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ORIGINAL ARTICLE

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Observations on the safety and efficacy of surgical decompression for lumbar spinal stenosis in geriatric patients

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Abstract This retrospective study examines the results of surgical decompression of the lumbar spinal canal in 122 geriatric patients (age range 75–89 years) treated under general anesthesia by the same surgeon between the years 1990 and 1999. Patient demographics, perioperative complications, pain profiles before surgery and at the time of data collection (December 2000), as well as overall mortality were recorded. One hundred and twenty-two patients were studied. The average age at the time of surgery was 78.8 years (range 75–89 years). No perioperative deaths were recorded. The mean time elapsed from surgery until patient follow-up was 45.7 months (range 12–119 months). Fourteen patients had died at the time of patient follow-up (December 2000). When compared to pain experienced before surgery, at the time of the interview a significant ($P<0.0001$) improvement in low-back and radicular pain as well as in the ability to perform daily activities (dressing, washing, getting out of bed and walking) was described. We conclude that, for geriatric patients rated as physical status I-II (>75 years) under the American Society of Anesthesiologists (ASA) classification, surgical release of lumbar spinal stenosis is a safe and effective treatment option. However, the suitability of ASA III patients requires further investigation.

Keywords Lumbar spinal canal stenosis · Geriatric patients · Surgical outcome

Introduction

Of the many age-related diseases, lumbar spinal stenosis is an increasingly recognised cause of low-back and radicular pain in elderly patients. The resultant chronic pain and discomfort may significantly compromise quality of life. While conservative interventions have been performed, for patients with severe lumbar spinal stenosis, surgical decompression is associated with a more favorable outcome when compared to nonsurgical management [1, 2]. However, due to age-related co-existing disease, health-care providers as well as patients and their families are often concerned as to the suitability of surgery for these high-risk geriatric patients. As a result, elderly patients are often advised that they are too old or too sick to undergo surgery. However, for the patient, non-surgical management may result in prolonged pain and suffering. Therefore, outcome data are important when taking management decisions for the geriatric patient suffering from lumbar spinal stenosis. Since few outcome data are available for patients older than 75 years, we performed a retrospective chart analysis and 10-year follow-up designed to document the immediate and long-term outcome of 122 geriatric patients (age range 75–89 years) who underwent general anesthesia for surgical decompression of lumbar spinal stenosis.

Materials and methods

All geriatric patients aged at least 75 years who underwent surgical decompression for lumbar spinal stenosis during the years 1990 to 1999 were included in the study. Only patients with lumbar spinal stenosis secondary to degenerative spondylosis were analyzed. In all cases the surgical procedure was performed by the same surgeon (R.G.).

A standard general anesthetic was administered and surgery was performed with the patient placed in the prone (knee-chest) position. In all cases, a midline incision was performed and the posterior spinous processes partially removed. Thereafter, at the level of the pathology, partial laminectomy, sublaminar facetectomy and bilateral root canal and foraminal decompressions were performed. In all cases, the facet joints were preserved. Surgical drains were not routinely placed.

A database was compiled using both inpatient and outpatient medical records. Medical history, radiology reports, operative and anesthetic records, as well as the immediate postoperative milestones, were recorded. In addition, on conclusion of the study period (December 2000), a telephone-based interview was performed (Fig. 1). At this time, using an oral pain score (mild, moderate, severe), patients were specifically asked to describe their pain before surgery and at the time of the interview. In addition, patient perception of the presence or absence of pain-induced limitations while performing daily activities (dressing, washing, getting out of bed and walking) was recorded. The preoperative and postoperative distance that patients could walk before experiencing limb pain (neurogenic claudication) was also recorded. Finally, analgesic drug requirements before and after surgery were noted.

Descriptive statistical analysis was performed using GraphPad Prism version 3.0 (San Diego, Calif., USA). Pain scores were compared using the Chi-square test. Data are expressed as percentages or numbers. $P<0.05$ was considered statistically significant.

Results

The records of 122 patients (60 women and 62 men) were reviewed. The average age at the time of surgery was 78.8 years (range 75–89 years). Patient physical status was recorded as class I, II and III, under the American Society of Anesthesiologists (ASA) classification, in 19%, 74% and 7% of patients, respectively. Eleven patients (9%) had undergone previous spine surgery. Fourteen patients had died at the time of patient follow-up (December 2000). However, no patients died during the intermediate (<3 months) postoperative period. A total of 108 patients were contacted at the time of patient follow-up. The mean time elapsed from surgery until patient follow-up was 45.7 months (range: 12–119 months) (Table 1).

Fig. 1 Interview protocol

1) Demographic data:

Name_____ Date of birth_____

Gender M / F Marital status (single / married / divorced / widow)

Address_____

2) Clinical assessment:

a. Verbal Pain Score at rest (mild, moderate, severe)

Before operation _____ After operation _____

b. Walking distance (< 100 meters; > 100 meters)

Before operation _____ After operation _____

c. Limitation in activities of daily living (none, mild, moderate, severe)

	Before operation	After operation
Washing	_____	_____
Dressing	_____	_____
Getting out of bed	_____	_____

3) **Analgesic drug requirements**:

Drugs (yes / no): Before operation _____ After operation _____

Frequency Before operation _____ After operation _____

4) **Expectation of surgery**: will help / will not help

5) **Satisfaction with surgery**: excellent / good / moderate / bad

Table 1 Demographic data on the 122 geriatric patients who underwent surgical decompression for lumbar spinal stenosis

Age[a] (year): mean (range)	78.8 (75–89)
Sex (M/F): *n*	62/60
Weight (kg): mean±SD	71.1±11.9
Height (cm): mean±SD	165.5±7.3
ASA (I/II/III): *n*	23/90/9
Months since surgery (at review): mean (range)	45.7 (12±119)
Deaths (at December 2000): *n*	14

