The "Dissident" in Western Surgical Anti-infection Technology—Semmelweis

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Abstract: In the obstetrics and gynecology ward of the Vienna Hospital in the 19th century, a doctor named Semmelweis had been confused about the cause of death of high fever caused by puerperal fever after giving birth to a child. At that time, the medical profession believed that puerperal fever was caused by the toxic atmosphere in the atmosphere, but Semmelweis disagreed. He tried his best to find out the cause of the disease because the doctor did not wash his hands thoroughly after the autopsy and gave birth at the time of childbirth, resulting in the death of the mother due to bacterial infection. In the process of popularizing this cause to colleagues in the medical profession, he encountered unprecedented resistance and became a "dissident" in surgical medicine at that time.

Keywords: Puerperal fever; Semmelves; Surgical medicine; Dissident.

1. Introduction

Sterilization technology is the basis of modern medicine. In hospitals, infection control personnel have always encouraged hand hygiene, and all their medical procedures are performed in a sterile environment. However, less than 200 years ago, drugs and medical devices were used without any effective antiseptic and disinfection measures, which led to the occurrence of patient infections. Hungarian obstetrician Ignaz Semmelves proposed hand-washing measures to reduce maternal mortality. Later generations called it "one of the most striking victories in all medical triumphs", which greatly reduced maternal The death rate during childbirth was also questioned like never before.

2. The "Dissident Hypothesis"

The Vienna hospital in the 19th century provided many learning opportunities for doctors and medical students, and attached great importance to the teaching of pathological anatomy. Every morning, the obstetrician doctors and medical students perform an autopsy in the hospital morgue before going to the clinic. However, long before the American surgeon William Halstead introduced rubber gloves into surgical practice, the patient's anatomy and internal examination were performed with bare hands.

The Vienna General Hospital has two obstetric clinics. Since 1840, obstetricians and medical students have been in the first clinic, and by 1846, the death rate in this clinic was more than five times that of the second clinic, and the midwives of the second clinic were seen there . At the time, the high mortality rate was generally thought to be related to "children’ s bed fever," a disease that has been recognized since Hippocrates. It is now believed to be caused by staphylococcal or streptococcal sepsis, and it was believed in the 19th century. It is the unhealthy miasma caused by the blood mixture, pus and feces that fill the air in these crowded wards. The initial symptoms of infection are fever, tachycardia and diarrhea also appear soon after delivery, followed by a series of sepsis-related symptoms, including pain in the uterus or perineum, peritonitis, pleural effusion, pericarditis, seizures, and extremities Violet spots etc. This was the reputation of the first clinic, so women at that time often preferred to give birth at home or even on the street instead of being admitted to the terrible general hospital. The high mortality rate in obstetrics has been a headache for Semmelweis [1].

The young obstetrician Semmelweis couldn't bear the deaths of the mothers, and he was determined to find the real cause of puerperal fever. The famous philosopher Foucault once mentioned in his book "The Birth of Clinical Medicine" that statistics are of great help to the advancement of medicine. Semmelweis also used some statistical knowledge, which played a certain role in finding the cause of the disease. Semmelweis found in his observations and investigations that out of the 3157 women in the first delivery room in 1844, as many as 260 died of puerperal fever, 8.2%. The death rate in 1845 was 6.8%, and in 1846 it was 11.4%. However, comparing these figures with the adjacent second ward, the death rate from puerperal fever in the same period was only 2.30%, 2.0% and 2.7%, respectively [2]. He pondered and investigated the same and different conditions of the two wards, and noticed an important detail from it. The students in the first ward have to enter the pathological autopsy room for necropsy of the corpse of the mother

who died due to illness, while the midwives in the second ward do not need to participate in the autopsy. This gave Semmelweis an idea. Since the incidence of puerperal fever in the two wards is high or low, this undoubtedly shows that the human factor is very large. Specifically, the reason why the incidence of puerperal fever among women in the first ward is higher than that in the second ward is that the students who came out of the autopsy room used their hands to remove a certain toxin from the corpses of women who died of puerperal fever. Infected healthy mothers. Various factors gave Semmelweis a hypothesis: that puerperal fever is caused by a certain toxin in the body.

