The outcome of Microscopic Selective Decompression of Degenerative Lumbar Spinal Stenosis

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Objective: The aim of this study is to report our experience in treating degenerative lumbar canal stenosis with microscopic selective decompression.

Setting: Orthopedic department, Salmaniya Medical Complex.

Design: Retrospective study.

Method: A review of 48 patients who had microscopic selective decompression for degenerative lumbar spinal stenosis. Thirty-one patients were evaluated for 2.5 years (1 to 4 years) after surgery. The outcome was assessed using the Roland and Morris disability score and Zurich claudication score. Instability was determined according to the criteria described by White and Panjabi.

Result: A significant decrease in low back pain disability and a significant increase in walking time and ambulation were seen. An excellent to good outcome was noted in 24/31 (77.4%) patients. No patient showed secondary radiological instability.

Conclusion: Microscopic selective decompression is a safe and effective procedure. In the absence of pre-operative radiological instability, posterior instrumentation and fusion is not required.

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Degenerative lumbar canal stenosis is the commonest cause of back pain and leg pain in people over 65 years. Clinical and radiological signs of progression of stenosis often result in significant decrease in the patient quality of life and surgery is required with increasing frequency[1,2]. Spinal stenosis is defined as narrowing of the vertebral canal and/or the foramen, to a degree that gives rise to compression of lumboscaral nerve roots or the cauda equina producing symptoms of claudication or radiculopathy[3].

The initial treatment should be conservative. The natural long-term outcome of conservative treatment is unsatisfactory in many patients. In a study of conservatively managed patients followed for four years, 77% had persistent claudication, 85% were unchanged or had deteriorated and 63% had continual back pain[4]. The natural history of spinal stenosis summarized by Dilip et al as 15% of cases improved, 30% deteriorated, and 45% remained unchanged[5]. Surgery is required after the failure of conservative treatment[6].

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The aim of this study is to report our experience in treating degenerative lumbar canal stenosis with microscopic selective decompression. The procedure aims to decompress the spinal canal and the foramen while minimizing the risk of developing secondary instability postoperatively.

METHOD

A retrospective review of 48 patients who had microscopic selective decompression with or without posterior instrumentation for lumbar stenosis at S.M.C hospital, Bahrain between January 2000 and December 2004 was done. Seventeen patients were excluded; two had previous surgeries, one had Laurence Moon pedal syndrome, one had rheumatoid syndrome, one had past history of cancer colon and colostomy, two died before proper follow up, and eleven were lost to follow up. The 31 patients assessed were without systemic pathology or vascular disease affecting lower limbs and had given formal consent for surgery.

The mean age was 65 years (55 to 75 years). There were 18 females (58%) and 13 males (42%). These patients had acquired degenerative lumbar stenosis. The L4/ L5 level was stenotic in 25/31 (80.6%), L3/L4 in 15/31(48.4%), L5/S1 in 9/31 (29%), L2/L3 in 1/31 (3.2%). Three patients (9.7%) presented with concomitant spondylolisthesis at L4/L5.

All patients presented with symptoms and signs consistent with nerve root involvement. The duration of symptoms ranged from 2 to 10 years. Unilateral symptomatic left and right leg were 9/31 (29%) and 11/31 (35.4%) respectively, and bilateral symptomatic legs were 11/31 (35.4%). Leg symptoms whether claudication or numbness due to radiculopathy were examined and subclinical vascular factors were excluded. The distribution of neurological symptoms combined with neurological examination and MRI allowed diagnosing the symptomatic stenotic levels. In addition, dynamic myelogram and CT myelogram were used in nine cases.

All surgical procedures were performed by the senior author. Microscopic selective decompression was achieved by fenestration of laminae with minimal soft tissue dissection, preserving the posterior tension band and pars inter articularis[10,11]. As much of the facet joints and laminae as possible were preserved whilst ensuring complete decompression of the nerve root course. The fenestration was restricted to the clinically relevant level and side[12]. This procedure was repeated in bilateral or multilevel cases. Three patients with degenerative spondylolisthesis and six other patients were considered to be unstable according to White and Panjabi or as multiple levels decompression were planned with scoliotic deformity[13]. These patients underwent an associated posterior instrumentation and fusion. We have evaluated the results of microscopic selective decompression for 3 years.

The patients were interviewed and asked to comment on subjective outcome with regard to their back pain and walking ability pre-operatively, in the early

postoperative period (1st six weeks) and late postoperative period. Roland and Morris disability score and Zurich claudication score were used[7,8,9].

Radiographic criteria of instability by White and Panjabi

Flexion extension radiographs
Sagittal plane translation >4.5mm or 15%
Sagittal plane rotation >15ºin L1-2-3
> 20ºat L4-5
> 25ºat L5-S1
OR
Resting radiographs
Sagittal plane translation > 4.5mm
Sagittal plane rotation >22º

RESULT

Pre-operatively, the mean score of Roland and Morris was 14 points (24 points: severe disability, 0: no disability) which reflects severely compromised quality of life[14]. The mean short term follow up score was 5 points indicating a significant decrease in the level of disability. In long term follow up, there was reduction in the mean score by eight points. This confirms maintenance of this improvement.

