

## Spanish flu in Turin as told by historical autopsy reports

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### Summary

Spanish flu spread worldwide between 1918 and 1920 causing over 20 million deaths, exceeding even the number of deaths registered during the First World War (WWI). The main symptom of the disease was hemorrhagic tracheobronchitis, the onset of which was typically sudden and fatal. Young, healthy people died quickly. Despite the tragic impact of the disease on populations, already exhausted by the First World War, there is very little documentation. This was likely due to the severe censorship of the time. For this reason, autopsy reports can be a relevant source of information on the disease. Historical catalogues kept in Turin, where all autopsies were detailed, can be consulted. According to the “Regolamento di Polizia Mortuaria” dating back to 1892, autopsies were to be performed on all patients that died at home or in hospital. Therefore, autopsy reports showing the spread of diseases among the population can also help us obtain information about the spread of Spanish flu in Turin. While not documented, almost certainly the “Regolamento” was improperly implemented since just 45 cases of Spanish flu were reported, while deaths were most certainly daily and in their hundreds. According to autopsy reports, the first case occurred on 8th October 1918, although, the first official diagnosis is dated as being 24th November 1918. The records show that 18 people died during the first Italian pandemic wave. The second Italian pandemic wave seems to have been even more aggressive in Turin with 27 people having died between 8th January 1920 and 7th February 1920.

**Key words:** history of pandemic, Spanish flu, ancient autopsy reports

### Introduction

The Spanish flu pandemic spread worldwide between 1918 and 1920 and exceeded the number of deaths registered during the First World War <sup>1</sup>. It was probably, along with the Plague and the Black Death, one of the worst pandemics in history <sup>2</sup>. More than one-third of the global population of 500 million was affected and around 50-100 million people died <sup>3</sup>. There are many different theories about the spread of this pandemic. The case of a military cook based in Camp Funston, Kansas in March 1918 is generally referred to as being the first reported occurrence of Spanish flu <sup>4</sup>, according to other reports the real centre of the pandemic began in a major troop staging and hospital camp in Etaples in France in late 1917 <sup>5</sup>, while, other reports suggest that the epicentre of the flu could be traced to in China <sup>4</sup>. Wherever the illness originated from, in the US, France or China, it certainly did not originate in Spain, as the name would suggest. The pandemic spread quickly worldwide between the spring and summer of 1918. The first pandemic wave especially affected military troops. Notably, the mortality rate of the first wave was lower than the second. While poor health and sanitary conditions of the populations by

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### Conflict of interest statement

The Author declares no conflict of interest.

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the end of World War I were surely an influencing factor of the disease, King Alfonso XIII of Spain became ill in neutral Spain, suggesting that these factors were not decisive. In late spring of 1918, the Spanish press agency Fabra Reported that “A strange form of the disease of epidemic character, has appeared in Madrid. The epidemic is of a mild nature, with no deaths reported”. This was the first official report of Spanish Flu in Europe. Spain was a neutral country during the war and therefore the press there was not censored<sup>6,7</sup>. This first report, however, gave the impression that the flu had started in Spain and thus it was familiarly called Spanish flu. Diversely in Spain, it was called “The French flu” or “The Naples Soldier” from the title of a popular musical. The press in countries directly involved in the fighting were not permitted to report on the spread of the disease and due to the censorship, initially, measures against the spread of the disease were not taken. At the end of the summer of 1918, with the epidemic becoming more aggressive, people began to die. Italy had the highest number of cases of contamination after Russia, but in terms of death rate, Portugal’s toll was even higher<sup>8</sup>. According to Giorgio Mortara, the deaths in Italy were about 600,000 during the three waves of flu<sup>9</sup>. The first wave began at the end of April 1918, lasted until June and then disappeared in July 1918. The disease in this first wave was mild and mortality was low. In September 1918, the second wave began and the flu spread mostly in the centre and south of Italy up until May 1919. Spanish flu had its own W-shape of mortality. It typically affected young healthy people between 20 and 40 years of age and not only old people and children<sup>10</sup>. This was probably due to immunity acquired by older people in previous similar flu pandemics. It may also have been due to the major reactivity of young people’s immune system, according to the theory of “cytokine storm” which was perhaps the peculiar pathogenic mechanism of the Spanish flu<sup>11</sup>. The main symptom of the disease was hemorrhagic tracheobronchitis, which would appear suddenly and was usually fatal. The cause of the flu was most likely a virus similar to that of H1N1 influenza strains<sup>12</sup>. The genomic sequence of the virus was finally studied in 1997 using fixed and frozen tissues from influenza victims<sup>13</sup>. At the time of the spread of the pandemic, the Director of paediatrics at the University of Genoa, Pacchioni wrote in his “Pathologica” in 1919 that the pathogen responsible for the pandemic could be a very virulent variant of Pfeiffer’s bacillus in association with Streptococci<sup>14</sup>. On the other hand, Doctor Segale wrote in the same year about the discovery of a new pathogen: Streptococcus pandemics<sup>15</sup> and its role in the pandemic<sup>16</sup>. In Turin, Professor Pio Foà believed that the pandemic was due to Streptococcus

