that objective necropsy findings should be used to increase the accuracy both of clinical case notes and case abstracts. Recording errors in the SHIPS scheme should also be eliminated. We are carrying out a prospective investigation of this; preliminary findings show that in many cases necropsy findings have made no impact on the recorded diagnoses, even when there have been gross discrepancies.⁷ Thus errors are fossilised in the permanent record.

Selection of cases for necropsy—Necropsies are expensive and time-consuming, and it may be asked whether the most appropriate cases are being selected for examination. There is no doubt that there already is an element of selection—as shown by our national figures and from one's personal experiences of hospital practice. Clinicians vary greatly in their attitudes to the necropsy room; their convictions about the value of necropsies in clinical practice, teaching, and research; their confidence in clinical diagnoses; and their approach to relatives. We have inquired into this by questionnaire and the responses will be reported.

We are grateful to our colleagues in the departments of pathology of the Scottish medical schools for providing data.

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References

- ¹ Hasson, J, and Gross, H, *American Journal of Medicine*, 1974, **56**, 137.
- ² Burrows, S, *Journal of the American Medical Association*, 1975, **233**, 441.
- ³ Waldron, H A, and Vickerstaff, L, *British Medical Journal*, 1975, **2**, 326.
- ⁴ Patel, A R, *et al*, *Health Bulletin*, 1976, **34**, 215.
- ⁵ Patel, A R, Hutcheon, A W, and Wilson, G M, *Health Bulletin*, 1976, **34**, 227.
- ⁶ Hutcheon, A W, and Wilson, E M, *Health Bulletin*, 1976, **34**, 221.
- ⁷ Cameron, H M, *et al*, in press.
- ⁸ Freeman, J T, *Pennsylvania Medicine*, 1968, **71**, 71.
- ⁹ McMahan, G A, *Laboratory Investigation*, 1968, **18**, 468.

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The ultimate audit

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Summary

The necropsy diagnoses in 78 stillborn and young infants have been compared with the clinical diagnoses in an attempt to justify post-mortem examination in this age group. Clinical diagnosis was confirmed in over 88% of cases but unexpected changes in diagnosis were made in six cases, which indicates that selection is of no value.

Introduction

The role of the necropsy in medicine is one that may cause extreme views even among morbid anatomists. The case for a 100% necropsy rate is justified by the argument that the clinician, supported or confounded by the findings, will modify future treatment accordingly and hence improve clinical care.¹ Against that a plea for greater selection of cases is made because necropsy is a time-consuming procedure that rarely modifies the clinical diagnosis.²

The subject of post-mortem examination of the stillborn and young infant has not promoted much written opinion, but it is a highly emotive topic in discussion. The problem of requesting permission for a necropsy falls heavily on junior medical staff, whose experience in this field may be limited and who may well feel inadequate to cope with it.³ This is difficult in the case of an adult death but how much harder to approach a young couple, with whom the doctor may well identify, who only hours earlier were anticipating a happy outcome to months of planning a new

way of life. Facts are needed to justify such an assault on both patient and doctor. The following findings may help the decision of whether or not to request a necropsy and if so with or without case selection.

Methods

Seventy-eight necropsies were performed on 43 stillbirths and 35 live-born infants in a district general hospital. All were over 28 weeks' gestational age. Duration of life ranged from a gasp to three weeks with only eight surviving over 48 hours.

All necropsies were performed by one person, thereby reducing technical variation, and took place over three years. Permission to perform a necropsy was requested routinely by obstetric or paediatric staff and, when obtained, necropsy was usually carried out within 36 hours of death, or of delivery in the case of stillborn infants.

All systems were examined, as was the placenta when it was presented. Tissues were subjected to histological examination. Pulmonary bacteriology was obtainable in most cases. Genetic analysis was requested only when the stigmata deemed it promising. A second opinion was sought with problem cases. The clinical notes were studied before necropsy and the staff were asked to give the most likely clinical diagnosis.

Results

Results are expressed by the clinical diagnosis and whether or not the necropsy diagnosis agreed with it. Additional information obtained is also detailed (table I).

In 59 out of 78 cases (75.6%) necropsy diagnosis completely agreed with the clinical diagnosis. In another 10 cases additional information was obtained (88.5%). In the other nine cases (11.5%) the necropsy diagnosis was radically different from the clinical diagnosis (table II).

Discussion

That as high a proportion as 88.5% of diagnoses was largely confirmed may well indicate that necropsy should be undertaken

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only when the clinical diagnosis is in question. This is the argument used by Burrows.² In this series only three of the five unknown cases were clarified, yet among the 73 cases in which the clinical diagnosis was reasonably firm six had totally different necropsy diagnoses.

