

Recommendation

Autopsies should be the subject of a formal external audit process. Clinicians should be involved in evaluating the quality of reports and the basis of conclusions drawn, including the cause of death.

THE AUTOPSY

INTRODUCTION

This section of the report presents an analysis of the available pathological information about the patients in this year's sample. The analyses are made from the perspective of both pathologists and clinicians. There is much common ground and recognition that there is a need to revise parts of the current process for evaluating the delivery of care to our patients.

An autopsy should improve the understanding of the pathological events involved in a patient's death and also enable surgeons to assess the technical performance of surgery, where this has been done.

The lessons learnt from autopsies should lead to improvements in health care. In order to do this, there is a perceived need to improve communication between clinicians and pathologists and adopt the modern thinking of multidisciplinary team working within the context of clinical governance requirements. In the sample of deaths used to compile this report, 11% (91/857) of the autopsies took place under the auspices of the hospital

pathologist (consent autopsies). The remaining 89% (766/857) were coroner's autopsies. Clinicians are feeling more and more disillusioned and frustrated with the information obtained from coroner's autopsies, which may not help in the understanding of a patient's death. The problem appears to lie with the basic reasons for the existence of the coronial system, the purpose of which is quite different from that required by clinicians. In addition, coroners may prohibit the pathologist from sharing information until after an inquest, and even so, mechanisms for dissemination of the pathologists' reports are far from standard. Previous NCEPOD reports have highlighted this issue and have quoted the limited financial resources made available to coroners as an explanation. The current coronial system, which is now the main route for clinicians to obtain an autopsy of a patient, puts limits on the quality of information which a pathologist can contribute and the ability to function within a team. Under such conditions, how can a coroner's pathologist contribute to knowledge and audit?

THE PATHOLOGISTS' PERSPECTIVE

As in previous years, the review of autopsy reports was performed by the Pathology Advisors, a panel of consultant histopathologists. The results were compared with the report for 1994/95 [3] since this was based on a similar sample of deaths occurring within three days of operation, as well as the last report, which covered data for 1999/00 [2]. The advisors used the Royal College of Pathologists' 'Guidelines for Postmortem Reports' as the exemplar for autopsies [36], although useful information on standards of examination can also be found in 'Best Practice' guidelines produced under the auspices of the Association of Clinical Pathologists [37].

The problems in standards of autopsy and communication with clinicians that are highlighted in this report are not new. They have been raised before by NCEPOD and it is disheartening to encounter the same problems again.

AUTOPSY RATE

Most autopsies were performed for HM Coroner.

Of the 2114 cases included this year, an autopsy was performed in 857, representing an overall rate of 41%. There were 1724 cases referred to the coroner, who ordered an autopsy in 44% (766/1724); this proportion is lower than in 1994/95, when 57% of cases referred to the coroner had autopsies. The other 91 cases were hospital ('consent') autopsies, representing 11% of the total number.

When relatives refuse a hospital autopsy, the case is often referred to the coroner. This approach should not be used to set aside the family's wishes. A coroner may order an autopsy for his own lawful purposes, even if the next of kin opposes this. The coroner must perform a balancing act between the wishes of the relatives and the coroner's duty to society. In overriding the wishes of the family, the coroner's actions must be 'proportionate'. Within the current system the clinical curiosity of a surgeon, by itself, would not be a sufficient reason for a coroner to override the wishes of the family.

We received 596 autopsy reports, 70% of the 857 examinations performed. The pathology advisors reviewed a random sample of 499 reports. This sample was 84% of the reports received (499/596) or 58% of all the autopsies performed (499/857).

Cases in which no autopsy was performed may not have been fully investigated.

The lack of autopsy in 59% of cases raises the question of whether the investigation and audit of these deaths were complete [37]. Many recent studies have highlighted that autopsies still reveal unexpected findings, even in the age of high-technology medicine [37-40]. This fact is also demonstrated by many of the vignettes in this report.

Case Study 81

A laparotomy was performed on a patient with a distended tender abdomen and air under the diaphragm. The SpR4 who performed the operation noted multiple perforations of the right colon with faecal contamination of the peritoneum. The patient died in recovery. Autopsy showed the cause to be an obstructing carcinoma of the sigmoid colon. There were also liver metastases. Neither of these findings was observed during the laparotomy.

THE QUALITY OF THE AUTOPSY REPORT

Clinical history

A clinical history was absent from 11% (55/499) of all coroners' cases. This finding may reflect the requirement of some coroners that the autopsy report does not contain a clinical history, as highlighted previously [2]. Of the 444 cases with a clinical history, it was considered to be of an acceptable standard in 90% (400/444), a similar proportion to the previous year [2]. The other 44 cases fell below a satisfactory standard, usually because the clinical history was too brief to allow appreciation of a complex clinical picture.

Description of external appearances

In 31% (154/499) of cases, scars or incisions were described but not measured, despite guidelines recommending this practice [36,37]. The height was recorded in 60% (301/499) and the weight in 45% (226/499). These proportions are similar to last year [2]. The height and weight should be recorded in all cases because they are important objective measurements of body build and allow sensible interpretation of organ weights. Overall, the external description was graded as below a satisfactory standard in 9% (43/499), often because important information about the operation site was omitted.

Gross description of internal organs and operation sites

The gross description of internal organs was considered unsatisfactory in 18% (89/499) of reports. The usual reason was that the description was too brief to allow full clinicopathological correlation. In particular, there was failure to adequately describe the operation site; Tables 7.1 and 7.2 show that in 18% (91/499) of reports the operation site was not described or the description was inappropriate.