pandemic and not to Pfeiffer’s bacillus<sup>17</sup>. Despite the freedom of scientific debates, the censorship forbade the spreading of news about the pandemic and this certainly helped to spread the disease both in Italy<sup>18</sup> and abroad<sup>19</sup>. The debate in the scientific milieu was very intense, although censorship and self-censorship prevented a public discussion of the causes of the pandemic. The censorship was due to wartime ideology; the disclosure of bad news was forbidden in order to avoid demoralising the army. The self-censorship among doctors was instead due to the difficult identification of the aetiological agent of the Spanish flu. Indeed, this difficulty seemed to end the golden age of microbiological discoveries causing a kind of embarrassing self-censorship among the medical community<sup>20</sup>. According to records, the pandemic ended in the Western Hemisphere in May 1919. In Japan, there was a third epidemic wave between the end of 1919 and 1920<sup>21</sup>.

## Materials

The general scarcity of information due to censorship increases the importance of the little information that is available<sup>22</sup>. Archive research was carried out to find cases of Spanish flu among the autopsy reports in the Royal Institute of Pathology of Turin and which are now kept by the Institute of Pathology of Turin. The aim of the research was to reconstruct the history of the Spanish flu in Turin according to these reports. The reports generally describe the main pathological findings and the main cause of death. Together with this data, there are some other details such as the name of the patient, when they died, when the autopsy was performed and the hospital they died in. Among all the autopsy reports falling between 1918 and 1920, those with the final diagnosis of “flu” were selected. The cases having pathological findings pointing to pandemic flu were also selected. The main pathological findings selected for these studies according to reports of autopsies performed in Italy were haemorrhagic trachea bronchitis and haemorrhagic pneumonia<sup>23</sup>.

## Results

The retrospective study on autopsy reports allowed for the discovery of the first autopsy performed on a victim of Spanish flu in Turin. This was a 35-year-old woman who had died on 8th October 1918. According to the main historical documentation, no cases occurred during the first pandemic wave of Spring 1918, and therefore it is considered that this first case be-

