SURGERY FOR LUMBAR SPINAL STENOSIS IN OLD PEOPLE

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We have reviewed 31 consecutive patients, aged 65 years or more, after surgical decompression for degenerative lumbar spinal stenosis. The average follow-up was 42 months. Assessment included a standard questionnaire, a pain diagram which was completed by the patient, and clinical and radiological examination.

Patients were considered in three groups; degenerative spondylolisthesis (19), lateral recess stenosis (5), and central-mixed stenosis (7). The indication for surgery was leg pain: no patient had an operation for back pain alone. Fusion was never performed.

Overall, 64% of the patients had an excellent result, 17%, a good result and 19% a poor result. We conclude that the long-term outcome of decompressive surgery in the elderly is good; it does not differ from that reported for younger patients.

The syndrome of back and leg pain due to nerve-root entrapment caused by degenerative disease of the lumbar spine is not always recognised in elderly patients; the symptoms are accepted by patient and doctor as part of getting old. Even when spinal stenosis is thought to be the cause of the disability, surgical treatment may not be considered because it is thought to carry a high morbidity.

The conservative treatment of degenerative stenosis with anti-inflammatory agents, corsets and epidural steroid injections is rarely effective (Wiltse, Kirkaldy-Willis and McIvor 1976). Previous reports of surgical decompression for spinal stenosis have commonly included patients from all age groups (Tile et al 1976; Verbiest 1977; Getty 1980; Grabias 1980; Surin, Hedelin and Smith 1982; Nasca 1987) and even in those which deal with the treatment of degenerative stenosis alone, there was usually a lower age limit of not more than 55 years (Surin et al 1982; Fast, Robin and Floman 1985; Katz et al 1991).

We report the clinical presentation of degenerative lumbar stenosis and the long-term results of spinal surgery in patients aged 65 years or over at the time of surgery.

PATIENTS AND METHODS

We reviewed 34 consecutive patients, aged 65 years or over, who had had decompressive surgery for degenerative spinal stenosis at Wrightington Hospital between 1984 and 1989. All had been traced and 31 were available for examination at from 2 to 7 years (mean 3.5) after operation.

There were 18 women and 13 men, with a mean age at the time of surgery of 72.2 years (65 to 81). All had had either sciatica or neurogenic claudication, and had been assigned to one of the following categories:
1) degenerative spondylolisthesis
2) lateral recess stenosis, or
3) central-mixed stenosis in which there was overall narrowing of the anteroposterior (AP) diameter of the spinal canal and the lateral recesses.

Central stenosis was diagnosed if the AP diameter
of the spinal canal was less than 15 mm. In groups 2 and 3 the vertebral alignment was well preserved. The types of stenosis are related to the sex of the patients in Table I.

**History and examination.** All 31 patients had had pain radiating to the lower limbs; this was the primary indication for surgery and was of two types:

1) true sciatica or impulse pain, with tingling or shooting pain radiating below the knee, exacerbated by coughing or straining, and also occurring at rest, or
2) neurogenic claudication brought on by exercise and described variously as cramp, heaviness, numbness or weakness of the lower limbs.

Both types of pain could be either unilateral or bilateral, and either claudication or sciatica (Table I). Leg symptoms had been present before surgery for a mean of 8 years (1 to 16).

The pain had forced the patient to stop walking after a mean period of 8 minutes (0 to 45), and all 31 patients gave a history of low back pain preceding the onset of leg pain by an average of 10 years (2 months to 30 years).

**Neurology.** Twenty-two patients had lost the ankle reflex, but distal weakness was rare: two patients had had a weak extensor hallucis longus and one a drop foot. There was sensory loss in six, usually distally; it was patchy and not confined to any particular dermatome. Only two patients had had straight-leg raising of less than 80°. No patient had had more than two inappropriate signs (Waddell et al 1984) at the time of surgery.

**Radiography.** Most patients had had a radiculogram, but in three this had been technically difficult; they had undergone CT. Of the 19 patients with spondylolisthesis, seven had a complete block on the radiculogram, with no water-soluble dye visible at the level of the stenosis. Of the seven patients with central-mixed stenosis, two had a complete block and the other five had only lateral recess stenosis, with a radiculogram showing nerve-root cut-off and often some indentation of the dural sac (Fig. 1). Stenosis was at one level only in 28 patients (90%) and at

<table>
<thead>
<tr>
<th>Table I. Type of stenosis related to the sex of the patient and to the type and site of leg pain</th>
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<tbody>
<tr>
<td><strong>Type</strong></td>
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<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Degenerative spondylolisthesis</td>
</tr>
<tr>
<td>Lateral recess</td>
</tr>
<tr>
<td>Central-mixed</td>
</tr>
<tr>
<td>Total</td>
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**Fig. 1**

Anteroposterior and lateral radiculograms of a patient with degenerative spondylolisthesis, showing marked narrowing of the column of contrast at the L4 to L5 level, with bilateral nerve-root cut-off.
two levels in the other three, all of whom had the central-mixed type. The intervertebral levels which were decompressed are shown in Table II; three patients had decompression at two levels.

