical spine showing plate screw.*

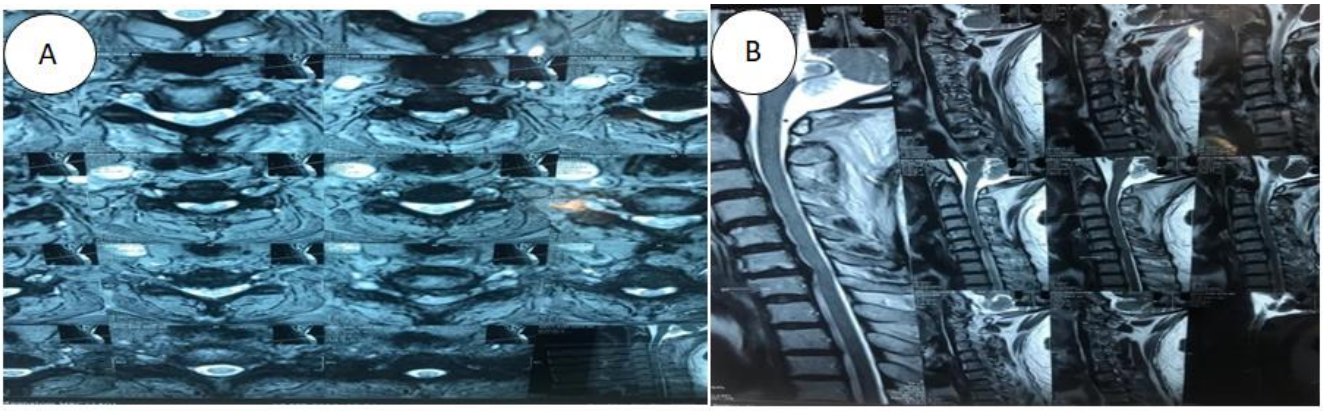

Figure 6(A,B): *MRI of the cervical spine showing disc prolapse.*

Discussion

The plate is a rigid structure that provides a secure interface between the plate and the implant. In the elderly population, to intervene surgically requires special consideration that is based to balance the risks and benefits linked to the surgical treatment [16]. The authors have shown in many recent studies that inserting a plate screw helps to reduce the complication and may

even shorten the recumbency span [17-20]. There were three problems (3.19%) linked to the plate screw in our study. It was described in another study that the incidence of early plate failure increases substantially [21]. In 1955 Robinson and Smith initially introduced cervical anterior fusion [22]. There is however still a significant incidence of plate breakage or migration and back-out screwing.

We used a mesh cage for single-level cervical disks and compared to plate-screw stabilization it was much more effective. Titanium mesh and a locking plate device for cervical disc prolapse discectomy were used here. We hypothesized that attaching the cage to the cervical disk might serve as a load-sharing tool, resulting in lower stress at the interface between the screw and the plate. During the follow-up span, there were no cases of building failure. The transition has remained stable in the patients who were followed for more than 12 months. For the cages to maintain significantly a longer follow-up period is needed, and follow-up results should be compared with those reported for traditional methods. Titanium mesh cages were also used with satisfactory performance in anterior spine reconstruction for trauma and tumours. The main advantage of the titanium mesh cage is a reduction in morbidity at the donor site. Such cages are unusual buildings in that, unlike threaded cages, they still have a large surface area of exposed cancellous bone to recover after proper preparation. Cages are significantly more expensive today. Depending on the size and number of cages used, implanting titanium mesh cages will add about one to several thousand dollars to the surgical costs. Although the authors have yet to clinically experience the issue, revision surgery in the presence of a cage can be more difficult. Titanium is relatively soft, a carbide burr is readily able to cut through cages. Considering the risk factors, single-level discectomy in cervical disc prolapse using titanium mesh cage can provide good clinical results and help prevent complications. Cervical discectomy and fusion with cage and plate screw fixation is an approved procedure for cervical discernment therapy and has been documented to alleviate pain and enhance motor and sensory deficits [23-26]. To avoid complications of the donor site, intervertebral body spacers made from titanium, carbon and peek were created and are increasingly being used. Moreover, our study showed the limited operating time with mesh cage surgery than plate screw stabilisation. Patients had fewer complications, blood loss with mesh cage surgery. Thus they had to stay in the hospital a shorter time than plate screw surgery patients.

Conclusion

Anterior cervical reconstruction single-level discectomy in cervical disc prolapse essentially produced good clinical results using titanium mesh cage and helped a lot to prevent complications. Among the two groups of patients, we found it is minimally invasive to use only a mesh cage. It has given shorter hospital stay and rapid recovery. Nonetheless, risk factors related to the process should be carefully considered. Thus the mesh cage has given us comparatively the safer and better performance than the stability of the plate screw.

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