

Value of Autopsies in the Study of Diagnostic Errors in Respiratory Medicine

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Diagnostic errors are real and are causing harm to patients on a global scale. However, the methods for measuring diagnostic errors are underdeveloped. One very important tool in this regard is the use of autopsies, in order to point out the cases where the actual affliction was missed and to quantify the incidence of such mistakes. We have carried out a study to compare the clinical diagnostic with the post mortem autopsy report in 119 patients who have died at the Pulmonology Hospital in Iasi, Romania, between January 2nd 2016 and January 2nd 2017. The purpose of this research is to determine the incidence of diagnostic errors and to identify the most missed or overlooked respiratory diseases.

Keywords: diagnostic errors, tuberculosis, autopsy, clinical diagnostic, post mortem diagnostic, bronchopulmonary neoplasm

Diagnostic errors are becoming increasingly worrying for the medical community on a global scale. Studies have shown them to be responsible for an estimated 40,000-80,000 deaths every year, in the USA alone [1]. This death toll and all the other harm suffered by the patients come from a delay or the actual failure of providing the right treatment. Other harm can come from the complications of diagnostic testing which is not necessary. The *smoking gun* is when patients are being treated for conditions which actually do not exist [2].

However, when it comes to the prevalence of diagnostic errors or the scale on which they can cause harm, these remain mostly unknown. This is the product of the underdeveloped methods of measuring diagnostic errors [3,4]. Putting things in perspective, most research is focused on treatment-related errors. However, this approach needs to shift also towards diagnosis-related errors in order to reach a new level in patient safety [5].

Autopsies are a key advantage in this regard, due to the fact that they can confirm if the patient's affliction was accurately diagnosed. If a diagnostic error is proven by the autopsy, then that situation can be used to point out what illnesses are susceptible to be misread by physicians. Comparing clinical with autopsy diagnosis can also indicate what diseases are under-diagnosed or over-diagnosed. This is particularly significant when it comes to afflictions concerning public health, such as tuberculosis.

Experimental part

We conducted a retrospective study of all autopsies carried out on patients who died in the Pulmonology Clinical Hospital, Iasi, Romania, between January 2nd 2016 and January 2nd 2017. Medical charts, which contained clinical diagnoses, were compared to autopsy diagnosis listed on the final autopsy reports, in order to identify misdiagnosis. This was the case when the autopsy diagnosis differed from the main admittance and/or clinical diagnosis, regardless if the error in question affected or not the patient's survival. The data was processed by using descriptive statistics.

Results and discussions

Out of a total of 119 autopsies performed, the post mortem diagnosis was missed in 38 cases (31.9%). The most common error involved the diagnosis of bronchopulmonary neoplasm in 21.05% (8 out of 38) of cases. The illness was overlooked twice and misread in another 6 situations as pulmonary TB (3 cases) and pneumonia (3 cases).

An interesting aspect is the fact that bronchopulmonary neoplasm was established also as the main clinical diagnosis in 7 cases. Out of these, 2 were revealed at the autopsy to be, in fact, pulmonary abscesses, another 2 turned out to be pneumonia, with the remaining 3 post mortem diagnostics being non-Hodgkin lymphoma, pulmonary embolism and bronchopneumonia.

The second most established post mortem diagnosis was acute myocardial infarction (13.15%), which was completely overlooked in all 5 of its occurrences.

Another affliction with a high incidence in this statistic is pneumonia, which was found in 10.52% (4 out of 38) of autopsies, but misread as bronchopulmonary neoplasm (2 cases), respectively COPD and pulmonary TB. Also, pneumonia was the main clinical diagnosis for 5 patients, but was infirmed on all counts by the pathologist.

The embolic pulmonary pathology is statistically significant for post mortem diagnosis with 7.89% (3 cases out of 38) for pulmonary embolism (mistaken as bronchopulmonary neoplasm, pneumonia and infected bronchiectasis) and 5.26% (2 cases out of 38) for pulmonary infarction (mistaken as pneumonia).

One affliction with a particular behavior is tuberculosis. For one case, this main clinical diagnosis was confirmed by the autopsy, although the patient was admitted with bronchopneumonia. In another four cases, pulmonary TB constituted the clinical diagnosis, but was actually mistaken for bronchopulmonary neoplasm (3 cases) and pneumonia (1 case). Last, but not least, one misread case consisted of both TB and bronchopulmonary neoplasm as clinical diagnosis, which turned out to be pulmonary abscess.

