will have very proximal high grade subtotal occlusive two or three vessel and/or left main artery disease. These are the potentially salvageable sudden death candidates, with an expected mortality of 12-30 percent per year on medical management. Therefore, we recommend angiography on an urgent basis for all patients with the combination of small-to-moderate infarcts on ECG/VCG and positive ischemic ST response and/or flat or falling blood pressure to the low level exercise test. The mechanism for the ST change and inappropriate blood pressure responses at these low levels of stress appears to be exercise-induced severe ischemic ventricular dysfunction.

Regarding safety in the stable early post-infarct patient, we can confirm the findings of Smith and co-workers from our experience that no ventricular tachycardia, ventricular fibrillation, myocardial infarction or other serious complications or sequelae to this low level test were observed. Because the information gained is highly relevant to the clinical care of these patients, and because there had been no problem in the early experience, two years ago we started to do this early low level exercise evaluation as soon as the patient was stable after infarction, and cleared by monitored activities of daily living and a 24-hour ECG tape. The test may be done by the seventh day post-infarction, at the earliest, in the patient without complication. In patients suspected of having had large infarctions or with major complications, the test is postponed until the patient is stable and/or out of heart failure (no earlier than the 12th day). Patients with minor complications, such as transient AV block and transient atrial or ventricular arrhythmias who are controlled in the intermediate interval, are tested once they have been stable for two days, and cleared by self-care and 24-hour ECG tape monitoring.

We believe it is inappropriate to discharge a patient to any level of home activity without an objective assessment of physiologic responses and symptoms that may occur with this activity. High-risk subsets of patients found by such assessment should have special attention paid to control of arrhythmia and careful management of hypertension and incipient congestive heart failure. Furthermore, angiography at three to five weeks is indicated for patients with positive ST change and/or a flat or falling blood pressure response, especially if they have angina during the test, have previously had no complications, and do not have extensive infarction. This should be done to identify those from this high-risk group with significant left main, left main equivalent or proximal subtotal three-vessel disease and reasonable ventricular function whose risk can be significantly reduced by appropriate early revascularization surgery.

The pre-discharge low level exercise test described by Smith and co-workers is safe and effective and provides a standardized, objective method for such an assessment.

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The Lesson from the Complications of Coronary Arteriography

It is a general human tendency to take pride in publicizing success and to shy away from admitting failure. Authors are therefore usually enthusiastic to report their experience with new procedures when the results are favorable and the rate of adverse reactions is low, even though in some instances these conclusions may be premature. On the other hand, authors tend to hesitate indefinitely about reporting interventions where the results are poor or the rate of complications is high. An important factor in this regard is the concern that the particular problem encountered may be a feature unique to their laboratory and therefore potentially embarrassing to them.

It is also known that in science, the knowledge of negative experimental results may be equally valuable and sometimes more important than positive results. Such a statement may apply par excellence to the complications of coronary arteriographic studies.

In the early 1970s, shortly after the percutaneous femoral technique was introduced, several angiographers were concerned that the number of serious complications of coronary arteriographic studies possibly had increased.\textsuperscript{1,2} One of us cooperated in a study carried out in three university-affiliated hospitals, which was designed to compare the rate of complications with the brachial and femoral techniques. The preliminary results were presented at the scientific sessions of the American College of Physicians in 1972.\textsuperscript{3} Upon completion of the study, the incidences of various serious complications with the femoral technique and with the brachial technique were, respectively, as follows: myocardial infarction, 1.8 percent vs 0.4 percent; cerebrovascular accidents, 1.6 percent vs no cerebrovascular accidents; and death, 1.5 percent vs 0.2 percent. The difference between the two techniques with regard to these problems was statistically significant. Several later studies reported even higher
mortality and confirmed the increased rate of serious complications with the femoral technique when compared to the brachial approach.

A multitude of factors were thought of as possible culprits or contributors to the increased rate of complications with the femoral technique. Thromboembolism secondary to multiple catheter changes over a wire, the materials utilized in the construction of the catheters, the design of the catheters, the duration of the procedures, the experience of the operators who are being trained in teaching laboratories, and the severity of the underlying disease (particularly in the presence of involvement of the main left coronary artery) were considered. Of these, thromboembolism appeared to be the most important etiologic mechanism underlying the increased rate of serious complications attending the transfemoral approach. A number of modifications were proposed, including systemic administration of heparin during the procedure, which proved to be most popular and effective. The expertise of angiography teams, as reflected by the number of procedures performed per year in a specific laboratory, also received much attention.

