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Chemonucleolysis versus Surgical Discectomy for Sciatica Secondary to Lumbar Disc Herniation*

A Cost and Quality-of-Life Evaluation

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Summary

The objective of this study was to evaluate and compare the cost and effects on quality of life [using quality-adjusted life years (QALYs)] of 2 treatments for sciatica secondary to lumbar disc herniation: chemonucleolysis and surgical discectomy.

The design involved a combination of decision analysis and Rosser index, with assessment of probabilities from long term clinical series. Utility was based on patients' subjective assessment using a simplified self-administered Health Measurement Questionnaire (HMQ). 146 patients from 7 hospitals were enrolled, 2 to 3 months after chemonucleolysis or surgery. The end-points used were cost and QALYs for each intervention, every year for years 1 to 7.

At the time of analysis (1990), the total cost of surgical discectomy was FF15 400, compared with FF8000 for chemonucleolysis.

After 1 year, and including the costs of reoperation for failure and relapse and long term medical costs for the non-reoperated unsatisfactory results, discectomy costs were almost 40% higher than those of chemonucleolysis. Ratios remain unchanged after 7 years. QALY results reveal an additional benefit of 52 days of good health associated with chemonucleolysis.

Low back pain is a major cause of morbidity and economic loss in industrialised countries. However, only a small proportion of patients require root decompression for disc herniation. There are important international variations in annual rates of discectomy. For example, the annual incidence of disc surgery per 1 million inhabitants is 80 in the UK, compared with 700 in the US. The number of discectomies performed in France each year can be estimated at approximately 740 per 1 million population.

Given proper indications and technique, disc surgery has proven to be an effective procedure. However, a subset of patients experience continuing or recurrent radicular pain after lumbar surgery, requiring further investigations and surgical inter-

* Discectomy is the surgical excision of an intervertebral disc; chemonucleolysis is the dissolution of the nucleus pulposus at the centre of an intervertebral disc by injection of a chemolytic agent such as chymopapain.

ventions. In order to avoid the distressing and complex problem of the failed back syndrome, percutaneous techniques have been developed, including chemonucleolysis, and manual and automated nucleotomy. Numerous studies have revealed that these new techniques have an immediate success rate comparable to that of discectomy when properly indicated.

Evaluation of the economic consequences of disc surgery and of percutaneous techniques should not limit itself to short term outcomes, where a relative consensus on success rates seems to prevail. Long term outcomes, including failures, pain recurrence as well as the rate of success of repeat surgery, are more controversial. Moreover, new techniques like percutaneous nucleotomy and microdiscectomy are too recent to allow long term comparisons. Available European series on microdiscectomy do not exceed 2 years, and the rate of pain recurrence in the long term is not known. Therefore, this study is limited to discectomy and chemonucleolysis and attempts to compare short term and long term outcomes, in terms of quality-adjusted life years (QALYs), as well as associated costs.

Methods

Structure of the Decision Model

Evaluating the treatment procedures for lumbar herniated disc syndrome presupposes that we know how to conceptualise within the same schema elements which are determined by physicians' decisions and elements that depend on chance. The first step in designing a decision model[1] was to schematise events according to the choices made by physicians or dictated by the natural course of events (fig. 1). The branching out corresponds either to