Table 7.1	Is the operation site described?
Operation site described	2000/01
Yes	420 (84%)
No	59 (12%)
Not applicable	20 (4%)
Total	499

Table 7.2	Is the gross examination of the operation site appropriate to the clinical problem?
Gross examination appropriate	2000/01
Yes	388 (92%)
No	32 (8%)
Total	420

As in last year's report [2], most cases in which the operation site was not adequately described were orthopaedic procedures. However other specialties were not immune from this failing.

Case Study 82

A check cystoscopy in a male with superficial transitional cell carcinoma of the bladder was complicated postoperatively by acute retention. A transurethral catheter could not be passed, so a suprapubic catheter was inserted. Unfortunately, bowel contents passed via the catheter. A cystoscopy under local anaesthesia confirmed misplacement of the catheter associated with a tear in the bladder. A laparotomy to repair the ileum and bladder was performed. However, the patient also had severe chronic obstructive airways disease and it proved impossible to wean him off the ventilator.

In the autopsy report, the external examination did not include the suprapubic catheter site. The internal examination described the small intestine and bladder as 'normal' with no mention of the repairs that had been performed.

Although most pathologists weigh the major organs, as required by the guidelines [36,37] there remains a minority that do not (Table 7.3).

Table 7.3	Organs that were examined by pathologist but NOT weighed
Organ	Number of cases
Brain	34
Lungs	38
Heart	14
Liver	48
Spleen	56
Kidneys	50

The autopsy was limited in 6% (29/499) of cases, most being coroners' cases in which examination of the brain was omitted. In only a minority was this because the next of kin had expressed a desire for limited examination, despite recent adverse media comment on autopsy practice. It would appear that relatives are not generally withholding consent for full autopsy, but it will be important to monitor any trend in this direction in the future.

Retention of autopsy material

Histological specimens were retained in 27% (134/499) of cases, compared to 28% last year and 23% in 1994/95 [2,3]. However, the retained tissue was itemised in under half of these 134 autopsy reports, despite recent recommendations that tissues or organs retained should be clearly stated [41]. In nine cases, material was retained for other tests, usually microbiology. In only four reports was there a statement that the relatives had refused consent for retention of organs and/or tissue.

A description of the histology was included in only 66% (88/134) of cases in which histology was taken. Of the reports in which the description of histology was missing, all but one were coroners' cases. The histology reports were considered satisfactory in 92% (81/88). Of the cases with no histology report, its absence was considered to detract significantly from the value of the report in 21% (87/411), a similar proportion to the previous year [2].

Case Study 83

A 78-year-old, female patient with a choledochoduodenal fistula underwent an ERCP and biliary tract stenting, following which she was discharged from hospital. Four days later she was readmitted with small bowel obstruction and a laparotomy was planned for the following day. She had suffered a MI 15 years earlier and was known to have an abdominal aortic aneurysm. On admission she had shortness of breath, basal lung crepitations and an ejection systolic murmur. An ECG diagnosed LVH, a chest X-ray revealed a right basal effusion and serum biochemistry showed elevated troponin levels and renal impairment (urea 20.4 mmol/l, creatinine 157 micromol/l). A medical referral (grade unknown) provided an opinion that the murmur was not significant and no echocardiography was performed. General anaesthesia included arterial and venous pressure monitoring. Anaesthesia was complicated by

ST segment depression and haemodynamic instability. Laparotomy showed small bowel ischaemia with no lesion obstructing the bowel lumen. Postoperatively she was managed on an ICU, the troponin level was higher than preoperatively and she died the following day.

The autopsy description of the heart stated that there was asymmetrical thickening of the interventricular septum with areas of scarring that the pathologist interpreted as hypertrophic obstructive cardiomyopathy. There was also triple-vessel atherosclerosis of the coronary arteries with thrombotic occlusion of the right coronary artery. No histology was taken. The cause of death was given as 'ischaemic heart disease and hypertrophic cardiomyopathy'.

The lack of histology in this case was considered a serious fault by the Pathology Advisors. There are genetic implications to a diagnosis of hypertrophic cardiomyopathy, and tissue should have been retained to confirm this diagnosis. In the opinion of the Advisors, it seems likely that the changes described in the report could all be due to ischaemic heart disease.

Summary of lesions, clinicopathological correlation and cause of death

A summary of lesions was present in 17% (83/499) of cases, continuing the downward trend in the number of reports with this feature observed last year [2]. A summary of lesions is a useful device in complex cases, but a comprehensive and accurate clinicopathological correlation is more important and can encompass all the major and incidental findings with a discussion of their relevance.

A clinicopathological correlation was present in 68% (341/499), a higher proportion than previously [2,3]. It was satisfactory in 81% (276/341); the usual reason for the remainder being less than satisfactory was excessive brevity.

Cause of death

An Office for National Statistics (ONS) cause of death was given in all but four cases. In the 495 reports detailing a cause of death it followed ONS formatting rules in 96% (473/495). However, it included reference to the operation in only 50%

(246/495), an even lower proportion than the 76% found in the previous year [2]. Although in a few cases it seemed appropriate to omit the operation from the cause of death, there were far more cases where the operation was at least a contributory factor, and should have been mentioned in part II of the ONS cause of death; in some cases, there was no mention of the operation even though it should have been in part I. Examples of appropriate formats might be (these examples are fictitious):

- I(a) Cerebral metastases
- I(b) Adenocarcinoma of the colon
(excised 5 January 2002)

or

- I(a) Coronary artery thrombosis
- I(b) Coronary artery atherosclerosis

- II Above-knee amputation for peripheral vascular disease

The date in the first example is to comply with the request of the ONS and World Health Organisation that the date of removal of primary malignant tumours should be recorded, in addition to the site and histological type [42].

