Gender-Associated Findings in Postmortem Examinations of Elderly Patients: an Increased Rate of Pulmonary Embolism in Women

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Abstract

Background: While age at death is on the rise, the number of postmortem examinations is declining and is disproportionately low among the elderly population. Research on the subject of gender-associated pathology in the elderly is also scarce.

Objective: To seek eventual gender-related differences in autopsies of elderly patients.

Methods: We analyzed the data extracted from a published report on 93 PMEs performed at a geriatric hospital during the past 20 years.

Results: Ninety-three autopsies, representing 1.2% of the 8,101 deaths during these 20 years, were performed. Forty-five of the deceased were women and 48 were men. The incidence of pulmonary embolism was significantly higher in women (28%) than in men (10%) ($P < 0.02$). There was no significant difference in the gender distribution of the other diagnoses.

Conclusion: Gender distribution of PME-based causes of death in elderly patients revealed a significant rate of pulmonary embolism in women. A thorough search of the medical literature revealed two previous studies with similar findings. Further research will determine whether pulmonary embolism is more frequent or whether it has a worse prognosis in frail elderly women.

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Research of gender-associated pathology "should be strengthened and broadened "from womb to tomb" [1]. This recommendation, issued by the Committee on Understanding the Biology of Sex and Gender Differences, emphasizes the importance of the early as well as the final stage of life in gender research. However, while age at death is now considerably higher [2], the number of postmortem examinations is continuously declining [3]. Moreover, it is disproportionaly low among the elderly population [4]. Do we possess sufficient clinical knowledge on these elderly patients and on what happens to them at the end of life? While one would expect modern medical technology to obviate the need for PMEs and assume that, medically, everything about the deceased is already known, several studies have shown that the percentage of misdiagnoses remained unchanged over the past decades [5]. Achieving an accurate clinical diagnosis is especially difficult among elderly patients because of multiple pathologies and atypical presentation of diseases [6]. In a recently published study we reviewed all the PMEs performed at our geriatric hospital over the past 20 years [7]. Further processing of the data through distribution of the PME-confirmed causes of death by gender revealed a finding hardly reported until now – a significantly higher rate of pulmonary embolism in elderly women. This finding is the subject of the present report.

PME = postmortem examination

Methods

Shmuel Harofeh is a 396 bed geriatric hospital that provides all medical services for elderly patients except surgery. Autopsies are performed by the pathology department of a neighboring general hospital. All the PMEs performed during the period 1980–1999 were included in this study.

The results of the PMEs, including principal cause of death and additional findings, were collected from the autopsy report of each case. Clinical details were retrieved from the medical records. Permission for performance of PME was obtained in each case from the deceased's relatives, as required by law. Since this is a retrospective study over a period of 20 years, we were unable to obtain details regarding the decision to perform an autopsy.

Statistical processing was done by using the SPSS program. Chi-square test or Fisher' exact test was used for comparative analysis. $P < 0.05$ was considered significant.

Results

During this 20 year period 93 autopsies, representing 1.2% of the 8,101 deaths, were performed. The annual rate of PMEs has progressively decreased from 2.8% in the early 1980s to 0.25% in subsequent years. Forty-five of the deceased were women and 48 were men; the average age at death was 79 $\pm$ 7.4. The overall rate of PME-confirmed clinical death causes was 58%. The leading undiagnosed clinical cause of death was pulmonary embolism, detected in 12 patients, representing 13% of all the PMEs. Interestingly, 10 of these 12 patients were females. In six cases the clinical diagnosis of pulmonary embolus was confirmed by PME. Other details, including clinical causes of death, rates of PME-confirmed diagnoses, etc., are presented elsewhere [7].

Table 1 shows the PME-based causes of death distributed by gender. Cancer and pulmonary embolism were the most frequent causes of death, each being identified in 19% of the cases. The incidence of pulmonary embolism was significantly higher in females (28%) than in males (10%) ($P < 0.02$). Table 2 presents the macroscopic appearance of the pulmonary emboli and main findings at the PMEs of these patients. There was no significant difference in the gender distribution of the other diagnoses.

