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Revision and Explantation Strategies Involving the CHARITÉ Lumbar Artificial Disc Replacement

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Study Design. A large case series of anterior revision surgery in patients who had complications following lumbar total disc replacement with the CHARITÉ artificial disc.

Objectives. To analyze and discuss the etiology of implant-related complications and to present a strategy that can be applied to lumbar intervertebral disc prostheses in cases where anterior revision surgery is necessary.

Summary of Background Data. This report represents the largest single-site, consecutive case series reported in the literature of anterior revision surgery following lumbar disc arthroplasty.

Methods. A total of 18 patients are included in this study. All patients required an anterior revision procedure for repositioning or removal of the prosthesis. The mean time to revision was 6 months (range, 9 days to 4 years).

Results. In 17 of 20 cases, implant removal was required and the patient was converted to a fusion. In 3 cases, primary revision of the CHARITÉ artificial disc was performed. Six revision cases were performed within the early postoperative period, defined as 7 to 14 days. All early cases were approached *via* reexploration of the original anterior midline retroperitoneal incision. Late revision was required in 14 cases, ranging from 3 weeks to 4 years following initial arthroplasty. A variety of surgical approaches were used in late revisions, including the lateral transpsoas approach at L3–L4 or L4–L5 (n = 5), expanded ipsilateral left retroperitoneal approach at L4–L5 (n = 2), contralateral right retroperitoneal approach at L5–S1 (n = 6), and transperitoneal approach (n = 1). Following 20 consecutive, anterior revision procedures, implant revision was successfully achieved in all cases.

Conclusions. Total disc replacement implant revisions occur largely as a result of technical errors in positioning and sizing of the implant. In addition, adherence to strict patient selection criteria will eliminate many cases of implant failure. When necessary, anterior revision surgery can be performed safely when a strategic approach is used.

Key words: lumbar spine, CHARITÉ artificial disc, total disc replacement, arthroplasty, revision surgery, implant failure. **Spine 2007;32:1001–1011**

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The use of intervertebral disc prostheses as an alternative to spinal fusion has been advocated to preserve segmental motion and to prevent adjacent segment disease. The CHARITÉ artificial disc (Depuy Spine, Raynham, MA) has had the longest clinical follow-up of any available intervertebral disc prosthesis having undergone more than 15,000 implantations in over 30 countries worldwide.[1] Within this large patient population, the need for anterior revision of an implant following lumbar disc arthroplasty has occasionally arisen. Despite this, a comprehensive revision strategy for lumbar artificial disc prostheses has not yet been described. The purpose of this paper is 2-fold: 1) to analyze and discuss the etiology of implant-related complications in order to minimize the incidence of such complications in the future; and 2) to present a strategy that can be applied to lumbar intervertebral disc prostheses in the event that an anterior revision procedure needs to be performed.

Various rates of reoperation following lumbar total disc replacements (TDRs) have been reported in the literature. Griffith *et al* retrospectively reviewed the initial European results of patients treated between 1987 and 1991.[2] A total of 139 SB CHARITÉ model III prostheses were implanted in 93 patients. Device failure, migration, or dislocation occurred in 6 of 93 patients (6.5%). Of these, 3 patients (3%) required reoperation; however, only 1 patient (<1%) required anterior revision with device removal and conversion to a circumferential fusion.

David *et al* analyzed the long-term complications on 272 lumbar disc prostheses in 197 patients with 10 years or more of follow-up.[3] All patients were implanted with the SB CHARITÉ III artificial disc. The total reoperation rate in this series was 10.5%. Eighteen patients (9%) had secondary posterior instrumented fusions where the prosthesis was left in place as an anterior cage. Three patients (1.5%) required anterior revision surgery: 2 were cases of polyethylene core failure that necessitated removal and reimplantation of a new prosthesis at 10 and 12 years follow-up, respectively, and 1 patient had anterior subluxation of the device requiring revision with removal and 360° fusion.

Lemaire *et al* reported on 147 prostheses in 100 patients with a minimum of 10 years of follow-up.[4–6] Five patients (5%) required a secondary posterior arthrodesis; however, no anterior subluxation of the prosthesis was identified in this series.

Scott-Young analyzed a personal series of 182 patients since 1997 that underwent lumbar TDR with the