Assessment of whether in-hospital mortality for lobectomy is a useful standard for the quality of lung cancer surgery: retrospective study

Tom Treasure, Martin Utley, Alan Bailey

ELPS

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Cardiothoracic Unit, Guy's Hospital, London SE1 9RT
Tom Treasure
professor of cardiothoracic surgery

Clinical Operational Research Unit, University College London, London WC1E 6BT
Martin Utley
senior research fellow

Society of Cardiothoracic Surgeons of Great Britain and Ireland, London WC2A 3PE
Alan Bailey
data coordinator

Correspondence to: T Treasure Tom.Treasure@gstt.sthames.nhs.uk

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Abstract

Objectives To calculate in-hospital mortality after lobectomy for primary lung cancer in the United Kingdom; to explore the validity of using such data to assess the quality of UK thoracic surgeons; and to investigate the relation between in-hospital mortality and the number of procedures performed by surgeons.
Design Retrospective study.
Setting 36 departments dealing with thoracic surgery in UK hospitals.
Participants 4028 patients who had undergone lobectomy for primary lung cancer by one of 102 surgeons.
Main outcome measures In-hospital mortality in relation to individual surgeons, among all patients, and among each of five groups of patients defined by the number of operations performed by the surgeon.
Results 103 patients (2.6%, 95% confidence interval 2.1% to 3.1%) died after surgery during the same hospital admission. No significant difference was found for in-hospital mortality between the five groups.
Conclusions The number of procedures performed by a thoracic surgeon is not related to in-hospital mortality. Reporting data on in-hospital mortality after lobectomy for primary lung cancer is a poor tool for measuring a surgeon's performance.

Introduction

Since 1998 British cardiothoracic surgeons have had to report their mortality figures for selected "marker" operations. This was in response to publicity surrounding the high mortality from congenital heart surgery at the Bristol Royal Infirmary. Lobectomy for lung cancer was chosen as the marker operation for thoracic surgery because it is the only operation performed often enough for meaningful statistical comparisons to be feasible. It is the only general thoracic operation for which data are specific to a surgeon, and data are now available covering two years.

Questions arise as to how such data should be presented and whether the reporting of such data provides a useful tool for assessing the quality of thoracic surgery.[1] We aimed to calculate the mortality from this procedure and in relation to individual surgeons.

Methods

Data were collected by a designated member of each thoracic surgical unit as part of the UK Society of Cardiothoracic Surgeons' annual return. Operations are categorised under 237 headings and pooled for the unit. Postoperative deaths during an admission for a procedure are recorded, but not the cause of death. We divided the data into fifths according to the number of operations performed by the surgeon over the two financial years 1999-2000 and 2000-1.

Results

Of the 4028 patients who had undergone a lobectomy during 1999-2000 and 2000-1 by one of 102 surgeons, 103 died (2.6%, 95% confidence interval 2.1% to 3.1%) during the same hospital admission. Figures 1 and 2 present the data for each of the 102 surgeons. Figure 1 gives an initial impression of a relation between surgical volume and risk. Most of the data in figure 2 lie within the 95% limits that would be expected if the risk of in-hospital mortality were the same for all patients, regardless of surgeon or other factors.

Mortality among the five groups of patients defined by the number of procedures performed by the surgeon over the two years was not significantly different (χ^2=1.477, df=4, P=0.83; table).

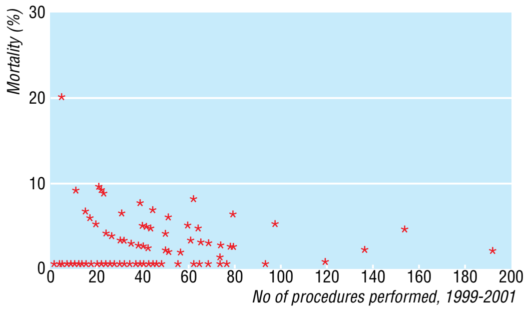

Fig 1 In-hospital mortality in relation to number of operations performed by surgeon during 1999-2001

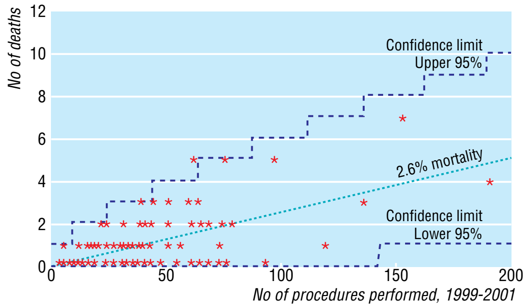

Fig 2 Number of patient deaths in relation to number of operations performed by surgeon during 1999-2001

