Temporal trends, Complications and Outcomes of Pacemaker Implantations: a decade long single-centre analysis

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Introduction: Limited data exists regarding temporal trends, long term outcome and complication rates of permanent pacemaker (PPM) implantation. In 2008, PPM implantation services commenced at Tauranga Hospital, a secondary hospital in New Zealand providing for a population of over 250,000. An overall strategy of procedural safety was implemented with emphasis on cephalic vein access and ventricular septal lead placement whenever possible. We present our findings over the past ten years.

Methods: Consecutive patients undergoing new single chamber (SS) or dual chamber (DD) PPM implantation at Tauranga Hospital from 2008-2018 were included in this retrospective analysis. Patient demographics, procedural characteristics, complications, short and long term outcomes were obtained from electronic records and device database. Cardiac resynchronization therapy were excluded.

Result: 876 patients identified, comprising DD 590(67%), SS 286(33%). Median age at implantation was 79y (IQR 72-85), predominantly European (90%) and male (61%). Device indications and presenting symptoms are shown in figure 1. There is a trend of increasing proportion of DD implantation and decreasing SS (figure 2). Patients with SS were older than DD (median 83 vs 77y) with more comorbidities (figure 3) and lower LVEF (45±10 vs 49±7, p=0.05). Those with DD had less Major Adverse Cardiac or Cerebral Event (MACCE) than SS (31% vs 63%, HR 0.44, CI 0.35-0.54, p<0.001) and lower all-cause-mortality (17% vs 53%, HR 0.29, CI 0.22-0.37, p<0.001). Short term procedural complications (≤12 weeks) occurred in 3.7%. Median time to complication was 10±39 days. Most frequent complication was lead displacement in 16(1.8%) patients, of which 11 were atrial leads. 5(0.6%) developed subclavian venous thromboses, 4(0.5%) pneumothoraces, 2(0.2%) haematoma requiring evacuation, 2(0.2%) infection requiring explantation and one pericardial effusion not requiring drainage. Long term complication rate (>12 weeks) was 1.1% including three cases of pacing cardiomyopathy occurring after one year. Cephalic vein access for ventricular lead was utilized in 78% of patients and was associated with lower complication rates compared to non-cephalic access (3.1% vs 6.8%, HR 0.45, CI 0.22-0.94, p=0.033). 84% of ventricular lead was placed in the septal position. This was associated with less MACCE compared to patients with leads in the apical position (37% vs 62%, HR 0.70, CI 0.55-0.90, p=0.005).

Conclusion: Patients who receive single chamber PPM are older with more comorbidities and greater long term mortality. Over ten years, there is a trend towards greater proportion of dual chamber PPM being implanted. Despite being a relatively low volume centre, our overall procedural complication rates were acceptable. We attribute this to the specific strategy of cephalic access utilization and ventricular lead placement in the septal position.