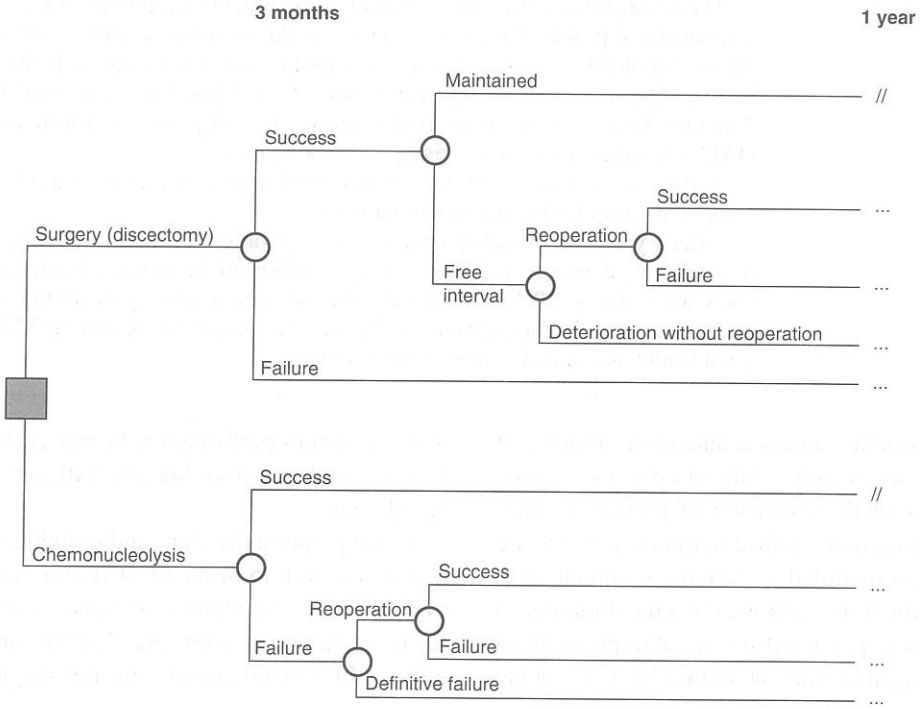

Fig. 1. Decision tree used in the cost-effectiveness analysis of chemonucleolysis versus surgery (discectomy). *Symbols:* // indicates that the branching structure beyond this point is similar to the preceding 'success' subtree; ... indicates that the branching structure beyond this point repeats each year for years 1 to 7.

Table I. Criteria for evaluation of clinical outcome

Success	Very good	No symptoms
	Good	Lumbar pain and/or slight sciatica No interference with social or professional life No treatment required
Failure	Poor	Insufficient improvement
	Bad	Further treatment required Lumbar pain or sciatica unchanged or worsened

decision nodes when a choice of treatment is made, or to chance nodes when events occur with outcomes that depend on chance. In this case, the decision tree is in fact a 'probability tree' with only chance nodes. The tree involves 2 major branches: surgical treatment and chemonucleolysis. For each treatment, the set of events are the following:

(a) Short term (1 year)

- At 3 months, the treatment may succeed or fail. Failures may be reoperated or not, reoperation may be a success or a failure.
- Good results may persist up to the end of year 1, or deteriorate after a relapse-free interval. Two attitudes can be adopted: either the recurrence of the problem requires further surgery or is medically treated. Subsequent surgery is performed after a period of unsuccessful medical treatment. It can be either a success or a failure.

(b) Long term (2 to 7 years)

The same process as above is reproduced in the course of subsequent years: good results at the end of year 1 may be maintained until the end of year 2, or a deterioration may occur after a relapse-free interval. In this case, reoperation may or may not be performed after preliminary medical treatment, and prove to be either a success or a failure.

Criteria for evaluation of the results include the 2 categories 'success' or 'failure', used in most of the papers reporting the results of the 2 procedures (table I).

Assignment of Probabilities

Evaluation of the short and long term efficacy of the 2 treatments was based on a survey of the literature. Most of the short term randomised clinical trials carried out in North America deal mainly with laminectomy, which is no longer in use. However, 2 case studies reported by Brown and Tomkins[2] and Alexander et al.[3] conclude that discectomy and chemonucleolysis produce equivalent results after 3 and 12 months. In France, chemnucleolysis has been favourably compared in randomised controlled trials with microdiscectomy[4] and to percutaneous manual nucleotomy.[5] However, there have been no randomised trials comparing chemonucleolysis and discectomy.

As far as long term evaluation is concerned, no randomised studies are available. Although we agree that the results of a mathematical model should ideally be based on comparative trials, we must not feel bound to ignore long term effects of therapies. We therefore tried to offer an analytical approach to the problem and looked for converging data extracted from available clinical series.

Discectomy

In the short term, a review of 7 European and US studies[6-12] published between 1972 and 1987 and based on 11 341 patients shows an average success rate of discectomy at 3 months of 81%, ranging from 70[10] to 87%.[6] At 1 year, the results published by Bouillet[6] and Lewis et al.[7] showed a rate of success of 76.4 and 74%, respectively.

