

1-YEAR EXPERIENCE WITH SOLIS PEEK CAGES IN CERVICAL DISCECTOMY AND FUSION

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Objective: This study evaluates the efficacy of peek cages in interbody fusion in 32 consecutive patients treated for cervical disc herniation. **Methods:** During one-year period, 32 patients were treated in our Department for cervical disc disease using interbody fusion with peek cages. There were 19 men and 13 women, aged between 33 and 68 years (mean 44 years). We used autologous cancellous bone for cage packing and no plate fixation. The mean follow-up was 12 months. **Results:** We judged the success of surgery using the following criteria: recovery of neurological function/radiculopathy, positioning of the cage, extent of fusion at 1-year follow-up, and return to work. **Conclusion:** The use of peek cages in interbody fusion for the treatment of cervical disc disease seems to be a good alternative to classic ACDF using tricortical bone graft.

Keywords: interbody fusion, cervical disc, peek cage

INTRODUCTION

Age-related degeneration of the cervical spine is a common condition in general population. Symptomatic degenerative cervical disc disease may produce neck pain, referred pain, radicular arm pain, or clinical myelopathy. Radicular arm pain is the most common indication for surgical intervention (3). Treatment of cervical radiculopathy has been a subject of controversy for the past decades (2). The operative approaches are as numerous as its clinical presentations and the choice of surgical approach is a major consideration. It seems that the best approach is the most direct operative option that provides the best exposure of the offending pathology and that is associated with minimal patient morbidity and a high rate of success (8). Although each patient is considered individually, most cervical disc herniations are located ventrally. Anterior cervical discectomy has proven to be a safe and effective procedure for the treatment of degenerative disc disease (11).

The purpose of this study was to evaluate the safety and efficacy of Solis Peek cage in the treatment of cervical disc disease.

MATERIAL AND METHODS PATIENTS

Over a 1-year period, between January 2007 and January 2008, a total of 32 single- or double-level cervical discectomies were performed in our department. Twenty-five patients suffering from cervical degenerative disc disease underwent single-level ACD and seven patients two-level ACD and intervertebral fusion using Solis Peek cages (Stryker Spine SAS, France); no plate stabilization was used. There were 19 men and 13 women, aged between 33 and 68 years (mean 44 years) (Fig. 1).

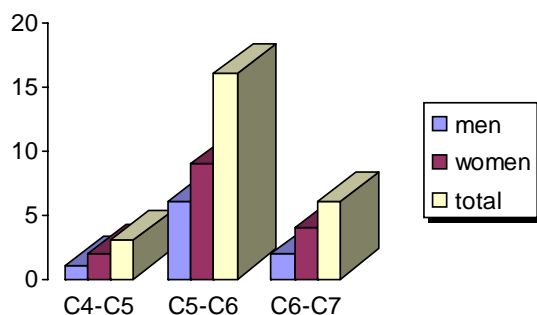


FIG.1 Distribution of treated levels

All patients were clinically and neurologically evaluated and underwent MRI examination. Patient inclusion criteria were: clinical evidence of disc degeneration (neck pain, radiculopathy or myelopathy), clinic-imaging correlation, and failure of conservative treatment.

Poly-ether-ether-ketone (PEEK) is a semicrystalline aromatic polymer with a modulus of elasticity resembling bone that has been used to create structural spinal implants (2, 13). PEEK implants combine superior strength and impact resistance with radiolucency and don't produce artifacts on plain films, CT scans or MRI. Four titanium pins are inserted on both surfaces of the spacer for better bone fixation and for X-ray localization (Fig. 2).

PEEK implants elicit minimal inflammatory response or cytotoxic response in in vivo and in vitro models (13). They have excellent resistance to corrosion, are nonresorbable, are insoluble in most solvents, and have long-term biocompatibility (4).

