Deaths and necropsies in a thoracic unit

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Abstract

Background There is concern about the decrease in the number of requests for necropsies, so a study was undertaken to assess current clinical practice.

Method A prospective study was made of all deaths occurring under the care of five chest physicians and three thoracic surgeons at East Birmingham Hospital from 1 April to 30 June 1989.

Results A necropsy was sought in 34 of 58 deaths (59%) and was performed in 22 instances (38%). Major unexpected findings which would have affected clinical management were noted in three patients (14%). The mean delay in reporting results of histological examinations was 146 days (range 41–260 days).

As the result of an increase in pathology technical staff levels and alteration in the practice of processing histological data, there was a substantial improvement during the corresponding period in 1990 (mean reduction 58 days, 95% confidence limits 39–77 days). Apart from patients with histologically proved carcinoma, there was no consistent pattern for requests for necropsies.

Conclusions Necropsies continue to reveal diagnoses which were not suspected while the patient was alive. Although the number of requests made by clinical staff for necropsies is reasonable, the reasons for the requests are not consistent. Guidelines are suggested to improve the number of successful requests and to maximise the information obtained from them.

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Over the last 30 years, the rate of hospital necropsies in the United Kingdom has declined considerably.1 For pathologists the time made available by the reduction in the workload from necropsies has been filled by an increase in the workload from surgical procedures and screening programmes. The opportunities for training junior histopathologists, however, are decreasing. For clinicians and their junior staff the reduction in the number of necropsies being performed has lessened the chances of benefiting from a detailed postmortem examination. This latter point is of major importance since many studies have shown that necropsies uncover unexpected findings of variable significance in 15–58% of cases.2–7 There has been considerable interest recently in medical audit and quality assurance,8 Because the postmortem examination might be regarded as the “ultimate audit” of clinical outcome,9 it has been suggested that accreditation by the Royal Colleges for higher professional training should be dependent not only on an adequate necropsy rate but also on the dissemination of information from such examinations.10 We have therefore undertaken a prospective study to examine our current clinical practice with respect to death and postmortem examinations to determine whether we might alter our future practice.

Methods

The division of thoracic medicine and surgery at East Birmingham Hospital comprises six chest physicians, five of whom are responsible for the chest medical on call rota, and three purely thoracic surgeons in the regional thoracic surgical unit. Having obtained agreement from all the consultants involved, we studied prospectively all deaths that occurred between 1 April and 30 June 1989 under their care.

The names of patients who had died were obtained from the certificate office of the hospital. The notes of each patient were examined and the cause of death on the death certificate recorded. The assistance of HM Coroner was sought for patients whose notes were not available because they had been removed from the hospital for the purpose of an inquest. The doctor who completed the death certificate was approached to determine whether a necropsy had been requested, and the reasons for requesting or not requesting were sought. The Wilcoxon rank sum test for unpaired samples was used to determine whether the length of stay in hospital affected the making of a request for a necropsy.

The hospital statistics department provided data on the number of deaths in the whole hospital during the study period and for a similar three month period for the years 1985–91. Data collected from the pathology department included the date of the necropsy, the grade of doctor who performed it, the diagnoses obtained from it, and the results of any histological examination performed. The time from the necropsy to reporting of histological results was noted for the period under study and for a comparable
period in 1990, and the difference between the years was examined with 95% confidence limits.

Macroscopic and histological necropsy findings were examined as suggested by Reid.** In addition, the total number of necropsies performed for the whole hospital during the study period was recorded, as was the total number performed over the same period in the years 1985–91. The $\chi^2$ test was used to determine the trend in the number of necropsies being performed over the period 1985–91.

The results of the necropsies were classified by two investigators (DB and CJ) into the following grades: (I) confirming the clinical diagnosis; (II) showing additional information which was important and clinically expected (for example, presumed carcinoma with unknown histology); (III) showing additional information which was important and clinically unexpected (for example, pulmonary embolism diagnosed as pneumonia); (IV) showing additional information which was not expected but was regarded as clinically unimportant (for example, bronchopneumonia in a patient with disseminated carcinoma).

**Results**

Over the three month period there were 370 deaths in the whole hospital and a necropsy was performed in 103 (28%) instances, including five at the central Birmingham mortuary. The total number of necropsies performed in this period was similar to that in previous and subsequent years. Fifty eight of these 370 deaths occurred in the thoracic unit, comprising 33 medical and 25 surgical patients. Thirteen cases were reported to HM Coroner, who requested necropsies on 10 of them (table 1). A necropsy was requested by the hospital in 21 cases and the request was granted in 12 instances (table 2). Sixteen of these requests were made by the most junior member of the department, either a preregistration house officer or senior house officer, and five requests were made by a doctor of registrar grade. No relatives were approached directly by a consultant about postmortem examinations.