We have given specific attention in our laboratory to limiting the number of complications during coronary arteriographic studies, and we adopted a number of routines directed toward this goal. The procedures were performed with careful attention to detail. Systemic administration of heparin was employed in all patients in whom there was no specific contraindication, regardless of whether we utilized the brachial or femoral approach (about 80 percent of our patients are catheterized by the brachial technique and 20 percent by the femoral approach). We have insisted on the procedure of the shortest duration that provides the necessary diagnostic data for the optimal management of the patient. Although our laboratory is oriented to teaching and to allowing our fellows in cardiology to develop sufficient skill to perform independently, all procedures are performed under the direct supervision of an experienced attending physician.

Review of over 1,400 consecutive procedures performed during the past five years in our laboratory showed an incidence of myocardial infarction of 0.2 percent, no cerebrovascular accidents, and a mortality of 0.07 percent. Therefore, it is apparent that serious complications could be kept at a satisfactorily low incidence in a teaching laboratory with a moderate volume of procedures, where both the brachial and femoral techniques are performed, provided appropriate precautions are taken. Reports from other institutions utilizing administration of heparin and other individualized precautions now show that the femoral technique (which is easier and faster and utilizes less contrast material) can be performed with a degree of safety comparable to the brachial approach. Had everybody silently ignored the complications encountered with this technique in the early 1970s, one can only speculate on how many more fatalities would have occurred from thromboembolic phenomena before a simple, inexpensive, and effective modification would have been introduced.

Admittedly, systemic administration of heparin is not the only factor that may have helped decrease the incidence of complications of coronary arteriographic studies; however, the fact that pioneers of the femoral technique adopted this modification, with further reduction of their initially low rate of complications and the incidental observation that omission of heparin prophylaxis in a small number of special studies resulted in increased numbers of thromboembolic phenomena, adds further support to the value of systemic administration of heparin during percutaneous transfemoral arteriographic studies. Besides, it is the original alert produced by the reported increased numbers of complications that may have resulted in the attention to all of the other "little things" that now contribute to present safety.

Editors and individuals in responsible positions in medical institutions should, therefore, encourage the publication of unfavorable results, as well as the good results, provided they are scientifically or clinically relevant. It should be kept in mind that although undesirable experiences may appear embarrassing to the authors, they are in all likelihood not unique to a single institution. The publication of such experiences may alert other workers to the problems and provide a stimulus to develop the appropriate solutions.

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REFERENCES

New Members of the International Editorial Board

The worldwide educational programs of the American College of Chest Physicians represent an "international university without walls." Members around the world identify their medical priorities in regional congresses which are structured by four ACCP councils: the Asia Pacific Council, the European Regional Council, the Middle East Regional Council, and the Pan American Regional Council. Thirteen world congresses on diseases of the chest have been organized by ACCP; these are now presented every four years. There are 25 chapters of the College outside the United States and Canada representing 2,692 members.

Vital as these educational assemblies are, the written word remains the most reliable means of international communication. Scientific communication in the disciplines of cardiopulmonary medicine and surgery is fundamentally related to the viability and stature of College publications. The leadership of the College recognizes the responsibility to provide authoritative original scientific reports in the pages of Chest for both members and nonmembers. In addition to members residing overseas, we are pleased that more than 2,200 individuals and institutions outside the United States and Canada also receive Chest every month (total international circulation 4,892). The contents of each issue reflect the contributions of scientists from every region of the world. We appreciate the assistance of the international representatives to our Editorial Board in these endeavors and are pleased to welcome distinguished scientists to this Board. We look forward to the opportunity to meet with them during the meeting of the International Editorial Board to be held at our next world congress in 1982. The masthead in this issue identifies the members of the International Board. New members are: Jose-Luis Barros, Spain; Rubin J. Jaen, Venezuela; Paul Keszler, Hungary; Stuart C. Lennox, England; W. Laurence Simpson, Australia; Jesse P. Teixeira, Brazil; Juro Wada, Japan; Ann J. Woolock, Australia.

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