Therefore, 2 sets of hypotheses were considered: (a) a 'high' hypothesis, with a success rate of 87% at 3 months and 76.4% at 1 year, based on Bouillet[6] (table II); and (b) a 'low' hypothesis, with a success rate of 80% at 3 months and 74% at 1 year, based on Lewis et al.[7] and Louyot et al.[8] The high hypothesis is more favourable towards discectomy than the results of Sicard,[11] who found 'very good/good' results in 83% of 3000 patients. Similarly, the low hypothesis is also conservative, since the 74% success rate quoted by Lewis et al.[7] is based merely on total relief of sciatic pain, with or without remaining lumbar pain.

Estimates of deterioration rates at 1 year are based on the same series, which seem to fit rather well with reoperation and recurrence rates observed in other studies.[13-15] For example, in the low hypothesis based on Louyot et al.,[8] a global

Table II. Outcome at 7 years for 100 patients undergoing discectomy (%)[6]

Outcome	Time after surgery (years)							
	0.25	1	2	3	4	5	6	7
Initial success maintenance	87.0	76.4	71.4	68.9	66.4	63.9	61.4	58.9
Recurrences and reinterventions		3.2	2.0	1.0	1.0	1.0	1.0	1.0
cumulated recurrences and reinterventions[a]			3.2	5.2	6.2	7.2	8.2	9.2
Recurrences without reintervention		7.4	3.0	1.5	1.5	1.5	1.5	1.5
cumulated recurrences without reintervention[a]			7.4	10.4	11.9	13.4	14.9	16.4
Initial failure maintenance	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0

a Refers to events that occur at the end of the preceding year.

rate of deterioration of 6%, leading to subsequent surgery in half of the cases (3%) was found. In the high hypothesis, a total recurrence rate of 10.6% at 1 year was reported by Bouillet.[6] 3.2% of patients underwent further surgery, and 7.4% were definite treatment failures and received only conservative medical therapy.

In these 2 series, subsequent surgery after discectomy was only performed on patients experiencing recurrence of pain after a relapse-free interval, not on treatment failures. A review of the European literature confirmed that this reflected the European attitude, which is more conservative than that generally observed in US studies. Consequently, we have assumed that patients failing on discectomy did not undergo another operation.

The rate of success on reoperations after recurrence was based on the convergent results of Bouillet,[6] Lewis et al.[7] and Salenius and Laurent.[10]

For long term results, 5 studies were analysed,[7,8,10,13,16] which included a total of 2000 patients, and a follow-up of between 3 and 10 years. Overall, the rate of success averaged 59% at 7 years. We accepted this rate as a baseline probability, corresponding to a deterioration rate of 17.5% between year 1 and year 7, also reported by Louyot et al.,[8] with 7% of patients undergoing surgery and 10.5% being considered as having definitive treatment failure.

As repeat surgery is reported to be more frequent during the first 2 years, we assumed that the rates of reoperation due to recurrence of pain were 3% in year 1 (3.2% in the high hypothesis), 2% in year 2, and 1% in each subsequent year.

Chemonucleolysis

In the short term, considering the convergence of European and North American trials, a success rate of 80% at 3 months seems to be very well established, with stabilisation between 3 months and 1 year. According to Deburge et al.,[17] 50% of patients who immediately fail treatment undergo surgery after 3 months.

In the long term, in a survey published in 1986, Nordby[18] estimated the average rate of success to be 77% after follow-up of between 7 and 11 years. We chose as a baseline probability a lower estimate (67% at 7 years), based on the study of Lavignolle et al.,[4] with a recurrence rate of 12.5% at 7 years, 10.5% of whom undergo surgery, the other 2% of patients being considered as experiencing definitive therapy failure. It was considered that the rate of post-chemonucleolysis surgery was twice as high in the second year as in subsequent years. By linear retrospective extrapolation, the rate of post-chemonucleolysis surgery was fixed at 3% in year 2 and at 1.5% per annum between years 3 and 7. As for patients with pain recurrence who did not undergo another operation, the annual rate of recurrence was assumed to be constant over time, i.e. 0.33%.

