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Disc herniation in the lumbar spine during growth: long-term results of operative treatment in 18 patients

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Abstract We studied 18 patients who had undergone surgery for herniated lumbar discs between the ages of 11 and 17 years. The inclusion criteria for girls was an age of 15 years or below and for boys 17 or below at surgery. The mean follow-up time was 10 years and the clinical outcome was good. Age at surgery and length of the follow-up had no effect on the result. The radiological

disc height at follow-up did not correlate with the follow-up time or age of the patient at operation. MRI scans at follow-up from ten patients operated at less than 15 years of age revealed multilevel disc degeneration but favourable clinical results.

Key words Disc herniation · Children · Operative treatment · Long-term results

Introduction

Disc herniation requiring operative treatment in young people is rare. Giroux and Leclercq [5] in 1982 reported that 1% of the patients operated for disc herniation were between 13 and 18 and 4% between 13 and 21 years of age. On the other hand, Kurihara and Kataoka [7] from Japan gave a frequency of 15% for patients operated for herniated discs below 19 years of age. A history of trauma is often expressed as an aetiological factor in young patients [1, 16], but the role of associated anomalies has also been emphasized [3]. The primary results after disc excision in young people are usually favourable [5, 10, 11]. Few long-term follow-up studies exist, however.

The aim of this study was to elucidate long-term clinical and radiological results in young people having had surgery because of herniated lumbar disc.

Patients and methods

In 1989 we studied the charts of 34 young patients (21 years of age) who had undergone surgery because of disc herniation between 1971 and 1983 in three hospitals: the Orthopaedic Hospital of the Invalid Foundation, Helsinki University Hospital and Oulu University Hospital [6]. The primary results were generally favourable. From this group of patients we selected those who had undergone surgery during growth – boys up to 17 and girls up to 15 years of age – 14 patients altogether.

The patients of the present follow-up study comprise these 14 and 6 additional patients in the same age group who had undergone surgery for herniated discs between 1984 and 1991 at the Orthopaedic Hospital of the Invalid Foundation. These 20 patients were invited to attend the follow-up study. Two patients refused to attend the study, thus 18 patients comprise the study group.

The patients underwent an outpatient clinical and radiological study by an independent observer (S.M.), who was not involved in the primary surgical treatment of the patients. The primary results were estimated from patient charts and interviews at the outpatient study conducted between 1992 and 1996. Good primary result was defined as being totally free of symptoms after the operation, while fair result was recorded for patients with minor symptoms and poor result for patients deriving no benefit from the surgery. The clinical examination included an interview, registration of the Os-

Table 1 Patient distribution

Patient	Gender	Age (years)	Dise level	Primary result	Follow-up period (years)	Benefit ^b (years)	Oswestry ^c index	Disc height (%)
1	M	11	L5-S1	Good	7	7	0	50
2	F	12	L4-5	Good	11	11	0	70
3	F	13	L5-S1	Good	22	12	10	62
4	F	14	L4-5	Good	9	9	8	100
5	F	14	L4-5	Good	11	6	2	100
6	F	15	L4-5	Good	28	10	0	83
7	F	15	L4-5	Good	10	5	5	75
8	M	15	L4-5	Good	7	7	0	75
9	F	15	L5-S1	Good	5	5	8	54
10	F	15	L5-S1	Good	6	6	0	50
11	F	15	L5-S1	Good	10	10	8	80
12	M	16	L4-5	Good	12	9	4	50
13	M	17	L4-5	Good	11	11	2	85
14	M	17	L4-5	Good	10	10	0	82
15	M	17	L4-5	Good	6	6	12	100
16	M	17	L4-5	Good	11	11	0	91
17	M	17	L4-5	Good	7	7	0	70
18	M	17	L4-5	Good	6	5	0	83

^a Age at surgery^b Approximate time of total benefit^c Oswestry index at follow-up^d Height of operated disc as percentage of height of third disc

westry scale [4], pain drawing and clinical estimation of lumbar spinal movements. In the preoperative myelograms the sagittal diameters of the contrast pillar at the three lowest discs were measured. The distance from the lowest point of the contrast pillar to the upper posterior corner of S1, was also measured, because of the possibility of fixation of the top of the dural sac, which during growth could lead minor disc herniations to give symptoms.

