

In Memoriam

Geoffrey O. Hartzler, MD A Tribute

Barry D. Rutherford, MD; Joel K. Kahn, MD; David Strelow; David R. Holmes, Jr, MD

On Saturday, March 10, 2012, cardiology sadly lost one of its brightest stars. Geoffrey O. Hartzler died suddenly at his home at the Lake of the Ozarks; he was 65 years old. Geoff was a very special individual, intellectually brilliant, intense, energetic, and controversial.

He was born in 1946 in Goshen, IN, the second of 3 brothers, the youngest of whom died tragically of a berry aneurysm as a teenager. His father was a Mennonite minister who in a later career was instrumental in establishing the first outpatient community mental health center in the United States. His mother contracted polio when Geoff was 4 years old and survived in an iron lung. She remained the focus of the family's energy for nearly 4 decades.

He entered medical school at Indiana University. While a freshman, he worked 10-hour shifts watching a telemetry monitor and responding to cardiac arrests. At that time, he developed a keen interest in acute care medicine. He won an essay contest sponsored by the Mayo Clinic and spent a 3-month summer externship at Mayo. During that externship, he met and worked with another student clerk, David R. Holmes, Jr. Both went on to complete internal medicine and cardiology training at the Mayo Clinic and became Mayo faculty members in 1977.

I (B.D.R.) first encountered Geoff Hartzler in the early 1970s when he was a cardiology fellow at the Mayo Clinic. At that time, I was a young consultant working in the Coronary Care Unit at St. Mary's Hospital. We were floating polyethylene catheters at the bedside to the pulmonary artery in patients with acute myocardial infarction. Hemodynamics were monitored and nitroprusside was infused to control left

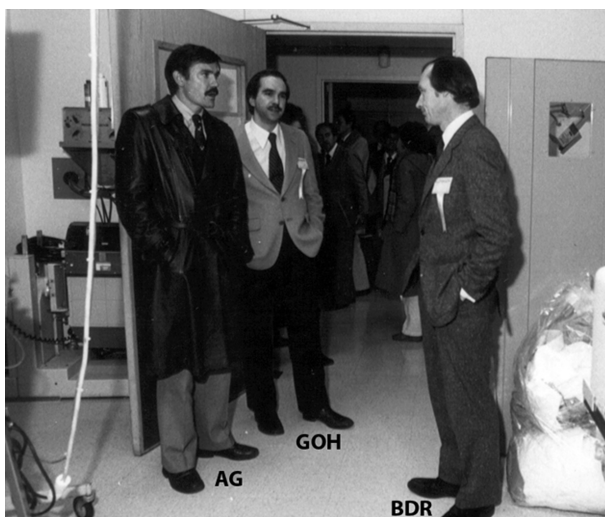
ventricular filling pressures—a complex procedure ahead of its time. Geoff was on call with me one night, and by the time I arrived at the unit, he had the procedure done and indicated to me that I should go home and get some sleep. I knew then that I was dealing with a very special individual.

At this time, Geoff also had a keen interest in the early development and clinical application of invasive electrophysiology. His practice included the laboratory study of patients with supraventricular tachycardia and ventricular tachycardia,

leading to the elucidation of basic mechanisms of tachycardia and to unique treatment modalities. He developed techniques for catheter-based endocardial mapping that subsequently facilitated catheter-based ablation. He developed techniques for delivering critically timed stimuli and burst pacing to terminate refractory arrhythmias and, while in Rochester, performed the first such procedure. Working with cardiovascular surgeons and others, he developed protocols for intraoperative electric mapping of the heart, allowing the guided resection of bypass tracts for the supraventricular tachycardia known as Wolff-Parkinson-White and the guided resection of myocardial tissue to prevent recurrent ven-

tricular tachycardia, and performed intraventricular catheter ablation for ventricular tachycardia. These techniques have become the standard of care.

