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Anterior Cervical Interbody Fusion (ACIF) with Carbon-Composite Cages

J.P. ELSIG, F. SGIER*

Orthopedic Surgeon; Zollikerberg, Switzerland
** Neurosurgeon, Klinik St. Anna; Luzern, Switzerland*

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Introduction

Intervertebral fusion cages or "disc cages" are inserted after anterior cervical discetomy in order to primarly stabilize the motion segment, to restore disc space height and some amount of physiological lordosis.

They contain autologous cancellous bone which will eventually achieve a solid bony fusion between the two vertebrae. We report our experience with ACIF using an OstaPek, i.e. carbon-composite cage manufactured by Co-Ligne, in 165 patients.

Material and Methods

A total of 165 patients underwent an ACIF procedure. Of these 165 patients all had preoperative and intraoperative or immediate postoperative results, 142 have a follow-up of at least 3 months, 62 have a follow-up of 1 year and 17 have been examined at 2 years. The patients pre- and postoperative clinical parameters are summarized in figure 1.

A score of 0 means intolerable neck and arm pain, 0% working capacity, immobile patient needing assistance and muscle function of 0%, i.e. full motor radicular deficit or plegic muscle (see table 3). A score of 4 means no pain, full working capacity, ability to do heavy work and normal neurological examination.

Patient Population

Of the 165 patients enrolled in this study, there were 72 men and 93 women with an average age of 51,1 years (range 29 to 82 years). All of the patients were enrolled prospectively. The primary indication for surgery included degenerative disc disease (N=152), trauma (N=7), revision surgery (N=5) and congenital abnormality (N=1).

The secondary diagnosis included cervical disc herniation (N=97), central spinal stenosis (N=96), foraminal stenosis (N=64), segmental spinal instability (N=42), pseudoarthrosis (N=8), spinal deformity (N=4), spondylolisthesis (N=1) and epidural fibrosis (N=1). It must be stressed that a patient can have a combination of the above mentionned pathologies.

Of these 165 patients, 79 (48%) present with at least one additional systemic illness. Three-quarters of the patients (N=127) had undergone no prior surgery, 33 had a previous spinal fusion procedure (5 posterior and 28 anterior), 8 had a previ-

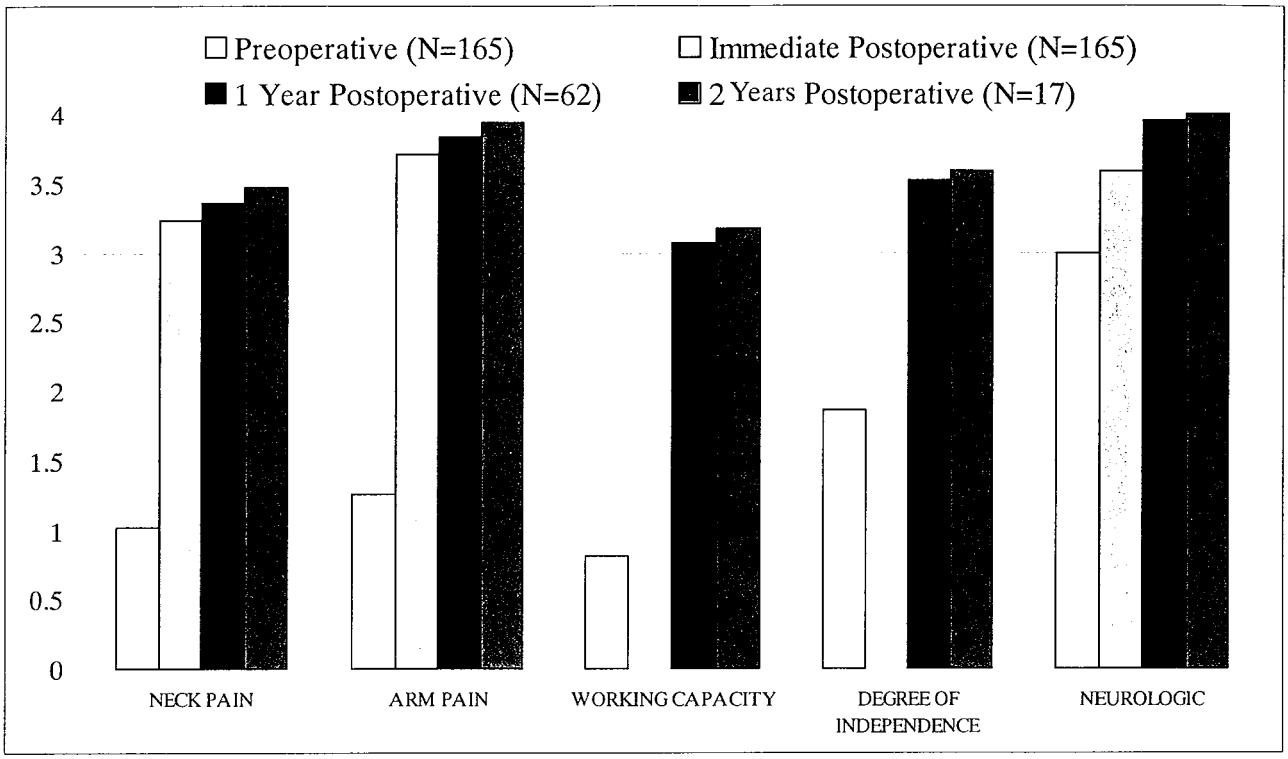

Figure 1 Mean preoperative and postoperative patient parameters. The 0 through 4 scale (vertical axis) is defined for each of these in table 3.

