No indications for percutaneous lumbar discectomy?

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Summary. A questionnaire was used to assess the outcome of automated percutaneous lumbar discectomy (APLD), to correlate patients' data and to identify criteria for pain relief and patient satisfaction. Two hundred and thirty eight patients were operated on by APLD between 1988 and 1990. The questionnaire returned by 182 patients (76.4%) was suitable for evaluation. The mean follow-up was 2.5 years. Overall, 60% reported pain relief and 52% were satisfied with APLD. Conventional operations were carried out subsequently on 45 patients (25%). Bivariate and multivariate analyses were done for preoperative (age, gender, neurological deficit, Lasègue's sign, sports activity), perioperative (weight of disc material removed, level of APLD) and post-operative (conventional nucleotomy, change in condition, pain relief, satisfaction, sports activity, return to work, compensation claims) parameters. The only significant parameter for improvement in condition and pain relief was age, where patients younger than 41 do better. Risk factors for reoperation were a positive Lasègue's sign and over 41 years of age. Patient satisfaction was significantly higher for patients without sensory deficit preoperatively.

Résumé. Un questionnaire a servi de base pour évaluer les résultats de la disectomie per-cutanée (APLD) pour identifier des critères prévisibles pour le soulagement de la douleur et la satisfaction du patient. 238 patients ont été opérés selon la méthode APLD entre 1988 et 1990. Les question-

naires remplis de 182 patients (76.4%) ont été valables pour l'évaluation. La durée moyenne était de 3 ans. 60% font part d'une réduction de douleur et 52% étaient satisfaits de l'APLD: 45 patients (25%) furent réopérés de façon conventionnelle. Il n'y a pas de critères prévisibles pour le résultat après l'APLD en ce qui concerne le soulagement de la douleur radiculaire ou la satisfaction du patient. La satisfaction du patient dépend, comme on peut le prévoir, de la réduction de la douleur. La douleur radiculaire diminue avec le temps après l'APLD. Une différence significative dans le soulagement de la douleur est seulement trouvée chez les patients avec ou sans déficit sensoriel préopératoire. La douleur existe dans 41% avec déficit sensoriel préopératoire par rapport à 25% sans déficit sensoriel préopératoire. Mais la satisfaction n'est pas différente de façon significative chez tous ces patients. La satisfaction du patient ne dépend pas des critères définis par Onik (1988) dans ses instructions pour APLD (signe positif de Lasègue, déficit neurologique). Les auteurs ne croient pas que l'APLD influence l'évolution spontanée de la Rombolgie radiculalgie.

Introduction

Automated percutaneous lumbar discectomy (APLD) was first described by Hijikata et al. in 1975 [6]. It is performed according to the technique developed by Onik et al. [15].

Scores used to rate the success of APLD are generally high, ranging from 55% to 87%. In our

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Table 1. The frequency of reoperation (%) in 182 patients after APLD and data for bivariate analysis. The only significant factor for reoperation is a positive Lasegue's sign ($p = 0.01$)

opinion, such scores are not reliable as they depend on the particular examiner, and they do not take into account the patient's condition [2, 3, 4, 5, 6, 8, 9, 10, 11, 17, 19, 20]. Moreover, the question as to why surgical outcomes vary, despite standard indications, is still unanswered [21].

Morphological-pathophysiological parameters are used to define criteria for selecting candidates for APLD. Leu and Schreiber [11] point out the role of contrast discomanometry; Jerosch et al. [7] stress the value of computed tomography (CT) discography. Mochida and Arima [13] demand the absence of perforation of the posterior longitudinal ligament and degenerative canal stenosis detected by CT or magnetic resonance imaging (MRI) along with other clinical guidelines (age and disturbance of innervated muscles). We chose a different approach and compiled individual pre-, peri- and post-operative patient data to establish patient characteristics predicting satisfaction with the operation. The automated surgical technique minimises the influence of the surgeon since the same instruments are used, the probe is in a standardised position confirmed by image intensifier, and the operation lasts 20 minutes, so that assessment is based primarily on the patient's personal data. The patient's characteristics should serve to reformulate indications and contraindications for APLD.

