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The Seminal Contribution of Georg Kelling to Laparoscopy

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ON THE 23RD OF SEPTEMBER 1901, during the 73rd Meeting of the German Natural Scientist Society in Hamburg, Georg Kelling (Fig. 1) the gastroenterologist and surgeon, performed the first laparoscopic operation on a dog. He called this procedure "celioscopy."[1,2] Kelling examined the abdominal cavity of the animal, which he had inflated by insufflating filtered air using a self-constructed instrument (Fig. 2). Through another trocar, he was able to insert a thin Nitze cystoscope (Fig. 3).

Kelling explained the principle of the celioscopy as follows:

> The method is based on the fact, that the front of the abdominal wall is extremely flexible. After removing any existing air in the abdominal cavity and re-filling the area with air, filtered through cotton, one obtains a large dome-like area. The insufflation of air is made possible by using the Fiedler trocar (Fig. 4). The inserted mandrin, then being withdrawn, enables the area to be examined without the danger of damaging any of the internal organs.

This instrument was designed by Alfred Fielder, the physician to the Royal House of Saxony in Dresden. Its original purpose was to palpate the organs, especially the liver. Kelling recognized, however, the possibilities for further medical examination used in combination with his own constructions.[3]

The examination of the abdominal cavity was accomplished by the insertion of a second trocar through which a narrow Nitze cystoscope was passed. Georg Kelling ended his discussion by saying: "I will now close, gentlemen, by expressing the wish that the endoscopic method finds more usage than has been the case until now, considering the fact that it is truly more useful than the method of laparotomy used at present."

This examination, performed on that day, can be considered the birth of laparoscopy.

Georg Kelling was born on July 7, 1866, in Dresden-Friedrichstadt as the oldest of seven children to the Dresden civil engineer Emil Kelling and his wife Margarethe. He grew up in Dresden and later studied in Leipzig and at the Friedrich-Wilhelm-University in Berlin. He graduated in 1890 after being promoted to medical doctor under the auspices of Prof. Dr. Friedrich Albin Hoffmann. His dissertation was titled "Measuring the size of the stomach." Kelling concentrated his dissertation on the anatomy and physiology of the intestinal tract.[4] On the basis of his experience and his scientific experiments, he developed the first laparoscopic operation method. Through his training and collaboration with the leading gastroenterologist and physiologist of this period, Prof. Dr. Ismar Boas and

FIG. 1. Georg Kelling (1866–1945).

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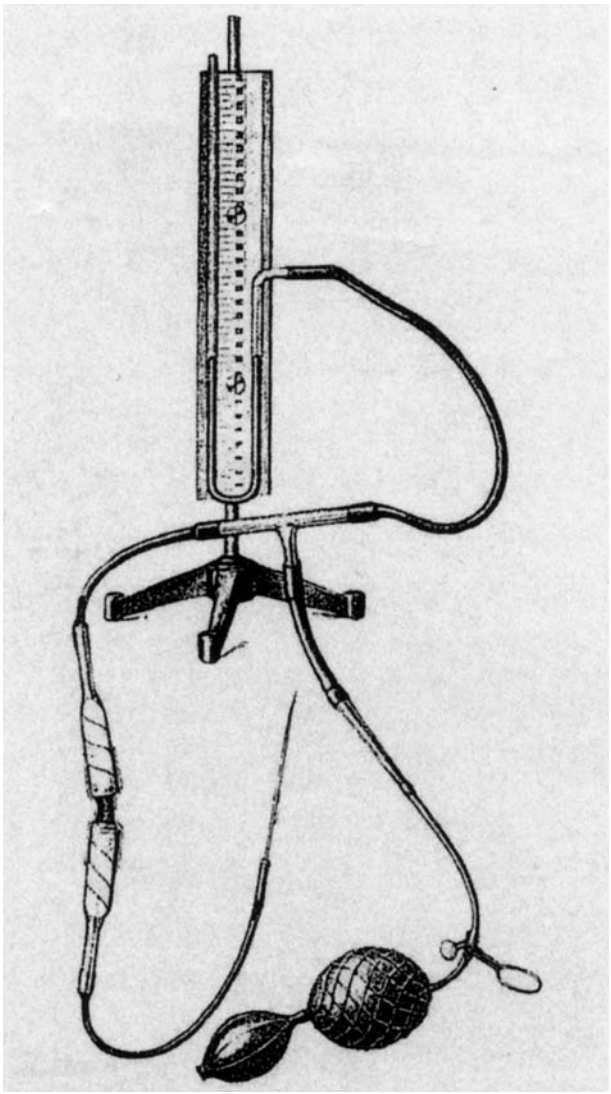

FIG. 2. Kelling's insufflation equipment.

