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ORIGINAL STUDY

Outcomes of conservative treatment for ruptured lumbar disc herniation

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The authors set up a prospective study of the effect of conservative treatment on a ruptured lumbar disc herniation in 89 patients, between June 2008 and June 2010. Seventy-two patients (81%) improved, while the other 17 (19%) needed surgery. The JOA score (best possible result : 29) was found to be significantly improved in the 72 patients of the conservative group, at 1 month, 3months, 6 months, 1 year and 2 years (t-test : $p < 0.001$). At final follow-up, after 2 years, 84.7% of the patients in the conservative group had a good or excellent result. However, if the 17 surgical cases were included, this proportion dropped to 68.5% The volume of the protrusion decreased significantly in the 72 patients of the conservative group : from 1422.52 ± 539.10 mm^3 to 1027.35 ± 585.51 mm^3 (paired t-test : $p < 0.001$). There was a definite correlation, in the conservative group, between the final resorption rate on the one hand and the percentage of combined excellent and good results on the other hand (72 cases ; Spearman rank correlation coefficient : r 0.01 = 0.470, $p < 0.001$).

Keywords : lumbar spine ; disc herniation ; conservative treatment ; surgery ; resorption.

INTRODUCTION

Guinto *et al* (*4*), using computed tomography, were first to observe resorption of a herniated disc after conservative treatment. Autio *et al* (*1*) and Cribb *et al* (*2*), confirmed these findings with MRI.

MATERIALS AND METHODS

Demographics

This prospective study included 89 patients with herniation of a ruptured lumbar disc, who accepted conservative treatment between June 2008 and June 2010 in the Traumatology Department of Suzhou hospital for traditional Chinese medicine. Inclusion criteria were : back pain with sciatica, positive straight leg raising test, MRI-confirmed ruptured lumbar disc (interruption of "black line" or posterior longitudinal ligament) on sagittal T1- or T2- weighted images (*9*), and complaints consistent with the MRI findings. Exclusion criteria : pregnancy, liver or kidney dysfunction, previous spinal surgery, scoliosis, spinal cord disease, tuberculosis, tumour, and cauda equina syndrome with progressive nerve damage. There were 38 females and 51 males. Their average age was 39.5 years (range : 16 to 60 years). The mean duration of complaints was 17.6 months

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(range : 3 days to 10 years). The VAS for back pain was > 7 points in 64 out of 89 patients. The straight leg raising test was limited to 30° or less in 61 out of 89 patients. Aetiology : heavy physical labour (52/89) ; trauma (61/89). MRI was performed 2 to 6 times in a mean period of 6.11 months (range : 2 to 24 months). All patients were followed up for 2 years.

Treatment

All patients took celecoxib 200 mg/day for 1 to 2 weeks. Bed-rest was maintained for 3 to 4 weeks. This period was reiterated, if necessary, up to 3-6 months. Muscle strengthening exercises were started within pain limits, and adjusted to the patients' condition. Abdominal setting was executed as follows : the patient, in the supine position, with the knees flexed, raised the buttocks off the mattress, leaning on head, elbows and feet (five-point support). This exercise was repeated 3 times a day, in groups. The lumbar muscles were strengthened in the prone position, hands behind the back ; chest and extended legs were raised off the mattress for 3 to 5 seconds (swallow style) ; this was done once a day, also in groups. Operative treatment was chosen if the Japanese Orthopaedic Association (JOA) score (best possible score : 29) improved less than 25% after 3 to 6 months, if symptoms worsened progressively, or if a cauda equina syndrome became imminent.

Clinical outcome score

The JOA Back Pain Evaluation Questionnaire was used : a score of 29 was the best possible result. Improvement ≥ 75% was seen as excellent, improvement ≥ 50% as good, improvement ≥ 25% as fair, improvement < 25% as poor.

Measuring protrusion

A SIEMENS 1.5T MRI scanner was used (spin-echo sequence, 11 sagittal sections T1- and T2-weighted, 1.25 mm interval, 5 mm collimation). The data were managed with the Picture Archiving and Communication System (PACS). The volume and the resorption rate of the protrusions were calculated.

Statistical analysis

The data were analyzed with IBM SPSS Statistics 20.0 software. Continuous data such as JOA scores and volume of protrusions were analyzed with a t-test or a nonparametric (Mann-Whitney U) test. Categorical data such as combined excellent and good rates of JOA scores were analyzed with a chi-square test or a Fisher exact test.

RESULTS

All 89 patients were followed up for two years. Seventy-two patients (81%) responded well to the conservative treatment (Fig. 1). However, 17 patients (19%) switched to operative treatment : 9 because the conservative treatment had no effect (JOA score remained < 16), 3 because a cauda equina syndrome developed, and 5 because clinical symptoms worsened after an initial improvement. Surgery took place after a mean period of 5.1 months (range : 3 to 8 months).