Failure to mention the operation in the ONS cause of death was one of the most frequent criticisms made by the Pathology Advisors, and has been raised as a problem in previous NCEPOD reports [2, 43]. Perhaps pathologists think that by including the operation there is an implication that the surgery was below standard or inappropriate, or that by omitting the operation from the cause of death that an inquest can be avoided. However, an inquest should not be necessary simply because the operation is recorded. Coroners are required to hold an inquest if there is reasonable cause to suspect that the deceased died an unnatural death, but the criteria by which a death can be classified as unnatural are not well defined. It has been suggested that “... an ‘unnatural death’ is one which is wholly or partly caused, or accelerated, by any act, intervention or omission other than a properly executed measure intended to prolong life.... If, however, because of a hopeless prognosis, treatment is undertaken with a known and substantial risk, it may be likely that treatment has shortened life. Provided that no safer method of dealing with the case offered itself, this is still a death due to natural causes for practical purposes” [44]. By these criteria, many deaths following operation can be classified as natural. Furthermore, even if the death is not natural, this does not of itself imply negligence.

Case Study 84

A female with advanced breast carcinoma had an axillobifemoral graft performed for occlusion of the distal aorta. The graft occluded and she was taken back to theatre where thrombectomy was initially successful but was quickly followed by re-occlusion. Extensive ischaemic changes in both lower limbs developed and she died about 24 hours after the initial graft operation.

The cause of death was given as ‘ischaemic heart disease and peripheral vascular disease’; there was no mention of the operation in any part of the ONS cause of death. Breast carcinoma was included in part II.

Problems with the ONS cause of death in some of these cases are a cause for concern. The quality of death certification in general was criticised in a recent study [42], and pathologists have an important role in improving matters. Any paternalistic attempt to spare the relatives of the deceased any extra distress by omitting the operation from the cause of death is likely to be misguided in an era when the public expect openness and honesty from the medical profession.

The principal cause of death is shown in Table 7.4. The left-hand column shows the cause given on the autopsy report, while the other shows the cause that, in the opinion of the Pathology Advisors, was most likely (on the evidence of the autopsy report together with the other material supplied to NCEPOD). A difference of opinion is evident in some cases. Traumatic causes, primary postoperative haemorrhage and aspiration pneumonia were possibly under-reported by pathologists – could this be because they believe that an inquest will be avoided if they are not recorded on the death certificate?

Table 7.4 shows that ischaemic heart disease is by an order of magnitude the most important disease process causing death in these patients. Pulmonary embolism remains a significant cause despite prophylactic measures. Many of the ‘gastrointestinal disease’ cases were bowel infarcts.

Table 7.4	Principal cause of death (answers may be multiple, n=499)	
Cause of death	Autopsy report	Pathology Advisor
Sepsis	34	33
Malignant disease	45	45
Ischaemic heart disease	208	197
Pulmonary embolism	29	28
Other cardiovascular disease (non-malignant)	66	66
Cerebrovascular disease	8	6
Pneumonia (excluding aspiration)	25	22
Aspiration pneumonia	3	5
Other lung disease (non-malignant)	9	11
Gastrointestinal disease	46	58
Primary postoperative haemorrhage	22	28
Trauma	36	54
Other	25	33
Not stated	2	0
Not known	0	1

Case Study 85

A 57-year-old male presented with a swelling in the thigh and pyrexia. There was a past medical history of lobectomy for lung carcinoma, Crohn's disease and coeliac disease. The diagnosis of an abscess related to Crohn's disease was entertained, and a laparotomy was performed at which a psoas haematoma was drained. Postoperatively, his haemoglobin fell markedly and there was excessive blood in the drain. Re-laparotomy found a raw area in the left iliac fossa that was packed. However, blood continued to 'pour' into the drain. Despite all resuscitative efforts, including 13 units of blood, he died. The autopsy report gave a good description of the internal findings, and histology of the mass in the thigh unexpectedly demonstrated anaplastic large cell lymphoma.

Case Study 86

A 99-year-old female died on the operating table following haemorrhage. A staff grade orthopaedic surgeon carried out the operation for fixation of a fractured neck of femur with a locum consultant available by telephone. A spinal anaesthetic was inserted and the operation commenced at 11.30. An hour and a quarter later it was necessary to convert to general anaesthesia as the spinal was wearing off. Fixation was difficult as the fracture was severely comminuted and the equipment available was limited. Eventually a dynamic hip screw was inserted but additional stability was required and at 14.30 attempts were made to pass a wire around the femur. This resulted in a rapid haemorrhage requiring 9 units of blood, 4 units of FFP, 4 litres of Gelofusine and 1.5 litres of Hartmanns. The vascular surgeons came to help, identified the bleeding as being from the profunda

femoris artery, and this was ligated. The blood pressure was stated to be low throughout this period but there is no charted value after a recording of 70 mmHg at 14.50. Although the surgeon suggests that 'all seemed stable and closure of the wounds was in progress' when the patient arrested, the anaesthetist describes that the blood pressure was difficult to maintain despite the fluids and bolus of epinephrine. The patient had an EMD arrest at 16.25.