Prof. Dr. Emil Du Bois-Reymond, at the physiological institute of the Charité in Berlin, he developed his skills as a specialist in gastroenterology.

In 1896, he opened a private practice in Dresden at Christianstreet 30. On his 26th birthday, he married Hedwig Handel, and they had two children, Rudolph and Ilse.

While practicing medicine privately, he also did research on endoscopic topics at the City Hospital Dresden Friedrichstadt and the Royal-Veterinary-Conservatory in Dresden. He further perfected his knowledge regarding endoscopy and surgery by working closely with Prof. Mikulicz-Radecki at the Royal Surgical Clinic in Breslau. While there, he completed the second part of his work titled "Endoscopy for Esophagus and Stomach."[4] He was subsequently titled "privat dozent" and was then able to teach at the Royal Veterinary Conservatory in Dresden until the school was moved in 1923 to Leipzig.

Kelling's pioneering work in the development of laparoscopy is relatively unknown. This has much to do with the fact

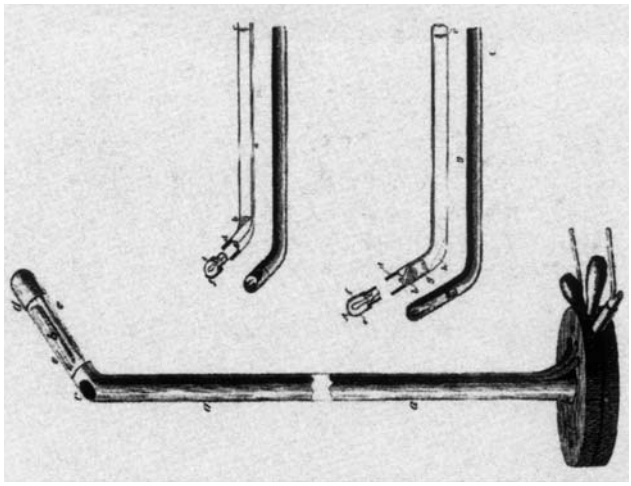

FIG. 3. Nietze cystoscope.

that his career was obscured by the destruction of Dresden in the Second World War. Kelling, with his second wife Johanna, died in an air raid on February 14, 1945, and many of his personal writings and effects were lost or destroyed.[5] The fact that we have only one photograph of him underlines the gravity of the situation at the time of his death.

Kelling's discovery and his evaluation of the method, which he was the first to set down in science, were long and often disputed. He had initially performed the examination on a dog and had completed only two operations in 9 years on patients. Considering such evidence, one might conclude that he himself held the examinations to be of no great worth.

On October 4, 1910, the *Munich Medical Weekly* published an article by the Swedish physician Hans Christian Jacobaeus of Stockholm titled "About the possibilities of using cystoscopy for the examination of serous cavities."[6] He based his work on three main criteria for the success of an examination: the insertion of a trocar or a bioptical needle without any damage to tissue and organs and the use of a transparent medium and a thin cystoscope. He described his experiences with the first 17 laparoscopies on patients with ascites. In the same issue, Kelling took a position concerning the findings of Jacobaeus. He wrote: "I am pleased to see that Dr. Jacobaeus has once again picked the study of examination the abdominal cavities by using a cystoscope with such a great success. Understandably, I want to assure the priority of this method to myself."

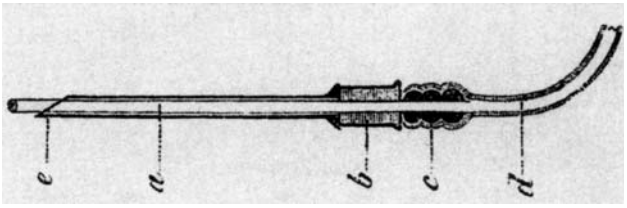

FIG. 4. Fiedler trocar.

Especially in view of the enormous developments of the last decades in laparoscopy, the ideas of Georg Kelling seem visionary. The use of a trocar, gas, and light, described by him 100 years ago, is still valid. His advocacy of the use of celioscopy with reduced trauma, rapid convalescence, and reduction of treatment cost are more apparent than ever before. His seminal contribution in the development of endoscopy has not yet been acknowledged adequately. Rightfully, Kelling deserves the accolade as the pioneer of laparoscopy.

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