Patients and methods

Between 1988 and 1990, 238 patients underwent automated percutaneous lumbar discectomy, according to the technique described by Onik [16], in the Department of Orthopaedics at the University of Heidelberg.

The indication for APLD was persistent lumbo-ischialgia despite a minimum of 6 weeks of conservative therapy, and lumbar disc protrusion or extrusion confirmed by CT or MRI. We did not strictly follow Onik's guidelines for indication for operation. Patients without Lasegue's sign and without pathological preoperative neurological findings, such as sensory or motor deficits, were also included. Patients suffering from isolated back pain from other aetiologies such as the facet syndrome, degenerative disc disease, sacroiliac pathology, etc were excluded. Patients with sequestered discs and spinal stenosis were also excluded.

All patients were instructed to describe their condition using a specially designed questionnaire. The mean follow-up period was 2.5 years (1–3.5 years). The data of 182 patients (76.4%) were suitable for evaluation and this was done by an independent person, not the surgeon.

Bi- and multivariate analysis was done for the preoperative parameters including age (17–78 years, median 41 years), gender, neurological deficit, Lasegue's sign, sports activity, and for the perioperative parameters of the weight of disc material removed and the level of APLD, to determine the factors which influenced the outcome of APLD. Postoperative parameters included change in condition according to the criteria of McNab [12], pain relief, patient satisfaction, sports activity, return to work and compensation claims.

Table 2. Patient satisfaction (%) in 182 patients after APLD and data for bivariate analysis. The only significant factor for satisfaction is no sensory deficit preoperatively ($p < 0.03$)

Results

Overall, 52% of the patients were satisfied with the outcome of the procedure and in 60% pain decreased after APLD. Complications of APLD consisted of 2 cases of discitis which were successfully treated conservatively.

Preoperative parameters

The only significant factor in the multivariate stepwise logistic regression analysis for a positive outcome with respect to improvement in condition ($p < 0.008$) and pain relief ($p < 0.03$) was age. With the median of 41 years, patients aged less than 41 years did better. All other parameters including sex, neurological dysfunction, Lasègue's sign and sports activity were not significant. A positive Lasègue's sign ($p < 0.003$) and an age of more than 41 years ($p < 0.02$) were identified as risk factors for reoperation. Of 24 patients with none of these risk factors, 1 (4%) underwent further operation. Of 112 patients with one of these risk factors, 25 (22%) were reoperated, and of 43 patients with a positive Lasègue's sign and aged 41+ years, 18 (41%) had a further operation. The data for bivariate analysis are shown in Table 1.

Perioperative parameters

No significant correlation with the outcome after APLD was found for the amount of disc material removed (0.5 g–11 g, median 3.0 g) or the level of operation L4/5 13 patients, L5/S1 69 patients).

Postoperative parameters

A subjective improvement was reported by 64% of patients, who achieved an excellent, good or fair result according to the criteria of McNab [12]. Patients with a follow-up of less than 1 year did not differ from patients with longer follow-up. Pain relief was reported by 60%, while 15% reported being completely free of pain. Pain improved with time; 9% were free of pain at up to 2 years compared to 17% who were free of pain at 3 years or more. Likewise, persistent pain decreased with time with 48% in the first year, 28% in the second, and 22% after the third. Younger patients had relief of pain more often (67%) than the older (51%) with the difference being significant ($p < 0.05$) with bivariate analysis. No other significant correlation was found, in particular with the amount of disc material removed.

