

SOCIAL INSURANCE COST OF STANDARD DISCECTOMY AND PERCUTANEOUS NUCLEOTOMY

A RETROSPECTIVE STUDY OF 87 SOCIAL INSURANCE CLAIM FILES OF MALE BLUE COLLAR WORKERS

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A retrospective review of social insurance claim files of male blue collar workers was conducted to compare the social insurance costs of percutaneous lumbar nucleotomy with standard lumbar discectomy; 29 percutaneous nucleotomy procedures were matched with 58 standard discectomies all carried out between January 1992 and December 1994. It was concluded that a standard discectomy procedure results in significantly higher costs during hospitalisation with respect to surgery, anaesthesia and hospital stay. A percutaneous nucleotomy leads to a significantly higher outpatient expenditure especially in radiology and medical devices. The relative proportion of outpatient practitioner's visits and hospital stay costs was significantly higher for the standard discectomy whereas medical devices had a relatively higher share in outpatient expenditure for the percutaneous nucleotomy. In this population of 87 compensation claimants, the average social insurance costs did not significantly differ between the percutaneous nucleotomy and the standard discectomy.

Keywords: retrospective study; percutaneous nucleotomy; discectomy; cost; fitness for work.

Mots-clés: étude rétrospective; nucléotomie percutanée; discectomie; coûts; capacité de travail.

INTRODUCTION

In Western countries low back pain is an important common problem that affects up to 80% of adults during their lives. Back problems constitute the most frequent chronic condition limiting activity in persons younger than 45 years. They

have an enormous effect on health care utilisation and costs. A herniated intervertebral disc is the cause in approximately 2% of cases accounting for a disproportionately large fraction (30%) of the US national yearly costs for treatment of low back pain. Moreover in men of working age, the costs of earnings and productivity losses attributable to herniated disks are similar to those of ischemic heart disease (1).

Since Mixter and Barr developed in 1934 a surgical alternative to conservative management of standard disc herniation many other surgical variants or improvements followed (6). Percutaneous nucleotomy was introduced in 1975, followed in 1985 by an automated method for removing nuclear material with less manipulation (10). In 1986 Kambin and Sampson reported a 85% success rate in 50 patients who underwent percutaneous discectomy: 13% were judged to be failures and required additional surgery (3).

Kahanovitz *et al.* found in a multicenter analysis that percutaneous discectomy did not appear to be a predictable or successful treatment modality

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as surgical discectomy. Only 55% of the patients were able to return to work in an average follow-up period of 16.8 months whereas 34% ultimately underwent surgical discectomy for continued symptoms after the procedure (2).

Studies conducted to investigate the outcome after standard discectomy reported a more consistent result. In a review article on return to work following back surgery, Taylor (9) identified 13 studies describing patients treated for disc disease alone. A satisfactory outcome was obtained in 82 to 97% of the cases with a required additional back surgery in 2 to 8% during an average follow-up period less than 5 years.

The present study investigates social insurance costs and fitness for work of percutaneous nucleotomy and standard discectomy.

PATIENTS AND METHODS

Population

The study was based on patient record files from the largest Belgian sickness fund. It covers approximately 45% of the population in Belgium where sickness insurance is legally imposed. All social insurance compensation files of blue collar workers undergoing a percutaneous nucleotomy between January 1992 and December 1994 were reviewed. This population consisted of all the patients for whom the specific nomenclature code for percutaneous nucleotomy was used by the treating surgeon. Details about diagnosis or clinical or radiological signs were not present in this administrative database. Basic sociodemographical data, date of intervention, duration of hospital stay, compensation payments, medical services payments and period of work incapacity were reviewed. Patients with a preoperative period of work incapacity longer than 6 months and cases with missing values were excluded, so that 31 blue collar workers were selected. Two (6.5%) patients had a second operation (standard discectomy). They were excluded to ease calculations.

Patients were matched with blue collar workers receiving compensation for work incapacity after a standard discectomy during the same period and responding to identical inclusion and exclusion criteria. Male blue collar workers were matched according to 5 criteria : age, preoperative period of work incapacity, employment status at the onset of work incapacity, follow-up and daily compensation for work incapacity

as an indirect indication of salary level and education. A study group of 87 cases resulted : a group with 29 claimants treated by percutaneous nucleotomy and a second group with 58 claimants treated by standard discectomy (Table I).

