

Discrepancies between clinical diagnoses and autopsy findings

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Abstract

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Autopsy examination is considered to be an essential element for medical auditing and teaching. Despite the significant progress in diagnostic procedures, autopsy has not always confirmed the clinical diagnosis. In the present study, we compared the diagnosis recorded on medical charts with reports of 96 autopsies performed at the University Teaching Hospital of the Faculdade de Medicina de Botucatu, Botucatu, SP, Brazil, between 1975 and 1982, and of 156 autopsies performed at the same institution between 1992 and 1996. The clinical diagnosis of the basic cause of death was confirmed at autopsy in 77% of cases. The percent confirmation fell to 60% when the immediate terminal cause of death was considered, and in 25% of cases, the terminal cause was only diagnosed at autopsy. The discrepancies between clinical and autopsy diagnosis were even larger for secondary diagnoses: 50% of them were not suspected upon clinical diagnosis. Among them, we emphasize the diagnosis of venous thromboses (83%), pulmonary embolisms (80%), bronchopneumonias (46%) and neoplasias (38%). Iatrogenic injuries were very frequent, and approximately 90% of them were not described in clinical reports. Our results suggest that highly sensitive and specific diagnostic tests are necessary but cannot substitute the clinical practice for the elaboration of correct diagnoses.

Key words

- Autopsy diagnosis
- Clinical diagnosis
- Iatrogenic injuries

Introduction

The importance of autopsy in clinical practice has long been the subject of discussion (1), and recently it has attracted even more interest (2-4). In 1991, the International Agency for Research in Cancer published "Autopsy in Epidemiology and Medical Research" (2), in which autopsy was considered to be an essential element for obtaining reliable information in epidemiol-

ogy. Indeed, autopsy is considered to be the gold standard among the diagnostic procedures (3,4). Studies comparing the accuracy of clinical diagnosis in different medical eras have shown that there has been no decline of errors in the clinical diagnoses despite the new diagnostic resources available (4-8).

The discrepancies between clinical diagnosis and autopsy findings have been discussed in many reports in the last years. In 1983, these discrepancies were classified by

Goldman et al. (9) considering their importance for clinical practice. He suggested that attention be given to therapeutically significant errors whose correction could contribute to medical care improvement (4,8,10, 11). These errors correspond to Goldman's classes I and II: significant diagnosis, for which the detection during lifetime would probably change the management and result in cure or prolonged survival, and significant diagnosis, for which detection during a lifetime would probably not change the management because there was no better therapy at that time (9).

Despite the social, economical, cultural and technological differences in the world, these discrepancies have shown surprisingly similar characteristics in hospitals in many countries. Class I discrepancies are found in 7 to 13% of cases, and class II in 15 to 25% (7,9,11-16).

There are some morbidities for which these discrepancies are significantly higher. Among malignant neoplasms, 23 to 40% of clinical diagnoses were in total disagreement with autopsy findings (17). Liver cancers, for example, are revealed at autopsies in 76% of cases (17). Surprisingly, among surgical diagnoses, which are made under direct observation of anatomical lesions, about 20% are not confirmed by the pathologist at autopsy.

Our study was carried out in order to identify the discrepancies between clinical diagnoses and autopsy findings at the Faculdade de Medicina de Botucatu, Botucatu, SP, Brazil, during two different medical decades, and discuss their causes and the contribution of technological advances to clinical practice.

Material and Methods

We retrospectively analyzed the medical and autopsy records of 252 adult patients admitted to the hospital of Faculdade de Medicina de Botucatu, Botucatu, SP, Brazil

- 96 cases from 1975 to 1982, and 156 cases from 1992 to 1996. The cases were selected consecutively according to the registration number of the autopsy records, and the criteria for exclusion were age less than 15 years and the impossibility of finding medical records. All patients included in the study were submitted to complete autopsy, including histopathological analysis. The study was approved by the Department of Pathology, Faculdade de Medicina de Botucatu.

Clinical diagnoses were all the clinical hypotheses listed by physicians in the medical reports. Autopsy diagnoses were those listed in the final autopsy report. Autopsy findings were divided into four categories: basic causes (main diagnoses related to death), terminal causes (events immediately responsible for death), secondary diagnoses (coexisting morbidities with main diagnosis, contributing or not to death), and iatrogenic injuries. In some cases, the same diagnosis was included in more than one category, for example, when an iatrogenic injury was the event which resulted in death. The medical management for each diagnosis was also reported.

