Surgery is the oldest discipline of medicine. The first Poland's University Chair of Surgery was established in the 18th century. Surgery that had been until then the domain of barbers became a clinical discipline. In the 19th century Polish surgeons were actively involved in the development of gastrointestinal surgery. Most famous among them, J. Mikulicz Radecki and L. Rydygier. They invented novel surgical techniques used for the treatment of many diseases. Their achievements contributed to creating Polish school of surgery, that was further developed throughout the 20th century. The progress in gastrointestinal surgery has been continued in the 21st century in spite of existing economic barriers.

**Key words:** Surgery, barbers, J Mikulicz Radecki, L. Rydygier, gastrointestinal surgery,

**INTRODUCTION**

Surgery is the oldest discipline of medicine. Since the earliest times the capability for treating injury, deformity or wound dressing decided about survival. Then the use of medicaments by the first doctors (*medici*) separated medicine from surgery. *Medicus* possessed knowledge of diseases and application of medicaments. A good surgeon had to possess intrinsic manual skills not available to many. Medical knowledge was mystical and even spiritual at that time, given mostly to monks, while surgery was practical capability that had much lower esteem. Surgeon was a craftsman, who possessed only superficial knowledge of medicine. And no wonder that Hippocrates contained his view of surgery and surgical horizon in only one sentence: "He who wishes to be a surgeon should go to war" (1). In the ancient
times through the Dark Ages or the period of unenlightenment much of the
traditional treatment for injuries and ailments stemmed from folk medicine. It
was dominated by using herbs, false charms, amulets, and expelling demons
from the body by sacrifices given to gods. Magic runes, stones, and herbs
collected on special days along with spells were the mainstay of medical care.
Since natural law governed all of man's life there was no need to worry about
medical theories. However, the depth of development of surgery in the different
civilizations was different in spite of the traced uniformity in the approach to
elementary interventions. In the ancient India surgery was at the forefront of
medicine. Cutting the nose as punishment for wrongdoing and other
deformities of the body created the need for the reconstructive or plastic
surgery. It was probably for these reasons that in the Islamic countries a
surgeon was given a more honored place.

Barbers and bath-attendants

In the Middle Ages, two great universities at Padua and Bologna with medical
schools added greatly to the advancement of surgery. In other countries surgery
was still a domain of craftsmen: barbers and bath-attendants. At first they formed
barbers' guilds, later transformed into surgeon's guilds. One of them was formed
in Cracow and described in 1505 in the Behem's Codex (Fig. 1). Out of the
Medieval craft guilds emerged first Companies of Surgeons in the 18th century.

All the same, the need to bring the
disciplines of surgery and medicine
closer together was perceived as late as
in the 18th century.

In Poland, medicine was besides
law one of the disciplines taught at the
Jagiellonian University since the
earliest times. Among the students of
the medical faculty, who studied
medicine was Nicolaus Copernicus,
whose De Revolutionibus Orbium
Coelestium was a turning point in
perception of universe that refuted the
principle of heliocentrism. Polish
doctors were well known across
Europe since 15th century, and many
of them served as physicians at the
royal courts. Among those most noted
were Józef Struś, who lectured on
medicine at the University of Padua,
the most famous university of the
Renaissance era, and Wojciech Oczko,
the first in the world to describe syphilis, which he discussed in much details in his treatise, published in the 16th century.

University Surgery

The first in Poland University Chair of Surgery at that time bringing together anatomy and obstetrics opened its door in 1779 at Cracow Academy. Surgery that had been until then the domain of barbers became a clinical discipline. This blend of the surgical craft and university teaching laid the foundations of the Cracow school of medicine centered in the university Chair of Surgery. The history of the first in Poland Chair of Surgery covers 224 years and is inseparable from the world achievements from the times of Lister through traditional to modern minimally invasive techniques.