The JOA score improved significantly in the subgroup of 72 patients who responded well to conservative treatment : this was noted at 1 month, 3 months, 6 months, 1 year and 2 years (t-test : $p < 0.001$) (Table I). Also the categorical variables (excellent, good, fair, poor) improved significantly at each time point (chi-square test : $p < 0.001$) (Table I). There was no significant difference between the average JOA score before and after one year of follow-up ; a plateau was reached after one year. At final follow-up, after 2 years, 84.7% had a good or excellent result. However, if the 17 surgical cases were included, this proportion dropped to 69%.

The volume of the protrusion decreased significantly (Fig. 2) in the 72 patients with positive response to conservative treatment : from 1422.5 ± 539.1 mm^3 to 1027.4 ± 585.5 mm^3 (72 cases ; paired t-test : $p < 0.001$).

There was a definite correlation (Table II) in the subgroup of 72 patients with positive response between the final resorption rate on the one hand and the percentage of combined excellent and good results on the other hand (72 cases ; Spearman rank correlation coefficient : $r\ 0.01 = 0.470$, $p < 0.001$). However, excellent or good clinical results were almost as frequent in the 57 patients with partially resorbed hernia (19), unchanged hernia (35) or increased hernia (3) as in the 15 with completely

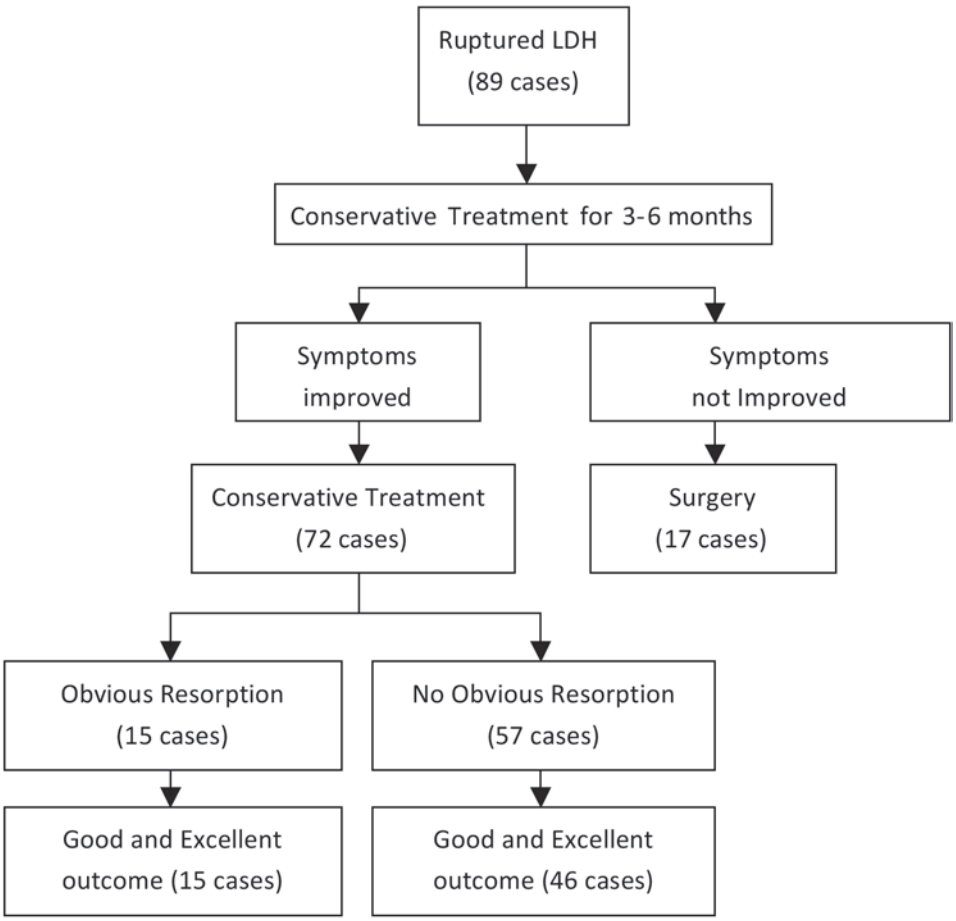

Fig. 1. — Treatment flow chart

resorbed hernia (15) : 80.70% versus 100%. This difference was not significant (Fisher exact probability test : p = 0.105).

DISCUSSION

Mechanism of resorption

Autio *et al* (*1*), and Splendiani *et al* (*14*) found that neovascularization in the outermost areas of a hernia, presenting as an enhancing rim on gadolinium enhanced MRI images, might be a major determinant of spontaneous resorption. Indeed, neovascularization means contact with blood circulation. Kobayashi *et al* (*7*) came to similar findings with ultrastructural analysis.

In a general sense, 4 mechanisms of resorption have been described : (1) ingrowth of new blood vessels, as mentioned ; (2) phagocytosis (*12,17*) ; (3) resorption of inflammatory oedema or haematoma (*13,10,17*) ; (4) tissue degradation and apoptosis (*5,6*).

