

Profiles in Cardiology

This section edited by J. Willis Hurst, M.D., and W. Bruce Fye, M.D., M.A.

Inge Edler: Father of Echocardiography

LOUIS J. ACIERNO, M.D., FACC, AND L. TIMOTHY WORRELL, M.P.H., R.R.T.

Cardiopulmonary Sciences, Department of Health Professions, University of Central Florida, Orlando, Florida, USA

Echocardiography has come a long way since its introduction as a clinical tool by Inge Edler (Fig. 1). As head of the Department of Cardiology at the University Hospital, Lund, Sweden, it was his responsibility to evaluate the cardiac patients prior to surgical correction of their cardiac abnormality. In particular, the surgical repair of mitral stenosis mandated a precise delineation of the severity of the valvulopathy. This was in 1953, at which time cardiac catheterization and contrast imaging were still in their infancy and failed to provide enough data for an accurate appraisal of the status of the mitral valve. At the same time, Carl Helmuth Hertz was working as a graduate student in the nuclear physics department at the University of Lund. Young Hertz was the son of famous Nobel laureate Gustav Hertz. During this era, the University of Lund was small enough to accommodate the entire faculty in the lunchroom. This provided the necessary intimacy for an unregulated interplay of ideas and research results among the various disciplines. This, no doubt, provided the ambience for the fortuitous interchange of objectives and research results between the young graduate student and Professor Edler. Thus, a merger was formed between the physicist Hertz and the cardiologist Edler.¹

It so happened that Carl Hertz had a marked interest in ultrasound and was already acquainted with the ultrasonic reflectoscope developed for nondestructive materials testing. Work

leading to the development of the reflectoscope began in the 1930s. A device was needed to test the construction of metal ship hulls and battle tank armor. This was first suggested in 1928 by a Soviet scientist, Sergei Y. Sokolov, at the Electrotechnical Institute of Leningrad. Other researchers in this area of interest included Floyd A. Firestone at the University of Michigan and Donald Sproule in England. Firestone's work led to the development of the supersonic reflectoscope in 1941. Other similar devices were developed in England and Germany.² The version which Carl Hertz would ultimately use was developed by the Siemens Corporation of Germany. Carl Hertz had a connection with the Techniska Rontgencentralen section of Siemens and was able to borrow an ultrasonic reflectoscope from the company, which was located in the nearby town of Malmö.¹ The first person to be examined with this device was himself. At that time, he identified a signal that moved with cardiac action using the time-motion or M-mode approach. On the basis of this initial attempt, both he and Edler immediately began a series of observations on patients with mitral stenosis.³ In a short span of time, World War II became history, and again Carl Hertz was able to borrow an improved reflectoscope manufactured by Siemens. Hertz's father was the director of the Siemens Research Laboratory before the end of the war and it was through this connection that young Carl was able to borrow the instrument. The scope was delivered in October 1953, and the young researchers immediately expanded on their previous studies with the improved version.¹

The first publication appeared in 1954; it was entitled "The Use of Ultrasonic Reflectoscope for the Continuous Recording of the Movements of the Heart Wall."⁴ Although the equipment was somewhat primitive, Edler and Hertz were able to register well-defined echoes on the cathode ray tube screen that moved synchronously with the heartbeat. Further observations clarified that the echoes were originating from the mitral valve as well as from the wall of the left atrium, in contrast to their original belief that they were emanating only from the wall of the left atrium.⁵ Many of these examinations were conducted on dying patients. Upon completion of the exam, Edler

Address for reprints:

Louis J. Acierno, M.D.
University of Central Florida
College of Health and Public Affairs
P.O. Box 162400
Orlando, FL 32816-2205, USA

Received: May 24, 2001

Accepted: June 6, 2001



FIG. 1 Inge Edler (1911–2001). Photograph courtesy of the Albert and Mary Lasker Foundation Archives and The National Library of Medicine.

marked the direction of the ultrasound beam on the patient's chest. After the patient died, he would pass an ice pick into the chest in the same direction the beam had been directed during the exam. On postmortem examination of the patient, he found that the anterior leaflet of the mitral valve had been transected by the ice pick and not necessarily the posterior wall of the left atrium.³ All of this work was demonstrated in a scientific film, shown at the Third European Congress of Cardiology in Rome in 1960⁶ and published in 1961.^{7,8} The remainder of the observations was presented at a symposium on ultrasound held at the University of Illinois in June 1962.⁹ Seven years later Edler, in collaboration with Lindström, introduced the combined use of Doppler and echocardiography at the First World Congress on Ultrasonic Diagnostics in Medicine in Vienna. At that time, they demonstrated the importance of this approach in the diagnosis of aortic and mitral valve regurgitation.^{10,11}

Inge Edler was a very private man, so much so that it has been virtually impossible to obtain adequate biographical material regarding the personal details of his life. Most of the information outlined here was obtained from a personal communication with his colleague, Dr. Jan Eskilsson, and from the curriculum vitae of Dr. Edler in his possession. In addition, we were fortunate to receive more personal details of his life from his son, Professor Lars Edler.