Rates of success of subsequent surgery vary according to different authors. However, 2 assumptions were retained, one of 80% based upon the results observed by Alexander et al.[3] and Lavignolle

et al.,[4] and one of 67% corresponding to Javid[19] and Bouillet.[6]

Distribution of Events over Time

In our model, distribution of events over time was made according to 2 rules: (a) deteriorations appearing within a period of time were assumed to occur midway through it; and (b) reoperations because of recurrent pain were assumed to take place after 3 months (i.e. 0.25 years) of failed medical treatment.

For a cohort of 100 patients, the number of years or year fractions of good or bad health was cumulated at 7 years. In a given year and for 100 patients, the potential years of life are equal to 100 patient-years of which x years are spent in good health and $100–x$ in poor health.

Utility Assignment

Quality-of-life (QOL) evaluation was based on the patient's own assessment of quality of life associated with the 2 types of states, success and failure, previously described (table I). Each state was weighted by a fraction representing the relative quality, and a scale where 1 represents ideal health and 0 equates to death. For example, a coefficient of 0.5 for a given health state means that a year of life spent in this condition is worth 6, rather than 12, months in terms of QALYs.

The Kind and Rosser score was used as such an adjustment factor. In the Rosser matrix, 8 levels of disability incorporating social, occupational, and physical impairment are combined with 4 levels of subjective distress to produce 32 health states to which weights have been assigned. To use these standard QOL coefficients we have to convert the clinical outcome into the Rosser classification such that we could use the corresponding utility weights to the time spent in such a state.

Data needed to elicit the appropriate place of the patient in the Rosser matrix were obtained in a prospective survey carried out in 1990, in 7 hospitals. It included 146 patients who had undergone chemonucleolysis or surgery 2 to 3 months before data collection. All patients were aged over 18 years, and had been treated for sciatica with clinical signs of lumbar disc herniation, well correlated with a clear picture of a herniated disc on computerised tomography (CT) or magnetic resonance imaging (MRI).

Criteria for exclusion from the study were the classic contraindications of chemonucleolysis, including pregnancy, prior lumbar disc surgery, chemonucleolysis or intradiscal injections of steroids, major neurological deficit, lumbar spinal stenosis and spondylolisthesis. Patients were recruited to constitute 2 groups of similar numbers corresponding to the 2 clinical results, success or failure. The investigator had to evaluate the patient's condition at 3 months' follow-up, using the Rosser-Watts classification of illness states.[20] The same day, the patients were asked to complete the Dallas pain questionnaire[21] and to evaluate their condition using the Health Measurement Questionnaire (HMQ).[22] The HMQ is a self-rating procedure based on functional criteria (general mobility, self-care, usual activity, social activity and personal relationships) and perceptual criteria (distress).

We used a modification of the rules for converting questionnaire responses into distress categories. The extent of pain was determined by a single 10cm global visual analogue scale, instead of using the 13 questions related to feelings contained in the HMQ. Hence, it is called the *simplified* Health Measurement Questionnaire (SMHQ). The scoring was devised so that a typical patient reported as having good or poor response to treatment could be assigned to one of the mutually exclusive categories of the Rosser classification.[23]

Such cross-sectional data were subsequently used through time as an approximation of the longitudinal quality of life of the patients reported in the literature as having satisfactory or unsatisfactory responses to treatment. The method included the following steps: (a) the sequences of potential clinical outcomes that lead to terminal branches for each treatment were identified; (b) each potential outcome occurring along a pathway was associated with the expected duration of stay in the corresponding

state of health; (c) duration of stay was multiplied by the weight of the corresponding Rosser coefficient of quality of life; (d) the state-dependent increment of utility for each interval of time through which the patient remained was added to calculate the cumulative quality of life of the pathway; (e) the probability of each pathway was calculated and multiplied by the quality of life of the path, and the products were added across all the paths to obtain the overall QALYs for each treatment at 7 years. Calculations were performed year by year. Results were calculated with and without discounting. In this case, the rate most commonly used in international studies (5%) was adopted.

