

## HISTORY OF MEDICINE / ИСТОРИЈА МЕДИЦИНЕ

**Dragoljub (Bata) Adamov (1927–1996) – The first pacemaker implantation in Serbia**

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It has been over half a century since the implementation of pacemaker therapy in our country and the region. The first successful implantation of a pacemaker in former Yugoslavia and in Serbia took place on September 16, 1965 in “Dr. Dragiša Mišović” Clinical Hospital Centre, and this operation, with a team of doctors of the institution, was performed by surgeon Dragoljub (Bata) Adamov (1927–1996). The first permanent pacemaker implantation was with epicardial leads with thoracotomy approach. The patient was operated on under general anesthesia, administered by anesthesiologist Predrag Lalević (1927–), and Dr. Adamov was assisted by Dr. Miša Albrecht (1933–) and Dr. Milan Dragović (1933–2009). Although pacemaker therapy has since been widely proven and confirmed, it is necessary to remember the pioneers who introduced this kind of therapy to the region, as they deserve a distinguished place in the history of medicine in Serbia.

**Keywords:** pacemaker; first implantation; history of medicine

**INTRODUCTION**

It has been over half a century since the implementation of pacemaker therapy in our country and the region. Today, in this area, the National Reference Center, “Prof. Dr. Milan Bane Đorđević” Pacemaker Center of the Clinical Center of Serbia epitomizes the highest level of application of this type of therapy. Pacemaker Center of the Clinical Center of Serbia bears the name of Professor Milan (Bane) Đorđević (1933–1993), the founder of this center, who established the standards for the use of pacemaker therapy and contributed immensely in its development and implementation [1].

However, it should be emphasized that the first successful implantation of a pacemaker in former Yugoslavia, and in Serbia, took place on September 16, 1965 at “Dr. Dragiša Mišović” Clinical Hospital Centre, and that operation, with a team of doctors of the institution, was performed by surgeon Dragoljub (Bata) Adamov (1927–1996) (Figure 1).

At the time, in Novi Sad, Serbia, Dr. Ivan Fajgelj (1919–2002) tried to save a patient with a complete atrioventricular block by connecting an electrode attached to the heart muscle with a low-voltage power source, a triggering switch being an ordinary musical metronome. Unfortunately, there are no precise data about this endeavor, which would be welcome, if for no other reason, as an illustration of doctoral inventiveness in solving the problem of life-threatening bradycardia.

Dragoljub Adamov was born in Kikinda, where he finished elementary school and began his high school education. When he was 14,



**Figure 1.** Dr. Dragoljub (Bata) Adamov

he was arrested together with his father, Rada, by the collaborationist government police and brought to Topovske Šupe (Cannon Sheds in Serbian) in Kragujevac on October 21, 1941. The total number of hostages that were arrested amounted to around 6,000. The shooting of hostages began on October 21 at seven o'clock in the morning. Initially, German soldiers executed 2,301 persons, as a reprisal for the 10 dead and 26 wounded German soldiers. Immediately afterwards, they executed another 500, since in the struggle that arose while people were being rounded up and taken away to be shot, another five German soldiers got killed. Two hundred and fifty hostages were kept in reserve for ex-



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**Figure 2.** Dr. Adamov in the operating room during surgery

ecution, in case of riots in the city [2]. Among people who got released were Rada Adamov and his son Dragoljub, by pure chance. It should be noted that Dragoljub's parents, Nadežda and Rada, were teachers of history and geography, respectively, at the Kragujevac High School at the time.

After the war, Dragoljub Adamov began his medical studies, which ended in 1952 at the School of Medicine of Belgrade University. As a student he was interested in endoscopic procedures and began to work on them at the Military Medical Academy. He specialized surgery in Belgrade, after which he started working at the Bežanijska Kosa Hospital, predominantly as a thoracic surgeon.