When Hugo Kołłątaj made a substantial reform of the universities that was particularly profound in Cracow during the Enlightenment he had no problems with finding the most suitable candidate to the post of the professor at the newly created Chair of Surgery. It was given to Rafał Czerwiakowski (1743-1816), a former Piarist, who obtained doctor's degree in medicine and philosophy, practiced at the Holy Spirit Hospital in Rome, and studied at the medical centers in Neapol, Bologna, Vienna, Paris and Berlin (Fig. 2). Czerwiakowski gained profound medical education abroad and returned to Poland in 1779 to be nominated professor of anatomy, surgery and gynaecology of the Main Crown School in Cracow. His historical inaugurating lecture on surgical instruments delivered to the audience of distinguished university professors on September 16th of 1779 marked opening of the Chair of Surgery with himself as Poland's first professor of surgery.

Since the very beginning of his carrier Czerwiakowski had to overcome many obstacles in organizing "Theatrum Anatomicum", the lecture hall for students. He conducted post-mortem autopsies and deepened his knowledge of anatomy, taught students and described the contemporary surgical instruments.

One of the most outstanding of his many achievements was publishing of the first in Poland six-volume textbook

Fig. 2. Professor Rafał Czerwiakowski
of surgery that was highly regarded and useful. He was a noted educator and a
surgeon deeply concerned about the ethical issues in his profession. He was the
author of "The Science of Universal Surgery". He gained renown of the father of
surgery for all his accomplishments in surgery. During his 24-year service as a
professor of surgery he laid sound foundations for further development of clinical
services.

Rafał Czerwiakowski was an outstanding physician and master in the craft of
surgery, great humanist, and all his attributes made him fully deserve the honour
of being father of Poland's surgery.

A disease made him resign the duties at the Chair of Surgery, but he never
gave up his work as a researcher. He died in Cracow 1816 for tuberculosis. Under
Rafał Czerwiakowski the role of the Chair of Surgery in Cracow and its renown
across the central Europe countries was much strengthened and many eminent
surgeons competed through subsequent decades for the post of the chairman of
Surgery Chair in Cracow. Many of them profoundly contributed to further
development of the Cracow school of surgery.

*Surgery in the 19th century*

19th century witnessed enormous progress in surgery. The discovery of
general anaesthesia followed by the rules of antisepsis allowed surgeons to
operate without patient's enduring unbearable pain and to lower the rates of
infections responsible for the highest rates of perioperative mortality. Without
these landmarks, narrow range of surgical procedures would still be limiting
further progress in surgery. The introduction of endoscopic procedures and
radiological examinations ushered the way to diagnostic procedures until then
based on clinical verification alone.

Polish surgeons always kept pace with all innovations in the science and art of
surgery and after the first reports from the world on anaesthesia it was introduced
in Cracow and Warsaw. On the February 6th, 1847 shortly after ether
anaesthesia induced by T.G. Morton in October 1846, Bierkowski used ether anaesthesia in Cracow (*Fig. 3*).

Independently of Bierkowski, Aleksander Le Brun (1803 - 1868) from Warsaw was one of the first surgeons to use
ether anaesthesia, and the first in Poland to perform incision of carbuncle under chloroform anaesthesia on
December 11th, 1847.

By the middle of the 19th century, post-operative
infections accounted for enormously high death rates in
the patients undergoing major surgical procedures. After
exploring the inflammation of wounds Joseph Lister
worked out principles of antisepsis. He published his
observations in the Lancet of March, 1867. Marian
Wygrzywalski applied Lister principles for the first time in Poland at the Holy Trinity Hospital in Piotrków Trybunalski. He used Lister's dressing shortly after the publication in the Lancet and moreover translated the article and published it in Gazeta Lekarska, no.4 in the same year. The principles of antisepsis were extensively popularized in Poland by Antoni Bryk in Cracow and professor Julian Kosiński (1833 -1914) in Warsaw.