Evaluation of Costs

The analysis was conducted from the combined viewpoints of the healthcare system and of the patient. Direct nonmedical and indirect costs were excluded from the calculations. Direct medical costs were subdivided into hospitalisation costs, physician services and drug costs.

The mean duration of hospitalisation for discectomy and for chemonucleolysis was determined from the survey. To obtain the best estimate of the true cost, we used the hotel approximation method for evaluating public hospitals. This method assumes that certain costs (called hotel costs) are evenly distributed over all inpatient days, regardless of the reason for admission. The costs included such items as administration, housekeeping, maintenance and general equipment, and were averaged over all inpatient days for 1 year, resulting in the per diem hotel cost.

The medical care cost included the cost of salaried physicians and nurses, pharmacy, laboratory and radiology use, equipment and supplies. The cost of an hospitalisation day was calculated by dividing the direct standard costs of the unit by the number of days. Specific expenses directly related to the 2 procedures performed in the operating room, chemonucleolysis and discectomy, were added. They were calculated using the 'component enumeration' method of hospital cost accounting. This analysis included 2 steps: measurement of personnel time and disposable equipment consumed in each intervention, and assignment of monetary cost for the resources consumed. The cost evaluation was carried out in 1 centre (Gonesse Hospital, Val d'Oise, France) and the findings may not, therefore, be directly generalisable to other centres.

The outpatient costs were estimated on the basis of the prescriptions made for the patient at discharge from the hospital, including pharmaceutical and physiotherapy expenses, and the costs of follow-up medical consultations. The costs of medical services and drugs were based on the French Relative Value Scale and retail prices, respectively.

Evaluation of Cost per QALY

Instead of simply comparing the average cost-utility ratio (total costs divided by total number of QALYs), we chose to measure the difference between the cost of chemonucleolysis and discectomy divided by the difference in utility of the 2 treatments, i.e. the incremental cost-utility ratio. This gave the extra gain of QALY per extra franc spent through switching from one treatment to the other.

Statistical Analysis

Variations in Rosser QOL coefficients and Dallas pain questionnaire scores on clinical outcome were compared using the Kruskall-Wallis test, which was also used to compare the 4 Dallas scores as a function of severity of discomfort and disability. Pearson correlation coefficients were determined between the 4 Dallas scores and the Rosser QOL coefficients.

Results

Evaluation of Quality of Life According to the Clinical Outcomes

Rosser coefficients and Dallas pain scores were significantly different for treatment outcomes ($p < 0.0001$) [table III]. Patient Rosser coefficients correlated significantly with the 4 Dallas scores ($p < 0.0001$). The correlation was negative, as a

Table III. Changes in Rosser and Dallas scores according to clinical outcome in the 146 patients included in the present series

Indicator	Clinical outcome		p-Value
Overall score	success (n = 76)	failure (n = 70)	
Rosser: physician-assessed 0.933 ± 0.224	0.990 ± 0.009	0.872 ± 0.314	< 0.0001
Rosser: patient-assessed[a] 0.901 ± 0.369	0.987 ± 0.016	0.807 ± 0.518	< 0.0001
Dallas: daily activities 32 ± 26.0	12.5 ± 13.7	53.2 ± 18.4	< 0.0001
Dallas: work 37.7 ± 31.9	15.8 ± 19.9	61.5 ± 24.7	< 0.0001
Dallas: anxiety 26.8 ± 28.7	10.5 ± 20.2	44.6 ± 26.0	< 0.0001
Dallas: social relations 22.4 ± 24.0	9.5 ± 14.5	36.4 ± 24.6	< 0.0001

a Rosser patient scores obtained from the simplified Health Measurement Questionnaire.

high Dallas score corresponds to a reduced quality of life.

Table IV shows the high correlation between the patient- and investigator-assessed Rosser coefficients ($p < 0.001$).

QALYs

In the cohort of 100 patients at year 7, on the basis of our assumption of distribution of events over time, the chemonucleolysis patient score was 84 patient-years of good health at year 7, 68 of which were attributable to a sustained successful initial outcome, and 16 to success of post-chemonucleolysis surgery in cases of initial failure or of recurrence.