[a]Age at time of operation

Table 2 Number of patients with co-existing systemic disease

	n (%)
Ischemic heart disease	72 (59)
Hypertension	83 (68)
Chronic atrial fibrillation	20 (16)
Myocardial infarction	14 (12)
Coronary artery bypass surgery	10 (8)
Congestive cardiac failure	25 (20)
Diabetes mellitus	31 (25)
Peripheral vascular disease	19 (16)
Cigarette smokers	18 (15)
Chronic obstructive lung disease	12 (10)

Table 3 Distribution of oral pain score (percent)

	Before surgery	At time of interview*
Mild	3	60
Moderate	15	39
Severe	90	9

*$P<0.0001$ between the groups

Table 4 Patient ability to walk

Distance (m)	Before surgery (*n*)	After surgery (*n*)	*P*-value
<100	50	18	<0.001
>100	36	68	<0.001

Hypertension and cardiac disease were the most common comorbidities (83 and 72 patients, respectively). Cardiac disease was subdivided into ischemic heart disease (59%), congestive cardiac failure (20%), chronic atrial fibrillation (16%), previous myocardial infarction (11%), and coronary artery bypass graft (8%). Other co-existing disease included diabetes mellitus (25%), peripheral vascular disease (16%) and chronic obstructive lung disease (10%) (Table 2).

The mean ±SD thiopental induction dose and intraoperative fentanyl administration was 2.0±0.1 mg/kg and 4.2±1.4 μg/kg, respectively. Fifty-seven patients underwent single-level laminectomy and 65 patients required decompression at two or more levels. The mean anesthesia time (time from intubation until extubation) and the mean surgical time (time from skin incision to skin closure) was 75.1±23 min and 53.1±14 min, respectively. The mean postanesthesia care unit and hospital admission times were 76.2±39 min and 3.9±1 days, respectively.

Postoperative complications included transient urinary retention (11.4%), exacerbation of congestive cardiac failure (9%), redness along the wound margins (3.2%), postoperative delirium (1.6%) and chest pain (1.6%). All complications responded to appropriate therapy. In no case was hospital stay prolonged due to the associated complication.

When compared to pain experienced before surgery, at the time of the interview a significant ($P<0.0001$) improvement in low-back and radicular pain was described (Table 3). Furthermore, patients reported a significant ($P<0.0001$) subjective improvement in the ability to perform daily activities (dressing, washing, getting out of bed and walking). In addition, the postoperative interview demonstrated a significant ($P<0.001$) improvement in patient ability to walk a distance greater than 100 m when compared to their preoperative status (Table 4).

Discussion

The results of this retrospective study suggest that surgical decompression of lumbar stenosis is a safe and effective treatment option for geriatric patients suffering from symptoms and signs of spinal stenosis. Despite the presence of co-existing disease, no patients died during the immediate postoperative period. In those with perioperative complications, treatment was successful and none of them required intensive care or prolonged hospital stay. Patients described significant reduction of low-back and radicular pain and improvement in their ability to perform daily activities.

The overall success of surgery in these high-risk patients is likely due to the fact that perioperative care was administered by the same highly experienced anesthetist [6, 8]. This observation is supported by the fact that the dosages of the potentially dangerous drugs, fentanyl and thiopental, were matched to age-related changes in redistribution kinetics and drug metabolism (4.2±1.4 μg/kg and 2.0±0.1 mg/kg, respectively) [3]. Furthermore, since the skill of the surgeon significantly alters patient outcome [4, 5], the results of this study may have been positively influenced by the fact that all operations were performed by the same surgeon.

In this study, only patients with ASA physical status I, II and III underwent surgery. This possible bias may be explained by the fact that the same professional staff was responsible for patient selection, surgery and perioperative care. As a result, it is possible that the very-high-risk patients were denied surgery, and therefore excluded from

the study population. Therefore, the results of this study should not be extrapolated to patients classified as ASA physical status IV or V.

We hypothesise that the rapid hospital discharge (3.9± 1 days) was achieved because of the low anesthetic and surgical complication rates. By contrast, Vitaz et al. reported an average hospital stay of 11.6 days (range 2–94 days) for geriatric patients (>75 years) recovering from surgical release of spinal stenosis [7]. Furthermore, in this study the length of hospital admission was directly related to the incidence of postoperative complications.

During our 10-year follow-up period, 14 patients (11.4%) died. However, no patients died in the intermediate (<3 months) postoperative period. Furthermore, when assessing the effect of surgery on patient mortality, it is important to compare the mortality rate of the study cohort with that of a matched non-study population. According to the Israel Central Bureau of Statistics, the mortality rate of patients older than 75 years is approximately 9% per year. Since our mortality rate was over a 10-year period it is unlikely that surgery adversely affected patient mortality.

This study may be criticised because of its retrospective study design. Furthermore, the levels of the patients' pain and functional disability were not recorded prior to the surgical intervention. However, a prospective follow-up of this nature is extremely difficult. Since all surgery was performed by the same surgeon (R.G.), and intractable pain as well as neurological deficit constituted the clinical indications for surgery, we believe that the baseline preoperative pain and functional disability were severe. Furthermore, functional disability was measured by assessing a wide range of variables (dressing, washing, getting out of bed and walking).

In conclusion, the results of this study suggest that for carefully selected geriatric patients with an ASA physical status I–II (>75 years), surgical release of lumbar spinal stenosis is a safe and effective treatment option. However, the suitability of ASA III patients requires further investigation. These results should be validated in a prospective study.

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