These sources provided us with the date of Edler's birth on March 17, 1911, in Burlöv, Malmöhus County, Sweden. His parents were Carl and Sophia who were teachers in the primary school in that vicinity. He graduated from the local high school, Högre Allmänna Läroverket, in 1930. Young Edler wanted to continue with University studies in physics, particularly micronics, but he was convinced by his sister to go for dentistry instead. As it was too late to enroll in the faculty of dentistry, he was able to be accepted by the faculty of med-

icine at Lunds University. This was supposed to be a stop gap measure. However, medicine intrigued him so that he continued his studies at the university, receiving his medical degree in 1943. While there, he met another medical student, Karin Jungbeck. They married in 1939. Karin later became an ophthalmologist and had her own practice until she retired. Their marriage was blessed with four children. Lars, the youngest and the one who supplied the information, is now Professor of Biological Oceanography. Dr. Edler's professional career was initiated in the field of general medical practice, but was soon restricted to his employment in the Department of Internal Medicine at the University Hospital of Lund, and in the space of several years revolved primarily around cardiology. He was appointed director of the Laboratory for Heart Catheterization (again at the University Hospital) in 1948 and functioned in this capacity until 1950. At that time, he was appointed director of the Department of Internal Medicine and the Cardiovascular Laboratory. He remained in this capacity until 1960, assuming additional administrative duties in 1953 as Head of the Department of Cardiology until his retirement in 1977 (curriculum vitae of Inge Edler and personal communication from Dr. Jan Eskilsson and Prof. Lars Edler).

Edler was quite active as a member of many societies devoted, in whole or in part, to the advancement of ultrasound. Among them were the American Institute of Ultrasound in Medicine, Deutsche Gesellschaft für Ultraschall Diagnostik in der Medizin, the Swedish Society of Medical Ultrasound, the Yugoslav Association of Societies for Ultrasound in Medicine and Biology, the Swedish Society of Cardiology, and the American College of Cardiology (curriculum vitae of Inge Edler and personal communication from Dr. Jan Eskilsson and Prof. Lars Edler).

Throughout his professional career, Dr. Edler was awarded many honors. The Albert and Mary Lasker Foundation awarded him and Helmuth Hertz the Clinical Medicine Research Prize in 1977 for pioneering the clinical application of ultrasound in the medical diagnosis of abnormalities of the heart. This was followed in 1983 by the Rotterdam Echocardiography Award for his most outstanding and pioneering work applying ultrasound as a diagnostic tool in cardiology. In December 1984, he received the Lund Award for "scientific work of extraordinary significance" from the Royal Physiologic Society. In 1987, Lund University bestowed upon him the title of Professor H. C. One year later he was again honored with the Münchener and Aachener Preis für Technik und angewandte Naturwissenschaft, and finally in 1991, he was awarded the Eric K. Fernströms Stora Nordiska Pris (curriculum vitae of Inge Edler and personal communication from Dr. Jan Eskilsson and Prof. Lars Edler).

Typical of his quiet academic life, Inge Edler died in his sleep on March 7, 2001, just 10 days short of his 90th birthday.

References

1. Lunds University: Available at <http://www.ob-ultrasound.net/inge-hertz.html>. Accessed April 13, 2001

2. *History of Ultrasound and Gynecology*. Available at <http://www.ob-ultrasound.net/history.html>. Accessed April 13, 2001
3. Feigenbaum H: Evolution of echocardiography. *Circulation* 1996; 93:1321–1327
4. Edler I, Hertz CH: The use of ultrasonic reflectoscope for the continuous recording of the movements of heart walls. *Kungl. Fysiografiska sällskapet i Lund förhandlingar* 1954;24.5:1–19
5. Edler I, Hertz CH: The early work on ultrasound in medicine at the University of Lund. *J Clin Ultrasound* 1977;5:352–356
6. Edler I, Gustafson A, Karlefors T, Christensson B: *The Movements of Aortic and Mitral Valves Recorded with Ultrasonic Echo Techniques*. Scientific film at 3rd European Congress of Cardiology, Rome, Italy, September 1960
7. Edler I, Gustafson A, Karlefors T, Christensson B: Mitral and aortic valve movements recorded by an ultrasonic echo-method. An experimental study. *Acta Med Scand* 1961;370(suppl):67–82
8. Edler I: Ultrasonocardiography, Part III: Atrioventricular valve motility in the living human heart recorded by ultrasound. *Acta Med Scand* 1961;370(suppl):83–124
9. Edler I: The diagnostic use of ultrasound in heart disease. Proceedings of the symposium held at the University of Illinois, Urbana 1962. In *Ultrasonic Energy* (Ed. E. Kelly), p. 303–321. Urbana: University of Illinois Press, 1965
10. Lindström K, Edler I: Ultrasonic Doppler technique used in heart disease. An experimental study. *Ultrasono Graphia Medica*, Proceedings of the 1st World Congress on Ultrasound on Ultrasonic Diagnostics in Medicine, Vienna, Austria, June 1969. Vol. III: 447–454, 1971
11. Edler I, Lindström K: Ultrasonic Doppler technique used in heart disease. Clinical application. *Ultrasono Graphia Medica*. Proceedings of the 1st World Congress on Ultrasonic Diagnostics in Medicine, Vienna, Austria, June 1969. Vol. III: 455–461, 1971