Of the twelve hospital necropsies performed, six were undertaken by the pathology senior house officer under supervision, two by the senior registrar, and four by the consultant.

| Table 1 | Reasons for referral to HM Coroner and necropsy findings in 13 cases |
|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| **Classification** | **I** | **II** | **III** | **IV** | **No necropsy** |
| Industrial disease | 2 | 1 | — | — | — |
| Chest trauma | — | 1 | — | — | — |
| On table death | — | 1 | — | — | — |
| Postoperative death | 1 | 1 | — | — | — |
| Unable to sign | — | 2 | — | — | — |
| Total | 2 | 6 | 2 | 3 | |

For classifications, see text.

| Table 2 | Major clinical diagnosis and necropsy findings in 21 cases examined in hospital (for classification see text) |
|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| **Classification** | **Clinical diagnosis** | **I** | **II** | **III** | **IV** | **No necropsy** |
| Postoperative death | — | 1 | — | — | — | 3 |
| Infection | — | 1 | 1 | 2 | 4 | |
| Carcinoma | — | 1 | — | — | — | 1 |
| Known chronic lung disease | — | 1 | — | 3 | 1 | |
| Total | 1 | 4 | 1 | 6 | 9 | |

Histological examinations after death were performed in 21 of the 22 necropsies; 254 histological specimens were made into 162 blocks. At least 54 sections were examined from macroscopically normal tissue, one of these being abnormal. The time from the date of the necropsy to the date of the histological report ranged from 41 to 260 days (mean 146 days; three specimens were undated but were reported at least 60 days after necropsy). Three of these cases revealed major unexpected findings (multiple pulmonary emboli diagnosed as bronchopneumonia; sudden death from severe coronary artery disease after a pneumonectomy; and an extensive alveolar cell carcinoma in an individual with cryptogenic fibrosing alveolitis).

The delay in reporting of histological results was made known to the pathologists and, over a similar period in 1990, histological reports were available a mean of 52 days (median 43, range 3–174 days) after the necropsy, significantly faster than in 1989 (95% confidence limits for the difference 39–77 days). The improvement was due to restoration of technical staff support and to more selective histological examination of embedded tissue.

There was no request for a necropsy in the remaining 24 patients. Seventeen of these had histologically proven carcinoma, nine of them dying in the postoperative period. The remaining seven cases included five patients with known chronic obstructive airways disease, one patient with histologically proved cryptogenic fibrosing alveolitis, and one individual with presumed carcinomatosis. A necropsy (HM Coroner or hospital) was therefore sought in 34 of 58 cases (59%), and was performed in 22 of 58 instances (38%).

Examination of the data revealed a general lack of consistency about requesting or not requesting necropsies. The thoracic surgeons referred all deaths in the operating theatre and both deaths resulting from major trauma to HM Coroner, but there was no consistent policy for postoperative deaths except in patients with macroscopic evidence of residual malignant disease at the end of the operation. For medical deaths where the doctor felt unable to sign the certificate, all the clinical diagnoses were confirmed at HM Coroner’s necropsy, with histological examination also
revealing an unsuspected alveolar cell carcinoma (see earlier). No consistent pattern of requesting necropsies was noted for patients dying within four days of admission as an acute emergency. Patients in hospital for over one week with a proved carcinoma were not referred for necropsy. For both surgical and medical patients, the length of stay in hospital did not relate to a request for a necropsy.

**Discussion**

This study shows that there is a substantial difference between the proportion of necropsies requested (59%) and the proportion performed (38%). The number could be increased by asking more relatives for consent; however, many junior members of staff commented on the lack of guidance provided by senior colleagues on the requesting of necropsies, and many were unaware of the training factor for junior pathologists. As a result of these findings, a document has been prepared for distribution to all new junior staff on the value of hospital necropsies.

Medical practitioners in England and Wales have no statutory obligation to inform HM Coroner about the death of a patient, other than that covered by common law. The circumstances in which it is suggested that a medical practitioner should contact HM Coroner have been well described. Of particular relevance to this study are medical mishaps such as perforation of a viscus during endoscopy. HM Coroner is unlikely to hold an inquest if a hazard has been fairly taken; the degree of care is important in this situation. In two patients with oesophageal perforations following dilatations for malignant strictures, referral to HM Coroner would have been appropriate. It might also have been considered appropriate to refer two other deaths to the Coroner (septicaemia due to a leaking anastomosis after oesophagectomy, and peritonitis with septicaemia and infected pneumonectomy space after surgery for a squamous cell carcinoma of the left upper lobe bronchus). New junior staff will be given a copy of the guidelines on notification of death issued by HM Coroner for Birmingham.

An increase in necropsies necessary for education and further training of junior medical staff could be achieved by providing specific guidelines for the categories of patients in whom necropsies should be sought. As a result of this study, the thoracic unit has developed the following guidelines for requesting hospital necropsies (on patients who do not require referral to HM Coroner).

1. Postoperative deaths occurring in hospital after major surgery or surgery for non-terminal disease. Necropsies should pay specific attention to the operation site, and seek evidence of lymphatic or metastatic disease in patients with known malignant disease.

2. Medical patients dying within one week of an acute emergency admission. Necropsies should concentrate not only on establishing the cause of death, but also on confirming any clinical signs that were elicited in life.

3. Carcinoma suspected on clinical grounds but without histological confirmation.

4. When the consultant in charge of the case has specifically requested that a necropsy should be sought.

One of our findings was the delay in availability of histological reports, with only three being issued before the junior medical and surgical staff moved to other appointments. There has since been a highly significant reduction in the time taken for histological reports to become available, brought about by an improvement in technical staff support and by embedding but not routinely examining blocks of macroscopically normal tissue.

Our results would support the suggestion by Reid that routine sampling of macroscopically normal tissue is not cost effective. He noted that 46% of histological specimens taken were not indicated on clinical or macroscopic pathological grounds. Of the 976 specimens taken in his study from normal or near normal tissue after death, under 5% showed any important pathological features.

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