Fitness for work

Patients were evaluated by medical advisers of the sickness fund. Individual medical evaluations took place regularly from about one month after surgical intervention until patients were judged fit for resuming work according to the legal criteria in the sickness and invalidity insurance. In the first six months of work incapacity the medical adviser evaluates fitness for work with regard to the patient's last job. After an incapacity period of 6 months the criterion is extended to all occupations the patient may have access to, according to his professional career and education.

Analysis of costs

In Belgium, health care and sickness benefits are insured by a social security system that is financed by contributions of both employees and employers. In the health care insurance, tariff-agreements are made between health care providers, government and sickness funds. In this system each medical act or intervention is valued at a fixed price. A daily lump sum is provided for hospitals to finance medical equipment, nursing, lodging and administration. Patients belonging to the working population are also compensated during the recovering period until fitness for work. They receive a daily compensation in accordance with their previous salary level. The expenditures for medical procedures, work incapacity compensation, hospital nursing, lodging and administration add up to the social insurance costs.

Social insurance costs were calculated for a follow-up of 2 years postoperatively. In view of the retrospective design of the present study, we were not able to rule out medical care costs unrelated to discal hernia intervention.

Patient's claim files were broken down into hospital and outpatient costs. Hospital cost consisted of the following groups : hospital stay, pharmaceutical products, synthesis material, physician fees and physiotherapy. As mentioned above hospital stay covers medical equipment, administration, nursing and lodging. The most important physician fees were found in surgery (the discal hernia intervention), anaesthesia and reanimation (during and after intervention), internal medi-

Table I. — Patient Characteristics

	Percutaneous nucleotomy	Standard lumbar discectomy
Number	N = 29	N = 58
Age (years)		
range	23-55	23-50
mean	37	36
median	35	34
Sex	male	male
Occupation	blue collar worker	blue collar worker
Years of operation		
1992	6	8
1993	14	32
1994	9	18
% received sickness fund compensation	100	100
Preoperative working incapacity (days)		
range	1-58	0-55
mean	16	19
median	10	17
Daily compensation (BEF)		
range	508-2,091	594-2,090
mean	1,566	1,524
median	1,473	1,427
Employment status at the onset of work incapacity		
% employed	100	100
Follow-up (days)		
range	404-1,264	438-1,314
mean	876	836
median	880	857

cine (cardiological and pneumological check up preoperatively), radiology, clinical biology and histopathology.

Outpatient costs could be divided into practitioner's visits, physiotherapy, nursing, clinical biology, medical devices (corset/bracing) and radiology. Outpatient drug consumption could not be traced. Diagnostic tests and other expenses before surgery were excluded as being common to both procedures. Daily sickness fund payments compensating for working time lost after 1 month of working incapacity were also calculated. No information about compensation payments during the first month of sick leave was available (to be paid by

the employer in the Belgian social security system). All costs are expressed in Belgian Francs (BEF).

Statistical analysis

Non-parametric statistics (Kruskal-Wallis analyses) were used to determine whether there were specific differences in costs and fitness for work periods between both surgical interventions. The statistical analyses were performed using programmes in the Statistical Packages for the Social Sciences (SPSS). The results of the different analyses were considered to be statistically significant if $p < 0.05$.

RESULTS

The mean work incapacity period was 118 days for a percutaneous nucleotomy and 113 days for a standard discectomy.

Table II averages the in-hospital costs, follow-up treatment expenditure and social sickness fund compensation for work incapacity in both the percutaneous nucleotomy and standard discectomy group.

Figures 1 and 2 break down the mean global hospital and outpatient costs (100%) during the follow-up into its mean components (%). The average outpatient cost of a percutaneous nucleotomy was significantly higher with respect to radiology and medical devices (corset/bracing). A standard discectomy involved a higher expenditure in surgery, anaesthesia and hospital stay.