The discectomy patient score was 65 patient-years in the high hypothesis (87% of initial success). Of these, 60 patient-years were due to initial success sustained at 7 years, and 5 patient-years due to successful reoperation. Individually, the probability of a patient being in good health at year 7 was 0.84 following chemonucleolysis versus 0.65 following discectomy.

Table IV. Convergent validity of Rosser and Dallas scales

Indicator	Coefficient of correlation	p-Value
Rosser: physician/patient	0.705	< 0.001
Rosser: patient-assessed/ Dallas: daily activities	–0.391	< 0.001
Rosser: patient-assessed/ Dallas: work	–0.322	< 0.001
Rosser: patient-assessed/ Dallas: anxiety	–0.374	< 0.001
Rosser: patient-assessed/ Dallas: social relations	–0.328	< 0.001

As previously described, QALYs were calculated by attribution of the Rosser coefficients to the fraction of years spent in good health (0.987 ± 0.016) or in bad health (0.807 ± 0.518) for a cohort of 100 patients year by year. The QALY results for the patient cohort are shown in table V. In the high hypothesis for discectomy, 44.24 potential life years were lost due to a reduction in quality of life in the discectomy cohort versus 27.36 in the chemonucleolysis cohort.

Costs per QALY

The total cost of discectomy and chemonucleolysis was calculated by adding the cost at the time of the 2 procedures to that of their long term failure from 1 year to 7 years. The mean hospitalisation duration was 2.2 ± 0.60 days for chemonucleolysis and 7.7 ± 1.6 days for discectomy. The total cost of discectomy at the time of the survey (1990) in a neurosurgical unit of a public hospital was FF15 400 ($US1 = FF5.46). The total cost of chemonucleolysis in the same period was FF8000.

Total costs and financial consequences of failure were calculated for each of the 2 procedures

Table V. Results in QALYs at 7 years for a cohort of 100 patients

Intervention	Time after intervention (years)						
	1	2	3	4	5	6	7
Nondiscounted QALYs							
chemonucleolysis (high hypothesis)	96.17	192.51	288.76	384.89	480.02	576.83	672.64
chemonucleolysis (low hypothesis)	96.00	192.51	288.03	383.02	479.47	574.98	670.44
discectomy (high hypothesis)	95.72	190.07	283.82	377.41	470.55	563.33	655.76
discectomy (low hypothesis)	94.76	188.70	282.10	376.15	467.84	560.18	652.17
Discounted QALYs							
chemonucleolysis (high hypothesis)	96.17	187.88	275.18	358.24	437.27	512.37	583.84
chemonucleolysis (low hypothesis)	96.00	187.48	274.50	357.26	435.98	510.76	581.98
discectomy (high hypothesis)	95.72	185.54	270.66	351.44	428.09	500.74	569.69
discectomy (low hypothesis)	94.78	184.19	268.90	349.30	425.56	497.89	566.51

Abbreviation: QALY = quality-adjusted life year.

using both the high (87%) and the low (80%) outcome assumptions at year 7 (fig. 2).

Comparison for a cohort of 100 patients of these indexed cumulative costs and of 7-year QALYs was used to calculate the cost-benefit ratio for each method. Using the higher figure, the additional discounted cost per patient of discectomy compared with chemonucleolysis was FF9126. The additional discounted benefits at 7 years associated with the use of chemonucleolysis was 0.142 years of life (52 days) per patient.

Discussion

Rosser coefficients measure quality of life of the patient based on 2 dimensions, pain and disability. The Dallas index expresses the impact of pain on daily activities, work, psychological state and relationship-related activities. This study has shown that these 2 indicators are closely linked. Also, the Rosser coefficients and the 4 Dallas scores have been shown to differ significantly as a function of the outcome of surgery or chemonucleolysis. It can be concluded that these indicators are valid criteria for assessing the quality or efficacy of treatments of intervertebral disc hernia, even though they are indirect indicators. In subsequent studies, it would be quite possible to add them to the 'conventional medical criteria' and to take them into account as secondary assessment criteria if the main ones are not sensitive enough to discriminate between treatments.

