Clinical Outcomes in Cervical Arthroplasty by Bryan®, ProDisc®, Prestige® and Baguera® – 36-month Results

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Cervical arthroplasty is an exciting and rapidly advancing treatment option for spine surgeons, providing the opportunity to preserve motion after neural decompression by anterior cervical discectomy and to protect the adjacent segments from increasing degeneration after fusion. The rationale behind motion-sparing spinal implants is based primarily on the growing evidence that spinal fusion may contribute to adjacent-segment degeneration.

Methods

Patients with one or more level symptomatic disc disease with anterior cervical disc decompression were given a total of 53 artificial disc prostheses. The experience included 35 patients (18 female and 17 male) with an average age of 43 years. Surgeries were performed between May 2003 and November 2006, with a total of 53 cervical disc prostheses of four different types: 16 Bryan®, 10 ProDisc®, 26 Prestige® and one Baguera®. All Patients had degenerative disc disease (cervical herniation, cervico-arthritis/spondylosis, cervical stenosis) at one or several levels as shown by pre-operative magnetic resonance imaging (MRI).

The most implanted cervical level was C5/C6. Also, 15 double implantations (most of them at C5/C6 & C6/C7) and one quadruple implantation were performed. The main duration of hospitalisation was six days, with no adverse events such as implant dislocation, nosocomial infection or non-manageable technical circumstances, being recorded. The follow-up included radiographic evaluation in neutral and dynamic positions in anterior-posterior and lateral view. Clinical and radiological follow-up was performed after 48 hours, three months, six months and then yearly. The patients completed outcome questionnaires such as the Neck Disability Index, Short Form 36 and self-assessment questionnaires and underwent neurological examinations.

Surgical Procedure

The patient is placed supine with a small sandbag under the nape of the neck. The head is kept straight. General endotracheal anesthesia is used. The incision is made after radiographic control of which level has to be operated, from the midline to over the anterolateral border of the sternocleidomastoid (SCM) muscle. The platysma is also incised transversely; after subplatysmal dissection, the cervical fascia is opened vertically anterior to the SCM muscle. Then, a blunt finger dissection is performed to develop the interval between the carotid sheath and midline visceral structures, both held by hand retractors. After opening the prevertebral fascia, the vertrebral bodies are easily palpable. Then, lateral radiographic control of the level and lateral stripping from the longus colli muscles is performed to develop the interval between the carotid sheath and midline visceral structures, both held by hand retractors. After opening the prevertebral fascia, the vertrebral bodies are easily palpable. Then, lateral radiographic control of the level and lateral stripping from the longus colli muscles is performed. Next, self-retaining retractors are inserted. The anterior longitudinal ligament is scraped off the vertebrae and retracted laterally with the prevertebral muscles. A window is made to the interspace with a scalpel blade, carried laterally as far as the retractors permit. Disc material is removed with forceps; an interspace spreader may be helpful. Under microscopic view, the discectomy is completed by drilling and curetting the interspace and removing bony spurs, disc herniation and the posterior, longitudinal ligament for exposition of the nerve roots.

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After decompression, the depth and height of the interspace is measured with phantoms, then the correct shaped prosthesis chosen and inserted under radiographic control while interspace spreaders maximally enlarge it. After removing the retractors, the stability of the cervical spine is examined by gentle flexion of the neck. Skin closure is performed after closure of the platysma; drainage will normally not be necessary. After arthroplasty, no Minerva jacket is required.

As indicated in the tables in Figure 1, the series records an improvement of clinical status, especially in the Visual Analog Scale (VAS) and in The Arm and Neck Disability Index. Furthermore, the comparison between those three different types of cervical disc prosthesis shows that the results are similar. However, long-term observation after five to ten years is awaited, especially in comparison with the long time practiced cervical arthrodesis through bone graft or intersomatic cages.

Also, long-term analysis of radiographic findings regarding the morphologic and dynamic status of the adjacent segments is in progress and has to be compared to cervical fusion.

**Conclusion**

There are many cervical disc prostheses currently in various stages of development and clinical usage. Although the time of this report, only limited short-term clinical results have been presented for most of these devices, the clinical and radiographic findings are encouraging. The current review after three years of experience in cervical arthroplasty, with its partial results, is guiding the authors to maintain this surgical strategy with the use of devices that may have an easy technical design for implantation with the technique of cervical fusion after anterior discectomy by bone graft and/or cages. Long-term follow up and comparison to anterior cervical discectomy and fusion remains important.

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