A Kruskal-Wallis analysis revealed that a significantly higher fraction of costs during hospitalisation was related to hospital stay in case of a standard discectomy. The proportion of medical devices in the outpatient costs was higher for the percutaneous nucleotomy which entailed also less relative costs of outpatient practitioner's visits.

DISCUSSION

This report attempted to compare social insurance costs of two surgical interventions for a similar disorder. For this method to be appropriate as a means of economic appraisal some prerequisites are necessary: intervention has to be performed on a comparable patient group and medical outcomes must be measured in the same units. All relevant costs must be considered and the procedures should not differ in their process utility experienced by patients (4, 5, 7, 8).

Both groups in our study were uniformly composed of male blue collar workers with a comparable age distribution. Several reports identified compensation status, preoperative duration of symptoms and employment status as prognostic factors of a good surgical outcome after an operation for disc herniation. We attempted to control for these confounders within the borders of a retrospective study design (7). Nevertheless certain limitations must be considered. A preoperative work incapacity of less than 6 months is not necessarily related to preoperative duration of symptoms. The inclusion of patients with a preoperative work incapacity of less than 6 months makes the involvement of intercurrent diseases with consequently higher medical expenses unrelated to surgical intervention less probable but does however not preclude it entirely.

Although, the studied population was very homogenous which is beneficial for the purpose of the investigation, it may not make the results generalizable to the population at large because only male blue collar workers were involved.

Fitness for work after surgical intervention assessed by medical advisers was defined as outcome measure. In our opinion, fitness for work — evaluated by an independent physician — is a better outcome measure than return to work because return to work is influenced by a number of non-medical factors like unemployment and economic growth.

Costs analysis showed that costs during hospitalisation especially surgery, anaesthesia and hospital stay were higher for the standard discectomy. This is mainly due to a longer operating time and a longer residency in hospital after this procedure. We found a mean duration of hospitalisation of 5 days for the percutaneous nucleotomy.

Tabel II. — Mean costs per intervention (in BEF)

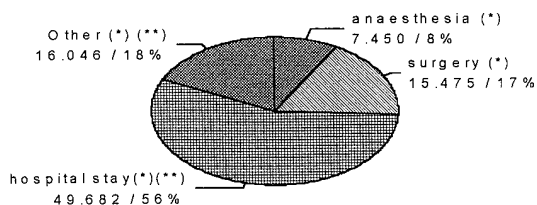
	Mean compensation (incapacity for work)	Mean outpatient costs (2 years after intervention)	Mean costs during hospitalization	Mean total expenditure (compensation, hospitalization, outpatient costs)
Standard discectomy	160,773	32,764	85,661	279,197
Percutaneous nucleotomy	220,384	52,529	73,292	346,206
p-Value	0.433	0.009	0.076	0.773

tomy whereas patients who had a standard discectomy stayed 8 days in hospital. The cost-savings of the percutaneous nucleotomy are substantially related to the less intensive use of in

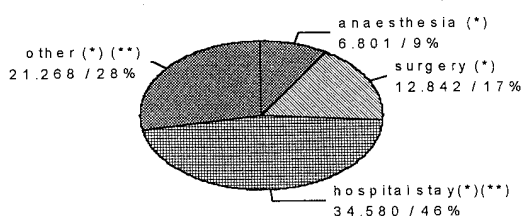
hospital resources and to a shorter hospitalisation. In the long run, they are levelled down by higher outpatient costs of medical devices and radiology. Differences in the salary-level and number of work incapacity days were not statistically significant among both groups leading to a comparable social insurance pay-out.

Our study demonstrates that fitness for work and social insurance costs do not significantly differ between standard discectomy and percutaneous nucleotomy within the restrictions imposed by the data set and as far as we do not account for the reoperations after the percutaneous procedure. The latter indicates that if the percutaneous nucleotomy has the potential to be a worthy alternative to the standard discectomy, the reoperation rate should be kept as low as possible. In that view, previous reports stressed the necessity of a proper patient selection and a correct surgical technique. These are essential criteria that lie beyond the scope of the present investigation.

