CARDIOLOGY UPDATE

Reviews for Physicians

1983 Edition

Elliot Rapaport, M.D.
Editor-in-Chief

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PREFACE

CARDIOLOGY UPDATE 1983 is the third in a series designed to present topics of current interest in Cardiology. These reviews are written in a manner to stimulate not only the interest of the cardiologist and cardiovascular surgeon but also internists, pediatricians, cardiology trainees, housestaff, and students. The articles are not intended to present the authors' own recent research work but rather to review the state-of-the-art as of 1983. The authors are outstanding authorities who have made many major contributions in their field.

CARDIOLOGY UPDATE 1983 compliments the previous volumes published in 1979 and 1981 and covers subjects not dealt with in-depth in these earlier editions. The 1983 volume goes into detail on the new procedure of coronary angioplasty, covers the area of arteriographic assessment of coronary disease, introduces the interesting area of intraoperative evaluation of coronary obstructions, reassesses exercise stress testing, deals with recent advances in diagnosis and management of peripheral vascular disease, presents the role of surgery in acute ischemic states, reviews the always fascinating topic of hypertrophic obstructive cardiomyopathy, looks at newer aspects of sinus node disease and bundle branch block, updates the present status of the antiarrhythmic drug, bretylium, covers a number of important areas in the field of hypertension including the problem of management in the very young and the

very old, and concludes with a discussion of contrast echocardiography. We believe that all of these areas will be of interest to the practicing physician.

The Editors, once again, wish to invite your comments and criticisms. We would especially be indebted for your suggestions for topics that would be of interest for future volumes.

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CONTENTS

CORONARY ANGIOPLASTY

Richard K. Myler, M.D.
Andreas R. Gruentzig, M.D. and
Simon H. Stertzer, M.D.

HISTORY

Interventional angiocardiography had its inception in Eberswald, Germany, in 1929, when Forssmàn,[27] looking for "a safer approach for intracardiac drug injection," placed a catheter from his basilic vein into his right atrium. Although this experiment met with consideration skepticism by the medical community, the era of invasive cardiology had begun.

Since then, the cardiovascular catheter has been primarily a diagnostic tool, although interest in its use as a therapeutic agent has continued. Catheters have been used to create intra-atrial communications in transposition of the great vessels,[90] to close patent ductus arteriosus[85,93] and certain atrial septal defects,[67] to interrupt inferior vena caval return in patients with recurrent pulmonary embolic disease,[77] and to treat atrioventricular block with a variety of ingenious pacemaker devices.

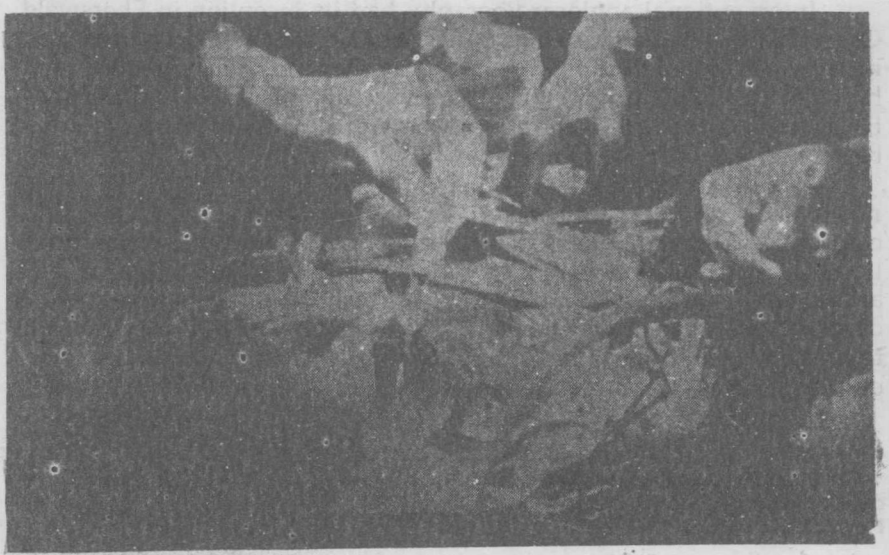
From the Departments of Medicine (Cardiology), University of California, San Francisco, California, Emory University Hospital and Clinic, Atlanta, Georgia, and Lenox Hill Hospital, New York, New York

Investigator	Country	Year Initiated
Dotter & Judkins	U.S.A.	1964
Zeitler	Germany	1967
Grüntzig	Switzerland	1974

FIGURE 1. History of peripheral transluminal angioplasty.

A particularly imaginative therapeutic catheter application was introduced by Dotter and Judkins[22] in 1964 to improve blood flow in peripheral arteries with arteriosclerotic obstructive disease. They used a coaxial catheter system and called the method transluminal angioplasty.[21–24] After their pioneering efforts, many European investigators, in particular Zeitler[116–119] and Porstmann,[111] applied the Dotter technique and gathered extensive data in a large number of patients. Gruentzig[30,32,33] altered the Dotter multiple-catheter system and developed a double-lumen catheter that had, at its distal end, a distensible balloon with a fixed outer diameter when inflated. The catheter allowed a smaller puncture site and permitted circumferential pressure on the arteriosclerotic plaque. Used in the iliac and femoral–popliteal arteries, the Gruentzig angioplasty catheter achieved an initial patency rate of 86% and a 3 year cumulative patency rate of 73%[35] (Figure 1).

