

## PROFESSOR JAN ANTONI MIKULICZ-RADECKI – ONLY THE INVENTOR OF THE PROTECTIVE MASK?

STAWARZ-JANECZEK Magdalena<sup>1\*</sup>, MUSZYŃSKA Bożena<sup>2</sup>, PYTKO-POŁOŃCZYK Jolanta<sup>1</sup>

<sup>1</sup>Jagiellonian University Medical College, Faculty of Medicine, Chair and Department of Integrated Dentistry, 4 Montelupich Str, 31-155 Kraków, Poland

<sup>2</sup>Jagiellonian University Medical College, Faculty of Pharmacy, Chair and Department of Pharmaceutical Botany, 9 Medyczna Str, 30-688, Kraków, Poland

Article submitted: 09.05.2021; accepted: 02.06.2021

### Abstract

Professor Jan Mikulicz Radecki, a doctor of many specialties, was involved not only in many branches of surgery but also in urology, orthopaedics and gynaecology, in a broad sense of oncology, otorhinolaryngology, anaesthesiology as well as radiology.

Jan Mikulicz Radecki was a promoter and one of the pioneers of asepsis in Europe as well as in the whole world. He introduced the steam boiler for sterilization and while working in Wrocław, he developed an aseptic operating theatre. Furthermore, another innovation of Mikulicz's clinic was the use of a face mask that was made of a sterile bandage and attached to a cap.

The aim of this study was to briefly summarize the most important achievements of this outstanding doctor and inventor who, as one of the precursors of asepsis, as well as a brilliant and versatile operator, inventor and doctor, has given unequalled merit to humanity. Nowadays, when the world is struggling with the pandemic caused by the SARS-CoV-2 virus, the principles of asepsis introduced by Mikulicz-Radecki have become extremely valid and important.

**Keywords:** disinfection, asepsis, mask, gloves, surgery

---

\*Corresponding Author: Magdalena Stawarz-Janeczek; magdalena.stawarz-janeczek@uj.edu.pl

Jan Mikulicz-Radecki was born in the mid-19th century in Czerniowce, Bukowina [1-3] (then Austro-Hungary, now Ukraine). After completing his medical studies at the University of Vienna [4], he began his work, initially as a volunteer (operationszögling) [3-5] and then as an assistant of professor Theodor Billroth in the II Surgical Department in Vienna [3,4,5], where he was awarded the docent title [4-7]. Later he moved to Kraków where he was a professor of surgery and the director of the Jagiellonian University's Surgical Department [3-5][Fot.1]. What is more, he worked in Kaliningrad (Russia) [4] and Wrocław where he also took over the surgical department [5]. Jan Mikulicz-Radecki as a doctor has always followed the principle: *salus aegroti suprema lex* (the well-being of the patient is the most important law) [3].

Professor Jan Mikulicz Radecki was a man of many talents. He is known as a doctor of many specialties. Mikulicz Radecki was involved not only in various branches of surgery but also in urology, orthopaedics and gynaecology as well as oncology, otorhinolaryngology, anaesthesiology and radiology [3]. Furthermore, at the time, he carried out 183 gastric resections caused by cancer [8]. He used methods of operation [3,4,5] which were hardly known and significantly innovative for his times, thoracic surgery for instance [3]. At the same time, in addition to surgical talent, he had undoubtedly a constructive mind, as he was also famous as a creator of instruments. It thanks to him we have today the scoliosometer [4], the compressor of Mikulicz [3], the harpoon forceps [3,4], the apparatus for plastic nose surgery, or the peritoneal forceps [3]. It should be noted that he was the first in the world to construct a gastroscope [3,4] [Fot.2] and an esophagoscope [3,6,9], which is why Mikulicz-Radecki was named the father of the esophagogastroscopy [4]. Another interest of the professor was anti-septic therapy. He has become famous for

using a germicidal action iodophorm. He introduced iodophorm for the treatment of surgical wounds [3,4] boil, leg ulcers, and gynaecological surgery. Mikulicz injected it also intraarticularly [3]. In the 1880s he published a work describing the effectiveness of the use of iodophorm in wound treatment [3,4,7].

Mikulicz-Radecki developed the composition of the so-called Mikulicz's ointment (containing Peruvian balsam, silver nitrate, and yellow vaseline) with a healing effect which is still used to this day (e.g. for the production of a recipe ointment), but once passed for a panacea [3]. It mainly has a healing, antibacterial and antiparasitic effect. Moreover, it is an excellent formula that supports the treatment of ulcerations or wounds which are difficult-to-treat. Mikulicz has also discovered and described a disease which has been called after him (Mikulicz's syndrome, symmetrical swelling of lacrimal and salivary glands) [1,4], as well as characteristic giant cells in the rhinoscleroma disease [3,7].