The autopsy identified that the coronary arteries showed very severe atheroma and calcification. The right coronary was completely occluded about 1 cm from its origin and the anterior descending coronary showed 90-95% occlusion near its origin. The myocardium showed diffuse fibrosis. The pathologist gave the cause of death as:

I (a) Coronary occlusion

I (b) Coronary artery atheroma

and went on to conclude that in his/her opinion, the fracture and operation were not material factors in the death.

In the first of these two cases, the Pathology Advisors considered that primary postoperative haemorrhage was the immediate cause of death, even though the operation had been performed well. However, the ONS cause of death did not mention either the haemorrhage or the operation. Nor was there any clinicopathological correlation. Therefore, an otherwise good autopsy that had revealed an unexpected diagnosis was classified as poor overall. In the second case, there was an intra-operative haemorrhage which, as a result of the underlying cardiac condition, could not be tolerated and death occurred. Was it the cardiac condition or the haemorrhage that should be blamed?

Overall score for the autopsy

Autopsies continue to provide useful information and are an important part of auditing perioperative deaths. However some of these examinations were unsatisfactory and did not explain the death. Problems included undue brevity, failure to properly examine the operation site, failure to make appropriate clinicopathological correlation and failure to take histology. These findings demonstrate that pathologists often under-investigated postoperative deaths.

Table 7.5 shows the overall score for the autopsy reports analysed. It shows that 35% were below a satisfactory standard. This proportion is slightly higher than last year [2], when 30% were judged poor or unsatisfactory, and considerably higher than 1994/95 when 12% were classified as poor or unsatisfactory. There may be two reasons for this: either the quality of reports is getting worse, or the standards set by the Pathology Advisors have risen. Although the latter is possible, we cannot test this hypothesis by reviewing cases from previous years because the data are destroyed after the review is complete. Nevertheless, we believe our standards are reasonable and it is disappointing that so many cases fall below a satisfactory standard. Common reasons include undue brevity of the report, failure to describe the operation site, failure to make adequate clinicopathological correlation, failure to take histology when indicated and failure to record

the operation in the ONS cause of death. Just one of these occurrences did not necessarily make an otherwise satisfactory report poor in our judgement, but two or more were likely to do so.

Case Study 87

A 93-year-old male with a fractured neck of femur due to a fall had a dynamic hip screw repair. Spinal anaesthesia was used in view of the presence of severe chronic obstructive airways disease. Hypotension was a problem during and after the operation. The postoperative haemoglobin level was 4.8 mg/dl, and a blood transfusion was given. Pulmonary oedema developed and the patient died.

The ONS cause of death was given as 'I (a) Acute pulmonary oedema with massive hydrothorax, due to I (b) General and coronary atherosclerosis, II Possible chronic hypertensive disease.'

The autopsy report described the internal findings in just 13 lines of text. There was no description of the operation site and apparently no attempt to determine the cause of the postoperative fall in haemoglobin. There was no clinicopathological correlation.

The cause of death includes neither the recent operation nor the fall, and does not accurately reflect the clinicopathological picture. Furthermore, the death was classified as natural even though the sequence of events leading to death was initiated by a fall. This autopsy added almost nothing to the investigation of the death and was classified as unacceptable.

Table 7.5	Quality of autopsies		
	2000/01	1994/95	1999/00
Quality of autopsy			
Unacceptable, laying the pathologist open to serious professional criticism	11 (2%)	8 (2%)	8 (2%)
Poor	167 (33%)	48 (10%)	96 (28%)
Satisfactory	202 (40%)	204 (43%)	150 (43%)
Good	93 (19%)	193 (41%)	73 (21%)
Excellent, meeting all the standards set by the RCPATH guidelines	26 (5%)	17 (4%)	19 (5%)
Total	499	470	346

As can be seen in Table 7.6, the detection of unexpected findings at autopsy reiterates the importance of this process in clinical mortality audit. In 102 cases (20%) there was a major discrepancy between clinical diagnosis and autopsy, and in a further 34 cases (7%) there was a minor discrepancy or interesting incidental finding. In 75 cases (15%) there was a failure to explain some important aspect of the case, although in 26 of these, the autopsy was felt to have been conducted satisfactorily.

Table 7.6	History, ante-mortem clinical diagnosis and cause of death compared with autopsy findings (answers may be multiple n=499)			
	Coroners'	Hospital	Total 2000/01	1999/00
Confirmation of essential clinical findings	357	17	374 (75%)	262 (76%)
A discrepancy in the cause of death or in a major diagnosis, which if known, might have affected treatment, outcome or prognosis	30	1	31 (6%)	29 (8%)
A discrepancy in the cause of death or in a major diagnosis, which if known, would probably not have affected treatment, outcome or prognosis	69	2	71 (14%)	52 (15%)
A minor discrepancy or interesting incidental finding	33	1	34 (7%)	30 (9%)
A failure to explain some important aspect of the clinical problem, as a result of a satisfactory autopsy	24	2	26 (5%)	22 (6%)
A failure to explain some important aspect of the clinical problem, as a result of an unsatisfactory autopsy	48	1	49 (10%)	35 (10%)

The proportions in each category are very similar to those observed last year [2]. Common reasons for failure to explain some aspect of the clinical problem as a result of an unsatisfactory autopsy included failure to describe the operation site adequately and failure to take material for further analysis.