We compared clinical information with autopsy findings, and we classified the discrepancies according to the criteria described below:

1) Basic causes: 1.1) correct clinical diagnosis confirmed at autopsy, 1.2) incorrect clinical diagnosis not confirmed at autopsy, 1.3) autopsy added important data related to basic cause not suspected by physicians, 1.4) autopsy diagnosis was not clear, with insufficient data to explain the death.

2) Terminal causes: 2.1) correct clinical diagnosis confirmed at autopsy, 2.2) incorrect clinical diagnosis not confirmed at autopsy, 2.3) the correlation between clinical data and autopsy diagnosis was not clear, 2.4) iatrogenic cause, 2.5) diagnosis performed at autopsy.

3) Secondary diagnoses: 3.1) correct clinical diagnosis confirmed at autopsy, 3.2) in-

correct clinical diagnosis not confirmed at autopsy, 3.3) diagnosis revealed only at autopsy, 3.4) correct clinical diagnosis not mentioned at autopsy.

4) Iatrogenic injuries: 4.1) suspected by physicians, 4.2) revealed at autopsy.

We considered clinical diagnoses to be incorrect when they were not suspected during the patient's lifetime, or when the results of investigative procedures were inconclusive, misleading, misinterpreted, or not available.

Results

Comparing the two periods, we observed that clinical diagnoses of basic cause were correct, i.e., they were the same as the autopsy finding, in 72% (1972-1985) and in

79% (1992-1996) of the cases (Table 1). Incorrect diagnoses ranged from 6 to 11%, and there was a reduction in the number of discrepancies over the second period. In 11 to 13% of cases, the medical reports provided imprecise or illegible information, which limited the correct interpretation of clinical reasoning.

The clinical diagnosis for terminal cause was correct in 60 to 65% of cases (Table 2). In 25% of them, no clinical hypothesis was mentioned in the medical reports and the diagnoses were performed by pathologists.

Discrepancies were more pronounced for secondary diagnoses (Table 3). In 50% of cases, autopsy revealed important diseases which were not suspected by the physicians. When a clinical hypothesis was raised, it was correct in only 40 to 44% of cases. We also

Table 1. Basic causes of death: correlation between clinical diagnoses and autopsy findings during two different periods (Faculdade de Medicina de Botucatu, São Paulo, Brazil).

Type of correlation	1975-1982		1992-1996	
	N	%	N	%
1.1. Correct clinical diagnosis confirmed at autopsy	70	72.9	124	79.4
1.2. Incorrect clinical diagnosis not confirmed at autopsy	11	11.5	10	6.4
1.3. Autopsy added important data not suspected by physicians	13	13.6	18	11.5
1.4. Autopsy diagnosis unclear (insufficient data to explain death)	2	2.1	4	2.5
Total	96		156	

N = number of cases.

Table 2. Terminal causes of death: correlation between clinical diagnoses and autopsy findings during two different periods (Faculdade de Medicina de Botucatu, São Paulo, Brazil).

Type of correlation	1975-1982		1992-1996	
	N	%	N	%
2.1. Correct clinical diagnosis confirmed at autopsy	62	65.3	93	60.4
2.2. Incorrect clinical diagnosis not confirmed at autopsy	2	2.1	7	4.6
2.3. Correlation between clinical and autopsy data not clear	7	7.4	15	9.7
2.4. Iatrogenic cause	1	1.0	5	3.3
2.5. Diagnosis performed at autopsy	23	24.2	34	22.0
Total	95*		154*	

N = number of cases.

*In one case during the first period and in two cases during the second period, there was no information about death conditions.

observed a small percentage of cases in which a diagnosis made during the patient's lifetime was not mentioned at autopsy.

The secondary diagnoses most frequently

Table 3. Secondary diagnoses: correlation between clinical diagnoses and autopsy findings during two different periods (Faculdade de Medicina de Botucatu, São Paulo, Brazil).

Type of correlation	1975-1982 (N = 96)		1992-1996 (N = 156)	
	N	%	N	%
3.1. Correct clinical diagnosis confirmed at autopsy	130	40.2	318	44.4
3.2. Incorrect clinical diagnosis not confirmed at autopsy	14	4.3	34	4.7
3.3. Diagnosis revealed only at autopsy	175	54.1	338	47.2
3.4. Correct diagnosis not mentioned at autopsy	4	1.2	26	3.6
Total	323		716	

N = number of cases.