longs to the second pandemic wave. The descriptions of the cases of Spanish flu show typical symptoms suggesting pandemic flu along with the presence of haemorrhagic tracheobronchitis described as being “very violent”. According to the descriptions, the clinical presentation and the pulmonary involvement typical of Spanish flu was so serious that some patients died within a few hours after the onset of symptoms. Similar qualitative or clinical descriptions were highly unusual in common autopsies and suggest particular attention of the pathologists working on these cases and are likely due to the dramatic clinical history of these patients. Moreover, because of the strict censorship of the time, pathologists avoided including a written diagnosis of pandemic flu in their conclusions, even if the diagnosis was clear enough, as in the case of the first victim. Indeed, after the first victim, 8 more cases occurred in the following days, all of them showing the same pathological findings typical of Spanish flu, but none reported the pandemic as being the final cause of death. Only on the 24th of November 1918 do we find the fatal diagnoses written as being “Bronchopneumonia due to flu”. This, not surprisingly, was registered after the end of the war. The first victims of the first pandemic wave were all among the young, mirroring the general age of victims around the world. The youngest victim was a 10-year-old child, although a report also mentions the miscarriage of a mother suffering from bronchopneumonia. In the following months, 18 cases were described. The pandemic wave went on until April 1919, and records show a decreasing number of victims. The last case, in spite of the final diagnosis, was probably not Spanish flu. The diagnosis is recorded as being “Bronchopneumonia due to flu” but the pathological findings describe bronchopneumonia without haemorrhage. Although the mutation of the pathogenic agent over the weeks is a possible explanation, it is more probable that this case was common bronchopneumonia with some symptoms of flu. After 12th April 1919, no autopsy report having a diagnosis of Spanish flu were found. The second pandemic wave was over in Turin too. According to autopsy reports the victims were 18. More realistically there were possibly hundreds of deaths each day. It is generally accepted that the pandemic flu was over in the northern hemisphere after the second pandemic wave. It is also accepted that this pandemic wave was overall the worst, some authors even suggesting that this was the real reason the First World War came to an end. Surprisingly, the worst pandemic wave in Turin occurred in the winter of 1920 (Fig. 1). On 8th January 1920, an autopsy on a 62-year-old man was performed. A short clinical history is also given; he arrived at the hospital in agony and died just two hours later.

It was also reported that he showed clinical symptoms of heart failure. However, the presence of pneumonia and particularly the red colour of the mucosa of the bronchi allows us to reasonably conclude that this case is among those of Spanish flu. The pathological findings are surely those of pandemic flu, but no diagnosis of Spanish flu was made. Probably the pathologists believed that the pandemic was over and therefore did not recognize this case as being due to the pandemic. The presence of this short clinical history is, however, very significant because it shows that some pathologists likely found these sudden deaths more impressive than the others. The same diagnosis is given in the following three autopsy reports, all dating back to 8th January 1920. On 14th January 1920, the first diagnosis of Spanish flu during a third pandemic wave was made. The victim was an 18-year-old woman who arrived at S. Giovanni Hospital in agony with severe dyspnoea and who died within a few hours. The pathological findings were haemorrhagic bronchopneumonia, congestion of the liver and the initial stages of reactive splenic hyperplasia. The pandemic was back. The second pandemic wave in Turin was the worst one in terms of the number of victims: 27 people and one foetus died between 8th January 1920 and 7th February 1920. Some very particular cases can be seen, such as that of a 40-year-old man who collapsed in the street and promptly died. He had probably been suffering from the onset of Spanish flu, and pneumonia and congestion of the lungs were evident. The patient’s spleen did not show hypersplenism because it was already chronically enlarged. Another curious case is that of an autopsy performed during a lecture on autopsy techniques held by Professor Pio Foà, highlighting that there were no particular concerns about the post mortem infectivity of the flu. Professor Pio Foà wrote some notes about Spanish flu in his book on pathology. He believed in the theory of the bacteriological pathogenesis of the flu, as reported in the paper of Segale and published in “*Pathologica*” in 1919. In Foà’s words, the pandemic flu seemed, in fact, in consideration of the scientific analysis of the disease, to be less dramatic than generally perceived. All 27 cases showed similar pathological findings: haemorrhagic pneumonia, variable hypersplenism and congestion of the kidneys and liver. No other pathological findings were found. The age group having the highest number of victims was between 20-30 years (12/27), although older age groups were also affected. The oldest victim was a 63-year-old. Considering gender, the victims of the first pandemic wave in Turin were in higher percentage female, whereas during the second pandemic wave this statistic was inverted.