Discussion

In-hospital mortality after lobectomy for primary lung cancer is not related to the number of procedures performed by an individual surgeon. The relation between a surgeon's volume and outcome has attracted interest, and it seems reasonable to believe that there could be an effect. Data have been published on 2.5 million operations over five years in the Medicare system.[2] These data, which were analysed with the model we used, show powerful effects for pancreatic and oesophageal cancer, which also apply to pneumonectomy and lobectomy for lung cancer. Five year survival is also influenced by the number of lung resections for cancer performed by a surgeon.[3] This may be a learning curve or practice effect.[4] It may also reflect better decisions made by teams dealing with lung cancer rather than those whose major focus is cardiac.

The UK data, however, do not show a relation between volume and outcome. Most of the 102 surgeons we reviewed performed both heart and lung surgery.[5 6] Lobectomy for lung cancer was thus a small proportion of their work. They typically performed around 150 to 200 cardiac operations a year, so any practice effect for lobectomy (an operation of intermediate technical difficulty in cardiothoracic surgery) is likely to be subsumed under the overall case mix. It is also likely that any volume effect according to setting is lost because the lower volume of lobectomies are most commonly performed within cardiothoracic units, which deal with a large volume of major chest surgery.[2] In the United Kingdom we need the contribution of "low volume" surgeons (surgeons performing less than 24 lobectomies a year provide 40% of the UK service for this procedure), so our results are reassuring.

Figure 1 gives the impression of a relation between surgical volume and outcome. This can be explained by the eye being drawn to the single high mortality figure of 20%, representing one death out of five cases, and not to the 35 of 59 points along the x axis which represent surgeons performing fewer than 20 lobectomies a year. It is more than likely that at least one surgeon with a low surgical volume would display high mortality purely by chance—for example, if all the patients of all the surgeons faced the same risk of in-hospital death, there would be a 65% chance of at least one of the surgeons who performed five or fewer operations over the two years having a mortality of 20% or more. Similarly deceptive is the way in which the points line up in asymptotic curves. All points representing a single death describe a curve running from 20% to about 2%, as the denominator increases from five to over 50. The same effect is seen as the points for surgeons with two and three deaths line up. The major characteristics of figure 1 are therefore artefacts rather than useful information about the performance of individual surgeons. Figure 2 provides a graphical representation of the data that is less open to misinterpretation. Importantly, the low level of absolute mortality is more obvious than in figure 1.

So what purpose does the collection of surgeon specific data serve? Annual surgical volumes are too small to form the basis of any statistically valid comparison of one surgeon with another. It is also likely that anaesthesia and postoperative care are as important as surgical competence in determining survival after lobectomy. The more important determinants of survival are patient related and include age, pulmonary function, cardiac status, and other comorbidity. And yet the data collected on lobectomy are not adjusted for risk. The development of risk scoring within thoracic surgery is clearly needed.

Previous pooling of data by the Society of Cardiothoracic Surgeons was based on anonymity. The current system is open to dishonesty and the likelihood

Data on in-hospital mortality for five groups of patients defined by number of operations performed by surgeon

Group	No of cases	No of deaths	No of surgeons	No of cases a year	Mortality (95% CI)
First	806	22	49	1-15	2.7 (1.7 to 4.1)
Second	811	21	21	16-23	2.6 (1.6 to 3.9)
Third	825	24	15	24-32	2.9 (1.9 to 4.3)
		21*			2.5 (1.6 to 3.9)
Fourth	797	16	11	32-40	2.0 (1.2 to 3.2)
		19*			2.4 (1.4 to 3.7)
Fifth	789	20	6	47-96	2.5 (1.6 to 3.9)
Total	4028	103	102		2.6 (2.1 to 3.1)

*Effect of switching two surgeons that both had 32 cases a year.

What is already known on this topic

British cardiothoracic surgeons must report their mortality figures for "marker" operations

Lobectomy for primary lung cancer is the marker operation for thoracic surgery; half are performed by surgeons who perform the procedure infrequently

Studies of other surgical procedures have shown a link between surgical volume and survival to leave hospital

What this study adds

In-hospital mortality after lobectomy is not related to the number of procedures performed by a surgeon

Mortality figures derived from a small number of cases are unreliable and should not be used as the basis of important decisions made by patients

Mortality from lobectomy for primary lung cancer is a poor means of measuring surgical performance of surgeons refusing to operate on high risk cases. For these reasons we believe that the registration of lobectomy data is an inadequate means of measuring surgical competence. Lung cancer is a rapidly fatal disease, and an informed patient might well choose to face a substantial surgical risk for the chance of cure.[7] A better indicator of quality would be cancer free survival at five years,[3] and this would reflect better the performance of the cancer multidisciplinary team, who are jointly responsible for patient selection.

