Catheter, Cardiac Encyclopedia Article

Catheter, Cardiac

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The first practical system for cardiac catheterization—passing a tube through a vein into the heart--was devised by physician Werner Forssmann (1904-1979) in 1929. Some earlier investigators had experimented with cardiac catheterization in animals and human cadavers. Forssmann, working at the Eberswalde Surgical Clinic near Berlin, Germany, set out to prove that the procedure was safe for live patients. He exposed a vein in his own arm, inserted a catheter (a long, thin, flexible tube), and advanced it about two feet through the vein to the right side (atrium) of his heart, confirming the position by X-ray. After eight more experimental procedures, Forssmann published a report describing the technique and suggesting its usefulness in examining and diagnosing diseased hearts and poor blood circulation. Forssmann was unable to develop the technique further due to financial strictures at the clinic. In the United States, two physicians at Columbia University read about Forssmann's experiments--André F. Cournand (1895-1988) and his associate, Dickinson W. Richards (1895-1973). They thought cardiac catheterization would provide a reliable method of determining blood flow through the lungs, blood pressure in the heart, and oxygen content of the blood, all important indications of cardiac and circulatory health. Cournand and Richards began experimenting with catheterization in the 1930s, progressing to dogs and chimpanzees in 1936. In 1941 Cournand performed the first human heart catheterization since Forssmann's, assisted by Dr. Hilmert Ranges. This and subsequent catheterizations showed that the procedure was safe and yielded the valuable measurements the colleagues had hoped for, providing an effective nonsurgical means of diagnosing cardiovascular problems. Cardiac catheterization rapidly spread through the world and became the single most important diagnostic tool for heart disease. In 1956, Forssmann, Cournand, and Richards shared the Nobel Prize in medicine or physiology "for their discoveries concerning heart catheterization and pathological changes in the circulatory system." At the end of the 1980s, an intracoronary prosthetic device called a stent was introduced. Used to hold vessels open, stents have revolutionized cardiac catheterization and interventional cardiology. In 1997 more than one- million stents were used worldwide. In a study of stent usage in angioplasty procedures, investigators found that when stents were utilized the percentage of patients requiring another angioplasty a year later was reduced from 25 percent to 16 percent.