Long-term results of surgery in lumbar stenosis

8-year review of 64 patients

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In the last decade many studies have analyzed the result of surgery in lumbar spinal stenosis and have reported success rates of 64–95 percent (Getty and Stanley 1980, Surin et al. 1982, Weinstein et al. 1983, Lassale et al. 1985, Johnsson et al. 1986, Nasca 1987). However, the mean follow-up in these studies was relatively short, the longest one being 4.2 years (Katz et al. 1991). Very little is known, therefore, on the very long-term results of operative treatment, particularly on whether the quality of the outcome tends to change with increasing time from surgery. We are reporting on the long-term clinical results of surgery, and the radiographic changes in the posterior vertebral arch at the levels operated upon, in patients with lumbar spinal stenosis.

Material and methods

We reviewed 64 patients (38 men and 26 women) who had undergone surgery for lumbar spinal stenosis between 1972 and 1988. Preoperatively, lumbar spinal stenosis was classified as developmental, degenerative or combined (Postacchini 1989). Degenerative spondylolisthesis was present at one or multiple levels in 25 cases. Operative procedures included: total laminectomy at 1–4 levels (28 cases), bilateral laminotomy at 1–3 intervertebral levels (19 cases), total laminectomy and intertransverse arthrodesis at 1 or 2 levels (12 cases) and bilateral laminotomy and intertransverse arthrodesis at 1 or 2 levels (5 cases). In 7 patients, discectomy had been performed at 1 or 2 levels. Of the 25 patients with degenerative spondylolisthesis, 10 had had a decompressive procedure and 15 had also undergone an intertransverse arthrodesis.

Patients had been followed for at least 6 months after surgery. The most recent clinical evaluation, at the time of this study, was made 8 (4–21) years after surgery. The clinical outcome, at both the early follow-ups and the most recent examination, was evaluated by means of a scoring system based on the patient's report and examiner's evaluation (Postacchini and Cinotti 1992). Results were rated as excellent, good, fair and poor. The outcome was rated as poor when repeat surgery was performed, even if the final result was satisfactory.

Of the 64 patients who entered the study, 38 had had radiographs of the lumbar spine in the early postoperative period (1–6 weeks after surgery). Furthermore, in 12 of the 38 patients, radiographs had been taken at 2–12 years after surgery due to recurrent low back symptoms; a CT scan had also been made in 4 patients and a MRI in 2. In these 38 cases, the radiographs obtained at the most recent follow-up were compared with the early postoperative radiographs and the radiographs, when available, obtained over the following years, in order to determine the amount of regrowth of the posterior vertebral arch that had occurred over the years. The amount of bone regrowth was calculated as a percentage of the width of the original laminectomy or laminotomy defect (Postacchini and Cinotti 1992). 4 degrees of bone regrowth were distinguished: no regrowth, corresponding to regrowth of 10 percent or less; and mild, moderate and marked regrowth, corresponding to regrowth of 11–40 percent, 41–70 percent and 71–100 percent, respectively. Patients were assigned to 1 of 4 groups: Group 0 had no bone regrowth and Groups I, II, and III had mild, moderate and marked regrowth, respectively.

Results

The clinical long-term results were excellent or good in 43 patients (67%) and fair or poor in 21 (33%). Of the 21 patients with unsatisfactory results, 10 (15%) already showed a poor or fair outcome in the first year following surgery. In 3 of the 10 patients, a too narrow

Figure 1. A patient submitted 5 years earlier to total laminectomy from L3 to L5. MRI scan shows central disc protrusion at L3-L4. At surgery, only the disc protrusion at L4-L5 had been removed.

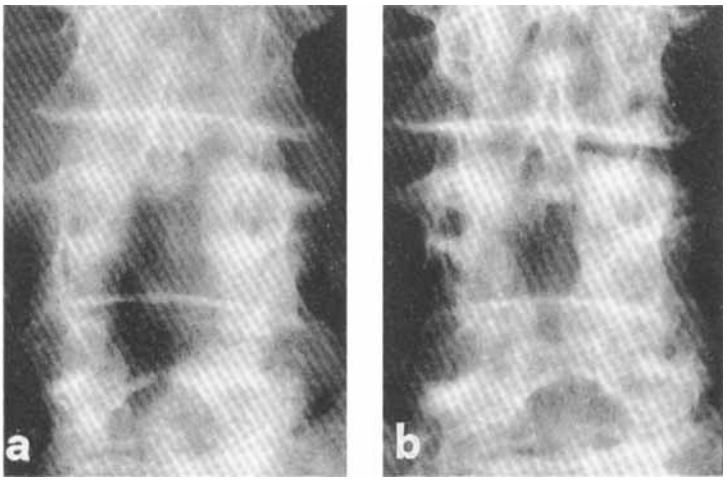

Figure 2. Early postoperative radiograph (a). Radiograph taken 7 years after surgery (b), showing marked regrowth of the posterior vertebral arch.

laminoarthrectomy had been performed in the transverse or caudocranial direction. 2 patients had severe radicular deficits, which were present preoperatively in 1 case and appeared after surgery in the other. 1 patient presented a diabetic neuropathy preoperatively and 1 had a disc space infection and a marked vertebral slipping which required repeat surgery. Of the remaining 2 patients, 1 showed vertebral instability at the operated level and one had been decompressed at an erroneous level.

Of the 54 patients who had a satisfactory clinical outcome at short term, 16 had had no postoperative radiographs or refused radiographs at the most recent follow-up. 2 of these patients had an unsatisfactory long-term result (12 percent). This was related, in 1 patient, to severe instability of the operated vertebral level and, in the other patient, to marked protrusion of a disc located in the decompressed area and not excised at surgery (Figure 1).

