Complete Heart Block with Stokes-Adams Attacks Treated by Indwelling Pacemaker

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A man, aged 65, a retired blind-maker, had attacks in which he felt faint and occasionally lost consciousness, over six years. His pulse rate had been known to be about 40 throughout this period. He had no cardiac pain. Attacks had not been more frequent than one or two a week until February 1960 when they increased to several a week.

Investigations revealed complete heart block. No other cardiac abnormality was detected.

In spite of hospital treatment with ephedrine, adrenaline, isoprenaline and prednisone, the attacks became more frequent, and were observed electrocardiographically to be associated with asystole for up to 20 seconds. He became lethargic and confused.

An electrode-catheter was passed by a vein to lie within the right ventricle. A suitable monophasic electrical stimulus conveyed to the heart by this means was followed by a heart beat so that the heart could be driven at a normal rate, and for the eleven hours for which this was maintained he had no attacks. Moreover, his mental state improved for this period.

When the electrode was removed the pulse rate slowed, dropping steadily until after ten days it reached a rate of 20 to 24. Consciousness was maintained with this slow rate, but he was confused and lay inert in bed. The electrode-catheter was passed into the heart again, and pacing at 80 resulted in immediate improvement in his general condition.

Operation for Insertion of Pacemaker

On March 31, 1960, under general anæsthesia, the pacemaker was placed within the rectus sheath with a specially devised lead running from it to a metal electrode 1 cm in diameter which was attached to the left ventricle within the pericardium (Fig 1). This apparatus produced an impulse 90 times a minute (approx. 2 volts for 1·5 msec) (Fig 2).

The patient left hospital five weeks later, taking no drugs, and has led an active life since. He attends hospital for one night each week for the pacemaker to be recharged. This consists of having a light coil of wire strapped to his abdomen. A suitable alternating current is passed through this coil which recharges the accumulators of the pacemaker within his rectus sheath. The patient states that he is quite unaware of the pacemaker, not being conscious of it even when it is being recharged.

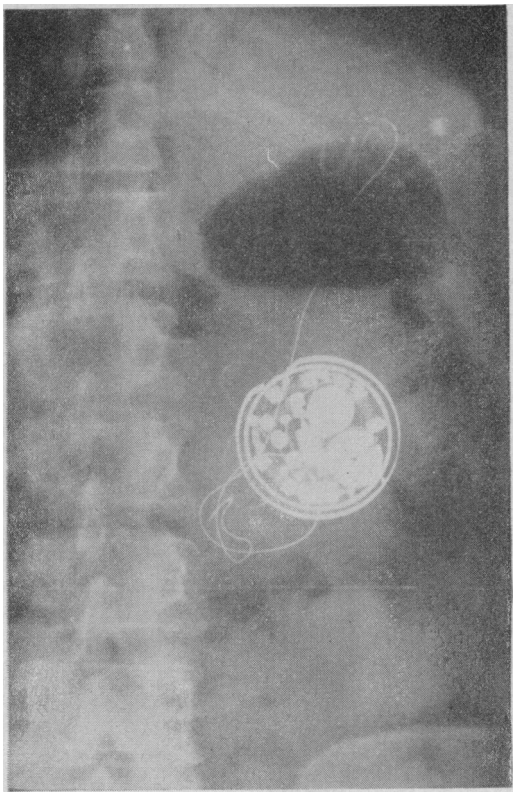

Fig 1 *Abdominal X-ray showing pacemaker in abdominal wall with leads to the heart*

The pacemaker used in this patient was made and designed by Dr Elmquist (Elmquist & Senning 1960) in Sweden. The source of energy is a small nickel cadmium accumulator used to operate a pulse generator in the form of a blocking oscillator. The whole apparatus, which is disc-shaped, is about 5 cms in diameter and 1·5 cm thick, and is embedded in inert plastic. Although in this man it has worked faultlessly for eight months, as a result of failures in other cases we are not satisfied with the design and both Dr Elmquist and we ourselves hope to produce a more satisfactory instrument.

It seems essential that, whatever method is used, no wire should traverse the skin, for if a wire is led externally there is always the danger of sepsis tracking along the wire to the heart, where it has been found to interfere with the electrical conduction.

In St. George's Hospital Cardiac Department, Mr J G Davies has been experimenting with transmission of the impulse at radio-frequency from a small external transmitter to a receiver placed in

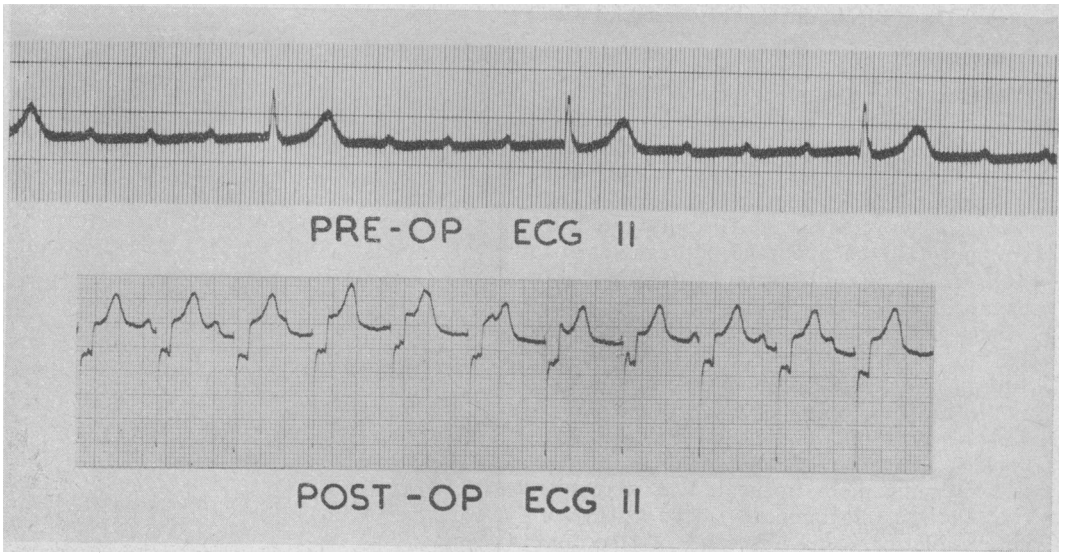

Fig 2 *Lead II of the ECG taken on admission to hospital, and after the pacemaker had been inserted. Longer recordings taken on admission demonstrate the pattern of complete heart block. Evidence of atrial activity is to be seen in both recordings*

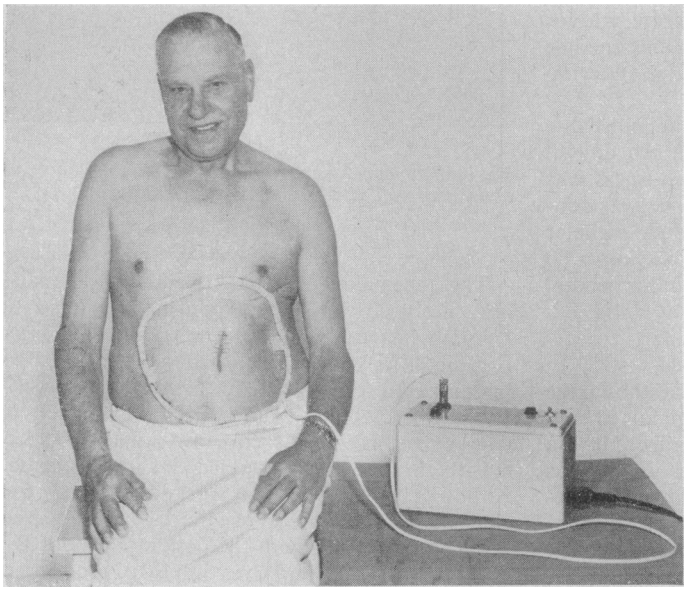

Fig 3 *The patient with the charging induction coil strapped on to the abdomen for charging*

the pericardium, and in the meantime Abrams and his colleagues in Birmingham have used the principle of induction of the impulse in to a subcutaneous coil (Abrams *et al.* 1960).

REFERENCES
Abrams L D, Hudson W A & Lightwood R (1960) *Lancet*, i, 1372
Elmquist R & Senning A (1960) Proc. II Int. Conf. Medical Electronics, Paris, 1959. London, p 253

The following cases were also shown:

Colonic Replacement For Impassable Stricture of the Œsophagus

Martin Birnstingl MS FRCS

Infected Cyst of the Liver

P E B Holmes FRCS (for H Park FRCS)

Symptomless Chronic Empyema

A E Stevens MB MRCP (for K P Ball MD MRCP)

Two Cases of Multiple Nævi

(1) E J Moynahan MD FRCP

(2) E J Moynahan MD FRCP (for P E Polani MD MRCP)

These cases showed somatic and psychic infantilism with delayed puberty and fibroelastosis of the heart.