In the times of Mikulicz, a major problem for the patients and surgeons was the post-operative pain and infections, including tetanus, sepsis, phlegmon, hospital gangrene, or erysipelas. It caused postoperative mortality, which reached the level of 90% [3]. Mikulicz had to face these problems as well. During his work at the clinic in Vienna, he was interested in the antiseptic method developed by Lister and enriched his knowledge on it thanks to his scientific journey to Germany, England and France [3,4,7]. Mikulicz spread the use of Lister's method in Europe [3]. However, he soon expressed his negative opinion on the continuous spraying of carbolic acid [3,4,7] and called for this practice to be discontinued because of the harmful effects of this compound on the respiratory tract, kidneys, and the development of the carbolic gangrene of fingers by operating doctors [3].

Jan Mikulicz-Radecki was a promoter and one of the aseptic pioneers in Europe and worldwide. At the end of the 19th century, he him-

self said that he changed antiseptic into aseptic [3]. What is more, he introduced a steam boiler for sterilization [1,3] and while working in Wrocław he created a modern, aseptic operating theatre, which was then the most modern not only in Germany but across the whole Europe. At this clinic, the aseptic principles of his idea were implemented. Surgeries were no longer conducted in lecture halls, as it was generally accepted at the time, but were performed in special treatment rooms. It can be said that Jan Mikulicz-Radecki revolutionized the way and conditions in which operations were conducted. The aseptic walls of the operating theatre were coated with white tiles and the corners of the walls were rounded to improve hygiene. A chemical-bacteriological laboratory was located in the basement of the clinic. While implementing the rules of aseptic, Mikulicz used the knowledge of the bacteriologist Carl Flügge [3]. Professor Jan Mikulicz-Radecki required that only the necessary number of people be present in the operating theatre, each of whom had to be properly prepared and dressed [10]. In the late nineteenth century, he began operating in sterile gloves in his aseptic clinic [10]. He used steam-sterilized, thread gloves, but also sterile clothing, caps, and surgical gowns [3], and sterile bandages [10]. White trousers, shirts, and gowns were also introduced for daily replacement. Therefore sterile clothes, masks, and gloves were required in the operating theatre [3]. It was required not only from the surgeon but also the assistance [10]. On top of that, it should be noted that another new feature in Mikulicz's clinic was the use of a cotton mask used to cover the mouth and nose (formerly called the Mikulicz's mask), made from a sterile bandage and attached to a cap [3,11].

Before the operational procedure itself, it was necessary to wash and disinfect

hands, to which Mikulicz attached great importance. The order of these measures, which he introduced, was the following: wash hands with hot soap and water, clean nails and wash them with 5% carbolic acid, wash hands with soap and hot water with a sterile brush, brush with 70 % alcohol, and wash with sublimate [10]. In addition, surgeons performing surgery had to smear the ends of their fingers in iodine [3]. If the gloves got dirty, they had to be changed each time, and in the case of digestive tract surgery, the surgeon normally changed gloves three times [10]. The operating field had to be covered with scarves and only the operated place could be exposed. Jan Mikulicz was the first to use the spiritus saponatus to wash hands with. The result of the introduced procedures was an increase in the percentage of wound healing per primam intentionem even up to 99% [3].

### Summary

Jan Mikulicz-Radecki was a scholar who contributed to the development of modern surgery and medicine. His aseptic rules have become a standard over time. As one of the precursors of aseptic, an outstanding and comprehensive surgeon, inventor, and doctor, he gave unrivaled merit to humanity. Nowadays, when the world is fighting against the pandemic caused by SARS-CoV-2, the principles of aseptic introduced by Mikulicz-Radecki become even more important and relevant.



Fig.1. Photographer unknown. Prof. Jan Mikulicz together with his team of the Surgical Department Jagiellonian University in Cracow. From the left they are sitting: Czesław Górski, Rudolf Trzebicky, Jan Mikulicz, Hilary Schramm. From the left are standing: Mieczysław Dembowski, Aleksander Bossowski, NN, Roman Sondermayetr. From the collection of the Department of History of Medicine, Jagiellonian University Medical College in Cracow.