3. Demonstration of "Dissident Hypothesis"

Semmelweis' epiphany occurred in 1847. At that time, the forensic medicine professor Klein accidentally stabbed himself with a knife that had been dissected while dissecting the corpse. He quickly fell ill with the same symptoms as the patient who died of postpartum fever. He speculated that the high probability of Klein's death was due to his inoculation of "corpse particles" from the contaminated knife. So Semmelweis boldly assumed that the same particles might enter the uterus when the doctor used his contaminated hands for internal examinations [3]. Although this theory is easily accepted today, the existence of bacteria in human tissues was unknown at the time. Semmelweis' hypothesis explains every observation of his. Since doctors and medical students performed an autopsy, but the midwife did not, only patients in the first clinic were exposed to corpse particles. In addition, as doctors examine patients every day, from one woman to another, it is obvious why the entire row of patients suddenly fell ill at the same time. This hypothesis also explains why the mother has a fever when the delivery time exceeds 24 hours. The risk is particularly high. In these cases, the women were examined several times, increasing the chance of infection. Finally, women who gave birth on the street did not receive a doctor's examination, so they did not come into contact with corpse particles. The elimination of various factors made Semmelweis' hypothesis that puerperal fever was caused by a certain toxin in the corpse was firmer. But it is only speculation, and there has been no conclusive evidence.

After deduction, Semmelweis decided to test this hypothesis further. He reasoned that if his hypothesis is correct, then puerperal fever can be prevented by chemically destroying the corpse poison on the hands. [4] Later, he finally found a simple and feasible method, which is to require every doctor, midwife and student who enters the delivery room to wash their hands thoroughly with a bleach solution. So he introduced a method of compulsory hand washing in a chlorinated lime solution so that doctors can remove dead body particles before performing any internal examinations. At the same time, he also cleaned all the instruments used during the operation. Later he began to enforce hand washing measures. After the implementation of hand washing measures, the annual mortality rate of the first clinic dropped from 11.4% in 1846 to 1.3% in 1848. The obvious effect of the intervention provides a solid basis for Semmelweis' hypothesis of the etiology of puerperal fever. [3] From the beginning, Semmelweis made bold guesses and explanations of the cause and tested them one by one, and rejected or rejected them one by one. Finally, the hypothesis that corpse poison entered the body caused puerperal fever was verified, and the verification results showed This hypothesis is valid and based on facts. This is also an outstanding example of the early application of modern epidemiological methods.

4. "Dissident Hypothesis" Encounters Obstacles

Although Semmelweis' hand-washing experiment has greatly reduced the mortality rate in the obstetric ward, his success has not been recognized by everyone. Because of his amazing discovery, he challenged the authority of the entire medical profession, and his approach has also caused great controversy. At that time, the mainstream medical theory was based on the traditional humoral theory, which believed that diseases were caused by the imbalance of body fluids. For example, at that time, Rokistankey attributed the production of all pathological cells to the mixing of undesirable substances in the blood. But Semmelweis even declared in his report: "The high maternal mortality rate is to be blamed on the doctor", and he himself confessed more frankly: "Starting from my ideas and making logical inferences, I must admit Only God knows how many maternal deaths I have caused." Of course, this behavior of Semmelweis also offended his colleagues, especially those professors of obstetrics, who believed that they had been insulted, and then began an angry attack on Semmelweis.

The 19th century was a time when bacteria had not yet been discovered, and people still believed in the theory of miasma and body fluids. Semmelweis's thinking was too advanced at the time, and too many people did not understand or even opposed it, believing that he slandered doctors and abandoned medical creeds. But he believed he was right. And he does not respond to these criticisms, and rarely writes articles or speeches to defend himself. As a result, his career was frustrated, he was dismissed from the hospital, and he was excluded from the medical profession in Vienna. After returning to Hungary in 1850, he still insisted on implementing hand washing measures in many hospitals to prevent postpartum fever. At this time, he not only firmly believed that his theory was correct and the intervention was effective, but also his mission was to protect the mother. He believes that every

hospital should implement hand washing measures to curb the prevalence of postpartum fever, otherwise it would be negligent [4].

In 1858, Semmelweis, who has become a full professor at the University of Budapest, was encouraged by another iconic figure in the history of Hungarian medicine, Rajos Markusowski, and began to publish the results of his research on children's bed fever. , Successively published his books on puerperal fever "The Causes of Puerperal Fever" and "The Causes, Understanding and Prevention of Puerperal Fever". In the book, he refuted those conservative and confusing concepts, and used statistical knowledge to make statistics to clarify and demonstrate his findings and theories. However, he has not received the general attention of the academic circle, and still suffered stubborn opposition from his opponents. Later he sent his book to the top obstetricians in Europe. Similarly, apart from a few doctors, some of the most famous doctors in Europe still strongly opposed it. Semel Weiss did not live to see the triumph of his doctrine, and he died on August 13, 1865. In the mental hospital in Vienna. The original autopsy documents recently revealed that Semelves was probably beaten by his entourage while escaping and died of systemic sepsis caused by infectious injuries. When he died, the maternal mortality rate rose quickly because the hospital he was in still did not pay attention to his practice. It was not until the 1870s that the method advocated by Semmelweis was gradually appreciated and promoted.

