Transvenous pacing in presence of anomalous venous return to heart

Alan Harris, John Gialafos, and Keith Jefferson

From the Cardiac Department, St. George's Hospital, London

A patient is described with chronic heart block and an absent right superior vena cava with a persistent left ventricular vena cava draining into the coronary sinus. This anomaly resulted in some difficulty in establishing transvenous pacing with the Devices L90 electrode. The use of an Elema electrode wire for transvenous pacing in the presence of this venous anomaly is recommended.

The majority of patients requiring pacemakers are paced using a transvenous electrode. Difficulties may be encountered in passing the electrode wire into the heart because of anomalous venous return. Probably the most frequent anomaly is a persistent left superior vena cava and the rarest is absence of the right superior vena cava (Winter, 1954; Hudson, 1965; Sherman, 1963).

Recent case reports by Harthorne, Dinsmore, and Desantis (1969) and Kukral (1971) have recorded failure to establish permanent transvenous pacing in patients with absence of the right superior vena cava and a persistent left superior vena cava communicating with the right atrium via the coronary sinus. We have recently installed a permanent transvenous pacing system in a patient with a superior vena cava anomaly and we report the clinical and practical details.

Case report

A 49-year-old man was admitted to St. George's Hospital Pacing Unit in March 1971 for permanent pacing. This patient's symptoms started about 2 years before admission when, during the course of an afternoon, he became unwell with giddiness, effort dyspnoea, and chest pain. At that time he was found to be in complete heart block with a ventricular rate of 40 per minute. He was treated with long-acting isoprenaline (Saventrine) and prednisone for a few weeks. His symptom of effort dyspnoea remained unchanged apart from a few weeks in 1970 when he was in sinus rhythm and reasonably well. In February 1971 he experienced his first syncopal episode and for this reason permanent pacing was recommended.

Examination of the cardiovascular system revealed a ventricular rate of 34/minute and a grade 3/6 ejection systolic murmur in all areas of the praecordium. The murmur was thought to be due to the large stroke volume. There were cannon waves in the jugular venous pulse. The electrocardiogram showed 2:1 block with a ventricular rate of 42/minute, right bundle-branch, and left inferior hemiblock.

In March 1971 an attempt was made to pass a Devices L90 electrode wire via the right cephalic

FIG. 1 Venogram showing absence of the right superior vena cava and the left superior vena cava draining into the coronary sinus.
vein into the right ventricle. The wire could not be advanced into the right ventricle from the right cephalic vein because the patient had no right superior vena cava; all the venous drainage of the upper half of the body entered the right atrium via a left superior vena cava draining into the coronary sinus (Fig. 1). A Devices L90 electrode was then passed via the left external jugular vein into the coronary sinus and looping the electrode off the right atrial wall was passed into the right ventricle. Because of the semi-stiff nature of the Devices L90 electrode, a very large loop of wire had to be formed in the right atrium before the tricuspid valve could be crossed resulting in an unstable pacing position.

The Devices wire was removed and replaced by an Elema electrode wire which is relatively soft but with a heavy tip which was passed into the right ventricle by gravity. The Elema electrode readily passed down the left superior vena cava and on into the right atrium via the coronary sinus. The patient was then turned onto his left side and the electrode crossed the tricuspid valve falling into the apex of the right ventricle. A stable pacing position was obtained and a demand pacemaker was implanted into the left axilla (Fig. 2). The patient was nursed on his left side for the next 24 hours and was then allowed normal activities. He has been followed up for 14 months and his pacemaker is functioning satisfactorily.

Discussion

When the left superior vena cava persists it is usually in association with a right superior vena cava. The combination of a left superior vena cava and absence of the right superior vena cava is rare, and Kukral (1971) could only find 32 published cases.

**FIG. 2** Chest x-ray showing the tip of the Elema electrode in the apex of the right ventricle (arrowed).

**FIG. 3** Penetrated chest x-ray showing shadow of left superior vena cava crossing the aortic knuckle.

In the early fetus the systemic venous return is through the bilateral anterior and posterior cardinal veins. With the secondary development of the left innominate bridge between the two anterior cardinal veins, parts of the cardinal veins atrophy. The segments of the left anterior cardinal vein which remain form the left superior intercostal vein, the oblique vein of the left atrium, and the coronary sinus (Patten, 1953). In our patient it is likely that most of the right anterior cardinal vein atrophied, and parts of the left anterior cardinal vein, which normally atrophy, remained to become the venous channel draining the upper portion of the body to the right atrium via the coronary sinus.

Though it is possible to identify the unusual venous channels on the plain chest film (Fig. 3), the abnormality is usually first discovered by the investigator at the time of cardiac catheterization or transvenous pacing by the unusual course taken by the catheter or electrode wire. The variety of venous anomaly may then be identified by venous angiography, and transvenous pacing may be established by selecting the appropriate electrode wire. We strongly recommend that any centre regularly involved in transvenous pacing should keep available Elema transvenous electrode wires.
References


Requests for reprints to Dr. A. M. Harris, Cardiac Department, St. George's Hospital, London SW1X 7EZ.

Notice

Pahlavi Medical Congress

The 4th Pahlavi Medical Congress will be held in Shiraz from 21-26 April 1973. It will include an initial three-day postgraduate course followed by three days of multispeciality biomedical conference.

In past years, this congress has attracted medical scientists from throughout Iran, the Middle East, and more recently, from all over the world. The 1972 Congress had registrants from 22 countries and features a highly successful course on Geographic Medicine moderated by Drs. D. P. Burkitt and M. S. R. Hutt.

The forthcoming Pahlavi Medical Congress will have as its theme 'Therapeutics and the Mechanism of Drug Action'. Dr. George Koelle, of the University of Pennsylvania, will be acting as one of the moderators for the course. We are eager to solicit interest and participation of speakers who may wish to attend this Congress and present 30-minute lectures which review an area of basic or clinical research within this framework. Such proposals should reach us not later than November 1972. We are also interested in receiving 10-minute abstracts concerned with biomedical subjects to be presented at the multispeciality section of the Congress. The deadline for these abstracts is January 1973.

In addition to the scientific aspects the entire venue of Iran, its 2500 year old culture, consisting of archeology, art, crafts, and its current developments are generally of tremendous interest to foreign guests. To facilitate this, both local tours, and tours to Persepolis, Isfahan, and Yazd are available.

The registration fee is $20-00 which allows for all lunches, local sightseeings, and some evenings' social activities.

We sincerely hope you may be with us for the 4th Pahlavi Medical Congress. Several new international hotels are available in Shiraz at moderate rates. You will find Shiraz, this poetic capital of ancient Persia, truly delightful in the month of April with warm sunny days, cool nights, and our famous roses in bloom.
Transvenous pacing in presence of anomalous venous return to heart.

A Harris, J Gialafos and K Jefferson

*Br Heart J* 1972 34: 1189-1191
doi: 10.1136/hrt.34.11.1189

Updated information and services can be found at:
http://heart.bmj.com/content/34/11/1189.citation

**Email alerting service**

These include:

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Notes**

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/