A prospective study of changes in self-rated disability and range of motion of the lumbar spine in patients with disc herniation undergoing decompression surgery

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Introduction

In the assessment of disability associated with back pain, the value of spinal range-of-motion (ROM) testing remains highly controversial. Whilst measures of ROM may not be the ultimate solution for assessing dysfunction in *all* spinal disorders, they may still be important in diagnoses that are specifically characterized by marked restrictions in movement.

The aim of the study was to examine lumbar range of motion in patients with herniated lumbar disc before and 2 months after decompression surgery of the lumbar spine, and to relate the changes to corresponding changes in self-rated disability in the performance of everyday activities.

Methods

Patients

29 patients with disc herniation (DH) (mean age 57 (SD 9) years; 66% men) took part in the study. The affected levels were (% patients): L2/3 7%; L3/4 10%; L4/5 55%; L5/S1 28%

All underwent decompression surgery without fusion/instrumentation.

A group of 33 age-matched controls (mean 56 (SD 7) years; 17 f, 16 m) with no history of serious LBP also performed the tests of spinal mobility, in order to derive gender-specific normal data for comparison.

Assessments pre and post surgery

Before and 2 mo after surgery, the following were measured:

- lumbar lordosis
- range of motion of the hips/pelvis and of the lumbar spine (see Figure 1)
- self-rated disability (Roland Morris questionnaire: 0-24 scale)
- pain (VAS 0-10) (using questionnaires, for pain in the last week; and a sliding scale for pain during the range of motion testing).

Assessment of outcome of surgery

Using a 1-5 Likert scale, the patients rated the success of surgery as as follows: (1) helped a lot (2) helped (3) helped little (4) didn't help (5) made things worse (dichotomised as good =1&2; poor =3,4&5)

Statistical analysis

Repeated measures ANOVA, ANCOVA, and simple and stepwise regression analyses were used. P<0.05 was considered significant.

Fig 1. Spinal curvature and range of motion: Spinal Mouse© system

Results

1) *Pre-surgery.* Compared with the controls, the DH patients had significantly lower values for standing lumbar lordosis (p=0.02) and range of flexion of the lumbar spine (p=0.001), but not of the hips (p=0.33) (see Table 1).

Table 1. Comparison of spinal mobility, DH patients vs controls

Variable (degrees)	DH patients	Controls	P value
Standing lordosis (º)	-26.2 (7.1)	-31.8 (10.0)	0.02
Hip range of flexion (º)	41.6 (18.2)	48.0 (14.9)	0.14
Lumbar range of flexion (º)	43.5 (15.5)	54.8 (13.4)	0.004

2) *Pre-surgery.* Roland Morris disability scores correlated significantly with lumbar spine range of flexion (ROF_l) (r=0.63, p= 0.0002, Fig 2); the correlation with hip range of motion failed to reach significance (r=0.36 p=0.06). ROF_l itself was significantly correlated with VAS pain during flexion (r=0.56). In stepwise multiple regression of both pain and ROF_l on disability, only ROF_l was selected for inclusion in the model as explaining a significant part of the variance in disability.

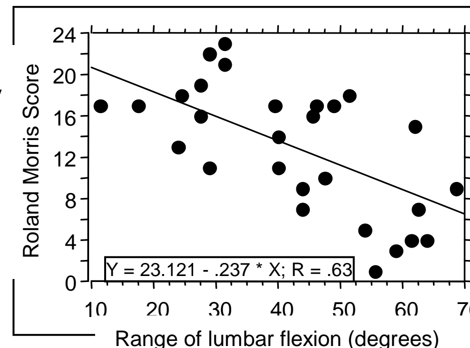

Fig 2. Relationship between lumbar ROF and self-rated disability

3) *Two months post-surgery,* there was a significant reduction in back pain and leg pain. Roland Morris disability scores showed a (non-significant) tendency to reduce (Table 2).

The group mean values for lumbar lordosis angle and lumbar range of flexion showed a significant decrease. Hip range of flexion showed a (non-significant) tendency to increase towards normal control values (Table 2).

Table 1. Spinal mobility, self-rated disability and pain before and after surgery.

Variable	Pre-op	2 mo post-op	P value
VAS back pain (ave last wk)	4.2 (2.9)	2.5 (2.1)	0.013
VAS leg pain (ave last wk)	5.6 (2.4)	2.1 (2.4)	0.0001
VAS back/leg pain (ROF test)	4.4 (2.6)	1.9 (2.6)	0.0001
Roland Morris Score	12.8 (6.1)	10.9 (6.2)	0.16
Standing lordosis (º)	-26.2 (7.1)	-21.3 (7.0)	0.0006
Hip range of flexion (º)	41.6 (18.2)	46.5 (15.8)	0.14
Lumbar range of flexion (º)	43.5 (15.5)	36.0 (13.5)	0.029

On an individual basis, there was a highly significant relationship between the *change* in self-rated disability scores and the *change in* lumbar range of flexion, pre- to 2 mo post-surgery (r=-0.85; p<0.0001) (Fig 3). Changes in range of flexion of the hips showed no such relationship (r=0.27, p=0.16).

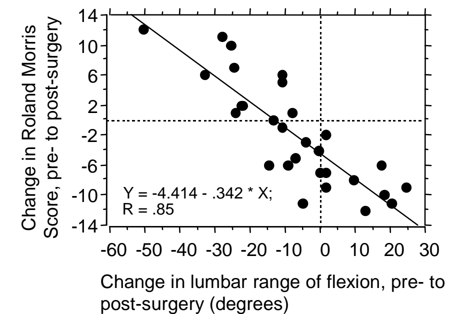

Fig 3. Relationship between changes in self-rated disability and lumbar ROF, pre- to 2 mo post-surgery

The "poor" outcome group of patients (=surgery helped little/didn't help; 17%) had a significantly greater reduction in lumbar range of flexion than the "good" outcome group (surgery helped/helped a lot; 83%) (p=0.02).

Discussion and conclusion

The pivotal role of *lumbar* mobility in explaining disability emphasizes the importance of measuring lumbar and hip ranges-of-motion separately, as opposed to "global trunk motion". In patients with a herniated disc, the determination of lumbar spinal mobility provides a valid, objective measure of function, which shows differences from normal matched controls; which correlates well with self-rated disability; and the changes in which, correlate extremely well with subjective changes in disability following surgery.

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