The remaining 38 patients who had a satisfactory short-term clinical result entered the radiographic study aimed at determining the amount of regrowth of the portion of the posterior arch that had been resected at surgery. No significant bone regrowth had occurred in 13 percent of the patients, while a mild, moderate or marked regrowth was observed in 47 percent, 26 percent, and 13 percent of the cases, respectively (Figure 2). In 9 patients a progressive increase of newly formed bone was observed in the radiographs taken over the years following surgery. In 2 patients with marked bone regrowth who had a CT scan at long-term follow-up, severe narrowing of the lumbar spinal canal was observed in the decompressed area. In a patient with mild bone regrowth and an unsatisfactory result, MRI showed a marked disc bulging at one of the decompressed levels. Vertebral motion segments which were stable preoperatively showed lesser tendency to bone regrowth than unstable motion segments. The long-term clinical results were rated as satisfactory in 29 cases (76%) and unsatisfactory in 9 patients (23%), 2 of whom had undergone repeat surgery for recurrent stenosis (Figure 3). Of the 15 patients with degenerative spondylolisthesis in this group, those who had had an arthrodesis showed a higher proportion (80%) of satisfactory results than those who had not had an arthrodesis (40%).

Overall, of the 54 patients who had a satisfactory outcome at short term, 43 (79%) still had an excellent or good result, while 11 (20%) had a fair or poor result at long-term follow-up.

Discussion

In no studies analyzing the long-term results of surgery in lumbar stenosis a distinction was made between short-term unsatisfactory outcomes not improving with time and short-term satisfactory results which deteriorate with increasing time from operation. Such a distinction is of paramount importance because studies of long-term surgical results are aimed at determining the frequency with which satisfactory surgical results deteriorate in the long-term and the reasons for

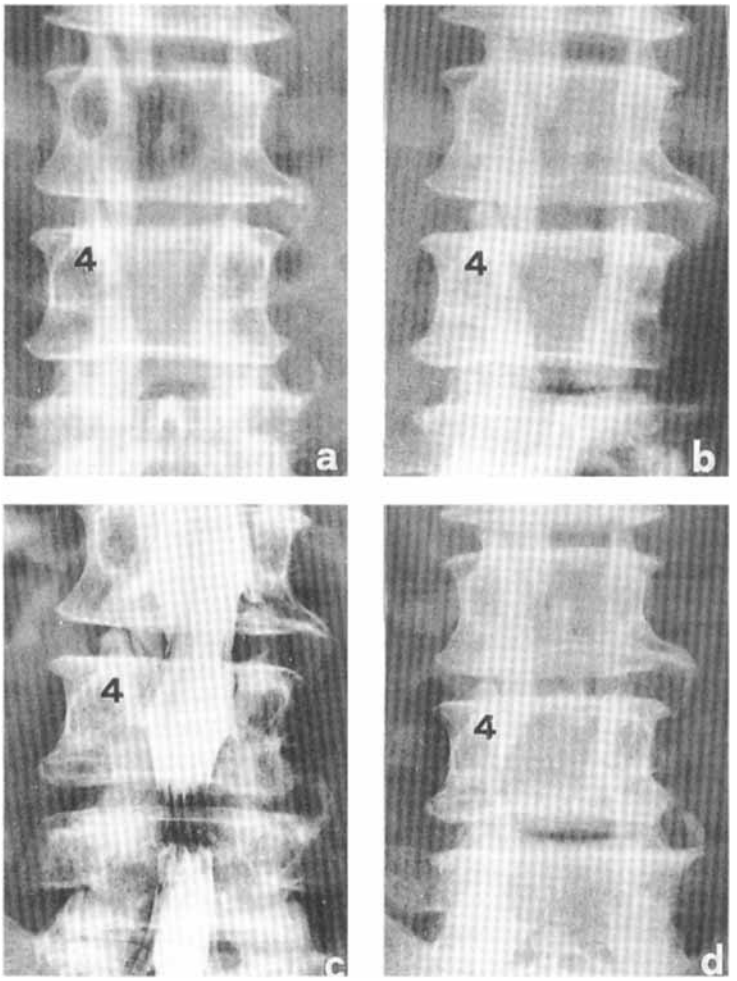

Figure 3. In this patient, submitted to total laminectomy at L3 to L5, decompression was too narrow at L4–L5 (a). 3 years after surgery, anteroposterior radiograph revealed regrowth of the posterior arch at L4–L5 (b): 4 years following the initial surgery a myelogram (c) revealed recurrent stenosis at L4–L5 and repeat decompression (d) was performed at this level.

deterioration. In our series, at an average time of 8.2 years after surgery, the proportion of unsatisfactory results was 33 percent, but it decreased to 20 percent when only those patients who had a satisfactory result at short-term were considered.

The unsatisfactory outcomes at short term, none of which improved with time, were mostly due to insufficient decompression as a result of a too narrow laminoarthrectomy or to persistent neurological deficits either not improved, or caused, by operative treatment. The most frequent cause of deterioration of early satisfactory results was recurrence of symptoms in the lower limbs. In most cases, this appeared to be related to protrusion of a disc not excised at surgery and, particularly, to regrowth of the resected portion of the posterior vertebral arch. Posterior arch regrowth was mild in 41 percent of cases and moderate or marked in 39 percent. The amount of bone regrowth appeared to be inversely related to the degree of vertebral stability and the width of the decompression, i.e., we observed a lesser tendency to bone regrowth in the presence of a stable lumbar spine or a wide surgical decompression in the transverse plane.

Based on the results of this study, we believe that: decompressive surgery for lumbar stenosis, while preserving vertebral stability, should be as wide as possible; any disc protrusion should be carefully detected and discectomy performed at the involved level; fusion should be performed when stenotic motion segments are unstable or risk to become unstable following surgery.

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