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Case number	Admittance diagnostic	Clinical diagnostic	Post mortem diagnostic
1	Acute respiratory failure	Aspiration pneumonia	Bronchopulmonary neoplasm
2	Acute respiratory failure	Post TB fibrosis	Acute myocardial infarction
3	Acute respiratory failure	Pulmonary TB	Bronchopulmonary neoplasm
4	Acute respiratory failure	COPD	COPD, Cirrhosis of the liver
5	Bilateral pleural effusion	Bilateral pleural effusion	Congestive heart failure
6	Bronchopulmonary neoplasm	Bronchopulmonary neoplasm , Pulmonary TB	Pulmonary abscess
7	Bronchopulmonary neoplasm	COPD	Sepsis
8	Bronchopulmonary neoplasm	Bronchopulmonary neoplasm	Pneumonia
9	Bronchopulmonary neoplasm	Bronchopulmonary neoplasm	Pulmonary abscess
10	Bronchopulmonary neoplasm	Bronchopulmonary neoplasm	Non-Hodgkin lymphoma
11	Bronchopulmonary neoplasm	Bronchopulmonary neoplasm	Pulmonary embolism
12	Bronchopulmonary neoplasm	Bronchopulmonary neoplasm	Bronhopneumonia
13	Bronchopulmonary neoplasm	Bronchopulmonary neoplasm	Pneumonia
14	Bronhopneumonia	Bronhopneumonia	Pulmonary infarction
15	Bronhopneumonia	COPD	COPD, Pulmonary fibrosis
16	Bronhopneumonia	Bronhopneumonia	Acute myocardial infarction, Pneumonia
17	Bronhopneumonia	Bronhopneumonia	Bronhopneumonia, Purulent pericarditis
18	Bronhopneumonia	Pulmonary TB	Pulmonary TB
19	Bronhopneumonia	Bronhopneumonia	Bronhopneumonia, Bronchopulmonary neoplasm
20	Chronic respiratory failure	COPD	Acute myocardial infarction
21	COPD	COPD	Pneumonia
22	COPD	COPD	Stroke
23	COPD	COPD	Congestive heart failure
24	COPD	COPD	COPD, Empyema, Congestive heart failure
25	COPD	COPD	Acute myocardial infarction
26	Infected bronchiectasis	Infected bronchiectasis	Pulmonary embolism, Pulmonary fibrosis
27	Pleural effusion	Pleural effusion	Bronchopulmonary neoplasm
28	Pleural effusion left side	Pleural effusion left side	Bilateral pleural effusion, Bronchopulmonary neoplasm
29	Pleural effusion right side	Bilateral pleural effusion	Ovarian neoplasm
30	Pleural effusion right side	Pleural effusion right side	Acute myocardial infarction
31	Pleural effusion right side	Pleural effusion right side	Congestive heart failure, Cirrhosis of the liver
32	Pneumonia	Pneumonia	Bronchopulmonary neoplasm
33	Pneumonia	Pneumonia	Pulmonary embolism
34	Pneumonia	Pneumonia	Bronchopulmonary neoplasm
35	Pneumonia	Pneumonia	Pulmonary infarction
36	Pulmonary TB	Pulmonary TB	Bronchopulmonary neoplasm
37	Pulmonary TB	Pulmonary TB	Bronchopulmonary neoplasm
38	Pulmonary TB	Pulmonary TB	Pneumonia

Table 1

The list of all 38 missed diagnosis can be found in table 1.

Although the diagnosis process has profited greatly from the technological advances, that has not diminished the benefits or the necessity of autopsies [5]. Moreover, using autopsy data in combination with hospital discharge information has been proven to reduce error related mortality [6,7]. One study revealed that using post-mortem case reviews as a substitute to autopsy leaves an outstanding 85% of diagnostic errors undetected [8].

Yet, for their proven benefits, the number of autopsies has dropped in the last decade [9]. Among the factors responsible for this situation are resistance of family members and/or caregivers. Physicians are also reluctant to autopsies out of fear of increased exposure to malpractice claims and a tendency to rely more on less

invasive postmortem investigations brought by the advent of medical technologies [10].

Conclusions

Autopsies have been proven to be an indispensable tool in discovering diagnostic errors, yet they are becoming an underutilized resource in this regard.

Several arguments can be made in relation to bronchopulmonary neoplasm, as the most misdiagnosed respiratory disease of this study. Considering that the chances of a favorable evolution of the treatment are influenced by how early the affliction is discovered, the fact that bronchopulmonary neoplasm is so easy to miss has a direct influence on the harm it can cause to patients.

Also, the diagnostic errors concerning tuberculosis that were observed during this study have a significant implication on the epidemiology of this disease.

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