FIGURE 2. Intraoperative view of the first human coronary angioplasty, performed in San Francisco, May 1977, Gruentzig, Myler, Hanna, and Crew.



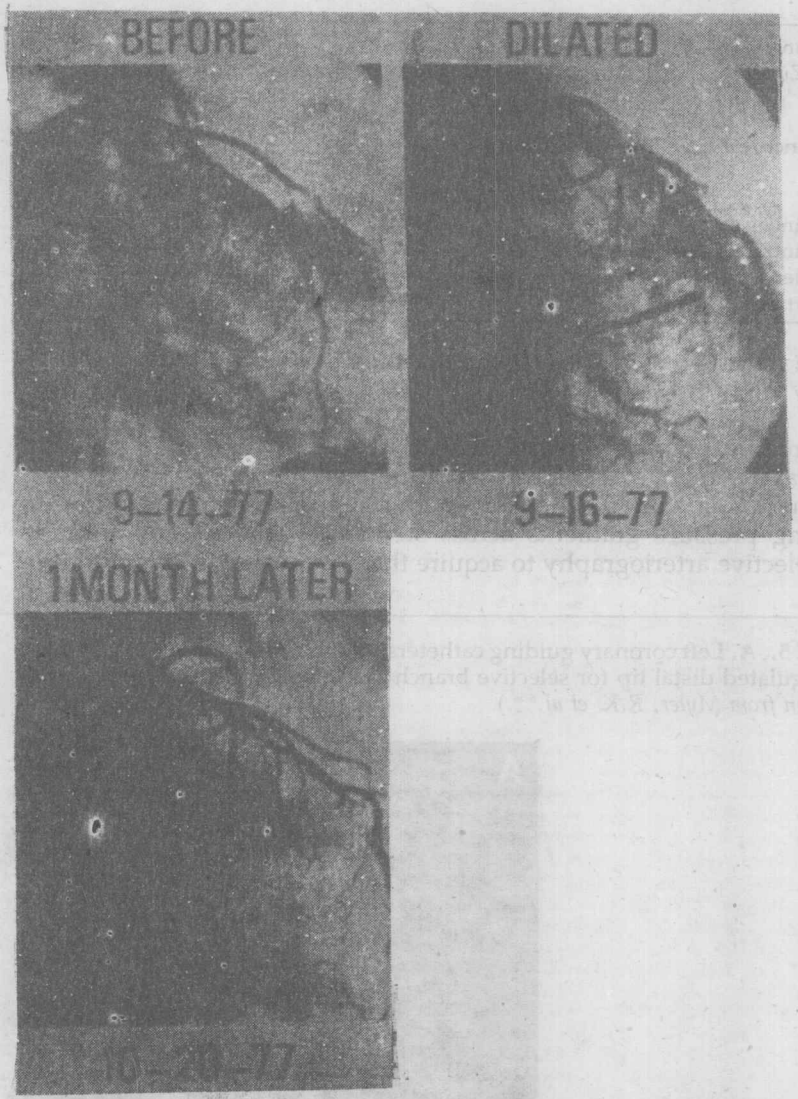


FIGURE 3. First percutaneous transluminal coronary angioplasty, performed in catheterization laboratory. Zurich, September 1977, by Gruentzig.

In 1976 Gruentzig miniaturized his peripheral angioplasty catheter system to perform coronary angioplasty, initially in a canine model and later in human cadaver experiments.[31,38–40] Then, Gruentzig, Myler, Hanna and Turina[41] performed the first intraoperative coronary angioplasties to examine this technique critically in living human atherosclerosis and to determine if distal embolic debris would be produced. In downstream

Grüntzig (Zürich)	—Animal Experiments with Dog Ligature Stenosis	1976
	Cadaver Studies	1976
(Zurich, S.F.)	—During CABG	1977
	Initial PTCA Procedures	
Grüntzig	—Zürich	— 9/77
Grüntzig & Kaltenbach	—Frankfurt	—11/77
Myler	—San Francisco	— 3/78
Stertzer	—NYC	— 3/78

FIGURE 4. History of percutaneous transluminal coronary angioplasty. CABG-coronary artery bypass grafting.

Millipore filters designed to collect effluent after intraoperative coronary angioplasty, embolic debris was never noted (Figure 2).

There followed a period of "probing" human coronary arteries, recording pressure gradients across stenotic lesions, and performing supraselective arteriography to acquire the experience necessary to pro-

FIGURE 5. A. Left coronary guiding catheters; Judkins type. On left (note circle) with angulated distal tip for selective branch placement. (USCI) (*Reprinted with permission from Myler, R.K. et al.*[80a].)