Introduction

Surgical treatment for lumbar herniated nucleus polposus (LHNP) was first described by Mixter and Barr in 1934 [1]. Although there is great debate on the best treatment for LHNP, open discectomy (OD) and removal of the nucleus polposus through an interlaminar approach is a widely accepted technique. Many authors have shown good results at short-term follow-up with OD, with success rates of up to 93%, early return to work and low rates of complications [2–6].

Long-term results after OD, however, are not as good as short-term ones. Hakelius [7] and Nashold and Hrubec [8] compared the clinical results of conservative versus surgical treatment of LHNP with, respectively, 7 and 20 years of follow-up; they found no difference between the groups. Dworak et al. [9] reported data for patients who

Mid- and long-term results of open discectomy: a clinical study with three to twelve years of follow-up

Abstract Long-term studies on the results of open discectomy (OD) for the treatment of lumbar disc herniation have shown a high percentage of patients complaining of low back or leg pain and obtaining a permanent disability allowance. We evaluated the clinical results of OD in a consecutive series of patients with 3–12 years of follow-up. A standard questionnaire, containing the Oswestry disability questionnaire (ODQ), was administered to 94 patients who had undergone OD at our institute between 1991 and 1999. A total of 85 patients (55.2%) gave complete information for the study; their mean follow-up was 85.9 months. Forty patients (25.9%) consented to a second clinical examination. The overall mean Oswestry disability index (ODI) was 17.43. At clinical follow-up, 29 of 40 patients (72.5%) suffered low back pain (LBP) with a mean ODI of 21.56. The presence of LBP correlated positively with a higher ODI score. Re-operation was performed in 11 of 85 patients: a 2nd OD procedure was done for recurrent disc herniation in 6 cases and posterior lumbar interbody fusion (PLIF) with posterior instrumentation was performed in 5 patients with disabling LBP. ODI scores in these two groups were respectively 37.33 and 13.2 with a significant difference. Long-term studies on OD have shown a deterioration of the clinical results with time. LBP is the complaint most responsible for a patient’s disability. Our study shows that at the mid- to long-term follow-up, OD still provides good clinical results, but also reveals a high percentage of LBP that is related to the onset of a symptomatic insufficiency of the operated disc. These data seem to be confirmed by the significant improvement of ODI after PLIF.

Key words Lumbar disc herniation • Open discectomy • Long-term results • Low back pain
had undergone OD with up to 14 years of follow-up: 70% of patients complained of chronic back pain or leg pain, and 14% were allowed a half or complete permanent disability allowance. Weber [10] followed two homogeneous groups of patients treated surgically with OD or conservatively in a 10-year prospective, randomised study: at one year, the surgical group had a significantly better outcome than the conservative group; at 4 years the difference remained significant but to a lesser degree; and at 10 years the difference was not significant anymore.

Recently, Mochida et al. [11] reported an inverse relationship between loss of height of the intervertebral disc, secondary to removal of the nucleus pulposus during OD, and the clinical result at the long-term follow-up. Although the efficacy of OD in the treatment of LHNP remains clear, many authors reported concerns about its long-term clinical results. Therefore, the aim of this study was to identify those factors that correlate significantly with a worse clinical result in patients who had undergone OD for LHNP, at the mid-term and long-term follow-ups.

Materials and methods

Between March 1991 and November 1999 154 consecutive patients underwent open discectomy (OD) surgery for lumbar disc herniation at our institute. The surgical technique included the removal of the herniated disc through an interlaminar approach and a limited laminotomy, followed by the accurate removal of the remaining nucleus polposus. Surgery was performed by the two senior surgeons (PC, DP). Information regarding clinical and operative results was obtained from the patients’ medical records.

In May 2003, one of us (FC) interviewed the patients by telephone and administered a questionnaire with questions about working capacity, professional situation, compensation and residual low back pain or pain irradiated to the lower limb. Occupational activity was distinguished into 3 categories according to Dworak et al. [9]: light work (office job or white-collar), medium strenuous work (including household tasks) and heavy work (construction workers, blue-collar workers). At the same time, patients were asked to answer to the Oswestry disability questionnaire (ODQ), version 2.0 [12, 13], and we calculated the Oswestry disability index (ODI). The ODI has been shown to be a valuable index of a patient’s disability due to back or leg complaint [12, 13]. The index represents in percentage the degree of disability of the patient so that the lower the score, the better is the clinical status.

We were unable to find 60 patients (39%) and 9 were not willing to completely answer the questionnaire. Thus, the follow-up study was performed on 85 patients (55.2% of the initial group), including 48 men and 37 women.

After the telephone interview, patients were invited to a second examination where we performed physical tests, including the straight leg rising test (SLRT) and the cruciate straight leg rising test (CSLRT), searched for any peripheral deficit of strength or sensitivity, and assessed the reflex status.

Comparisons between groups of patients were performed using Student’s t test. Correlations between ODI score and the clinical and demographic data were investigated by linear regression analysis. Significance was set for p values <0.05.

Results

We assessed the mid- and long-term outcomes of 85 patients who underwent open discectomy (OD) for lumbar herniated nucleus polposus (LHNP). The patients’ mean age was 45.5 years (range, 20–78) with the following distribution: 17 patients (20.0%) were aged less than 35 years; 29 (34.1%) were between 36 and 45 years; 21 (24.7%) were between 46 and 55, and 18 (21.2%) were older than 55 years. At the time of the study, 16 patients (18.8%) were involved in light work, 35 patients (41.2%) in medium strenuous work, 26 (30.6%) in heavy work and 8 patients (9.4%) were not employed. The level of disc surgery was L3-L4 in one patient (1.2%), L4-L5 in 42 patients (49.4%) and L5-S1 in 41 patients (48.2%). One patient only had two levels operated on at the same surgery: L4-L5 and L5-S1.

The mean ODI for the 85 patients was 17.43 (range, 0–68; SD=14.32) at a mean follow-up time of 85.9 months (range, 40–146). We compared the mean ODI of patients with 3–6 years of follow-up (mid term) with that of patients with 6–12 years of follow-up (long term): there was no significant difference between the two groups at the t test (p=0.816). There was no correlation between ODI and patient’s age (p=0.25), level of occupational activity (p=0.323) or level of herniation (p=0.31).

Of the 85 patients, 40 (47.1%) gave permission to a second clinical exam. There was no significant correlation between ODI and any of the tested findings: SLRT<45° (R2=1.8, p=0.471), CSLRT<60° (R2=0), strength (R2=2.3, p=0.387), sensitivity (R2=1.9, p=0.460), or reflex deficits (R2=0.5, p=0.826). Nine patients out of 40 (22.5%) complained of a persistent sciatica that had never been completely relieved by the surgical procedure; their mean ODI was 32.56 (SD=13.81). Linear regression analysis showed a positive correlation between a higher ODI and the persistence of sciatica (R2=25.8, p<0.001). Furthermore, 29 patients (72.5%) suffered persistent low back pain (LBP); their mean ODI was 21.56 (SD=14.74). LBP was strongly correlated to a high ODI (R2=35.4, p<0.001).

Overall, 11 (12.9%) of the 85 patients had undergone re-operation: 6 for nerve root irritation at the same level and side of the previous operation, due to a recurrence of LHNP, and 5 for persistent and disabling low back pain. In the case of recurrence of LHNP patients underwent a second OD: their mean ODI after the second procedure