Fig.2. Mikulicz designs gastroscopes. Photography: Anna Wojnar. From the collection of the Department of History of Medicine Jagiellonian University Medical College in Cracow.



## Resumo

*Profesoro Jan Mikulicz Radecki, kuracisto pri multaj fakoj, okupiĝis ne nur en multaj branĉoj de kirurgio, sed ankaŭ en urologio, ortopedio kaj ginekologio, en vasta senco de onkologio, otorinolaringologio, anesthesiologio kaj ankaŭ radiologio.*

*Jan Mikulicz Radecki estis iniciatinto kaj unu el la pioniroj de asepto en Eŭropo kaj ankaŭ en la tuta mondo. Li enkondukis la vaporkaldranon por steriligado kaj laborante en Vroclavo li disvolvis asepsan operaciejon. Krome, alia novigo de la kliniko de Mikulicz estis la uzo de vizaĝa masko farita el sterila bandaĝo kaj alkroĉita al ĉapo.*

*La celo de ĉi tiu studo estis koncize resumi la plej gravajn atingojn de ĉi tiu elstara kuracisto kaj inventisto, kiu, kiel unu el la antaŭuloj de asepsio, same kiel genia kaj multflanka funkciigisto, inventisto kaj kuracisto, donis grandiozan meriton al la homaro. Nuntempe, kiam la mondo luktas kun la pandemio kaŭzita de la viruso SARS-CoV-2, la principoj de asepto enkondukitaj de Mikulicz-Radecki fariĝis speciale validaj kaj gravaj.*

## References

1. Grzybowski A, Sak J. Jan Mikulicz-Radecki (1850-1905): His impact on modern medicine. *Clin Dermatol.* 2012 Jan-Feb; 30(1): 129-136; <https://doi.org/10.1016/j.clindermatol.2011.05.004>
2. Śniadecki M, Drucis K, Skokowski J, Kopicz A. Jan Antoni Mikulicz-Radecki (1850-1905)-Endoskopia, antyseptyka, aseptyka. Trzy filary współczesnej chirurgii. *Cancer Surgery* [internet]. 2009;(2):40-47. Available from <http://www.cancersurgery.pl/pdf/200902a07.pdf>
3. Kozouschek W. Jan Mikulicz-Radecki 1850-1905. Współtwórca nowoczesnej chirurgii. Wrocław. Wyd. Uniwersytetu Wrocławskiego; 2003
4. Zajączkowski T. Johann Anton von Mikulicz-Radecki (1850-1905)-a pioneer of gas-troscopy and modern surgery: his credit to urology. *World J Urol.* 2008 Feb; 26(1):75-86 DOI: 10.1007/s00345-007-0227-y
5. Bona W. Zasługi Jana Mikulicza dla rozwoju chirurgii w Polsce. Poznań: XIII tom Archiwum Historji i Filozofji Medycyny oraz Historji Nauk Przyrodniczych, 1933:20-100
6. Górecki P, Górecki W. Jan Mikulicz-Radecki (1850-1905)-The Creator of Modern European Surgery. *Dig Surg.* 2002;19(4):313-20. DOI: 10.1159/000064574
7. Kielan W, Lazarkiewicz B, Grzebieniak Z, Skalski A, Zukrowski P. Jan Mikulicz-Radecki: one of the creators of world surgery. *Keio J Med.* 2005 Mar;54(1):1-7. doi:10.2302/kjm.54.1
8. Wronecki K. Jan Mikulicz-Radecki: Wielki chirurg wrocławski. Zbliżenia Polska-Niemcy. Pismo Uniwersytetu Wrocławskiego i Uniwersytetu Opolskiego. 1996;1(13):112-124
9. Kuczkowski J, Stankiewicz Cz, Plichta Ł, Cieszyńska J. Jan Mikulicz-Radecki (1850-1905): a fundamental contributor to world surgery; surgeon of the head, neck, and esophagus. *Eur Arch Otorhinolaryngol.* 2012 Mar;269(8): 1999-2001. doi: 10.1007/s00405-012-1962-2
10. Mikulicz J. Ueber Versuche, die „aseptische“ Wundbehandlung zu einer wirklich ke-imfreien Methode zu vervollkommen. *Deutsche medicinische wochenschrift.* 1897 Jun; 26:409-413. German
11. Gandhi JA, Churiwala JJ, Shinde PH, Chaudhari SN. Surgical Mask-the Saviour: from its Invention to the COVID-19 Era. *Indian J Surg.* 2020 Jun; 82(3): 278-279 doi.org/10.1007/s12262-020-02438-x