Geoff first met Andreas Gruentzig in Miami in 1976 when Gruentzig presented data on balloon angioplasty in dogs. After the first human was treated in 1977 in Zurich, Switzerland, the Mayo Clinic developed a protocol to perform peripheral angioplasty on 100 patients before any coronary patients were to be treated. However, before the peripheral



Pictured from left to right, Dr Andreas Gruentzig (AG), Dr Geoffrey O. Hartzler (GOH), and Dr Barry D. Rutherford (BDR) at Saint Luke's Mid America Heart Institute catheterization laboratory in 1984.

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angioplasty protocol was completed, Geoff was asked to treat a patient with an isolated proximal lesion of the left anterior descending artery. Only 2 balloon catheters were available at Mayo. Geoff asked Dave Strelow (laboratory director) to find him a big dog and then took the first catheter and manipulated it into the dogs' left anterior descending artery. Unfortunately, the dog died before he completed the angioplasty. Undeterred, Geoff said, "We are ready!" The patient was taken to the catheterization laboratory the next day, and multiple catheters were placed to measure coronary blood flow, but after almost 2 hours, Geoff could not get the balloon to cross the lesion. A large crowd had gathered in the laboratory, including many of Geoff's superiors. At the last minute, the balloon crossed the lesion, the angiogram showed a perfect result, and coronary blood flow rose greatly, the first direct measurement of this response in humans. This first Mayo angioplasty was presented to the entire division a few days later. Some 20 years later, when Geoff returned to Rochester as a visiting professor, the Mayo faculty presented a baseline angiogram for his interpretation. Unbeknownst to Geoff, the Mayo faculty had selected the diagnostic angiogram from the first patient that Geoff had treated in Rochester, and he immediately recognized it. This was a testimony to his incredible visual memory and educational skills.

By 1980, the contrast between Geoff's pioneering spirit and the conservative setting at Mayo led him to look for an opportunity to join former Mayo colleagues at Saint Luke's Hospital in Kansas City, MO, including Drs David McCohnahay, Ben McCallister, and Barry Rutherford. Geoff then undertook the first balloon angioplasty at Saint Luke's Mid America Heart Institute in 1980. The field was in its infancy at that time; equipment was primitive; indications for the procedure were limited; and results were uncertain. From that time on, however, Geoff became the bright, brilliant light that revolutionized interventional cardiology. He possessed enormous energy, intense concentration, and unparalleled technical skill. He published extensively and described some of the first cases using 2 and 3 wires, kissing balloons, hugging balloons, removal of debris from the coronary tree, and management of complications. He extended the use of angioplasty procedures to patients with multivessel disease, teaching that, as equipment became more refined, 1, 2, or 3 vessels could be safely opened during a single procedure. Use of angioplasty was extended to all lesion types—ostial, bifurcation, diffuse disease, saphenous vein grafts, left internal mammary artery grafts, left main disease, chronic total occlusion, thrombus aspiration, and even a retrograde approach.

His skill in the laboratory was amazing, but his demeanor should be a lesson to all young interventional cardiologists. He was always thinking ahead, never used any derogatory language, never blamed others for complications, and always spoke personally to family members. It was always rumored that Geoff and Andreas Gruentzig were at odds with each other, with Geoff being considered the "cowboy from the Midwest" and Andreas "the thoughtful scientist." They had enormous respect for each other, however, and Andreas visited Saint Luke's in the early 1980s to exchange ideas with Geoff.

Perhaps his greatest contributions were in the fields of acute myocardial infarction and in patients with complex multivessel disease. In the 1970s and 1980s, the mortality from acute myocardial infarction was 20% to 30%, patients were on bed rest for 3 or 4 weeks, and most never returned to a full, active lifestyle. Geoff had the vision to treat these patients with direct balloon angioplasty, a difficult, technically challenging, and highly controversial procedure in 1981.