SURGICAL PROCEDURE

Patient positioning, localization and surgical approach are identical as those from the standard anterior cervical approach for the mid- cervical region. Placement of PEEK spacer: after complete removal of disc material and adequate lateral decompression, the end-plates are smoothed flat and lightly decorticated with a high-speed drill. It is essential that the surfaces be flat to maximize graft contact and equal load distribution (5) (Fig. 3).



FIG. 2 Solis peek cage

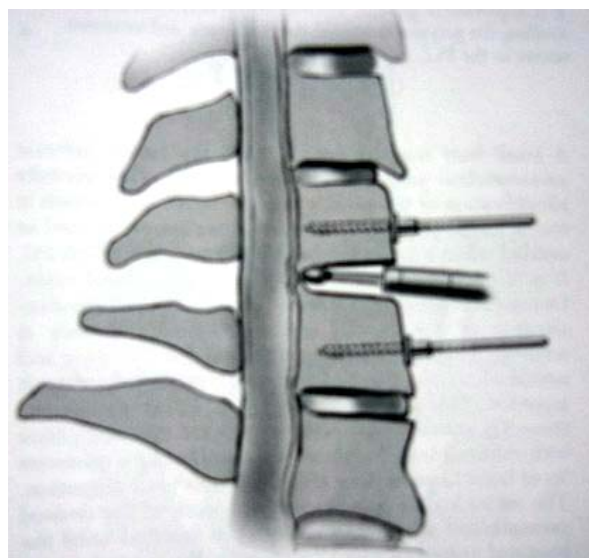


FIG. 3 Endplate decortication

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Following removal of the PLL and complete decompression of the neural elements the dimensions of the disc space are determined and an appropriately sized PEEK implant is selected for placement. The use of the SOLIS system facilitates implant selection and placement. Starting with the smallest template or trial, sequentially larger trials are tamped completely into the disc space (Fig. 4). The center of the spacer should be filled with cancellous bone harvested with minimal invasive procedure from the iliac crest. Autograft harvest is done with minimal exposure to avoid complications (Fig. 5). The SOLIS PEEK cage that corresponds to the final trial is chosen and gently placed into the disc space using the graft holder. The implant is tapped into the disc space using the tamp and mallet (Fig. 6).



FIG. 5 Cage filled with cancelous bone

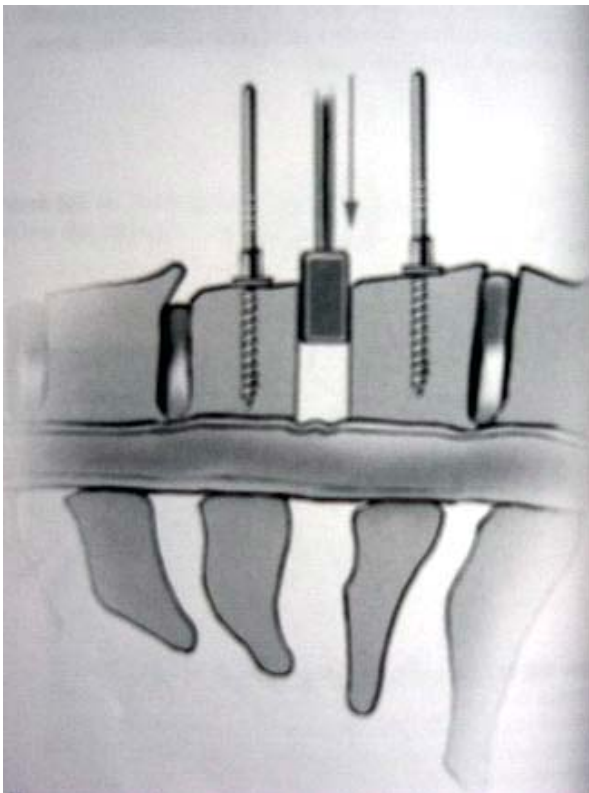


FIG. 4 Implant tapping



FIG. 6A



FIG. 6B



FIG. 6C

Fig. 6 A,B,C C5-C6 ACDF using Solis peek cage

All the patients in this series were a cervical collar for 1 month after surgery.