The introduction of endoscopy was a turning point in the history of medical diagnostics. First attempts to view body cavities were made using a candle, and then gas burning flame allowing for a brighter light. The attempts were unsuccessful due to inadequate illumination. In the early 1900s first lighted telescopes were used. After Edison's invention of the bulb, it was used in the first gastroscope constructed by Jan Mikulicz-Radecki (1850-1905) in collaboration with Josef Leiter (2, 3). He worked on his invention already in Vienna in 1880 and then in Cracow, where he was professor of surgery and the chairman since 1881 (Fig. 4). The first description of the endoscopic findings in gastric cancer was published by Mikulicz in Kraków in 1883, and contained the details of the endoscopic examination performed in a 35-year old woman with a cancer localised in the distal third part of the stomach and producing pyloric stenosis. His multiple innovations in operative technique for a wide variety of diseases helped to develop modern surgery.

The unique discovery of Wilhelm Conrad Roentgen truly changed the world and immediately became a useful tool for medical science. Professor Alfred Obaliński (1843 - 1898) together with Karol Olszewski, professor at the Chair of Physics of the Jagiellonian University was the first in Poland to make use, for diagnostic purposes, of the radiation discovered few month before, and in 1896 performed the first radiograph of the fractured elbow joint.

**Surgery at the turn of the 19th/ 20th century**

Surgery was destined to extend with the introduction of anaesthesia, principles of Lister's antisepsis and the aseptic techniques discovered by Semmelweis.

Among the most important accomplishments was mastering the technique of stomach surgery. Cracow school of surgery emphasized greatly broad knowledge, excellent manual skills and openness to all innovations in operation techniques with their implementing on Polish ground.

Jules Pean performed first stomach resection on April 9th, 1879. Postoperative course was fatal as the patient died on the 5th day after surgery after two blood transfusions of 50 and 80ml (4). Ludwik Rydygier became famous for the world's first documented stomach resection for pyloric cancer.
performed on November 16th, 1880 in a 63-year-old patient, Juliusz Mikolajewicz. The patient died 12 hours after 4-hour operation due to cardiovascular insufficiency (5). The first successful stomach resection was performed by Theodor Billroth in Vienna on January 29th, 1881. The patient, a 43-year-old woman, Therese Heller survived almost 4 months and died for cancer spread. Billroth wrote about this operation in extensive details in his letter to a journalist of Wiener Medizinische Wochenschrift on February 5th, 1881 (6). He already had at that time world renown as the surgeon and head of the surgery chair in Vienna, and, therefore, has been ever known as the first who performed gastroduodenal anastomosis.

Rydygier was at that time head of the surgery department at the small provincial town, Chełmno. He had never resigned the competition for priority over Billroth. In the publication of 1882 in Sammlung Klinischer Vortrage he covered extensively the progress in stomach surgery and described in details resection of stomach and technical variations of end-to-end anastomosis of the remaining stomach with the duodenum. This method, was initially known as Billroth I, and later as Rydygier-Billroth I operation.

Billroth, was first to perform resection of stomach with the technique of gastrojejunal anastomosis on January 15th, 1885. Until now the technique has been used in a variety of modifications. Rydygier performed the first resection of stomach for pyloric stenosis on November 21st, 1881 in the patient, Karolina Pfenig, who suffered for 3 years from continuous vomiting (7). Due to the intraoperatively found ulcer on the posterior pyloric wall which penetrated towards pancreas he removed stomach with gastroduodenal anastomosis. The patient survived, and her postoperative course was uneventful. The use of stomach resection for the treatment of peptic ulcer disease was widely discussed at that time and had many opponents. High mortality after the procedures discouraged Billroth and the fascination with stomach resections waned. Even a note in Berliner Klinische Wochenschrift on Rydygier's publication in Zentrallblatt fur Chirurgie was ended with the famous editorial commentary - Hoffentlich auch letzte. Redaktion - The commentary was inappropriate as this operation was successfully used for over 100 years.