LIAISON WITH CLINICIANS

Attendance of the clinical team at the autopsy

In only 27% (234/857) of cases in which an autopsy occurred were the clinical team informed of the date and time, and in only 50% (117/234) of these cases did a member of the clinical team attend. The usual reason given by clinicians was that they were unavailable or had other commitments (67%), a difficulty that is bound to be compounded if the autopsy is held outside the hospital where the death occurred. This is a common situation for coroner's autopsies.

The Pathology Advisors believe that the clinical team should normally attend to observe the findings as part of the educational and audit functions of the autopsy. Local arrangements should be in place to make this possible. However, this is obviously not happening in the majority of cases. This is a longstanding problem that has been raised in previous NCEPOD reports [2,3,43]. Given the preponderance of coroner's autopsies, it is to the coroner's pathologist that we should look to for change and improvement in this area.

Communication of the autopsy findings to the clinical team

Autopsy reports should be sent to all clinicians providing a case summary to the pathologist. There are agreed standards for this practice but the requirements of some coroners often restrict the communication necessary for good mortality audit.

Of all the autopsy reports, 71% (610/857) were received by the clinical team. This figure is similar to last year [2], but is less than in 1994/95 when 78% of reports were received. Of those clinicians who gave a timescale for receipt of the report, 73% (267/365) received it within a month of the examination.

In 97 cases, the surgeon stated in the NCEPOD questionnaire that the autopsy had not confirmed the clinical impression; in a further 82 cases, even though the overall clinical impression had been confirmed, the surgeon indicated that unexpected findings had been revealed. Thus, in 21% (179/857) of cases, surgeons stated that the autopsy added significant information, an example of which is given in Case Study 30 in Chapter 4.

Autopsy in this case revealed the cause of the acute abdomen to be a perforated gangrenous appendix. The appendix was anterior to the ileum, which was considered to account for the unusual clinical course. Histology showed adrenal infarction, acute tubular necrosis, diffuse alveolar damage and hypoxic changes in brain and liver.

When an autopsy takes place after a perioperative death, good practice should include the following points:

- The often complex clinical picture should be clear to the pathologist.
- The autopsy should be a complete examination of all major organs and include the operation site.
- Tissue for histology or other investigations should be kept where appropriate.
- The report should give enough detail so that the pathological changes and their relationship to the clinical picture are clear.
- Previously taken surgical specimens, and the histology, should be referred to in the clinical correlation and conclusions.
- The ONS cause of death should be clear and accurately reflect the pathological findings, including the operation where appropriate.
- The findings should be available to the clinicians in good time, and the relevance of the pathological changes should be clearly stated in a clinicopathological correlation in the report.
- The findings should be available to the relatives of the deceased.

The structure of the coroner's autopsy sometimes conflicts with the requirements of a full investigation into perioperative deaths. In particular, the flow of information between clinicians and pathologists can be severely inhibited.

However, these features are not always present in autopsies analysed for NCEPOD; this raises the question 'why?' One problem, highlighted in a previous report [2], is the potential conflict between the purposes of a coroner's autopsy and the need for full examination of the death for audit. For example:

- The purpose of a coroner's autopsy is to ascertain cause of death; any further investigation is not strictly part of the examination. In particular, Rule 9 of the Coroners' Rules [45] states that tissue may only be retained for histology if it is needed to ascertain the cause of death; investigations for any other reason require consent from the next of kin. In practice, the result is that pathologists do not take tissue when it would be indicated to analyse other pathological processes.
- A coroner's autopsy is often held in a public mortuary not attached to the hospital where the death occurred, preventing busy clinicians from attending the autopsy and inhibiting interaction between pathologists and clinicians. A possible result is pathologists failing to understand the clinical picture, while clinicians do not benefit from the examination. Moreover, some coroners prohibit communication between pathologist and clinician; sometimes surgeons write in the NCEPOD questionnaires that they are not meant to be present at coroner's autopsies.
- The report of a coroner's autopsy belongs to the coroner. This fact can inhibit the use of the report in audit and education. For example, this statement or something similar is boldly emblazoned on most reports: *'This report is confidential and should not be disclosed to a third party without the coroner's consent.'* We have also encountered reports endorsed with: *'Not to be filed in patient's notes.'* Others have: *'This copy of this report is provided with the approval of HM Coroner for the information of the deceased patient's consultant and his/her immediate medical colleagues. It must not be copied or used for any other purpose. Its use and distribution are controlled by the Coroners' Rules 1984.'* Some coroners actively prevent the dissemination of information derived from autopsies.

Case Study 88

The following extracts from an exchange of letters relate to an infant who died during a repair of a complete atrioventricular septal defect.

Letter to HM Coroner from the consultant cardiothoracic surgeon: 'I would like permission to

forward a copy of the postmortem report on X to the National Confidential Enquiry into Perioperative Deaths. They have asked me to fill in their usual questionnaire and, in particular, to enclose an autopsy report if one is available.'

Reply signed pp on behalf of the Coroner: 'Thank you for your letter...regarding release of the Post Mortem (sic) report on X to the National Confidential Enquiry into Perioperative Deaths. In my opinion, this authority is not an "Interested Person" within the meaning of the Coroner's (sic) Rules. If they require a copy Post Mortem (sic), they need to apply directly to my office, stating their reason for wanting a copy.'