**Operation.** All patients had been operated on by the same surgeon (PLRW). In 19 patients, lateral recess decompression alone had been performed, unilaterally in 12 and bilaterally in seven. This procedure included partial laminectomy with excision of the ligamentum flavum, medial facetectomy and occasionally resection of the medial part of the pedicle. Care had been taken to preserve the pars interarticularis, helped by the use of an osteotome to perform the medial facetectomies. In the past, other methods of removing the medial third of the facet joint, such as with rongeurs, had been found to jeopardise the pars interarticularis because inadvertent leverage can fracture this bony bridge. The other 12 patients had also had resection of the whole of the lamina and spinous process, to provide a full central decompression. No disc material had been removed at any operation.

**Follow-up.** The patients were reviewed at a special clinic by one of the authors (PLS), together with their complete medical records and all radiographs. Their satisfaction with the result and any requirement for analgesia were recorded. Walking distance was assessed and a neurological examination of the lower limbs was performed. Late vertebral displacement was assessed by comparing the preoperative radiographs with those taken at review.

**Pain diagram and score.** All patients had completed a pain diagram at their preoperative assessment; they repeated this at the review attendance (Fig. 2).

A grid (Fig. 3) was then used to divide the area below the buttock creases into 32 boxes for the back view and 32 for the front view, allowing the preoperative diagram to be compared with the postoperative one, as a measure of change in the leg pain. A similar procedure assessed the change in back pain, using a grid of 64 squares placed above the buttock crease (Fig. 3). The number of boxes occupied by the pain and ache marks was then added to give scores for leg pain and back pain.

**RESULTS**

Of the initial 34 patients, 31 were reviewed. Two patients had died and the third was suffering from senile dementia and unable to attend. At follow-up the mean age of the patients was 76.3 years. In Table III the results are related to the type of lesion, and the mean pain scores for each type are shown in Table IV.

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**Table II.** Type of stenosis related to the vertebral levels decompressed

<table>
<thead>
<tr>
<th>Type</th>
<th>L5 to S1</th>
<th>L4 to L5</th>
<th>L3 to L4</th>
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<tbody>
<tr>
<td>Spondylolisthesis</td>
<td>3</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Lateral recess</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Central-mixed</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>23</td>
<td>3*</td>
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</table>

* three patients had more than one level affected

Mark the areas on your body where you feel these sensations.

Use the symbols. Mark all the affected areas.

<table>
<thead>
<tr>
<th>Numbness</th>
<th>Pins and needles</th>
<th>Ache</th>
<th>Pain</th>
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<tr>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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Fig. 2

A pain diagram completed by a patient before surgery, showing typical sciatic distribution of pain, with paraesthesia in the lateral foot.

Fig. 3

The grids used to score pain diagrams. The 32-square grid is used for the anterior and the posterior aspects of the legs. This gives a total of 64 boxes each for leg and back pain.
Excellent results. Twenty patients (64.5%) had no leg pain. Eighteen of these enjoyed unrestricted walking, and the walking distance had improved in the other two. Ten of these patients had no back pain and another nine said their pain had improved. One patient's back pain was unchanged. None of these 20 patients required any analgesia and all were satisfied with the operation, having had symptoms preoperatively for a mean of 6.3 years (0.5 to 13). The mean preoperative pain diagram score for leg pain was 17.8 and at review was 0. For back pain preoperatively the mean was 6.6 and at review was 2.3.

| Table III. Results (number, percentage) related to the type of stenosis in 31 patients |
|---------------------------------------|------|-----|-----|
| Spondylolisthesis                     | 13   | 68  | 3   |
| Lateral recess                        | 1    | 20  | 2   |
| Central-mixed                         | 6    | 85  | 0   |
| Total                                 | 20   | 5   | 6   |

Good results. Five patients (16%) had less leg pain and could walk further, although only one could walk unrestrictedly. One of these patients had no back pain and in three this had improved. One patient's back pain was unchanged. All five required occasional analgesia, but were satisfied with the operation, having had symptoms for a mean of 6 years (2 to 10). The mean preoperative pain diagram scores for the legs and back had been 19.2 and 6.8 respectively; at review these were 7.8 and 4.6.

<table>
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<th>Table IV. Mean pain scores related to the outcome (see text)</th>
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<td>Outcome</td>
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<tr>
<td></td>
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<tr>
<td>Excellent</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Poor</td>
</tr>
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</table>

Poor results. Six patients continued to have leg pain, and no improvement in their walking distances. Back pain had resolved in one, improved in two, but was unchanged in the other three. All six required regular analgesia. Four of these patients were dissatisfied with their result, but two rather surprisingly were satisfied with their very small improvement. In these patients, the symptoms had been present for a mean of 10.4 years (6 to 13.3), the mean preoperative pain scores for legs and back were 29.3 and 6.8 respectively, and the scores at review were 25.2 and 7.1.

