Permanent pacemaker insertion in a district general hospital: indications, patient characteristics, and complications

A Eltrafi, P Currie, J H Silas

Abstract
This report reviews the experience of permanent pacemaker insertion in a district general hospital (catchment population of 350,000) and makes a comparison with the national database and other hospitals in the UK.

Methods—The records of all patients receiving a permanent pacemaker in the inclusive period January 1996 to December 1998 were reviewed. Data collected included number of patients paced each year, age, sex, indications, and complications.

Results—In the three years reviewed 200 patients received new permanent pacemakers, a rate of 190 per million population per year, which is similar to the national implantation rate of permanent pacemakers but lower than that of most European countries (see discussion). The majority of patients paced were elderly (75% were above the age of 70 years).

Atrioventricular block (including complete heart block, 45%, and Mobitz type 2 block, 12.5%) was the commonest indication for permanent pacemaker insertion, followed by sick sinus syndrome (25%) and these findings are comparable to those reported previously. However, carotid sinus syndrome was responsible for 16% of the patients paced and this was higher than that reported in the national database (6.5%). Only 1% of the pacemaker modes used was inappropriate and the complication rate was low at 3%.

Conclusions—This report confirms that permanent pacemaker insertion can be effectively and safely provided locally for the increasingly ageing population. The implantation rate both locally and nationally is still much lower than that of some countries in Europe.

Keywords: permanent pacemaker; atrioventricular block; sick sinus syndrome; carotid sinus syndrome
Complete atrioventricular block was the commonest (90 patients; 45%) indication for permanent pacemaker insertion followed by sick sinus syndrome (50 patients; 25%), carotid sinus syndrome (32 patients; 16%) and Mobitz type 2 (25; 12.5%).

Table 1 shows the modes used compared with the modes currently recommended by the task force of the American College of Cardiology and American Heart Association and adopted by British Pacing and Electrophysiology Group (BPEG). Of the 115 patients who had atrioventricular block (complete heart block and Mobitz type 2 block), 113 had DDD pacing (optimal) and none had an inappropriate mode. None of the 32 patients who had carotid sinus syndrome had an inappropriate moding system but two of the 50 patients who had sick sinus syndrome had VVI modes (inappropriate according the guidelines of BPEG).

COMPLICATIONS
Major complications occurred in six (3%) patients. These include leads displacement (four patients: three atrial leads and one ventricular lead), and wound infection which needed replacement of the pacemaker (two patients). Minor complications occurred in three patients (one patient developed small pocket haematoma within 24 hour of the procedure and further two developed a superficial wound infection that responded to antibiotics. No mortality occurred as a result of the procedures.

Discussion
This study showed that a consultant based permanent pacemaker service can be run effectively and safely in a district general hospital. Setting up such a service requires a cardiologist with good experience in dual chamber pacing and at least one highly qualified and motivated cardiac technician able to supervise the follow up and able to train other members of the team.

The implantation rate in this district general hospital was 190 per million of population per annum, which is similar to that of the UK generally (less than 200 per million of the population per annum). However, this implantation rate is much less than that of Germany and Belgium, which is 450 and 600 per million respectively. The low implantation rate in this country is best explained by a more conservative approach to pacing in the UK.6

In this report 75% of the patients paced were more than 70 years old, similar to the age distribution in the UK (73% of pacemaker implants are in the over 70s). Elderly patients have been shown to have the same benefit for pacemaker implantation (for example, time to ascend stairs) as has been shown in younger patients.1 There has been concern in terms of modes of pacing used in the elderly in the past: it was suggested that the elderly were given less complex pacing systems than younger patients and this has lead to allegations of ageism.7 In this report there is no evidence that the elderly were given a less complex system (see below).

Permanent pacing for complete atrioventricular block was the commonest indication in this study (45%) and it was comparable (42%) to that reported from a similar population.10 Untreated complete heart block has a one year and five year mortality of 50% and 75%–90% respectively11 12; while survival is 70%–85% at five years in those paced.13

Sick sinus syndrome was responsible for 25% of patients paced in this report and it was identical to that reported from a similar district general population.13 Pacing for sick sinus syndrome is based on the association of symptoms with specific dysrrhythmia; it effectively relieves bradyarrhythmic symptoms and can facilitate more aggressive drug treatment of tachyarrhythmias,15 but there is no evidence that pacing asymptomatic patients improves prognosis.16

Carotid sinus syndrome (asystole of three seconds or more with/hypotension after carotid sinus massage in patients with syncope and/or falls) was responsible for 16% of patients paced in this study. This is similar to that reported nationally (6.4%)13—probably because there is an active tilt testing service in our hospital—but lower than centres with a dedicated “syncope clinic” (23.2%).13

Table 1 showed that 142 patients (71%) were paced with the optimal recommended mode and only two (1%) patients received inappropriate modes. Both patients were diagnosed to have sick sinus syndrome and they were paced with VVI modes.

Though it was not clear from the records why one of these patients received an inappropriate mode, the other patient had muscular dystrophy, which probably explains the choice of a simple moding system.

Thirty one of the 32 patients paced for carotid sinus syndrome received dual chamber pacing system as this was shown unequivocally to be superior to ventricular pacing.7

The major complications rate (3%) was low and was comparable to that reported (2.48%) from a district general hospital17 and similar to that reported (2.8%) from a tertiary centre.18

Pacemaker implantation in a district general hospital reduces in-hospital stay and reduces...
the time spent with a temporary pacing system, which increases the risk of septicaemia. It also reduces the need for elderly patients and relatives to travel great distances for follow up.

Summary

This report confirms the feasibility of permanent pacemaker insertion effectively in a district general hospital with a low incidence of complications. It also confirms that appropriate pacing modes can effectively be selected in this setting.

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5 Cunningham AD, Rickards AF, Nathan AW. Trends in pacemaker implantation; is the UK the “poor man of Europe”? [abstract]. Br Heart J 1994;71(suppl):S9.

Appendix 1

NASPE/BPEG PACEMAKER GENERIC CODE

Examples: AAI, VVI, DDDR

- First letter signifies the chamber(s) being paced:
  - A (atrium)
  - V (ventricle)

- Second letter indicates the chamber(s) being sensed:
  - A (atrium)
  - V (ventricle)

- Third letter indicates the mode of sensing:
  - I (inhibited)
  - T (triggered)

- Fourth letter indicates rate responsiveness:
  - O (none)
  - R (rate responsiveness).

- Fifth letter indicates:
  - Antitachycardiac device

Appendix 2

GUIDELINES AND GENERAL PRINCIPLES FOR PERMANENT PACEMAKER INSERTION

(A) Guidelines

Patients considered for pacing are divided into three groups:

- Class 1: Conditions in which there is general agreement that pacemakers should be implanted—syncopal patients with complete heart block or prolonged sinus arrest.

- Class 2: Conditions in which permanent pacemakers are frequently used but there is some divergence of opinion about whether they are needed—sick sinus syndrome without syncope but with other symptoms.

- Class 3: Conditions in which there is general agreement that pacemaker are not needed—asymptomatic patients with sinus node disease or first degree atrioventricular block and unexplained Syncope without obvious cardiac arrhythmia.

(B) General principles for pacemaker choice

1. The ventricle should be paced if there is actual or threatened AB block.

2. The atrium should be paced/sensed unless contraindicated.

3. Rate response is not essential if the patient is inactive or has a normal chronotropic response.
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