Rippey and Chadgidakus,³ using similar figures to those of Burrows, argued persuasively for maximum necropsy rates,

TABLE 1—Clinical diagnoses that were confirmed or changed by necropsy

Clinical diagnosis (No)	Confirmed by necropsy	Changed by necropsy	Additional findings
Congenital anomaly (18)	17	Viral infection (1)	
Intracranial haemorrhage (4)	3	Adrenal haemorrhage (1)	
Hyaline membrane (13)	12	Bronchopneumonia (1)	Hydrops fetalis (1) Bronchopneumonia (1) Intracranial bleed (3)
"Placental insufficiency" (13)	12	Congenital anomaly (1)	
Abruptio placentae (11)	11		Congenital anomaly (2) (1 lethal) Intracranial bleed (1) Inhaled blood (1)
Maceration (4)	3	Listeriosis (1)	
Septicaemia (3)	3		
Rhesus incompatibility (3)	2	Congenital anomaly (1) (lethal)	
Cord compression (1)	1		
Eclampsia (1)	1		
Twin pregnancy (1)	1		
Maternal diabetes (1)	1		
Unknown (5)	3		Ruptured internal mammary artery (1) Congenital anomaly (2) (2 lethal)

TABLE 2—Nine cases where the main clinical diagnosis was changed by necropsy findings

Case No	Clinical diagnosis	Necropsy diagnosis
1	Intracranial bleed	Adrenal haemorrhage
2	Hyaline membrane	No abnormality found
3	Maceration	Listeriosis
4	Congenital anomaly	Viral infection (indicated by cerebral perivascular calcification)
5	Rhesus incompatibility	Lethal congenital defect
6	Placental insufficiency	Congenital anomaly
7	Unknown	Ruptured internal mammary artery due to resuscitation
8	Unknown	Lethal congenital defect
9	Unknown	Lethal congenital defect

ONE HUNDRED YEARS AGO In every case of loss of consciousness, in which the coma has reached a certain depth, or, in other words, at a certain stage in the onset of coma, the eyes lose their normal correspondence and move independently of each other. Usually, the optic axes diverge; but divergence is by no means essential, and, when it exists, is only temporary. One eye may be at rest while the other is in motion, or both may be moving in different directions and at different rates; the positions assumed being often most striking and unnatural, but quite inconstant and uncertain. The movements are never "spasmodic," that is, abrupt; but always slow, rolling, gliding motions. They have no relation whatever to the cause of the loss of consciousness, but only to its degree. I have seen them in coma from injury to the head, from cerebral haemorrhage, from alcoholism, from uraemia, from "simple apoplexy" after an epileptic fit, and in profound anaesthesia from chloroform and ether. I have never failed to find them in any case of deep coma that I have examined.

The degree of coma with which this appearance corresponds is most readily observed in the artificial production of loss of consciousness by anaesthetics. After the first purely voluntary struggling, comes usually a period of quiescence and delirium, and then a second struggle, from which the patient gradually passes into "surgical anaesthesia," in which

noting that incidental findings were significant. Certainly in this study the discovery of bronchopneumonia complicating hyaline membrane disease caused routine broad-spectrum antibiotic cover to be provided in all infants at risk. Also knowledge of the extent of congenital deformity was made available for greater confidence in genetic counselling.

The crux of the argument must lie in those cases in which necropsy diagnosis differed from the clinical diagnosis (table II). The postmortem findings in seven of these cases (1, 2, 5-9) did not affect future treatment except for genetic counselling to the parents. Recurrence of this outcome may well have been avoided in two cases (3 and 4) by successful treatment of maternal listeriosis and investigation of the other mother for viral infection. In case 9 the discovery of pulmonary hypoplasia with severe renal dysplasia gave immense comfort to an anxious doctor who had tried, with great difficulty, to inflate the lungs.

The wastepaper basket of "placental insufficiency" remains full but perhaps the failure to find any other cause of death may encourage greater use of biochemical and hormonal data so that tragedy can be avoided in future pregnancies.

Many diagnostic categories in this series were imprecise—for example, twin pregnancy and maternal diabetes—but in the current state of necropsy techniques this is unavoidable.

Why do we perform necropsies? To comfort the relatives or comfort the doctors? Surely not just to provide the pathologist with a *raison d'être*. If the value of necropsy lies in radically altering the diagnosis these figures may not be considered worthy of the emotional effort needed by the young doctor or the time expended by the pathologist, even though that finding may be highly significant. Against that it can surely be only encouraging to have over 88% absolute confirmation of the clinical diagnosis. As this figure compares favourably with that in other branches of pathology, routine necropsy in these cases seems to be a justifiable intrusion into the sensitivities of medical staff and relatives alike. The evidence in this series does not provide a case for selection.

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References

- Burrows, S, *Journal of the American Medical Association*, 1975, **233**, 441.
- Rippey, J, and Chadgidakis, C J, *South African Medical Journal*, 1975, **49**, 662.
- Katz, J L, and Gardner, R, *Psychology in Medicine*, 1972, **3**, 197.

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the conjunctiva is insensitive. It is usually just at this point, at the end of the second struggle and just before the conjunctiva ceases to be sensitive, that the independent movements of the eyes begin, and the return of the optic axes to parallelism is a certain indication that the anaesthesia is passing away.

So invariable is this sign, that I have been in the habit, when administering chloroform and ether, of taking these movements as the indication of the degree of anaesthesia, instead of the rather barbarous method of rubbing off the corneal epithelium with the finger.

The independent movements have also, I believe, a great diagnostic value. Since it is clearly quite impossible for any one to simulate them by an effort of will, their existence forms a ready and certain means of excluding malingering and hysteria from the diagnosis of a case. The movements are in no degree an active process; but are simply dependent on loss of control, and what Dr Hughlings Jackson calls "reduction in automaticity." In this connection, it is interesting to note that, in some of the lower animals (*eg*, the chameleon), the eyes normally move independently.

The terms coma and loss of consciousness are used here in a wide sense, to include not only the state of profound stupor, with stertorous breathing, etc, but also all the stages which precede this graver degree. (*British Medical Journal*, 1877.)