RESULTS

The follow-up period was 12 months. We judged the success of surgery using the following criteria: recovery of neurological function/radiculopathy, positioning of the cage, extent of fusion at 1-year follow-up, and return to work.

Neuroimaging assessment. All patients sustained MR imaging before surgery. Postoperative lateral radiography was performed in all patients immediately postoperative, at 2, 6, and 12 months. Fusion was assessed on dynamic lateral radiography obtained 1 year after surgery. Fusion was considered successful if radiography demonstrated on flexion-extension views no movement between vertebral bodies or spinous processes, and trabecular bone bridging the vertebral bodies. The height of the disc space was measured on the neutral lateral cervical radiograph.

Clinical results. All 29 patients suffering from radiculopathy improved after surgery. One of the three patients with myelopathy had an improvement of the myelopathic signs.

Radiographic results. After cage implantation, the height of the disc space was restored in all patients (Fig. 7). There was one case of asymptomatic cage subsidence at 1-year follow-up. Each segment was deemed fused if no more than 2° of segmental motion was observed on lateral dynamic radiographs (Fig. 8). Solid fusion was achieved in 31 patients (Fig. 9).

Return to work. All patients presented with radiculopathy improved after surgery and returned to their previous jobs. The two patients with myelopathic signs and no improvement after surgery had no return to work at the time of 1 year follow-up.

Surgery-related complications. One patient suffered from mild dysphagia in the first 3 weeks after surgery. One patient developed a superficial wound seroma at the place of iliac crest bone harvest.



FIG. 7 Disc height restoration



FIG. 8 Fusion assessed on flexion-extension radiography



FIG. 9 Solid fusion at 1 year follow-up

DISCUSSION

Anterior cervical surgery has become an accepted route for treatment of the cervical disc herniation. Whether interbody fusion is necessary after ACD remains controversial and no single technique has been shown to be better or to produce superior results (12, 14). Some surgeons believe that there is no need for cervical fusion after ACD. Wilson and Campbell reported excellent results after ACD alone in 85% of their series patients (15). Martins reported good results after ACD and ACDF, but a higher rate of cervical kyphosis in patients who underwent simple discectomy (6). Sontag has advocated ACD alone; fusion should be performed when instability occurs. In his series, ACD was associated with longer periods of neck and interscapular pain (11).

We believe that ACDF improves the outcome in these patients. The role of the intervertebral disc in providing stability was demonstrated by Munro; in an experimental study he demonstrated that the intervertebral disc together with anterior and posterior ligaments provide significant stability (9). By removing

two of these three components, ACD impairs the stability. It has been accepted that the loss of disc height and increase motion are involved in the pathophysiology of spondylosis.

There is no universally accepted ACDF method; the ideal implant has not yet been found. In the last years there has been a growing trend in the implantation of cage devices for cervical interbody fusion (7, 10). The PEEK cage is a polyetheretherketone, which provides strength and stiffness in the intervertebral space. The fusion rate seems to be superior to the autologous bone graft application. In our study we didn't observe cage migration or breakage, and only one case of subsidence. Since we did not use plate fixation, we suggest that bottom pins are enough to keep the cage in the disc space and do not lead to cage migration. Another advantage of the PEEK cage is its radiotransparency and MRI compatibility, that provides excellent spinal cord and root visualization, without implant artifact. In our study the PEEK cages' biocompatibility was excellent.

CONCLUSION

This paper summarizes our short-term experience with PEEK cages in cervical interbody fusion after ACD. We believe that this is a safe, easy to use, and effective device, as an alternative to bone autografting after ACD. Based on these results, larger prospective, randomized studies, focused on long-term results, comparison with other cervical cages or substitutes, are needed.

Abbreviations used in this paper: ACDF = anterior cervical discectomy and fusion; ACD = anterior cervical discectomy; MRI = magnetic resonance imaging; PLL = posterior longitudinal ligament.

The authors state no conflict of interest.

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