Table 1 **Distribution of procedure and implants according to operative level**

Levels	Decompression	Insertion of Cages	Instrumentation
C3-C4	17	17	1
C3-C4	49	48	1
C5-C6	106	107	2
C6-C7	93	94	
Below C7	5	4	
Total	270	270	4

Table 2 **Percentages of patients with associated measures of postoperative correction**

Correction	Anteroposterior	Lordosis	Height
None (in situ)	0 %	0 %	0 %
Partial	5.5 %	10 %	7 %
Complete	94 %	88 %	90 %
> Complete	< 1 %	2 %	3 %

ous discectomy and 5 had a prior decompression. The social group distribution included 11% of patients recieving a disability pension, 76% of active working patients and 12% of retirees or of pre-professionals.

Operative data

The average hospital stay was 9.5 days, of which 6 days were postoperative. The patients averaged an anesthesia duration of 105 minutes and a surgery duration of 83 minutes. Per procedure the average blood loss was 40 cc.

All surgery included an anterior cervical interbody fusion. The types of interventions included (a single patient can have more than one of the below listed): decompression of a stenosis (N=106), wide decompression (N=61), osteosynthesis, i.e. additional plate and screws (N=21), and iliac bone grafting (N=153).

The number and specific levels of decompression, cage usage and instrumentation are summarized in table 1. In the vast majority of patients, a partial or complete deformity correction was achieved (see table 2).

Major complications were exceedingly rare: Only one patient had aphonia caused by compression of the recurrent laryngeal nerve, and another

Table 3 **Definitions used for the 5-point scales used to compare preoperative and postoperative patient outcome**

Score	Neck and Arm Pain	Working Capacity	Level of Independence	Neurologic
0	Intolerable	0 %	Immobile	Muscle function 0
1	Severe	25 %	Dressing	Muscle function 1-2
2	Moderate	50 %	House work	Muscle function 3-4
3	Mild	75 %	Light work	Sensory
4	None	100 %	Heavy work	Normal

had Horner syndrome as a result of irritation of the paraspinal sympathetic fibers. Both problems resolved completely 6 weeks after surgery.

Outcome

A total of 142 patients have had at least three months of follow-up, none of these patients experienced implant complications. Radiographic fusion was determined in 98% of the patients. 75% of the patients have returned to their previous profession, 5% changed profession, 12% are recieving disability pension and 8% are unemployed or without professional activity.

The associated complication rates include 1,5% implant, 5.5% graft donor site pain and 10% local complications, including a loss of correction in 14, and adjacent segment involvement in 4 of the 142 patients. Some form of reintervention was necessary in 3% of the patients.

Table 3 shows the scale and associated definitions used for the measurement of pre- and postoperative patient outcome. A comparison of these parameter means is shown in figure 1. The dramatic improvement in neck and arm pain achieved immediately following surgery and maintained over time is substanciated by the increase in patients function (i.e. work and physical independance).

Correspondingly, the level of patient medication use is reduced from 96% preoperative level to12% at the two years follow-up. The patients themselves graded their outcome as good in 72.5%, as improved in 25.5%, and as not improved in 2%. Nobody was worse than before the surgical procedure.

Conclusions

ACIF with OstaPek disc cages is associated with a high fusion rate of 98%, with very low morbidity and with a clinical failure rate of only 2%.

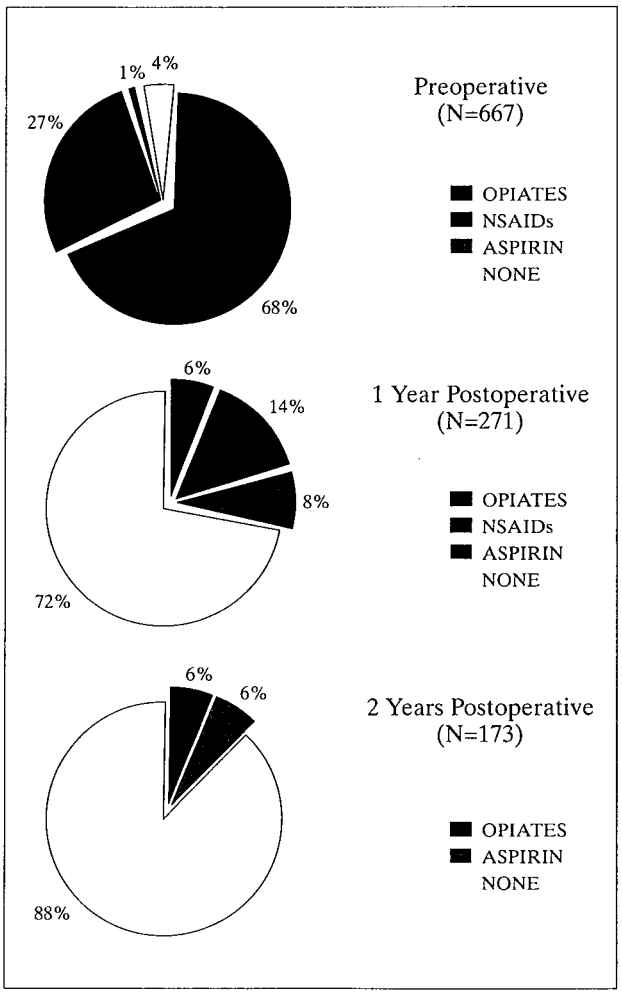

Figure 2 Mean preoperative and postoperative patient medication usage.

P.S. - *ACIF cages are shown by Kaech and Jinkins in the following chapter about "Clinicoradiologic assessment after disc cage implantation", figures 10 and 11.*

J.P. Elsig, M.D.
Orthopedic Surgeon
Forchstrasse 136
CH 8125 Zollikerberg, Switzerland