The first acute infarct patient was treated at Saint Luke's Mid America Heart Institute in 1981. A patient who had demonstrated a focal right coronary lesion on diagnostic angiography developed an inferior myocardial infarction in the wards. Geoff brought him down to the laboratory and crossed and dilated his now totally occluded artery. The patient's pain resolved, and he was discharged home in a few days. Geoff wrote a protocol for infarct angioplasty and began applying it to more patients. The initial results were published and influenced practice around the world. Despite at times being under intense criticism, he was able to stay the course; he continued to refine and defend the procedure, and finally after 15 years, direct angioplasty was established as a Class 1 recommendation and the preferred standard of care. Mortality has now decreased to single digits, and patients are dismissed from the hospital in 2 to 3 days and are able to return to active lifestyles. It is no exaggeration to state that in developing the procedure, Geoff has saved millions of lives in the United States and around the world. Today, the American College of Cardiology and the American Heart Association consider acute angioplasty to be the critical step in the management of acute myocardial infarction patients as described in "Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction."¹

Geoff's commitment to research and teaching was legendary. Beginning with the first patient treated in Kansas City, a prospective database of procedural details and outcome was maintained. A staff of research assistants was developed, and the database numbered thousands and then tens of thousands of patients; many seminal observations in interventional cardiology emanated from this database.

Beginning in the early 1980s, Geoff also began to offer small courses to teach angioplasty to other physicians. These grew in size and frequency, moving to a larger auditorium and including an annual course in Hawaii. By 1988, 3 teaching courses had been developed: 1 course in basic angioplasty techniques and 2 courses in advanced angioplasty techniques. Approximately 1000 physicians attended these courses each year, and over a 10-year span, a generation of interventional cardiologists was trained. Geoff had the uncanny ability to speak what he was thinking, so during a complex, difficult procedure, he continued to teach and instruct the audience. These conferences set the tone for all future teaching courses in interventional cardiology and were influential in defining conferences such as the TCT. In 1986, he also developed the first advanced angioplasty fellowship program, training 2 cardiologists annually in advanced techniques. Paul Teirstein was the first fellow in 1987 to 1988. Gregg Stone and James O'Keefe were fellows in 1988 to

1989; Joel Kahn and Tommy Lee, from 1988 to 1990. This heritage of education has continued to the present day.

Geoff also was involved in the early development of internal defibrillators. He and 3 other pioneers incorporated Ventritex, Inc, in 1985 to develop a superior defibrillator. He incorporated programmed stimulation and burst pacing as a means of terminating tachycardias.

By 1993, Geoff had been practicing invasive cardiology at a pace only a few could match. He chose to change direction and stepped back from clinical medicine to become Director of Cardiovascular Research at Saint Luke's Mid America Heart Institute, a post he held until his retirement in December 1995. At the time of his retirement, we presented him with a plaque with a quotation that summarizes our feelings about this remarkable man:

With boundless energy, creative genius and unparalleled skill, you have propelled the field of complex coronary angioplasty from its infancy to widespread clinical acceptance and maturity. Those of us that have been privileged to work with you remain in your debt. As an internationally acclaimed teacher, a kind

and caring physician and especially as a dear friend—you are truly "Masterly."

Geoff will be greatly missed by his wife and 4 daughters, colleagues, nursing staff, and technicians, all of whom loved him dearly. He will be missed by interventional cardiologists around the world who did not ever have the chance to interact with and to be taught by him, as well as by all other interventional cardiologists who have been influenced by his seminal work. Finally, his presence will be felt by the unnamed millions of patients to come whose care has been dramatically improved by the innovations pioneered by Geoff.

Disclosures

None.

Reference

1. Antman EM, Anbe DT, Armstrong PW, Bates ER, Green LA, Hand M, Hochman JS, Krumholz HM, Kushner FG, Lamas GA, Mullany CJ, Ornato JP, Pearle DL, Sloan MA, Smith SC Jr. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: executive summary: a report of the ACC/AHA Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines on the Management of Patients With Acute Myocardial Infarction). *Circulation*. 2004;110:588–636.