1. Mean costs during hospitalization after standard discectomy (in BEF)



2. Mean costs during hospitalization after percutaneous nucleotomy (in BEF)

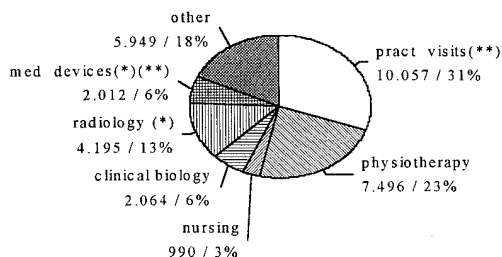


(*) mean cost significantly different at p<0.05

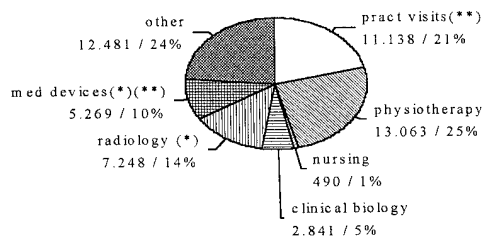
(**) relative weight (%) significantly different at p<0.05

Fig 1. — Pie chart of mean costs during hospitalization for standard and percutaneous discectomy (in BEF). Relative weights are indicated as a percentage of total expenditure.

1. Mean outpatient costs after standard discectomy (in BEF)



2. Mean outpatient costs after percutaneous nucleotomy (in BEF)



(*) mean cost significantly different at p<0.05

(**) relative weight (%) significantly different at p<0.05

Fig 2. — Pie chart of mean outpatient costs two years after standard and percutaneous discectomy (in BEF). Relative weights are indicated as a percentage of total expenditure.

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SAMENVATTING

M. DU BOIS, P. DONCEEL, B. DEBBAUT. Sociale zekerheidskost van de percutane nucleotomie en de standaarddissectomie.

Er werd een retrospectief onderzoek uitgevoerd naar de socialezekerheidskost van de percutane nucleotomie en de standaarddissectomie op basis van de socialezekerheidsgegevens van arbeiders. Hiervoor werden 29 percutane nucleotomie-ingrepen vergeleken met 58 standaardprocedures die alle werden uitgevoerd in de periode tussen januari 1992 en december 1994. Uit dit onderzoek bleek dat een standaardprocedure in een significant hogere hospitalisatiekost resulteert op het vlak van heekunde, anesthesie en hospitalisatieduur. Een percutane nucleotomie leidt tot significant hogere extramurale uitgaven inzake radiologie en medische hulpmiddelen. Voor de standaardingreep was er een significant hoger relatief aandeel voor de kostprijs van de verblijfsduur en de extramurale consultaties, terwijl het relatief aandeel van de kost van medische hulpmiddelen hoger was voor de percutane nucleotomie. Er was voor deze populatie van 87 verzekerden geen significant verschil in gemiddelde socialezekerheidskost tussen de percutane nucleotomie en de standaarddissectomie.

RÉSUMÉ

M. DU BOIS, P. DONCEEL, B. DEBBAUT. Comparaison du coût pour la sécurité sociale de la discectomie conventionnelle et de la nucléotomie percutanée : étude rétrospective de 87 dossiers de travailleurs manuels.

Dans cette étude rétrospective, nous avons comparé les coûts des nucléotomies percutanées avec ceux des discectomies classiques, à l'aide des données de la sécurité sociale des ouvriers. Pour ce faire, nous avons examiné 29 nucléotomies percutanées et 58 discectomies classiques, effectuées entre janvier 1992 et décembre 1994. Nous pouvons ainsi conclure qu'une discectomie classique entraîne des coûts d'hospitalisation significativement plus élevés en ce qui concerne l'acte chirurgical, l'anesthésie et la durée d'hospitalisation. Les dépenses externes sont significativement plus élevées sur le plan de la radiologie et de l'appareillage pour les nucléotomies percutanées. La part relative des coûts des consultations ambulantes et de la durée d'hospitalisation pesait plus lourde pour la discectomie classique, tandis que celle de l'appareillage était plus élevée pour la nucléotomie percutanée. Pour cette population de 87 assurés, les coûts moyens pour la sécurité sociale n'étaient pas significativement différents entre la nucléotomie percutanée et la discectomie classique.