The members of the UK Society of Cardiothoracic Surgeons voluntarily contribute their data. The content of this paper was presented to the UK Thoracic Forum on 9 February 2002, and the members present unanimously agreed to these data being presented. The interpretation and opinions are those of the authors.

Contributors: See bmj.com

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Extracorporeal shock wave therapy for plantar fasciitis: randomised controlled multicentre trial

Michael Haake, Mathias Buch, Carsten Schoellner, Felix Goebel, Martin Vogel, Ingo Mueller, Jörg Hausdorf, Karin Zamzow, Carmen Schade-Brittinger, Hans-Helge Mueller

ELPS

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Orthopädische Klinik, Universität Regensburg, 93077 Bad Abbach, Germany
Michael Haake *associate assistant professor*

Orthopädische Klinik Kassel, 43131 Kassel, Germany
Mathias Buch *assistant medical director*

Orthopädische Klinik, Johannes Gutenberg Universität Mainz, 55131 Mainz, Germany
Carsten Schoellner *senior resident*

Klinik für Orthopädie, Martin Luther Universität Halle, 06097 Halle, Germany
Felix Goebel *senior resident*

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Abstract

Objective To determine the effectiveness of extracorporeal shock wave therapy compared with placebo in the treatment of chronic plantar fasciitis.
Design Randomised, blinded, multicentre trial with parallel group design.
Setting Nine hospitals and one outpatient clinic in Germany.
Participants 272 patients with chronic plantar fasciitis recalcitrant to conservative therapy for at least six months: 135 patients were allocated extracorporeal shock wave therapy and 137 were allocated placebo.
Main outcome measures Primary end point was the success rate 12 weeks after intervention based on the Roles and Maudsley score. Secondary end points encompassed subjective pain ratings and walking ability up to a year after the last intervention.
Results The primary end point could be assessed in 94% (n=257) of patients. The success rate 12 weeks after intervention was 34% (n=46) in the extracorporeal shock wave therapy group and 30% (n=41) in the placebo group (95% confidence interval −8.0% to 15.1%). No difference was found in the secondary end points. Few side effects were reported.
Conclusions Extracorporeal shock wave therapy is ineffective in the treatment of chronic plantar fasciitis.

Introduction

Plantar fasciitis is a common cause of heel pain, affecting 10% of the general population.[1] It may be due to injury at the origin of the plantar fascia or to biomechanical abnormalities of the foot.[2 3] Standard treatment for plantar fasciitis is conservative, but about 10% of patients fail to respond.[4] Surgery is recommended eventually, but is unsuccessful in 2% to 35% of patients.[5] Only limited evidence exists for a short term reduction of pain from local treatment with corticosteroids.[6]

Extracorporeal shock wave therapy was introduced in the early 1990s for the treatment of insertion tendinopathies, where it is thought to provide long lasting analgesia and stimulate the healing process.[7] It has been recommended as treatment for chronic plantar fasciitis in patients unresponsive to conservative treatment.[8–12] However a recent review found that the efficacy of extracorporeal shock wave therapy in plantar fasciitis could not be ascertained owing to poor methodology in previous studies.[13]

Materials and methods

Our study was a randomised, blinded, multicentre trial with a two sample parallel group design. Patients were recruited in seven university hospitals, two clinics, and one practice in Germany (see bmj.com for inclusion and exclusion criteria). They were randomised to receive either extracorporeal shock wave therapy (135 patients) or placebo (137 patients). Treatment was allocated only at the time of the first intervention.

Intervention

Extracorporeal shock wave therapy comprised 4000 impulses of a positive energy flux density (0.08 mJ/mm²) under local anaesthesia with 2 ml mepivacaine 1%. Therapy was applied every two weeks plus or minus two days (3 × 4000 impulses). The total positive dose was 0.96 J/mm², the energy flux density was 0.22 mJ/mm², and the positive pressure was 13.7 MPa.

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Tables and criteria for inclusion or exclusion of patients appear on bmj.com