Table 4. Secondary diagnoses: more frequent discrepancies between clinical diagnoses and autopsy findings, verified during two periods (1975-1982 and 1992-1996), at Faculdade de Medicina de Botucatu, São Paulo, Brazil.

Secondary diagnosis	Correct diagnoses (N)	Incorrect diagnoses (N)	Diagnoses made at autopsy		Total (N)
			N	%	
Bronchopneumonias	5	30	31	46.0	66
Pulmonary embolisms	5	8	53	80.3	66
Venous thromboses	2	5	33	82.5	40
Benign prostate hyperplasias	-	5	21	80.0	26
Neoplasias	2	36	22	37.9	60
Pulmonary emphysemas	-	9	15	62.0	24
Thyroid diseases	-	-	12	100.0	12
Total	14	93	187		

N = number of cases.

Table 5. Frequency of iatrogenic lesions found at autopsy and correlation with clinical diagnoses during two different periods (Faculdade de Medicina de Botucatu, São Paulo, Brazil).

Type of correlation	1975-1982 (N = 96)		1992-1996 (N = 156)	
	N	%	N	%
Clinical diagnoses	3	5.6	11	9.5
Diagnosed at autopsy	50	94.4	104	90.5
Total	53		115	

N = number of cases.

missed by clinical medical professionals are reported in Table 4. In most cases, venous thromboses (82.5%) and pulmonary embolisms (80.3%) were not diagnosed. In 24% of cases in which pulmonary embolism was not suspected, this was the event that caused death. Approximately 50% of bronchopneumonias and more than 60% of pulmonary emphysemas were not diagnosed during the patient's lifetime. For thyroid and prostate diseases, these indexes were still higher, i.e., 100 and 80% of cases, respectively. Malignant neoplasias were diagnosed by pathologists at autopsy in 38% of cases, mainly stomach and lung carcinomas.

Among 252 autopsies studied, we found 168 iatrogenic injuries ranging from local inflammations due to the use of catheters, to fatal complications, such as pneumothorax and bleeding. These injuries were diagnosed during the patient's lifetime in only 5.6% of cases in the first period studied and 9.5% in the second period studied (Table 5). The iatrogenic injuries more frequently observed were the consequence of nasogastric, enteral, vesical or venous catheters. In six cases (2.4%), these injuries were directly responsible for death.

Discussion

Over the past decades, there has been a significant decline in the number of patients dying in hospitals that are submitted to autopsy in the whole world (7,8,18). This fact has been interpreted to be a consequence of four main factors: the intense technological development observed in medical areas in recent years, allowing more sensitive and reliable methods for clinical diagnosis during life; the cost of an autopsy; the compulsory need for permission by the family, and the possibility that the autopsy will reveal medical errors which could originate lawsuits. The progressive decrease in the interest of physicians, pathologists, relatives and hospital administrators in the execution of

the procedure, for several reasons, has also been responsible for this decline (19). Several reports have considered the importance of autopsy for clinical practice (7,8,16,20,21). The autopsy discoveries are essential elements to provide reliable data on epidemiology, and they can provide the answers to important questions in clinical practice: the identification of the main pathology responsible for signs and symptoms, the confirmation of clinical diagnoses, the establishment of the cause of death, the determination of the accuracy of diagnostic tests, providing data about the clinical course of some diseases, and others (3,8,19,20). The autopsy is the only method permitting the evaluation of all the clinical aspects at the same time, since medical professionals may only diagnose diseases for which they are searching (22).

In 1996, a study was published comparing clinical diagnoses with autopsy findings during four different periods of ten years each (6). The study demonstrated that discrepancies did not change significantly over those decades. The article analyzed the impact of new laboratory and imaging techniques and concluded that they were conclusive in only 30% of cases. In 7 to 10%, these methods induced to diagnostic errors. The largest percent of correct conclusive information was the result of invasive methods such as biopsies, endoscopies and surgical explorations (9), which basically changed very little with the new technological progresses.

The analysis of the diagnostic discrepancies at our hospital seems useful for the quality control of medical services, and can make important contributions to the improvement of care.

The difficulty in obtaining medical information was surprising. A high percentage of the medical reports, or parts of them, could not be located, and in medical records were often incomplete or illegible. This fact, unfortunately, is not a characteristic of our hospital. The poor quality of medical docu-

mentation is a frequent problem everywhere (16).