This study attempts to estimate the cost-benefit ratio of surgical discectomy and of chemonucleolysis in the treatment of intractable radicular pain caused by discal herniation at a 7-year end-point. This estimation was necessarily based on careful analysis of the literature, since no prospective study providing long term follow-up is available. Obviously, the accepted hypothesis regarding the clinical results may be subject to controversy, due to the variability of the reported results from numerous studies. However, this variability in itself suggests that a synthesis of the published results may provide a more realistic appraisal of outcomes in general practice, in that it highlights points of

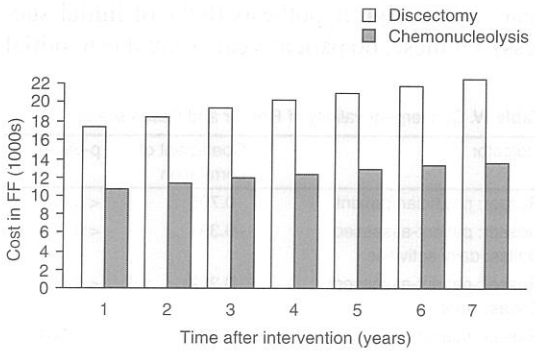

Fig. 2. Chemonucleolysis versus discectomy: course of the real medical cost per patient after 7 years. *Abbreviation:* FF = French francs.

consensus about key issues such as the range of short term results, frequency of pain recurrence, and rates and outcomes of repeat surgery. Whenever a divergence was detected in the literature for a given parameter, we included the possible extreme hypotheses in a sensitivity analysis.

We consider the short term performance of chemonucleolysis (i.e. 80% very good/good outcomes) to be firmly established. The success rate of this procedure has steadily increased as a result of better selection of candidates for nucleolysis. Thus, according to a review of the North American studies of chemonucleolysis published by Centre National d'Information sur le Médicament Hospitalier,[24] the mean success rate increased from 67% for 75 centres in the US between 1963 and 1975, to 80 to 89% after 1981 in 37 centres. In Europe, the mean success rate reported before 1981 in 13 centres was 70%, but more recent studies show the same progression. In 1986, Deburge et al.[17] and Clère[25] reported success rates of 77.5% at 6 months and 81% at 3 and 6 months, respectively.

Lavignolle and Duplan[26] highlighted the impact of good patient selection on the outcome of chemonucleolysis. The short term success rate increased from 78% with discography (200 patients 1978 to 1980), to 82% with discometry (500 patients 1981 to 1984), to 92% with discomanometry, which has been used since 1985 in 300 patients. We did not include these very favourable results, since they were observed in centres of excellence, some of which routinely use patient selection methods which are not yet available under normal conditions of practice. Also the follow-up for these later studies has not yet reached the end-point selected, i.e. 7 years.

Likewise, assuming that good results are maintained between 3 months and 1 year is conservative, since some authors such as Nordby[18] and McDermott[27] reported improvement between 3 and 6 months. Wiltse, cited by Nordby,[28] found that 52% of patients recovered at 4 months, 33% at 6 months, and 12% took 12 months.

In contrast, there is some divergence concerning the success rate of surgical repair in patients failing the initial procedure and/or experiencing pain recurrence following chemonucleolysis. This is why 2 outcome hypotheses have been tested.

Surprisingly, the short and long term results of discectomy have been investigated to a lesser extent than those of chemonucleolysis with chymopapain. Again, some centres of surgical excellence have reported higher success rates at 3 months than the 87% of our high hypothesis. However, it would have been illogical to base our methods on the most favourable results obtained by surgery, when we had not done this for chemonucleolysis. We therefore used the major studies, the results of which were obtained under normal working conditions, and we evaluated them on criteria defined on similar bases for both methods. The high hypothesis was based on the work of Bouillet,[6] which seemed to be more favourable to discectomy than that of Sicard,[11] reported from 3000 patients (83% rate of very good/good results). As for the low hypothesis (80% of good results observed by Louyot et al.[8] at 3 months), this is not the worst scenario. Salenius and Laurent,[10] and even the very respected study of Lewis et al.,[7] report worse results. In any case, the long term projections based on these data (i.e. 62 to 65% of very good/good results in year 7) are very close to the long term results published by Rish[15] (64% at 3 to 8 years) and by Lewis et al.[7] (62% at 7 years).