Rydygier's indications to stomach resections which he based on the literature reports and his own experience covered:

1. Stomach ulcer leading to pyloric stenosis
2. Pyloric cancer
3. Stomach haemorrhage that cannot be stopped
4. Perforation of stomach ulcer to abdominal cavity.

They opened a discussion on a variety of operative techniques used to treat stomach cancer and peptic ulcer disease.

Rydygier first performed gastrojejunostomy for peptic ulcer (8). Though he found intraoperatively duodenal ulcer instead of suspected ulcer of stomach he gave up the resection and terminated the operation. As vomiting persisted in the patient he decided to reoperate to perform gastrojejunostomy. The alternative to
gastrojejunostomy for the treatment of pyloric stenosis has been pyloroplasty, practiced up till now in the modified technique of Mikulicz. Some publications mention an Italian surgeon, Loreta, as the first to perform pyloroplasty in 1882. In fact his operation was limited to opening of stomach 3cm over the pylorus to enlarge its outlet with finger. Heineke and Mikulicz performed the first pyloroplasty operations independently in 1886 (9). The technique of Heineke was described by Frohmüller from Erlangen in his doctoral dissertation. Mikulicz first performed pyloroplasty for pyloric stenosis, and his first pyloroplasty for bleeding peptic ulcer in a 17-year-old woman from Cracow. The patient died after the operation due to the massive haemmorhage. Pyloroplasty has become an alternative treatment for gastrojejunostomy.

Mikulicz invented numerous novel operative solutions which have been widely accepted and used up till now. He first operated on a patient with perforated peptic ulcer and commented on the procedure as follows: "Every doctor, faced with a perforated ulcer of the stomach or intestine, must consider opening of the abdomen, sewing up the hole, and averting a possible or actual inflammation by careful cleansing of the abdominal cavity". These were historical words, and in spite of the fatal postoperative course of the patient, Mikulicz has been known as first to suture perforated ulcer (10). He also pioneered in the treatment of bleeding peptic ulcer and was the author of the technique of resection of the middle part of stomach.

He was very sensitive to the antiseptics. He used gauze mask and was one of the first to use gloves during surgery. Mikulicz contributed largely to the development of modern surgery for rectum. He introduced the term cardiospasmus and implemented own method of treating this disorder. He extended surgical armamentarium by hemostatic forceps, known later by his name.

Professors of the Cracow Medical Faculty of that time were famous in the world for their contributions. Mikulicz was a visiting surgeon in America, where he lectured and performed demonstration operations in several university clinics.

His student, Ferdinand von Sauerbruch in 1903, performed the first in the world operation on open chest under the guidance of Mikulicz and this date has been ever conceived as the beginning of thoracosurgery and modern oesophageal surgery.

His great successor was prof. L. Rydygier (1850-1920) (Fig.5), great continuator of the ideas of Mikulicz and his Cracow school of surgery, and the second after Mikulicz Poland's surgeon, who gained outstanding

Fig. 5. Professor Ludwik Rydygier with his assistants.
Rydygier was the second after Roux, who endeavored in 1908 to perform reconstruction of oesophagus with a part of jejunum translocated to the anterior part of thorax.

Great advantage of the Cracow school of surgery was its high level of medical treatment. Rydygier created a forum for the exchange of ideas and for sharing the innovations in surgical techniques at the congresses of Polish surgeons. The first was held in 1889 in Cracow (Fig. 6).

Two successors of Rydygier, outstanding surgeons of the 19th century, contributed largely to the progress in gastroenterological surgery. Professor Kader, a pupil of Mikulicz still in Wrocław, received his master's excellent recommendations and took surgery chair in Cracow. They continued collaboration in clinical medicine in Cracow. Kader first described meteorismus symptom, named as the Wahl and Kader symptom, and pioneered in epidural and intravenous anaesthesia. He was first in the world to perform liver resection for meteorismus in 1889.

