Reconstruction of the Cervical Spine using an Anterior Distraction Device (ADD)

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INTRODUCTION

Distractable vertebral body replacements (ADD and ADD plus, ulrich medizintechnik, Germany) were used for the reconstruction and stabilization of the anterior cervical spine.
Between 1999 and 2001 the ADD implants (Fig. 1) were used in combination with a cervical plate.
Since 2002 we changed to ADD plus implants (Fig. 2). This distractable implant is equipped with two plates (wings) at both ends making the attachment of this "single-piece" implant to the adjacent levels possible. Standard cortical screws are used. An additional anterior plate for fixation is not necessary.

Fig. 1: ADD implant
anterior distraction device

Fig. 2: ADD plus implant
winged anterior distraction device

Tab. 1 Pathology (n= 34)

Degenerative changes with myelopathy	23 patients
Osteomyelitis	5 patients
Tumour	4 patients
Fracture	2 patients

Tab. 2 Number of resected vertebral bodies

Vertebral bodies	1	2	3
Number of patients	8	22	4

PROCEDURE

A typical anterior approach to the cervical spine was performed. The unaffected adjacent vertebral bodies were fixed using the Caspar distractor.
For resection of the vertebral bodies a high speed drill system was used. The vertebral bodies were replaced by ADD or ADD plus implants. The operating time ranged from 120 to 150 min depending on the number of resected vertebral bodies.
For 4 weeks patients were wearing a stiff collar. Consecutive physical training followed.
Between 1999 and 2003 34 patients underwent vertebral body resection (13 female, 21 male). The indications are shown in table 1. Most of the patients suffered from degenerative changes with cervical myelopathy.

RESULTS

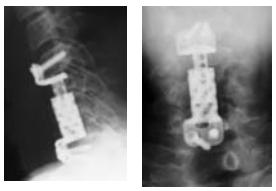
The number of resected vertebral bodies is shown in table 2.
No technique-related complication were observed. None of the patients had neurological changes for the worse.
In two patients early revision surgery had to be performed due to bleeding. In three patients revision surgery was necessary because osteoporosis had caused screw loosening. Settlement of the implants were observed in three patients but no revision surgery was necessary. In one patient the implant had to be changed. This occured as the result of a progressive tumour 1 ½ years after the surgery. A larger implant was used. Two cases of severe myelopathy showed no improvement after 1 and 1 ½ years, respectively. This is due to the permanent lesion of the spinal cord and is not related to the implant.

RESULTS

Surgical example 1: male, 55 years,
degenerative changes with cervical myelopathy

Preoperative MRI

Intraoperative situs



Stabilization with ADD plus

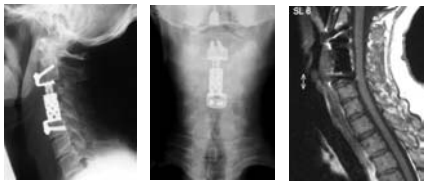
Surgical example 2: female, 60 years, cervical myelopathy

Preoperative MRI

Stabilization with ADD plus

Surgical example 3: male, 64 years, spondylodiscitis,
the postoperative stabilization is shown on MRI and plain X-rays

Preoperative MRI



Stabilization with ADD plus (X-rays and MRI)

DISCUSSION AND CONCLUSION

Discussion

ADD as a distractable vertebral body replacement showed good clinical results. The implantation is easy. However, disadvantages may be associated because a second work-process is involved. The handling of two systems is more time consuming and a second set of instrumentation - for the cervical plating system - needs to be available.

With the ADD plus vertebral body replacement a straightforward implant is available. Due to the development of the attached wings an additional plating is not necessary. Save insertion of the implant without image intensifier is possible. The possibility of the implant to dislocate is reduced. Dislocations resulting in myelon compression are not possible. The image intensifier is only needed when the screws are applicated.

The X-rays show nice correction results. The spine is stable, the profile of the vertebral column maintained.

Conclusion

The implant ADD plus is a very simple and safe technique to replace cervical vertebral bodies if handled correctly.
Because the implant is distractable in situ the surgical technique is very comfortable.
The combination of cage and wings reduces the risk of dislocation and allows safe stabilization.