Finally, the results obtained as a function of the various high and low hypotheses adopted differ little. According to our estimations, the probability of a given patient being in a satisfactory state of health (very good or good) during the seventh year ranges from 0.81 to 0.84 after chemonucleolysis and from 0.62 to 0.65 after discectomy. This therapeutic benefit is essentially attributable to the good outcome of the surgical repair of failures and recurrences, which provides a second chance for patients undergoing chemonucleolysis. The clinical results, reformulated in terms of QALY for a cohort of 100 patients, reveal an additional gain of 14 years of good health after the use of chemonucleolysis. Per patient, the additional benefit at 7 years associated with the use of this method is

equivalent to 0.142 years of life (i.e. 52 days of good health).

The hospital cost of the procedure itself and the cost to the 7-year end-point has been calculated for both methods, including repeat surgery for failures and recurrences and the long term medical costs for non-reoperable deteriorations. It was found that the hospitalisation costs associated with chemonucleolysis were about half those associated with discectomy. When the patient was admitted to a rheumatology service, the hospital cost of chemonucleolysis was only 48% of that of discectomy; it was still only 51.5% of that of discectomy when the postnucleolysis hospitalisation took place in a neurosurgery unit. At 1 year, after integrating the cost of repeat surgery for initial treatment failures, the global medical costs after chemonucleolysis were no more than 56.6% and 60% of those following discectomy, depending on whether the initial hospitalisation was in a rheumatology or a neurosurgery unit. At 7 years, the ratios remained unchanged. Thus, the indexed additional cost per patient of discectomy compared with that of chemonucleolysis was FF9721 or FF9126 at 7 years, depending on whether the patient undergoing chemonucleolysis was hospitalised in a rheumatology or neurosurgery unit. The use of chemonucleolysis resulted in a saving of nearly FF10 000.

Conclusion

Although surgical discectomy may produce slightly better immediate clinical results than chemonucleolysis with chymopapain, evaluation of costs and QALYs up to 7 years after intervention identifies additional benefit in favour of chemonucleolysis, due mostly to results from post-chymopapain surgery, offering a second chance to these patients.

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Saint Denis, le 19 FEV. 2016

Monsieur, cher ami

Nous vous remercions d'avoir répondu favorablement à la sollicitation de la Haute Autorité de Santé (HAS) pour apporter votre expertise sur le thème : « Evaluation médico-économique des biothérapies dans la prise en charge de la polyarthrite rhumatoïde ».

Comme nous vous l'avions indiqué dans le courrier de sollicitation, votre désignation en tant qu'expert sur ce thème a été soumise à l'avis du Bureau de la Commission Evaluation Economique et Santé Publique (CEESP), instance qui a pour mission d'analyser les déclarations publiques d'intérêts conformément au *Guide des déclarations d'intérêts et de prévention des conflits* (guide disponible sur le site de la HAS, www.has-sante.fr).

Cependant dès lors que votre déclaration d'intérêts a mis en évidence des liens pouvant être considérés comme majeurs au regard de la grille d'analyse des intérêts déclarés établie par la HAS, nous ne pouvons malheureusement pas retenir votre participation au groupe de travail pour ce thème.

En revanche, nous serions honorés si vous acceptiez de participer au groupe de lecture (GL) portant sur ce projet.

Nous tenons à vous préciser que le fait que vous ayez des liens considérés comme majeurs dans le cadre d'une thématique n'empêche pas votre participation sur un autre thème, sous réserve d'un avis favorable du Bureau.

Nous nous permettrons donc de solliciter à nouveau votre collaboration sur d'autres thématiques afin de pouvoir bénéficier de votre expertise.

Nous vous prions de bien vouloir agréer, ~~Monsieur~~ cher ami, nos sincères salutations.

Bien amicalement

Dr Jean-François Thébaut

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