Between the wars

The re-emergence of the independent state in 1918 changed the situation in all disciplines of Polish learning. Prof. Maksymilian Rutkowski (1867-1947) (Fig. 7) succeeded to the head of the Surgery Chair of the Jagiellonian University after Kader had resigned his post due to disabling chronic disease leading to blindness.

Rutkowski was a long-time head of the surgical ward at the Saint Lazarus Hospital. He established the first urology and neurosurgery wards separate from general surgery, also orthopedic outpatient clinic for school children, and a separate ward for children with osteoarticular tuberculosis. Rutkowski invented a novel method of bladder reconstruction using a part of ileum (1899) and partial reconstruction of urethra using appendix (1913). He pioneered in modern oesophageal surgery introducing the technique of oesophageal reconstruction using stomach in the patients with oesophageal strictures, being modified and used until now in the Cracow centre.

The successor of Rutkowski, prof. Jan Glatzel was a splendid surgeon, known for his operative skillfulness. He was instrumental in developing the method of treating pancreatic insulinoma.
Professor Antoni T. Jurasz (1882-1961), who succeeded after Glatzel was first in the world to perform marsupialization of the pancreatic cyst into the stomach. Since then over 20 long years passed until the clinical symptoms of hyperinsulinemia were associated with the autopsy findings of pancreatic insulinomas. In 1927 Wilder et al. demonstrated the presence of insulin in the liver metastasis specimen from the patient with malignant pancreatic insulinoma. The first successful excision of pancreatic insulinoma that averted hypoglicemia in the patient for 20 postoperative years was performed in 1929 by Graham Roscoe. Ten years later Glatzel performed first in Poland similar operation, and thus landmarked the beginning of endocrine surgery for insulinomas.

After 1945

In the immediate post-war years "reconstruction" of damages caused by the WWII started. The revolutionary technical progress in medicine of the 20th century was clearly related to the economic potential of the country. In Poland the financial barrier slowed the implementation of the innovations. It soon became obvious that short time from the publication of the novelties to their practical application was closely related to technological possibilities, and surgery in Poland faced a number of economic obstacles. Despite all these barriers the Department of General and GI Surgery in Cracow continued well-established tradition of the surgical school represented by Mikulicz and Rydygier, focusing research topics on the treatment of gastric, pancreatic and colorectal cancer. To keep pace with the radical changes in modern surgery and with rapid technological advances Ministry of Health and Poland's Government launched multiple research programs, extremely helpful in implementing latest world innovations in modern surgical practice. Most spectacular results were obtained as a result of long-term multidisciplinary project realized since 1975 by the Polish Gastric Cancer Study Group coordinated by the Department of General and GI Surgery in Cracow of the Jagiellonian University with the primary endpoint to improve early gastric cancer detectability and outcomes of surgical treatment in the population of Poland.

A new program on the model of immunotherapy of GI tract neoplasms has been launched in the genotherapy laboratory established at the Ist Department of General and GI Surgery in Cracow using genetically modified autologic neoplastic cells. Currently, phase I studies have been finished and the next stage investigations undertaken. Simultaneously, the studies have been continued on the value of tumor chemosensitivity evaluation for the individualization of adjuvant treatment.

Numerous research programs on the detection, diagnostics and surgical management of gastrointestinal oncological diseases have been launched and successfully conducted.
Polish School of oesophageal surgery created by Z. Jezioro popularized his technique of replacing resected oesophagus with a segment of small intestine and caecum. In Cracow, modified technique of Rutkowski was used replacing resected oesophagus with stomach.

Gradually increasing number of operations have been performed employing minimally invasive methods. Rapid technological development and the introduction of video and cameras into the operating theatre allow the inspection of body cavities through a minimum incision. The perspectives are even more promising. We are entering now the robotics era. Artificial hands of robot with fingers tipped with ultrasound scanner allow most precise diagnosis of all abnormalities. Transplant surgery has also developed rapidly owing due to the possibility of obtaining new organs from stem cells or to the progress in using nanotechnology.

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