Three of the patients with degenerative spondylolisthesis had developed an increase in radiographic vertebral displacement, but in all three back pain had improved or disappeared. None of the other 28 patients had developed or increased their slip; 16 of them had relief from back pain.

The mean walking distance in the 31 patients had increased from 8 minutes to 45 minutes. The ankle reflex had recovered in four of the 22 patients in whom it had been initially absent. There was no motor recovery in the two patients with weak extension of the hallux or in the one with foot drop. Sensory loss had improved in three of the six patients with this complaint. No patient had an increased neurological deficit after surgery.

Complications. There were deep venous thromboses in two patients, and one developed an acute confusional state, which recovered after four days. The mean time in hospital after operation was 12 days (10 to 18). There were no deaths or neurological complications.

DISCUSSION

Because it is treatable, the diagnosis of spinal stenosis must always be considered in elderly patients with leg pain of a sciatic or neurogenic nature.

Back pain is almost always associated with the leg symptoms, but it is not the indication for surgery. A detailed history of the leg pain, including its nature, distribution and relationship to exercise will often reveal the possibility of nerve-root entrapment. Since this has the potential for surgical relief it merits further radiological investigation by CT or radiculography. Many elderly people have difficulty in describing the pain; we have found that the pain diagram was a useful adjunct to the history in elucidating this.

In our series, symptoms attributable to the spine had been present for a mean of eight years before surgery, longer than that reported for younger age groups (Paine 1976; Getty 1980). In elderly patients, physical examination often reveals few abnormalities: even when there was definite nerve-root entrapment, straight-leg raising was usually normal. Sensory loss was vague, with no clear dermatomal distribution, but the ankle reflex was often absent, as has been reported in other series (Getty 1980; Nixon 1991). This paucity of physical signs makes the history of paramount importance in reaching a diagnosis. We found no difference in the symptoms between cases of degenerative spondylolisthesis and those of the central-mixed type of stenosis; both presented with similar proportions of neurogenic claudication and sciatica. Of the patients with lateral recess stenosis, however, 80% had a fairly constant sciatic-type pain, rather than an exercise-induced neurogenic claudication.

Plain radiographs always show degenerative disease, but they are essential to exclude other pathologies. The anatomical level of the stenosis cannot be determined from the history and examination alone. We have found that radiculography is satisfactory, and can show lateral
recess stenosis and nerve-root entrapment (Morris 1976). CT and MRI are alternatives which are now more widely available.

There is no precise method of assessing patients before and after surgery. Studies which use subjective criteria invariably report better results than those using functional and objective criteria (Howe and Frymoyer 1985). We augmented the simple criteria of patient satisfaction with more objective measures of the need for analgesics, the walking distance, and the comparison of the pre- and postoperative pain diagrams. The area on the legs covered by symbols correlated well with the outcome measures of walking ability, symptoms and patient satisfaction (Table IV).

Our six poor results were in three patients with degenerative spondylolisthesis, two with lateral recess stenosis and one with central stenosis. The mean duration of leg symptoms before surgery in this group was 12 years: this prolonged duration of compression of the nerve roots may have caused irreversible damage and precluded good results.

Our results do not differ greatly from those in previous reports (Paine 1976; Tile et al. 1976; Getty 1980; Fast et al. 1985) even although our patients were much older. Only Tile et al. (1976) have divided degenerative stenosis into subgroups of spondylolisthesis, lateral recess stenosis and central-mixed stenosis.

Paine (1976) reported that the results of surgery tend to be disappointing when two or more spinal levels are involved. This has also been our experience: we consider that neural compression at multiple levels is a relative contraindication to surgical decompression. For this reason our series includes a large preponderance of patients with stenosis at a single level, and this has improved our general results.

It has been suggested that spinal fusion should be combined with decompression (Feffer et al. 1985; Herkowitz and Kurz 1991; Katz et al. 1991) to prevent vertebral slip and reduce postoperative low back pain. We believe that fusion is not indicated in old people with degenerative stenosis. There was an increase in slip in three of our patients with degenerative spondylolisthesis but this was not associated with increased back pain. Tile et al. (1976) reported that all their patients with spondylolisthesis had an increased slip after surgery, but this was in a younger age group. We consider that, in elderly patients, decompression is the most important factor in relieving symptoms and that the addition of a spinal fusion would increase the postoperative morbidity. Of the 26 of our patients who improved after surgery, 12 had no back pain. This result is similar to that of Herkowitz and Kurz (1991) who always performed a fusion, but, again, their patients were younger. There may be a case for fusion in younger patients but we believe that in elderly patients there is more intrinsic stability in the spine and we advise decompression alone. Unless a protrusion is compromising the nerve root the intervertebral disc should be left alone; its removal will increase the potential for spinal instability (Grabias 1980). We believe that a second important factor in maintaining stability is the preservation of the pars interarticularis.

Conclusions. The results of local decompression for sciatica and neurogenic claudication in the elderly are good. We have found that a pain diagram is very useful in assessing and understanding the patient's symptoms.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES


