tion therapy was effective in the management of those patients with tracheal cancers. Regardless of treatment, the prognosis of carcinoma of the trachea is generally very poor. Apparently the only real hope for cures are the early lesions in the upper half, and even then the disease is not recognized usually until well advanced.

REFERENCES

Extraluminal Insertion of a Pacing Electrode*

Charles K. Francis, M.D. and Robert R. Henderson, M.D.

An uncommon complication of temporary transvenous pacing via the subclavian vein from an infraclavicular approach is described. The electrode was advanced extraluminally to the left ventricular pericardium where adequate pacing was temporarily achieved.

Transvenous temporary cardiac pacing using a semi-floating pacing electrode inserted into a large peripheral vein has become commonplace in the treatment of cardiac rhythm disturbances. The electrode is advanced via the superior vena cava and right atrium to the right ventricle without fluoroscopic monitoring, the position of the electrode being determined by typical electrocardiograph patterns. Insertion directly into a subclavian vein via an infraclavicular or supraclavicular approach has been shown to be a reliable and rapid route for electrode insertion. The following case demonstrates an uncommon complication of pacemaker electrode insertion from the infraclavicular route.

CASE REPORT

A 67-year-old white woman was admitted to the Tufts Medical Service, Boston City Hospital on June 20, 1971 complaining of sudden onset of exertional dyspnea and leg weakness without chest pain or dyspnea at rest. The patient had documented hypertensive heart disease for 20 years and had sustained an anterior myocardial infarction at that time. She had also been treated for thalassemia minor and adult onset diabetes mellitus. She was taking digoxin 0.25 mg daily and Equagesic, one tablet three times daily.

Physical examination revealed an orthopneic, moderately obese white woman with pulse 40 beats/min and regular; blood pressure 130/80 mm Hg; respirations 24 per minute; temperature of 98.8°F. Jugular venous pulsations revealed prominent A waves and the carotid pulse was slightly diminished. Inspiratory rales were heard at the right lung field. The PMI was at the mid-axillary line in the fifth intercostal space. The first heart sound was diminished, the second heart sound paradoxically split and there was a grade 3/6 harsh systolic ejection murmur at the left sternal border and apex.

*From the Combined Cardiovascular Unit, Regional Medical Program and the Tufts Medical Service, Boston City Hospital, Boston.
radiating to the axilla. There was no hepatomegaly or peripheral edema.

**Laboratory Data**

Hematocrit 37 percent, WBC 11,000; blood sugar 146 mg percent; SGOT 110 karmen units; arterial pH 7.42; PO2 70 mm Hg; Pco2 66 mm Hg; O2 saturation 94 percent; bicarbonate 41.5 mEq/L (room air). The remaining chemical determinations were normal. Chest roentgenogram showed left ventricular enlargement, dilatation of the aorta, calcification of the aortic knob, pulmonary vascular congestion and Kerley B lines. Electrocardiogram revealed complete atrioventricular block, atrial rate of 88 beats/min, ventricular rate of 40 per minute and a complete left bundle branch block pattern.

An Elecath semi-floating bipolar temporary transvenous pacemaker electrode was inserted from an infracavicular approach via the left subclavian vein with electrocardiographic monitoring at the bedside. Good initial blood return was noted following the subclavian puncture. Large positive P waves were noted during the electrode insertion, and with further advancement, a rapid transition to tall positive ventricular potentials was observed. The normal intracardiac electrocardiograph recording from the right atrium is commonly characterized by large biphasic P waves. Right ventricular endocardial recordings show deep QS and small P waves. The patient could be paced at an energy level of 2.0 milliamperes. A post-insertion electrocardiogram showed 1:1 capture at 80 beats/min and complete left bundle branch block pattern. In the following hours, unreliable pacing ensued; the energy level was increased to 8 milliamperes with 1:1 capture; diaphragmatic contractions were noted with each pacemaker discharge. Chest roentgenogram revealed the electrode to be lying outside the cardiac silhouette posteriorly along the heart border (Fig 1). Under fluoroscopic observation, a bipolar pacing electrode was inserted via the right median basilic vein and the original pacemaker electrode removed. Review of the videotape recordings of the removal show the pacemaker remaining external to the heart throughout its removal (Fig 1).

**Discussion**

Complications of temporary transvenous pacing via the subclavian vein from an infra- or supraclavicular approach have included partial pneumothorax, arterial puncture, myocardial perforation, bacteremia, infection at the insertion site, and malpositioning. Campo et al3 have reported two instances of extraluminal pacemaker electrode insertion from the supraclavicular approach. In the present report, the electrode was inserted from an infracavicular approach. Because of the unusual position of the initial electrode, the possibility of anomalous venous structures was investigated by the injection of contrast material into the superior vena cava and left subclavian veins with visualization of normal anatomy. The electrode appeared to be extrinsic to the cardiac chambers along the posterior heart border between pericardium and pleura and presumably traversed directly through mediastinal structures due to inadvertent venous perforation at the insertion site.

Although reliable pacing can be readily achieved at the bedside by this and similar techniques, temporary pacers electrodes should be introduced under fluoroscopic control whenever possible. Blind pacemaker insertion should be attempted only in extreme emergencies and for lifesaving reasons, in which case catheter position should be documented by chest x-ray examination as soon as possible. This case illustrates one of the possible potential complications of pervenous pacemaker electrode insertion without fluoroscopic control.

**References**


**Longstanding Cardiac Perforation by a Permanent Endocardial Pacing Electrode**

B. J. Hurwitz, M.B., B.Ch., and I.W.P. Obel, M.B., B.Ch., F.C.C.P.

A case of longstanding (19 months) cardiac perforation by an endocardial pacing electrode is described, in which uninterrupted cardiac pacing has been accompanied by intermittent diaphragmatic pacing. Repositioning of the electrode was not performed.

**Case Report**

An 80-year-old white woman was first seen in April, 1970 because of syncopal attacks for the preceding two years. There was no history of angina pectoris or myocardial infarction. She was found to be in total heart block with a pulse rate of 32 per minute. Her blood pressure was 260/110. X-ray film of the chest showed mild cardiomegaly due to left ventricular enlargement. There was mild diabetes.

On April 15, 1970, an Elema no. 588B endocardial electrode was passed via the right external jugular vein into the apex of the right ventricle. The diastolic pacing threshold was 1.3 volts. A Vitatron fixed rate pacemaker was attached for permanent pacing. Methyldopa controlled her hypertension and tolbutamide her diabetes.

She returned home to Rhodesia, 1,000 miles distant. There she was seen regularly by an internist. She did not experience syncope and he did not notice any change in pulse or ECG. She was referred back to our clinic at four to six month intervals where she was examined and lead position, ECG and pacemaker output were checked.

In November, 1970, at routine examination at our pacemaker clinic, the Vitatron power unit was found to be faulty and was electively replaced. Pacing failure had not occurred. The intracardiac electrode remained in a good radiologic position in the apex of the right ventricle, and the pacing threshold was 1.2 volts.

In August, 1971 her jugular venous pressure became raised.