The radiographic follow-up comprised anteroposterior and lateral standing radiographs of the lumbar spine. The degree of disc degeneration was estimated semiquantitatively according to Saraste et al. [12] in four categories: R0 = disc height was not decreased; R1 = disc height was decreased, but by 50% or less; R2 = disc height was decreased by 50% or more, but not completely eliminated; and R3 = disc was completely eliminated. In ten patients operated at or below 15 years of age lumbar MRI was performed at follow-up to assess the long-term evolution of the lumbar discs. The classification followed that of Schlenzka et al. [14] in T2-weighted images, and was M0 in normal discs, M1 in discs with enlarged nuclei but normal intensity and M2 in degenerated discs.

Nonparametric methods were used in the statistical analysis. Spearman's rank correlation coefficient was calculated to measure the relationship between variables.

Results

Clinical results

The main information from the study is given in Table 1. The mean follow-up time was 10.5 years (range 5–28 years). The mean score on the Oswestry scale was 3.5 (range 0–12). The Oswestry score at follow-up had no correlation with the length of the follow-up period and no correlation with the age of the patient at operation (Table 1).

Table 2 T2-weighted lumbar disc MR images at follow-up in ten patients undergoing disc excision at or below 15 years of age (0 = normal disc, 1 = internal rupture of annulus, 2 = degenerated disc)

Patient	Disc				
	I	II	III	IV	V
1	0	0	0	2	2
2	0	0	2	2	2
3	0	1	0	0	2
4	0	0	0	2	2
5	0	0	2	2	2
6	1	1	2	2	2
7	0	0	0	2	2
8	0	0	0	2	0 ^a
9	2	2	0	0	2 ^b
10	2	0	0	2	2

^a Fifth disc below a transitional vertebra^b Lumbar Scheuermann disease

Radiographic results

The height of the operated disc was calculated as a percentage of the height of the third lumbar disc. The range of heights was 50–100% (R1–R0). No correlations were found between the disc height at follow-up and age at operation or the length of follow-up. In the preoperative myelograms the sagittal diameter at the L3, L4 and L5 pedicular levels was always greater than 11 mm, which militates against the presence of a congenitally narrow spinal canal in these patients. The distance from the lowest point of the contrast pillar to the posterior corner of S1 varied by 10–75 mm (mean 44 mm). We also measured

the same distance in ten adult patients with various spinal problems, and their values varied by 30–60 mm (mean 45 mm).

Results from MRI in eight patients at follow-up

The results of MRI studies are given in Table 2. All but two patients showed degeneration of the two lowest discs. Three patients also had degeneration in their third disc.

Discussion

The main objective of the present study was to ascertain the long-term results after operations for herniated discs in young people. The short-term results from disc excisions in young patients seem to be universally favourable [2, 5], as they were in the majority of our current patients [6]. It is possible that young people adapt themselves better to the altered postoperative situation after disc excision. The age of the patient at surgery had no impact on the result at follow-up. The clinical results had no correlation with the length of the follow-up period and seem to parallel the data from adults [17], but are in contrast with a recent Finnish study [9], where the results at 13-year follow-up were not very favourable. That study [9] gives the 13-year follow-up results of 342 adult patients with documented disc herniation. Of these, 220 patients underwent lumbar discectomy. According to that report [9] several

indicators showed a rather poor outcome in these adult patients during the follow-up period.

There are also other studies [13, 15] where the long-term results in young patients are good and speak for an operative treatment in cases of severe symptoms and definitive diagnosis.

The long-term radiological results revealed that degeneration of the operated disc was a general finding. The disc height varied by 50–100% from that of the L3-L4 disc. No correlation between the disc height and the clinical results occurred. Of the MR images in those ten patients operated at or below 15 years of age, all showed degeneration of the lowest disc, while eight showed degeneration of the fourth disc and three of the third disc. This seems to indicate a degenerative process as an aetiological factor in these patients; however despite the general degeneration of the lumbar discs in these ten patients, the clinical results were generally favourable.

The long-term results in our patients operated for herniated discs at young ages seem to support the policy of operative treatment in these patients when the diagnosis is clear and when a reasonable period of observation does not see the symptoms resolved. In a recent study [8] similar results were obtained in conservative and operative treatment of disc herniation in young patients. The treatment groups, however, were not randomised and the mean follow-up time was 5.4 years. The operation cannot prevent the obvious further degeneration of the lumbar discs, but this degeneration seems to be quite benign and to carry a favourable long-term clinical prognosis.

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