In reply to the question on the NCEPOD surgical questionnaire, 'If a surgeon did not attend the postmortem, why not?' the surgeon wrote 'Our Coroner does not permit communication between his pathologist and the surgeon unless the surgeon has a specific question.'

Many reports suffer from excessive brevity, failure to describe important features such as the operation site, and lack of clinicopathological correlation. It may be that busy pathologists with a large number of coroner's autopsies to perform are unable to spend adequate time on the examination of these often-complex cases. In addition, the Coroner's Officer may have different priorities from the clinicians interested in the case.

Case Study 89

A fit 75-year-old male was treated for small recurrences of his bladder tumour at check cystoscopy. He made an excellent recovery from the anaesthetic and returned to the ward. In the early hours of the following morning, he had what was presumed to be a large haematemesis; resuscitation was unsuccessful.

The coroner was contacted and the surgeon anticipated an autopsy would be necessary, as the cause of the haematemesis was not known. However, he records that 'the Coroner's Officer pressurised the junior medical staff into giving a putative cause of death and an autopsy was declined.' The surgeon contacted the acting coroner to complain but no autopsy was performed.

The autopsy of a perioperative death needs to go beyond simply establishing the cause of death because of its potential value as an audit tool. Since the great majority of autopsies in perioperative

deaths are for the coroner (89% this year), this is an important issue. These problems need addressing in the light of the Home Office-led review of death certification and the coronial system in England and Wales [46].

Another matter is the audit of the overall quality of autopsy reports. We have found the standard varies widely. Autopsies are not audited in the same way as other clinical and pathological activities (e.g. quality control in biochemistry and cytology) and perhaps the Royal College of Pathologists should consider this issue. One area in which there is a particular need for education is in formulating ONS causes of death; the evidence of NCEPOD is that many pathologists are not doing so correctly.

We also need to remember the relatives of the deceased [47]. Feeding back the findings of the autopsy will improve their understanding of the circumstances of the death and, incidentally, the value of the autopsy [48,49]. There may be a place for pathologists in carrying out this task [50].

THE CLINICIANS' PERSPECTIVE

The autopsy should be seen as an essential and fundamental part of the on-going examination of clinical practice. Coroners should understand their responsibility in supporting this requirement.

Given the focus within this report on examining the progress of surgical patients through their hospital care, in that every patient considered here died, how did the actions of pathologists and coroners link with the process as a whole?

The place and purpose of an autopsy in current practice is becoming increasingly debatable. This is largely due to the high percentage of coroner's examinations, which by their nature are governed by the Coroners' Act (1988) and Coroners' Rules (1984). For the relatives of a patient, particularly in the case of the death of a younger surgical patient, it can be an enormous emotional load. For the NHS, the time involved and the cost are also significant factors. If autopsies are to be performed then, to be justified, their purpose must be clearly defined.

Current practice

Case Study 90

An elderly female with longstanding Crohn's disease was admitted to a medical bed with a developing pneumonia. Eight days later she was transferred to the care of the surgeons as she had peritonitis. Preoperatively the anaesthetist recorded that her condition was very poor. Her blood pressure was 90/50 mmHg, pulse rate 102, respiratory rate 28-30 and she was receiving 50% oxygen by mask. A laparotomy was performed starting at 19.30, and a perforation of the caecum was found with faecal peritonitis. A subtotal colectomy was performed with an ileostomy. Despite active measures by the anaesthetist, her systolic blood pressure never rose above 100 throughout the operation, which lasted until 21.10. Subsequently the patient was transferred to the ICU where she died five hours later.

An autopsy was done and the report is brief, consisting mainly of boxes, which have been filled in. These are

not easy for the uninitiated to decipher. Whilst coronary arteries 2 and aorta 3 may be taken to refer to the degree of arterial atheroma, lungs 2 and veins 4 are more difficult to comprehend. Nowhere is there an explanation of the coding system. The cause of death is given as:

I (a) Perforation of colon (Treated)

I (b) Chronic idiopathic inflammatory bowel disease

Was the autopsy of value in understanding the reason why this patient died? If we accept that one of the principles of the autopsy is to increase our understanding about the underlying disease and the effects of treatment, then the answer in this case is probably 'No'. While the cause of death may have been correct, neither the clinical nor pathology advisors could verify this because the internal findings were given as numerical codes (which were not explained), rather than free text, and a clinicopathological correlation (which could have put the findings in context) was absent. This autopsy report communicated nothing of value to the clinicians.

In drawing attention to this case, the purpose is not to criticise but to ask how we can avoid the situation where the clinicians, the coroner and the pathologist all act in total isolation.

Whatever else may be the purpose of an autopsy, whether a hospital or coroner's autopsy, it is to be expected that it will try to establish a cause of death. As medicine progresses and becomes ever more complex this becomes much less simple. 45% (853/1911) of these patients died in a critical care bed. The progression to death in these cases is complex and accompanied by multiple interventions. The intensivist refers to a death being the result of multi-organ failure but on the autopsy report this often translates into bronchopneumonia. Is there a widening gap in understanding between the critical care doctor and the pathologist?

When an autopsy is to be performed, arrangements for communication between clinicians and the pathologist need to be formalised. Clinicians involved should provide a case summary to the pathologist prior to the autopsy and include details as to how they can be contacted for further discussion.