Then he went on to the United States for a one-year training with Dr. Paul W. Sanger (1907–1968) in Charlotte, North Carolina, at the hospital which now bears the name of Dr. Sanger (Sanger Heart & Vascular Institute). After his training with Dr. Sanger, with whom he remained close friends, he continued his professional training at the Karolinska Hospital in Stockholm, Sweden, where he worked with Dr. Viking Bjork (1918–2009); his training was continued with Dr. Libor Hejhal (1924–1979) in Prague, then Czechoslovakia, where he studied in the field of vascular surgery [3]. During his training at the Karolinska Hospital, he had the opportunity to get acquainted with the concept of implantation of a whole pacemaker in the human body. In 1958, at this hospital, Dr. Åke Senning (1915–2000) successfully implanted the first pacemaker to patient Arne H.

W. Larsson (1915–2001). The pacemaker was designed by engineer Rune Elmquist (1906–1996) [4].

After returning from professional surgical training, Dr. Adamov went to “Dr. Dragiša Mišović” Hospital in Belgrade. This hospital was founded in 1952 and had a department of general surgery, but very quickly specific groups of pathological conditions began to dictate further development of vascular, pulmonary, and cardiac surgery (application of hypothermia was made possible for the first time). It was the dominant motive for young surgeons to continue improving in exactly these areas [5]. The first complex cardiovascular surgery at this hospital was performed by Ivo Popovic Đani (1915–1986), and Dragoljub (Bata) Adamov [5].

In his later career, Dr. Adamov made great efforts to define and establish the Department of Thoracic and Vascular Surgery, as the first independent Center for Vascular Surgery in our country, which was realized in 1970. During the first several years, this department was headed by Dr. Adamov, with his primacy in cardiac pacing, but he focused his interest on the problems of vascular surgery, and made great efforts in allocating resources for founding a special hospital for vascular surgery and training of its staff. The 1970s began and ended with the construction of a new hospital building in Dedinje, a part of Belgrade, which became operational in October 1977 under the name of Department of Cardiovascular Surgery, what is today Dedinje Institute for Cardiovascular Diseases. Its first director was Dr. Adamov. The Department of Vascular Surgery was led by chief physician Miodrag Jevremović, and the Service of Cardiac Surgery by Professor Mihajlo Vučinić (1932–2004) [5].

In 1986, Dr. Adamov's illness forced him into early retirement, and he died in 1996.

## FIRST PACEMAKER IMPLANTATION

In 1965, Dr. Adamov implanted the first permanent pacemaker with epicardial leads with thoracotomy approach (Figure 2).

This first implantation occurred on September 16, 1965 (hospital protocol number 1281, operations' protocol sequence number 1002) (Figure 3). The patient was operated on under general anesthesia, which was administered by anesthesiologist Predrag Lalević (1927–), and Dr. Adamov was assisted by Dr. Miša Albrecht (1933–) and Dr. Milan Dragović (1933–2009). Scrub nurse was Nada. Patient K.D., born in 1904, was operated on due to complete heart block.

The protocol is a description of the entire procedure, so it contains the following (the copy written into the protocol) (Figure 4):

### *Implantation of a pacemaker*

*Type: Permanent subcutaneous subepicardial automatic pacemaker-battery, made by Electrodyne<sup>1</sup> company, produced in June 1965. Impulse rhythm of 70 bpm.*

<sup>1</sup> Pacemaker company Electrodyne from the US was producing pacemakers at the time; subsequently it was sold to Becton Dickinson Company, which stopped pacemaker production in 1971.

