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Pacemaker rate sensor optimization- Our small step to a quality patient journey

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Introduction

Cardiac pacemaker functions in maintaining basic heart rate (HR) for patient with significant bradycardia. It has another general function to raise patient HR according to their physiological need namely "Rate modulation", particularly for those with chronotropic incompetence: failed to raise HR to maintain physical needs. However, optimization of the rate sensor's function was generally underutilized due to limited clinic time; minimal patient engagement and the rapidly growing patient volume (newly implanted pacemaker has been doubled to ~1500 annually in the past decade, and is still accumulating). Without the rate sensor optimization, some patients particularly the younger may limit their activities for years after implantation. We have established a Cardiac Nurse Pacemaker clinic in 2010 with over 1200 clinic attendance every year. It not only provides regular device follow-up and counseling, but also empowers patient self-care knowledge and ability; assess and manage signs and symptoms including exercise intolerance.

Objectives

1. To improve exercise tolerance of selected patients by pacemaker rate sensor optimization. 2. To evaluate different optimization methods, that may best fit the patients.

Methodology

A pilot study was conducted from April 2011 to September 2012 (18 months). We have recruited 20 ambulatory patients with symptoms of exercise intolerance and performed rate sensor optimization using 3 different methods. 1) Adjust rate sensor using treadmill exercise test (TET) with supervision by Cardiologist and collaboration with physiotherapist. 2) Perform 6-10 minutes walk in clinic, both before and after rate sensor adjustment. 3) Collect patient baseline average HR histogram via pacemaker interrogation, adjust rate sensor only by experience and review in clinic every 1-2

months. All patients would be reviewed with the following parameters being monitored: a) average HR histogram, b) exercise tolerance (floor of stairs), and c) patient satisfaction and QoL

Result

All patients (n=8) recruited in group 1 and 2 shown improvement in all monitored parameters. Two of them could even resume their previous job. For patients recruited in group 3 (n=12), only six of them (50%) showed improvement in the average HR histogram, although eight of them (67%) claimed with subjective improvement in their exercise tolerance and QoL. Repeated clinic follow-up and re-adjustment were needed in most of them, four of them without any improvement were thus terminated. Conclusion: Rate sensor optimization of pacemaker under TET or 6-10 minutes walks are shown to be effective, and the latter one seems to be more cost effective and time-saving. On the other hand, Cardiac Nurse Pacemaker Clinic can offer quality specialized care and continued support for pacemaker patients including those with exercise intolerance after implant.