Case Study 91

An 87-year-old female was admitted under the care of the physicians. Her admission notes show that she had had nausea and vomiting for six days prior to admission. Her abdomen was mildly distended and she had constipation. Conservative treatment was ordered. Five days following admission she was referred to the surgeons. Her condition was of concern to the anaesthetists, she was recorded as ASA 3/4, and a consultant, a staff grade and an SHO were all present at the laparotomy. A surgical registrar performed the operation. An obstructing carcinoma of the sigmoid was found and resected, no metastases were seen. Postoperatively the patient was taken to the ICU where she was ventilated and required increasing inotropic support, as she became septic and cardiovascularly unstable. Eventually it was decided, following discussion with the relatives, to withdraw inotropic support and the patient died on the third postoperative day from multi-organ failure.

The death was reported to the coroner and an autopsy was ordered. Nothing that could not have been anticipated was found and the cause of death was given as:

I (a) Bronchopneumonia

I (b) Carcinoma of the colon (operated)

In identifying these as being the diseases or conditions directly leading to death, the form adds the footnote that 'this does NOT mean the mode of dying, such as (e.g.) heart failure, asphyxia, asthenia, etc. It means the disease, injury or complication, which caused death'. This phrase comes from the ONS death certificate.

Whilst it might be seen as pedantic to dwell on the difference between the intensivist's and pathologist's view as to the cause of death, bronchopneumonia resulting in death following shortly after a surgical operation for the resection of a sigmoid carcinoma without metastases might suggest sub-standard care. In reality the patient was in a poor state to withstand the operation and died despite maximum postoperative intervention. To the clinician giving multi-organ failure as the cause of death makes this very much clearer. To the pathologist, the finding of florid bronchopneumonia at autopsy may represent the final 'coup-de-grace' in the patient's inexorable downward-spiralling course and may, to him/her, be a perfectly acceptable immediate cause of death. Such differences of opinion should be overcome by discussions between the pathologists and clinicians both before and after the autopsy. However, the degree to which a pathologist is permitted to make his/herself aware of the clinical background to a

patient's management appears to be very variable. As our pathologists have illustrated, this may be due to the attitude of some coroners who positively discourage communication. Such obstruction to the flow of information must limit the function of the pathologist and the quality of the information he can contribute to the understanding of a case. The following clinical vignette illustrates this point.

Case Study 92

An elderly male with severe Parkinson's disease was admitted for incision and drainage of an abscess in the groin. A spinal anaesthetic was administered with some difficulty due to the patient's rigidity. The ECG showed marked S-T segment depression but the systolic blood pressure was stable at 145 mmHg. Twenty-five minutes into the procedure the abscess had been drained and the wound was being cleaned with betadine and hydrogen peroxide when the patient underwent a sudden collapse. Initially there was a bradycardia and glycopyrrolate 200 micrograms together with ephedrine 12 mg were given. About a minute later, the blood pressure and pulse disappeared; epinephrine 1:10,000 was given in two boluses of 5ml. An LMA was inserted and 100% oxygen administered.

When, to improve venous access, a 14 G cannula was inserted into the left external jugular vein gas bubbles were aspirated in large amounts. The anaesthetist also noted the appearance of the face and veins to be suggestive of superior mediastinal obstruction. In view of the age and general state of the patient's health, it was decided that further resuscitation should not be attempted.

The case was reported to the coroner who decided that an autopsy was required. Despite the events described above, no specific actions were taken to identify gas in the circulation and the cause of death was given as:

- I (a) Abscess of right groin (operated)
due to*
- I (b) Right Richter's femoral hernia & small bowel obstruction*
- II Myocardial ischaemia; coronary atherosclerosis*

The pathologist went on to make the following conclusions:

'Death was due fundamentally to the effects of a large groin abscess, which was under operation for drainage. This abscess arose over a right femoral hernia sac. Also present was undoubted small bowel obstruction with fluid faeces retained back to the stomach. This was the result of adhesion and kinking of the small bowel in

relation to the neck of the hernia. A knuckle of bowel wall had probably been incarcerated in the neck of the hernia. This represented an incomplete or Richter's hernia with chronic adhesion and probably intermittent partial herniation initially. The hernia was substantially reduced at autopsy examination but haemorrhage and inflammation in part of the bowel wall was consistent with recent herniation. Inflamed bowel was the likely source of infection and the cause of the abscess.

The anaesthetist observed an undoubted episode of gas embolism with gas bubbles drained from the neck veins. The likely source of this was small veins in the wall of the abscess cavity. There was no breach of any major vessel. This gas embolic episode coincided with the final collapse.

However, there was no evidence of gas embolism of fatal degree. The patient was profoundly ill with major sepsis and small bowel obstruction. He also had severe myocardial ischaemia owing to severe coronary artery disease.

Gas embolism was present to some undeterminably extent and was coincident with the collapse and cardiac arrest. It may have precipitated the cardiac arrest. However, the embolism was consequent upon the operative procedure, which was properly carried out. Gas embolism was a minor and indirect factor in the death, which was fundamentally due to sepsis and intestinal obstruction.

Small bowel obstruction was not diagnosed in life but Richter's hernia is notoriously difficult to diagnose owing to incomplete closure of the bowel. Bowel was not present in the hernial sac and pus was not in continuity between the peritoneal cavity and the abscess space.

There was no evidence of failure of care contributing to the death. The medical and surgical notes were detailed and exemplary'.

The pathologist's conclusion in this case study, might be construed as setting out to exonerate the clinicians, as has been mentioned in "The Pathologist's Perspective" at the beginning of this chapter. However, the clinicians had no doubt of the significance of the gas embolism and the clinical events surrounding the death support their view that it was the cause of death. Hydrogen peroxide causing gas embolism and death is of very considerable significance. Clearly this was a complex case, illustrating that differences of opinion may persist despite the very full discussions, which had taken place.