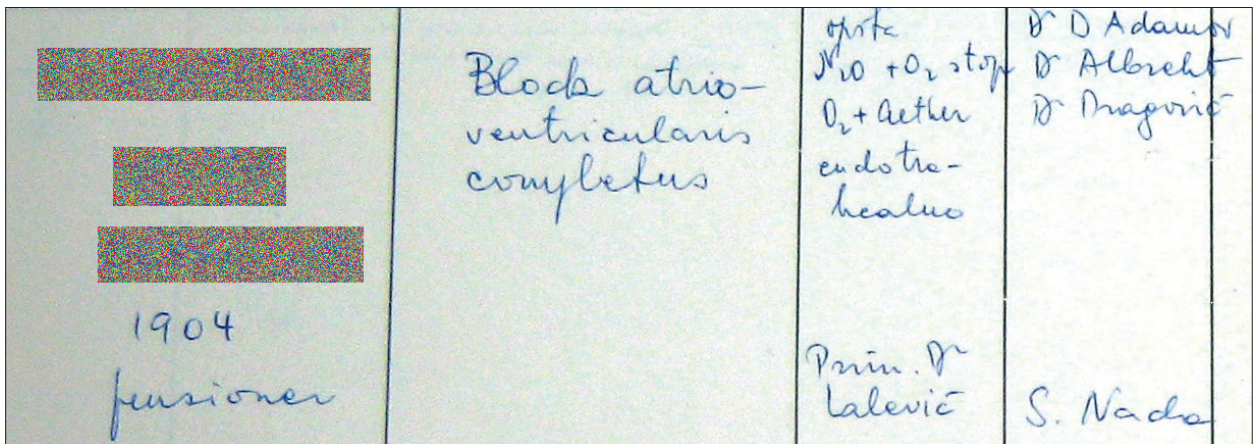


Figure 3. Part of the hospital protocol with the above diagnosis of the patient and the team that took part in the first pacemaker implantation

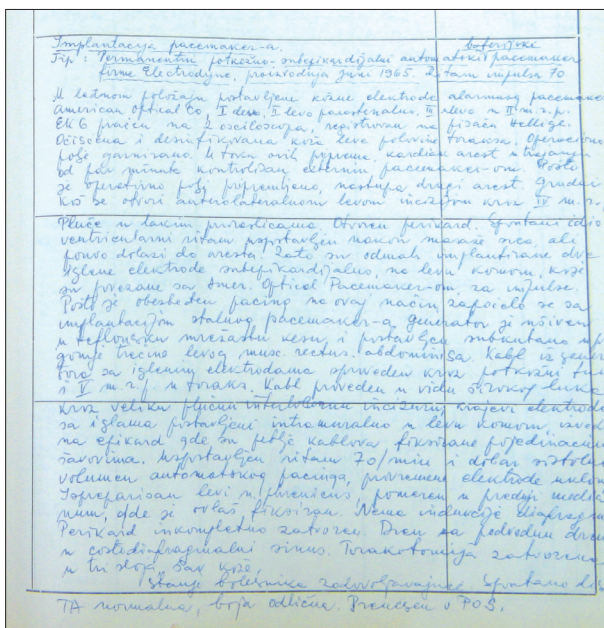


Figure 4. Page of the original protocol with the description of the entire procedure of the first pacemaker implantation

In the dorsal position, a set of skin electrodes of an alarm pacemaker by American Optical Co.<sup>2</sup> was set – I to the right, II left parasternal, III left in the second i.c.s. (intercostal space – author’s note).

ECG monitored on two oscilloscopes, registered on a Hellige printer.

Skin of the left half of the thorax cleaned and disinfected. Operative area draped.

During preparations, cardiac arrest for a period of a few minutes, controlled by an external pacemaker. After the operative field is prepared, the second arrest ensues. The chest opened by anterolateral incision in the fourth i.c.s. Lungs in

