

A Universal Celebration : 100 Years of Korotkoff Sounds, 1905 - 2005

Nasim H Naqvi

Summary

The measurement of systolic and diastolic blood pressure by auscultation was first described 100 years ago, when a young Russian army doctor, Nicolai Sergeevich Korotkoff, addressed a meeting at the Medical Academy of St. Petersburg on 8th November 1905. During the last hundred years, Korotkoff's contribution has proved to be one of the most useful methods in the diagnosis, treatment, monitoring and prevention of life threatening cardiovascular ailments and the centenary of his discovery should be celebrated universally.

Resume

La mesure de la pression arterielle systolique et diastolique par la methode auscultatoire a ete decrite, pour la premiere fois, il y a tout juste cent ans quand, le 8 novembre 1905, un jeune medecin de l'armee russe, nomme Nicolai Sergeevich Korotkoff, communiqua sur ce theme devant l'Academie medicale de St Petersburg. Depuis ces cent dernieres annees, cette contribution de Korotkoff peut etre consideree comme l'une des methodes les plus utiles au diagnostic et au suivi therapeutique des patients atteints d'hypertension arterielle. La methode de Korotkoff est aussi utilisee pour la prevention des pathologies cardio-vasculaires menacant la vie. C'est la raison, pour laquelle une telle decouverte merite d'etre universellement commemoee.

On 8th November 1905, a 31 year old Russian army surgeon, Nicolai Sergeevich Korotkoff, presented a paper to the Medical Academy of St. Petersburg. In this presentation, he described his discovery of diastolic sounds that he had heard when using a child's stethoscope, during deflation distal to the arm cuff of Riva-Rocci's blood pressure apparatus. Fortunately, the proceedings of this meeting have been preserved and also translated into English.¹ Although he faced some hostile questions from at least one member among the audience, he was encouraged by his own professor, who greatly admired him. His method of measuring systolic and diastolic blood pressure by means of auscultation took a long time to reach American and British medical practitioners. By 1910, following translation from papers in German, auscultation was beginning to replace palpation of the pulse in Boston² and news of Korotkoff's method was brought to the notice of the British medical profession also in that year, by George Oliver in his communication to the Royal Society of Medicine.³

In the century since its introduction, nothing new of significance has been added to the simple method described by Korotkoff, and according to Swales, "the Korotkoff sounds are the foundation of all the clinical studies on which our knowledge of human blood pressure is based, at least up to recent times".⁴ Although Korotkoff's sounds and the method have enjoyed worldwide recognition, used by thousands of doctors and health care workers every day, Korotkoff himself remains bafflingly unknown to most of those who practice his method daily. Although Schevchenko and Tsitlik wrote about him in some detail \ he has largely been ignored by historians of medicine. Garrison's encyclopaedic history of medicine fails to mention his name⁵, monographs on the history of cardiology make no reference to his work⁷ and even modern medical

historians have failed to record his name.⁸ This relative obscurity should not be attributed to his shyness and shunning of publicity, although others have pointed out that Korotkoff has not been recognised because he only made one contribution. His contribution may be solitary but its significance and usefulness in medicine is clear.

Nicolai Sergeevich Korotkoff was born in 1874 in the town of Kursk in Russia and after finishing high school education, he entered the medical faculty at Kharakov University in 1893. He later changed to the Moscow University Medical School from where he qualified with distinction in 1898 and then subsequently completed his surgical residency in Moscow. In 1900 he served as a Red Cross volunteer in China during the Boxer Rebellion. In 1902 he became an assistant to Professor Sergei P Fedorov at the Military Academy, St. Petersburg. From here he was sent for two years to the front lines during the Russian-Japanese war. While on war duties, Korotkoff developed an interest in studying injuries to the blood vessels and observing the collateral circulation.⁹ His simple tools in the harsh environment of war were a Riva-Rocci's blood pressure apparatus and a child's stethoscope. Using these two, he was able to recognise diastolic sounds below the cuff during deflation.

He probably returned from war duties in 1905, re-joining the medical academy at St. Petersburg, where he made the historical presentation written on a single page, quoted here in English translation.

"The cuff of Riva-Rocci is placed on the middle third of upper arm; the pressure within the cuff is quickly raised up to complete cessation of circulation below the cuff. Then, letting the mercury of the manometer fall one listens to the artery just below the cuff with a children's stethoscope. At first no sounds are heard. With the falling of mercury in the manometer down to a certain height, the first short tones

appear; their appearance indicates the passage of part of the pulse wave under the cuff. It follows that the manometric figure at which the first tone appears corresponds to the maximal pressure. With the further fall of the mercury in the manometer one hears the systolic compression murmurs, which pass again into tones (second). Finally, all sounds disappear. The time of the cessation of sounds indicates the free passage of the pulse wave; in other words, at the moment of disappearance of the sounds the minimal blood pressure within the artery predominates over the pressure in the cuff. It follows that the manometric figures at this time correspond to the minimal blood pressure".⁹

In 1905, when the above simple description of systolic and diastolic measurement of blood pressure was presented, it was not supported by any experimental work. Later, in 1910, Korotkoff submitted a comprehensive dissertation and successfully defended his thesis obtaining his MD. This document has now been translated into English and it was published by Segall in a limited edition in 1980.

During the First World War Korotkoff acted as surgeon to the disabled or injured soldiers. He was an extremely modest and compassionate individual. He had witnessed atrocities carried out by the Tsarist soldiers on the striking miners while serving in Siberia. This might be the reason that he welcomed the October 1917 revolution, becoming chief physician at Leningrad where he died aged 46 in 1920. We do not know the circumstances or cause of his death at a relatively young age. His wife, who was a nurse and had accompanied him to various assignments on behalf of the Red Cross, died during the siege of Leningrad in 1941.

A fairly detailed paper on Korotkoff's life was published in the *BMJ* in 1982 where it was mentioned that his son Serge Korotkoff, a specialist in sports medicine working in Moscow, was compiling his illustrious father's biography.¹¹ It is most unfortunate that his son died and the manuscript of biography of his father he had put together was also lost.¹²

However meagre the information we have about Korotkoff, his pioneering contribution to the accurate measurement of blood pressure will continue to benefit patients. The centenary, on 8th November 2005, of the publication of his discovery of Korotkoff's sounds deserves to be celebrated Worldwide.

Références

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⁹Shevchenko YL, Tsitlik JE *op. cit.*, note 5 above

¹⁰ Lewis, *op. cit.*, note 1 above.

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¹²Swales. *op. cit.*, note 4 above, p. 493.

Author.

Dr. Nasim H Naqvi, FRCA,
Retired Consultant Anaesthetist
Heaton Grange Cottage
Heaton Grange Drive
Bolton BL1 5DA UK