5. The Influence of "Dissident Thinking"

Semmelweis can undoubtedly be called the pioneer of modern aseptic surgery and epidemiology. His exploration of the etiology and preventive measures of puerperal fever laid the foundation for the development of epidemiology and epidemiology. He guessed The "dead factor" is the microorganism, which is of great significance to the subsequent development of medicine [5].

Semmelweis, as the pioneer of modern aseptic technique and epidemics, his theoretical methods had an important influence on later medical thoughts and the study of etiology in the late 19th century. His description of bed fever in children, like the pathogenic description of infectious diseases decades later, is also based on the assumption that every case can determine a necessary cause. At the same time, there is a possible line of influence between his theoretical methods and the core etiological research of medicine in the late nineteenth century. Although there is no evidence that later researchers consciously adopted Semmelweis' method. But as we will see, Semmelweis' strategy is likely to have an impact in a more subtle way. We can see that in the early literature on the etiological significance of microorganisms, research on infectious wound diseases (especially wounds with fever in children) is very important. Considering all of these, it is clear that Semmelweis' famous theoretical position and research have contributed to the rationality of the germ theory and encouraged attempts to incorporate other diseases into the model. Therefore, in addition to any direct positive effects, it can be said with certainty that Semmelweis' etiological strategy is an important part of the background conditions of medical research in the late 19th century [6].

Semmelweis's exploration of the etiology and preventive measures of puerperal fever also provides methodological guidance for the development of modern medicine. As a revolutionary scientist, Semmelweis' theory on the etiology of postpartum fever was largely rejected by his contemporaries mainly because it contradicted the prevailing medical paradigm at the time, but he still Take social interventions that help improve health or well-being, that is, fight against deep-rooted medical ideas in complex social structures (such as medicine)−propose hand washing measures. He put forward conjectures about the cause, established related hypotheses about the cause, looked for ways to control the cause, tested the effects of intervention methods, and finally effectively controlled the continued epidemic of the disease and confirmed the correctness of the cause of the hypothesis. This series of activities reflected modern epidemiology Complete ideas and methods [7]. Related to this is that at the time, Semmelweis' work did not fully understand children's bed fever. He did not find that microorganisms were being transferred from the corpse to the women and infected them. He hypothesized that the "corpse material" was transferring and causing some kind of decomposition in the female body, which was obviously false. The true part of his hypothesis is that something in the hands of medical students caused this problem, and the mechanism behind it was not understood until the emergence of the reproductive theory of the disease. Many epidemiological findings are the same. This plays a certain reference function for contemporary epidemiology.

In terms of the etiology of infectious diseases, Semmelweis' work played a certain role in the discovery of the bacterial theory of its etiology. It was an important foreshadowing of the work of Pasteur, Liszt and Koch and heralded the birth of microbiology. . More than ten years later, Pasteur began to conduct microbiological research, and Liszt only proposed surgical aseptic in 1867, although this was 18 years later than Semmelweis' invention of washing and disinfecting hands with bleach. It was not until 1876 that Koch proved that bacteria can cause disease for the first time, leading the medical community to believe in the pathogenicity of bacteria, and doctors began to understand the principle of washing and disinfecting hands before obstetric examinations. At this time, Semmelweis's thoughts were understood and accepted, but this is more than ten years after his death, and 30 years have passed since his

investigation. The simple hand-washing measures he proposed was the beginning of aseptic surgery and is still a widely used method.

6. The Historical Influence of "Dissidents"

Semmelweis's "Handwashing experiment" can produce such obvious results in a short period of time, and he should be awarded some important rewards, but it is a pity that this is not the case. When a new idea impacts an old idea, when the scientific revolution comes, the intensity of opposition to the new theory is often proportional to the greatness of the new theory. Max Planck, the founder of quantum mechanics, said: "Scientific truth will not succeed by persuading its opponents to make them see the light, but as the opponents die and the younger generation who accepts new theories grow up. Carry forward." So in history, too many scientists have been treated unfairly and even lost their lives for discovering the truth and challenging authority. The same goes for Semmelweis. When convincing colleagues in the medical profession about the cause of puerperal fever, he encountered unprecedented resistance. Semmelweis, who had not persuaded his boss for 12 years, was eventually forced to a mental breakdown and became a mentally ill patient in the eyes of everyone. It was not until many years later that people discovered bacteria under the microscope, and the facts proved that Semmelweis, known as the "traitor of the medical world," was correct. Authoritative figures in the medical field accepted Semmelweis's idea and established the germ theory, which solved the problem of maternal death caused by puerperal fever and saved hundreds of millions of women. Semmelweis is obviously a hero. When the medical community was helpless in the dilemma of puerperal fever, he became the first breakout with wisdom and courage to break through the dark.

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