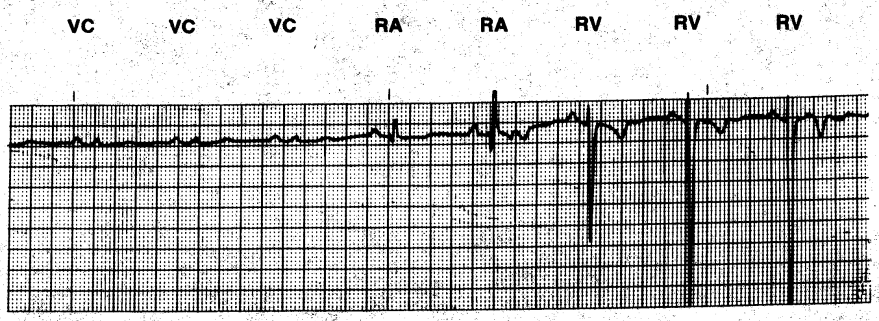
compared to traditional catheterization. Nevertheless, its use does require training and practice. We recommend that every hospital prepare a small group of physicians, nurses, and technical personnel who will be truly familiar with use of the apparatus and ready to offer their services to other physicians on request. The results in information gained could help advance diagnosis and treatment on a broad front.

We developed the flow-directed catheter in the late 1960s in connection with myocardial infarction studies in seriously ill patients. We sought a method for placement of catheters within the pulmonary artery which would provide prompt and reliable passage; would permit manipulation without use of the fluoroscope; and would not cause ventricular arrhythmias. A small inflatable balloon, mounted at the tip of a highly flexible cardiac catheter, was developed and tested, first in animal experiments and later in the clinical area. By 1970 we had reported on its use in 100 patients.

The device consists of a double lumen catheter of about 1.5 mm outside diameter. The smaller lumen is approximately 0.4 mm in diameter and is used to inflate a latex balloon at the catheter tip with either carbon dioxide or air. After the catheter has been introduced into the circulation by cutdown or percutaneous technique, the tip is positioned in the

ECG LEAD FROM CATHETER TIP DURING INSERTION



VC *Catheter tip in vena cava (note: low signal amplitude with "P" and "QRS" approximately equal)*

RA *Catheter tip in right atrium (note: larger amplitude and positive direction of "QRS"; "P" may be larger than shown here, depending on position of catheter within atrium).*

RV *Catheter tip in right ventricle (note: small "P" with large negative direction "QRS").*

Caution: For electrical safety, it is mandatory that these intracavity ECG's be monitored with suitably isolated, preferably battery powered, equipment.