light adhesions. Opening the pericardium. Idioventricular rhythm spontaneously established after cardiac massage, but arrest ensues again. Thus, two needle electrodes immediately placed subepicardially, the left ventricle connected with Amer. Optical external pacemaker. Having secured pacing in this way, the implantation of a permanent pacemaker started. The generator sewn into a Teflon mesh bag and placed subcutaneously in the upper third of the left musculus rectus abdominals. The cable from the generator with a needle electrode administered through the subcutaneous tunnel and in the intercostal space in the thorax. The cable implemented in the form of a wide arc through the large pulmonary interlobar posterior, the ends of the electrodes with needles placed intramurally into the left ventricle, sewn onto the epicardium, where cable loops are held in place by sutures. Automatic pacing rhythm of 70 bpm established, good systolic volume, temporary electrodes removed. Preparation of the left n. phrenicus, it is moved to the front mediastinum, where lightly fixed. No induction of phrenic nerve stimulation and diaphragm stimulation. Pericardium incompletely closed. Underwater drainage in the costo-diaphragmal sinus. Thoracotomy closed in three layers, the skin sutured.

Condition of patient satisfactory. Spontaneous breathing, BP normal, excellent color, transferred to the ICU.

The operation was successful, and the patient survived for the next several years without significant complications and disorders. However, according to Professor Lalević, the whole story has a tragic outcome – the patient committed suicide, afraid that because of the pacemaker he would not be able to die [10]. Documents confirming this outcome do not exist, but this is what Dr. Adamov said in a conversation with Professor Lalević about the sad fate of the first patient with an implanted pacemaker in the history of Serbian medicine.

CONCLUSION

Dr. Adamov has left a large and significant trace in surgery in general, and will be remembered as a pioneer and the first doctor who implanted a permanent pacemaker, not

<sup>2</sup> American Optical Company (AO) from Southbridge (Massachusetts, USA), was founded in the 19th century; in the 1960s it began to produce equipment related to cardiology, which is linked to the arrival of engineer Berković (Barouh Vojtec Berkovits, 1926–2012). He constructed defibrillators and first pacemakers “on demand,” which was not enough for commercial success in the beginning.

only in Serbia, but also in this part of Europe. Thus began the era of application of pacing in our country.

Although pacemaker therapy has since been widely proven and confirmed, it is necessary to remember the pioneers who introduced this kind of therapy to the region, as they deserve a distinguished place in the history of medicine in Serbia. The desire and intention of the author of this review was to remind all of us of it.

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Special thanks are also owed to Professor Aleksandar Nešković and to the family of Mr. Josip Klinger from Zurich, especially to his daughter Vesna, for locating and establishing contact with the Adamov family, Mr. Rade, Dr. Bata Adamov’s son, and Rade’s wife Bogdanka, to whom I owe special thanks for understand my desire for all of us to participate in recalling the indelible mark made by Dr. Dragoljub (Bata) Adamov in the application of this type of therapy.

Information on Dr. Ivan Fajgelj’s attempt to create a pacemaker in Novi Sad using a metronome is derived from personal contact with Dr. Josip Lavac, whose father proposed a technical solution to this attempt to save a patient’s life.

I express gratitude to Professor Predrag Lalević, who was a witness to the first pacemaker implantation and who has shared his memories with us.

## Драгољуб Бата Адамов (1927–1996) – прва уградња пејсмејкера у Србији

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### САЖЕТАК

Протекло је преко пола века од почетака примене пејсмејкер терапије у нашој земљи. Прва, успешна уградња пејсмејкера у бившој Југославији, па тиме и у Србији, учињена је 16. септембра 1965. у болници „Др Драгиша Мишовић“ у Београду, а операцију је, заједно са тимом лекара ове болнице, извршио хирург, примаријус др Драгољуб Бата Адамов (1927–1996). Прва уградња пејсмејкера је учињена приступом торакотомијом са применом епикардијалних електрода.

Пацијент је оперисан у условима опште анестезије, коју је водио анестезиолог др Предраг Лалевић (1927–), а асистирали су др Миша Албрехт (1933–) и др Милан Драговић (1933–2009).

Примена пејсмејкер терапије касније је широко примењивана, али неопходно је подсетити на пионире примене ове врсте терапије у овом региону, јер су они својим местом у историји српске медицине такву пажњу засигурно и заслужили.

**Кључне речи:** пејсмејкер; прва уградња; историја медицине