Satisfaction with the outcome after APLD was reported by 52% of the patients. A significant difference ($p < 0.03$) was found in those with preoperative sensory deficit (43% satisfied), and those without (60% satisfied). No other patient-

Table 3. Pain relief (%) in 182 patients after APLD and data for bivariate analysis. The only significant factor for positive outcome is age under 41 years ($p < 0.03$)

related factor was significant for postoperative satisfaction. Of 72 patients without pain relief, 10% were satisfied; of 35 patients without improvement in sensation, 15% were satisfied; and of 27 patients without improvement in motor function, 33% were satisfied. None of the patients without improvement of pain, sensory and motor deficit was satisfied.

Of those patients who had been active in sports and who had resumed the same level of sports activity after APLD, 79% were satisfied ($n = 26$). Pain relief was reported in 79%, and there was improvement in 88%. Of those patients who did not resume the same level of sports activity after APLD, 40% were satisfied ($n = 78$); 50% had pain relief and 53% improvement of function. Of those patients who were not active in sports, 53% were satisfied ($n = 47$); 68% had pain relief and 72% improvement of function. A fourth group of patients started sports activity after operation ($n = 31$); 55% of were satisfied, 58% had pain relief, and 61% improvement of function. The data for bivariate analysis are summarised in Tables 2 and 3. The mean duration of inability to work was 8 weeks; this was prolonged in patients ($n = 11$) who changed occupation after operation with a mean of 15 weeks, and in those claiming compensation ($n = 7$), with a mean of 20 weeks. Pre- and postoperative data were not significantly correlated to a change of occupation or to a compensation claim.

Discussion

This study confirms that postoperative pain relief and satisfaction can be achieved by APLD. Of the patients included in the study, 60% reported pain relief and 52% were satisfied with percutaneous discectomy at a mean follow-up of 2.5 years.

The aim of the study was to identify patient-related factors which contribute to pain relief and satisfaction.

Mochida and Arima [13] related results to age, motor function of the lower limbs and the length of preoperative conservative treatment. Hijikata [7] reported poorer results for the level L5/S1. Werth [23] reported better results in men (57%) than in women (49%). Better results were confirmed by Buchl [1], Schonig [18], Werth [23], and recently by Mochida and Arima [13]. Hijikata et al. [6] reported considerably worse results in patients aged more than 30 years than in those aged 25.

In our study the only significant predictive factor for a positive outcome with respect to pain relief and satisfaction was age, where younger patients had better results. The absence of a preoperative sensory deficit was positively correlated to patients' satisfaction. It is remarkable that the outcome is not related to the amount of disc material removed. Therefore, a mechanical defect such as a decrease of intradisc pressure or a decrease in disc height seems unlikely. This has been confirmed by Delamarter [3] who found no changes in disc morphology on CT or MRI after

APLD. The reduction of pain in the postoperative course suggests an overlapping with the natural course. Success with APLC after one year seems unlikely and the natural course of disc herniation normally has a good prognosis [14, 22]. As older patients seem to have a less favourable outcome, degenerative changes of the spine seem to influence the success of APLD. The assessment of outcome is also influenced by physical activity. Patients who are active in sports are significantly more satisfied compared to patients who are not, but sporting activity is not in itself a predictive factor for a positive outcome; 78 (43%) patients could not resume sport at the same level after operation and were not satisfied with the outcome.

The risk for reoperation in our series was 25%. Nachemson [14] reports that 6.6% of patients in his study required reoperation after APLD, whereas Ulrich [21] had 30.7% of reoperations. Risk factors were a positive Lasegue's sign and an older age. As the Lasegue's sign suggests more extensive nerve root irritation, this implies that the effect of APLD is more related to intradisc pathology. A placebo effect of APLD can be assumed as 10% of patients were satisfied with the outcome even when they had no change in condition or pain relief.

Summarising the results, APLD has a positive effect in patients suffering from lumbar pain related to disc herniation. Outcome is influenced by the natural course, age, the extent of nerve root involvement, physical activity and a placebo effect. As the best results are achieved in younger active patients with little neurological dysfunction who have a good prognosis, it is the opinion of the authors that APLD should play only a minor role in the treatment of lumbar pain related to disc herniation.

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