Anno *Gennaio 1920.*

Numero d'ordine	NOME E COGNOME	ETÀ	GIORNO della		PROVENIENZA	DIAGNOSI ANATOMICA
			Morte	Autopsia		
1551 <sup>B</sup>	[REDACTED]	29	18	18	S. Giovanni (Bullisium)	<p><i>Torale, non si apre il cranio.</i></p> <p><i>Arteria cardiaca normale; nulla di notevole al cuore; Broncopneumonia bilaterale, emorragica, a focolari confluenti. Emorragio pleurico. Fegato leggermente ingrandito. Milza indifferente. Focolare emorragico superficiale al polo superiore del seno sinistro. Seno normale. Segnale indifferente, nulla di particolare.</i></p>
<p><i>Broncopneumonia influenzale</i></p>						

Figure 1. An original autopsy report.

## Discussion

The retrospective study of these old autopsy reports shows a distribution of the cases of Spanish flu in Turin and agree with sources of literature regarding gender and age. The number of autopsies carried out during the pandemic period does not reflect in any way the actual number of victims. The reason for this discrepancy may have been caused by wartime censorship. However, it must be also said that no significant increase was reported after the end of the war, despite censorship being lifted. The existence of a number of cases of Spanish flu being diagnosed after the end of the war would seem to exclude an attitude of self-censorship of pathologists. The only autopsy law cited in autopsy catalogues is the “Regolamento Speciale di

Polizia Mortuary.” According to this law, dating back to 1892, autopsies were to be performed on all people who died at home and all those who died in hospital. The number of autopsies, however, seems to be far too low to allow us to believe that this law was implemented. More realistic is the hypothesis that autopsies were performed only on selected patients, probably on demand by clinicians. Despite the limited number of cases, the most surprising data is the high number of victims during the so-called third pandemic wave since it is generally accepted that there were no more victims after the end of the second European pandemic wave. In Turin, the distribution of cases seems to be quite different. No clear reason can be given for this. The symptoms described on the autopsy reports and the pathological findings are so suggestive of Spanish

flu that they do not allow for the hypothesis of a diagnostic error. The increased attention of pathologists to these last cases of Spanish flu probably depended on the increased clinical attention to Spanish flu and to lethargic encephalitis that coexisted in the same period, therefore, more autopsies than usual were requested by clinicians.

The archive research carried out in the autopsy reports at the University of Turin shows some new and until now unknown aspects of the spread of Spanish Flu. The pathological findings are common, as reported in other sources of literature; gross lesions as well as haemorrhagic tracheobronchitis, however, attention is paid to the congestion of liver and kidney too. This pathological finding is described as “typical of flu”, other observations for this are not noted. This suggests that the observation was common, even though there is no further accurate written description of the macroscopic findings. To find detailed descriptions of the microscopical findings we need to refer to the papers of the series of autopsies published in *Pathologica*<sup>20</sup>. At the end of the pandemic, the presence of catarrhal pneumonia became more common. Perhaps by the end of the pandemic, the pathogenic agent of the flu had mutated, even if its clinical presentation was similar. Therefore the clinical diagnosis was “flu”, even if the pathological findings were different. The last autopsy on an accepted case of Spanish flu in Turin was performed on 3rd February, whereas the last case diagnosed as flu dates back to 7th February 1920, although this wasn't Spanish flu since there is no report of haemorrhagic pneumonia. Irrespective of the low number of autopsies reported, and even in the impossibility of knowing what kind of information they actually had, the pathologists of Turin seem to have been experts on pathological findings. These brief clinical histories are very informative in terms of the sudden clinical presentation of the flu and are an important further source of information in consideration of the general scarcity of documentation available. The history of the Spanish flu in Turin has now more clinical, epidemiological and pathological details. This research improves the value of historic autopsy reports in understanding the epidemiology of diseases among the population, even in consideration of the small number of people on which these autopsies were performed.

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