Our discrepancies in the diagnosis of basic causes are very close to those reported in the international literature since we found Goldman's class I errors in 8.3% of cases. These results are also comparable to those obtained in other services in Brazil, such as Faculdade de Ciências Médicas, Universidade Estadual de Campinas (UNICAMP) (9.5% discrepancies class I) (14). Despite the technological innovations instituted during the interval between the two study periods, we did not observe significant improvement in the indexes of diagnostic errors, in agreement with the literature (6,9).

Concern about the terminal cause immediately responsible for death was surprisingly small. In 24% of cases, there was no mention in the medical reports about the clinical hypothesis for this aspect. We believe that the justifications for this fact are very close to those described in the literature: the lack of time, the need for medical care for patients that are still alive, the insufficient number of available physicians, and others (16).

The discrepancies between secondary diagnoses were more expressive. In 50% of cases, the diagnoses were made at autopsy, and many times they included important diseases such as bronchopneumonias (46%), neoplasias (37.9%), venous thromboses (82.5%) and pulmonary embolisms (80.3%). These data agree with the literature, which shows that 45% of the bronchopneumonias are diagnosed at autopsy (6), as well as 26 to 44% of the neoplasias (6,21,23,24) and 87% of the pulmonary embolisms (15,25).

It is also notable that diseases for which clinical history and complete physical examination are sufficient for diagnosis, such as thyroid diseases and benign hypertrophy of the prostate, presented discrepancy indexes as high as 100 and 80%. We did not find data about these findings in the literature, but we attributed them, unfortunately,

to negligence in clinical evaluation, since they were not simply little goiters or small hypertrophies, but thyroid carcinomas, Hashimoto's thyroiditis and prostates sufficiently enlarged to produce symptomatology. We emphasize that, among all diagnostic methods, a complete clinical evaluation provides the most reliable information for the establishment of a correct diagnosis (6). The high indexes of discrepancies among secondary diagnoses may be explained by the restriction of clinical reasoning to the most serious morbidities, or to those whose clinical aspects are more evident. In this situation, the other diagnoses become less important, and many times are not documented by medical reports.

We did not detect data concerning iatrogenic injuries at autopsy in the literature. Our data showed that they are very frequent, and rarely diagnosed before death (8.3% of cases). Many of these injuries were nonsignificant and probably inevitable, such as small inflammations caused by catheters, but this did not tranquilize us since a large percentage of them was extremely serious or even fatal and, again, these were not diagnosed during the patient's lifetime. We believe that these results can be attributed to the fact that physicians may fail to describe the unfavorable results of their conducts on medical reports, or even to their difficulty to attribute injuries or diseases to medical procedures that should benefit the patients. In addition, we should consider the fact that our hospital participates in medical teaching, and medical procedures are not always carried out by the most qualified professional. The lack of frequent dialogues among professionals of different medical specialties about their common patients is probably another cause for the discrepancies, as well as the insufficient contact between physicians and pathologists, which could provide precious information to both.

The maintenance of the indexes of discrepancies over the two periods studied de-

spite the technological progresses in diagnostic methods merits discussion. The expansion of medical services with an increased number of patients assisted and higher complexity of the cases can be one of the factors responsible. However, we believe that the main reasons for this fact are related to the medical attitude towards autopsy. The emphasis placed on the autopsy during medical teaching is minimal, in contrast to the enthusiasm demonstrated for new diagnostic procedures. Thus, autopsy is often considered unnecessary or even a waste of time. The lack of knowledge about the contribution that autopsy could make to medical training and the belief that other activities are of greater usefulness cause the medical professionals to distance themselves more and more from the autopsy rooms and from the meetings where autopsy observations are discussed (19).

A correct diagnosis results from the harmonious interaction between clinical evaluation and complementary exams. Highly sensitive and specific diagnostic tests are necessary, but they are not sufficient for the elaboration of a correct hypothesis. The selection and interpretation of the tests, as well as the clinical evaluation before and after them, should be more reliable than the tests themselves (4). Procedures that can contribute to the improvement of medical practice through verification of diagnostic accuracy, like autopsy, should be developed and valued (26). Despite technology, the elaboration of correct diagnoses remains difficult, and errors are inevitable. Accepting imperfections, detecting errors and learning with them are essential attitudes for the full development of medical art and science.

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