Table 1. Gender distribution of PME-based causes of death of elderly patients

Cause of death	Female	Male	Total no. of cases
Age (SD)	78.7 (±10)	77.5 (±8.3)	
Cancer	10	8	18
Pulmonary embolism*	13	5	18
Pneumonia	6	8	14
Congestive heart failure	6	7	13
Ischemic heart disease	3	5	8
Stroke	3	5	8
Sepsis	3	4	7
Gastrointestinal bleeding	1	2	3
Tuberculosis		1	1
Liver cirrhosis		1	1
Pancreatitis		1	1
Necrotizing colitis		1	1
Total	45	48	93

* $P < 0.02$.

Table 2. Macroscopic appearance of pulmonary emboli and main PME findings

	Female (n=13)	Male (n=5)
Thromboembolism of main pulmonary arteries	3	1
Massive bilateral pulmonary emboli	3	2
Lt. lower lobe pulmonary embolus + infarct	2	
Rt. upper lobe pulmonary embolus + infarct	2	1
Bilateral small pulmonary emboli and very recent pulmonary infarctions	1	
Thromboembolism of small branches of pulmonary arteries	1	
Multiple fresh pulmonary emboli in segmental bronchi of both pulmonary arteries	1	
Small pulmonary emboli		1
Additional findings at autopsy		
Ischemic heart disease	7	3
Tumors	6	2
Bronchopneumonia	5	2
Pulmonary edema	5	2
Stroke	3	2
Decubitus ulcer	4	2

Discussion

Our findings revealed a significantly higher rate of PME-confirmed causes of death due to pulmonary embolism among elderly women. Only a few studies have been performed on the subject of pulmonary embolism and gender association in old age. One study found no difference in the incidence of pulmonary embolism between men and women over 50 years [8]; but two others showed a higher prevalence of pulmonary embolism in males, but these were not based on PME-confirmed results [9,10]. However, a thorough examination of the medical literature revealed two additional studies that mentioned findings similar to ours. Karwinski and Svendsen [11] reported a higher frequency of PME diagnoses of pulmonary embolism among elderly women, and Klima et al. [6] also noted a higher frequency of pulmonary embolism among elderly women at autopsy. Thus our findings are in accordance with these previous observations and strengthen the view that pulmonary embolism could be a significantly more frequent cause of death in elderly women.

The elderly are indeed at increased risk for both venous thrombosis and pulmonary embolism [12]. Morbidity and mortality caused by pulmonary embolism also increase with age [13]. However, this diagnosis is difficult to make in the elderly because of the many co-morbid conditions so common in this age group, particularly cardiopulmonary diseases [14]. In addition, reports suggest that the typical symptoms are less often seen in the elderly [15.16]. Antemortem diagnosis of pulmonary embolism is difficult, with up to 70% of the cases undetected [17]. Because of the difficulties in diagnosing pulmonary embolism at this age [18] and the continuous decline in the number of postmortem examinations, gender differences could go unnoticed.

What is the cause of this gender-related difference? Immobility, the most common factor for pulmonary embolism among all age groups, is equally present in these men and women. Venous thromboembolism, another known risk factor for pulmonary embolism, increases with age, but the (weak) gender association it presents is with men rather than women [9,19]. Thrombophlebitis was not detected in our patients. Other authors also report a very low incidence of thrombophlebitis in elderly patients at autopsy [20]. None of the PMEs in this study were postsurgical procedures and there was no significant difference between the clinical characteristics of both groups with respect to congestive heart failure or atrial fibrillation. Since this is a retrospective study we could not obtain information on the coagulation status of these subjects.

The relatively small number of cases in our report is a limitation that could be redressed by further gender-oriented studies of PMEs in the elderly. One of the questions to be addressed is whether pulmonary embolism is more frequent or whether it has a more fatal prognosis in frail elderly women. Putative causes for this predilection should be investigated as well. In the meantime, enhanced clinical suspicion for pulmonary embolism and an awareness of an increased risk in elderly women are called for.

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