The complexities of modern clinical care challenge many pathologists, particularly those with forensic training only, who may have a limited understanding of recent advances in critical care. Some will have trained in clinical medicine in the early days of intensive care units. For surgeons and anaesthetists not directly engaged in critical care, it is often difficult to keep abreast of developments. How much more difficult is this for the pathologist?

It is accepted that the pathologist's opinion on the cause of death will, on some occasions, differ from that of the clinicians and often the autopsy will elucidate or discover factors that were unknown to the clinicians. However, there are examples where the pathologist appears to be unaware of the clinical circumstances of death (see Case Studies 85 and 86 earlier in this chapter). When this happens, there is an impression of clinicians, pathologist and coroners each acting in total isolation. From whichever perspective one chooses to view this process, the current approach to autopsies (the majority of which are coroner's examinations) demonstrates the urgent need for better communication between all parties involved.

When there is better communication and a comprehension of the significance of clinical events things can be very much better.

Case Study 93

A 70-year-old female had septicaemia requiring intensive care and was subsequently admitted for a nephrectomy to remove the kidney that was the source of infection. Her general health was poor and in particular she had a history of ischaemic heart disease and cardiac failure and was receiving lisinopril and digoxin. An echocardiogram was performed and this showed an ejection fraction of 11%. The consultant anaesthetist noted the echo findings as 'mod/severe LV impairment' in the preoperative note. The operation was completed in under an hour and the patient was returned to the ward after 10 minutes in recovery.

The following morning she had a good urine output and was afebrile and stable. During the afternoon her urine output deteriorated and at 20.30 she suffered an EMD arrest from which she was resuscitated. Post-arrest, the serum potassium was 7.0 mEq/L and glucose and insulin were given. However, she remained unresponsive with dilated pupils and it was decided that further resuscitation was not indicated and she died at 01.30.

The excellent autopsy report notes that the histopathologist discussed the case with the anaesthetist

prior to the autopsy. The events leading to death are clearly described. Examination of the heart showed that 'most of the anterior wall of the left ventricle and two-thirds of the septum have been severely scarred and damaged by previous myocardial infarct'. 'The coronary arteries displayed severe atheroma throughout'. In particular the anterior descending branch was almost completely occluded for most of its course and the right coronary artery had 'severe confluent calcified atheromatous plaques'. The cause of death was given as:

- I (a) Acute on chronic cardiac failure*
- I (b) Severe ischaemic heart disease and mitral valve stenosis*
- I (c) Severe coronary atheroma and thrombosis*

Interestingly, this autopsy report could be criticised for not recording the operation in part II of the ONS cause of death.

Pathologists and clinicians should hold multidisciplinary audit meetings.

Findings from autopsies need to be part of the process of learning from deaths at morbidity and mortality meetings. Pathologists undertaking autopsies should attend such meetings not only for the benefit of the clinical discussion but also as part of the pathologist's continuing professional development.

As the proportion of autopsies performed for the coroner has increased and the number of hospital autopsies has declined, the autopsy has become a process that appears, in many cases, to have lost its link with clinical medicine. This may result from poor communication between the clinician and the pathologist and a failure in understanding by the pathologist of the role of the often-complex clinical events leading to death. There is a need to bridge this gap by insisting that there is proper communication between clinicians and the pathologist prior to the autopsy. This should be a requirement which, through the use of formal summaries from the clinicians to the pathologist, would ensure that the clinical situation prior to death was understood by the pathologist; it would also discourage the arbitrary dismissal of clinical factors by the pathologist, as sometimes happens at present. Such a system cannot be put in place unless the current coronial system is altered. The quality of clinical summaries may also be an issue; the

submission of incomplete, inadequate or misleading information would not be acceptable. Once the principle of shared information was accepted then the separate but linked issue of quality could be addressed.

In addition, pathologists undertaking autopsies need to be very much more aware of the clinical interventions taking place prior to death, particularly for those patients dying in intensive care units. For this to happen, the pathologist should form part of multidisciplinary morbidity and mortality discussions that take place following surgical deaths, with the opportunity to amend the cause of death and conclusions in the light of these discussions.

All aspects of medicine are being subjected to external audit; there is no reason why aspects of current practice in relation to autopsies should not receive similar scrutiny. The quality of these examinations should be assessed and audited by independent groups that include clinicians whose patients are undergoing autopsy. There is, from the cases examined by NCEPOD, evidence of inconsistency in the way in which individual coroners are ordering autopsies. In that the performance of an autopsy can be stressful to relatives and expensive, the decision-making process applied by coroners could be improved and monitored. How can a coroner, who has many duties, consider in detail the large number of deaths which will be reported to him on a daily basis from the area within his jurisdiction?

This of course presupposes that a coroner can find a pathologist to do the work. Anecdotal evidence indicates that coroners may often experience problems in finding a suitable pathologist to do some autopsies, especially those requiring specialist expertise. The Royal College of Pathologists' current workforce figures show that 16% (173/1071) of consultant histopathologist posts and a similar percentage (7/42) of paediatric pathologist posts across the UK are vacant (personal communication).

For autopsies to be of a broader value to modern practice, those performing them and the conclusions they reach need to be more fully integrated into multidisciplinary medical practice.