Conservative treatment : a fair alternative

This study confirms the statement of Weinstein *et al* (*16*) that conservative treatment has an acceptable outcome, although inferior to the outcome obtained with surgery. Indeed, a rate of 84.7% of good or excellent results is inferior to the rate of +/- 95% mostly obtained with surgery. Thus conservative treatment may be a good option for patients who are

Table I. — Effect of conservative treatment on the JOA score (72 non-surgical patients)

Follow-up time	Number of cases (non-surgical)	JOA score	Excellent result	Good result	Fair result	Poor result	Excellent and good results
Before treatment	72	11.68 ± 4.31*	–	–	–	–	–
After 1 month	72	19.83 ± 2.98*	7	22	33	10	40.28%
After 3 months	72	21.92 ± 2.71*	12	46	10	4	80.56%
After 6 months	72	23.63 ± 2.82*	26	34	11	1	83.33%
After 1 year	72	24.10 ± 2.94*	30	30	12	0	83.33%
After 2 years	72	24.19 ± 3.03*	29	32	11	0	84.72%

JOA = Japanese Orthopaedic Association questionnaire for low back pain : 29 = best possible result.

* = $p < 0.001$.

Table II. — Relation between resorption of protrusion and treatment effect at 2 year follow-up

Resorption rate (RR)	Number of cases	Excellent result	Good result	Fair result	Poor result	Excellent and good results combined*
Obvious resorption (RR ≥ 50%)	15	13	2	0	0	100%
Partial resorption (20% < RR ≤ 50%)	19	8	10	1	0	94.74%
Resorption unchanged (-20% < RR ≤ 20%)	35	7	20	8	0	77.15%
Volume increased (RR ≤ -20%)	3	1	0	2	0	33.33%

* = $p < 0.001$.

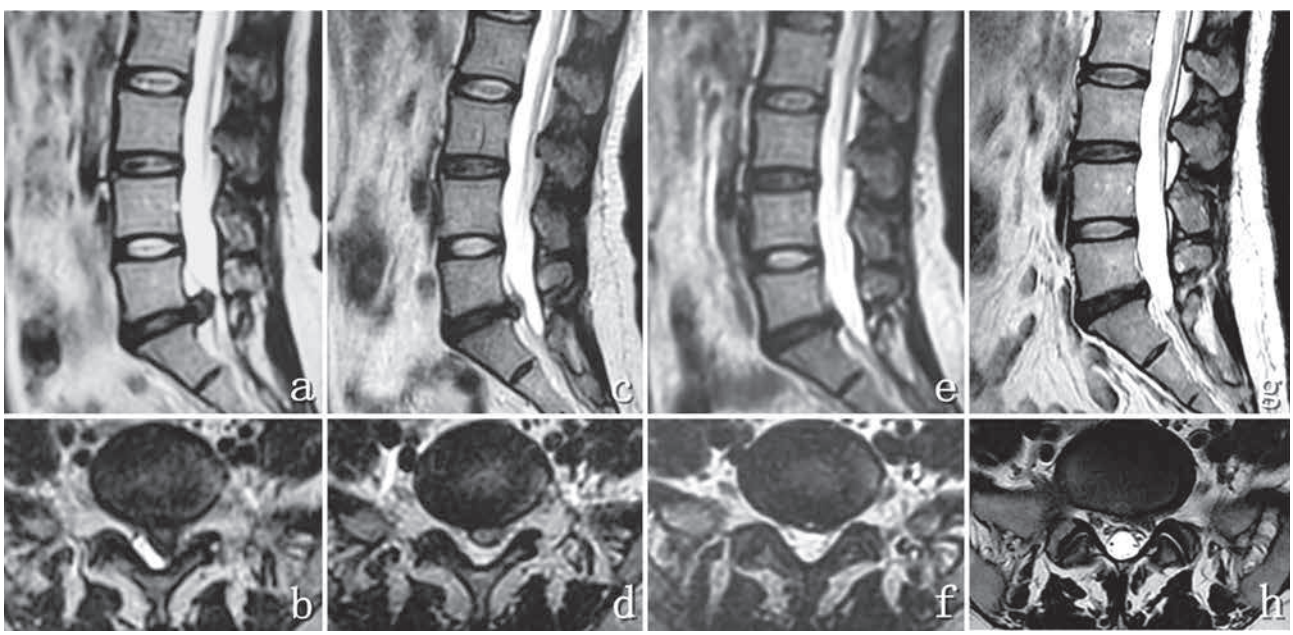

Fig. 2. — MRI scan of a 51-year-old female : left hernia L5S1, 1693.02 mm^3. Important resorption down to 781.55 mm^3 over a 20 month period.

reluctant to undergo surgery, or who have any contra-indication for surgery. However, the use of NSAIDs (non-steroidal anti-inflammatory drugs) should be limited, as they inhibit the function of phagocytes and inflammatory cells, which initiate resorption of the hernia. The patients should be followed up very strictly so as to avoid a cauda equina syndrome.

Limitations

The current study had several limitations : small sample size, short follow-up time, and MRI scans performed at different time points. Moreover, resorption and outcome in the surgical group were not studied.

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