Walking ability improved in 29/31 (93.5%) of patients according to Zurich claudication score. Pre-operatively, 25/31 (80%) could not walk more than 5 minutes. Six weeks postoperatively 18/31 (58%) could walk more than 5 minutes and 13/31 (42%) more than 10 minutes. This improvement maintained with 19/31(61%) walking more than 10 minutes and 12/31 (38.7%) between 5 to 10 minutes two years postoperatively (Figure 1).

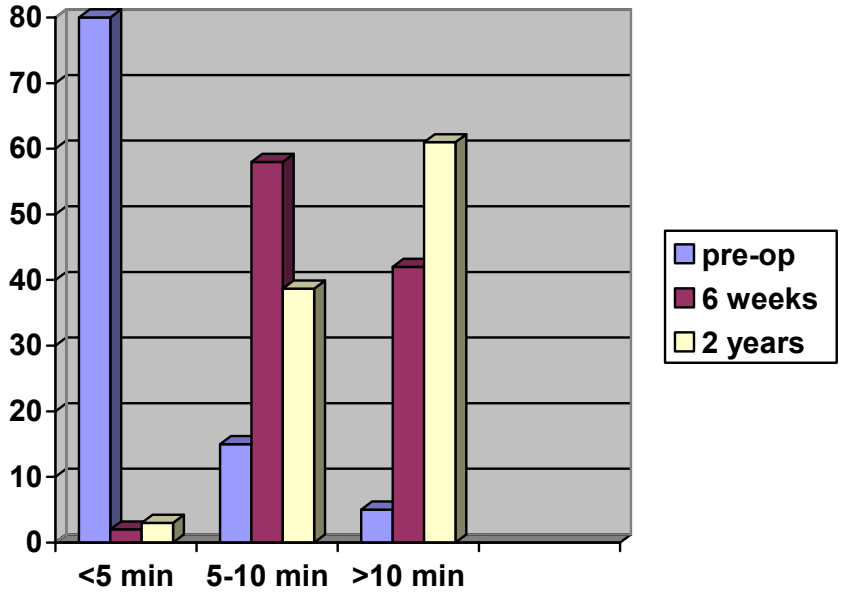

Figure 1. Walking ability outcome

According to Zurich score, 24/31(77.4%) were very satisfied, 6/31(19.3%) satisfied, and 1/31(3.2%) unsatisfied (Figure 2).

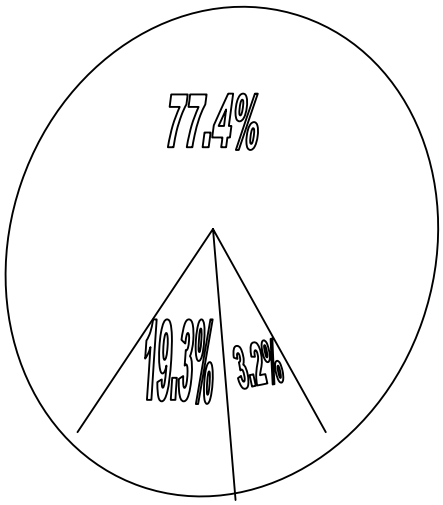

Figure 2. Satisfaction score according to Zurich.

One patient died on the 6th postoperative day with sudden onset of severe hypotension and progressed to multiple organ failure. Two patients had dural tear which was repaired and resolved, and three patients had postoperative infection; one was deep infection which required debridement and drainage.

DISCUSSION

This study has the deficiencies of a retrospective review, but the variable used was selected because they are reliable and widely accepted. The quality of life, the severity of back pain, and the functional status were recorded according to established scoring systems[7,8,9.]

In previous reports of the outcome after surgery of 5 to 10 years in the treatment of spinal stenosis, the incidence of good to excellent result has varied between 55% to 86% [15,16.] Jolles et al reported 79% excellent results[17.] Our results are consistent with those studies. We observed good and excellent results in 77.4% of cases. There was fair outcome in 22.5% of cases, which is similar to other studies. These were subjective results which could not be explained on the basis of the neurological examination and these patients were dissatisfied because of persistent low back pain despite the resolution of sciatica and the neurogenic claudication, and the absence of secondary instability.

It has been reported that patients continued to improve during a period of 7 to 13 years after decompression[18]. The facet joints should be preserved by using an undercutting technique in combination with the laminectomy, and that only in the selected cases proved to be unstable radiologically should decompression be combined with fusion.

In a meta-analysis study between 1975 and 1995, it was stated that the least invasive surgical procedure produced the best result[19]. A review of 88 cases reported no significant differences in outcome between different surgical treatment groups (laminectomy alone, laminectomy and fusion) except in some cases of degenerative spondylolisthesis[20].

In this study, the improvement of back pain was very satisfactory. This could be explained by the fact that before surgery patients often try to relieve their claudication by bending forwards, which enlarges the spinal canal. However, this posture increases low back pain. After decompression surgery, the patient can again extend their lumbar spine, which decreases the back pain.

A major concern after decompression is the recurrence of low back pain because of secondary instability. Igushi et al stated that multilevel decompression and a pre-operative sagittal rotation angle of more than 10º are risk factors for development of secondary instability[16].

CONCLUSION

This study has shown that selective microscopic decompression of spinal canal with preservation of the posterior tension band of spine is a safe procedure with low rate of secondary instability. There is a high incidence of excellent or good results. Surgery enables these patients to have a better quality of life.

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