

Comparison between VDD and DDD Pacing in Symptomatic Second degree and Complete Heart Block

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Abstract

Background: VDD pacing provides the physiological benefits of atrioventricular synchronous pacing with the convenience of a single lead system, but is hampered by uncertainty regarding long term atrial sensing and development of sinus node disease.

Objective: To evaluate the efficacy and sensitivity of two different types of dual chamber pacemakers: (VDD and DDD pacemakers) by various electrophysiological and operative parameters in an attempt to determine whether VDD pacemakers are a viable alternative to DDD pacemakers in treatment of patients with 2nd and 3rd degree heart block with normal sinus node function.

Method: The study was conducted during the period between April 2006 to September 2007 on 48 patients with symptomatic 2nd degree and complete heart block, attending the Cardiac Care Unit in Al-Kadhimia Teaching Hospital. Those patients divided into two groups: VDD group and DDD group; each consisted of 24 patients. The VDD and DDD pacemakers were implanted in the patients and the tests of efficacy and sensitivity were done at implantation and in the follow up periods (2nd day of implantation, 10 days, 1 month, and 3 months after implantation) for both groups. These tests were: Atrial sensitivity, atrial lead impedance, P-wave amplitude, event histogram (% of atrio-ventricular synchronous pacing), duration of implantation, and duration of fluoroscopy. The outcomes of these tests were compared in both groups.

Results: Forty eight patients were implanted; half of them received DDD pacemakers, and the other 24 received VDD pacemakers. At the time of implantation and during the 3 months of follow up, the DDD group showed significant higher efficacy and sensitivity than the VDD group. After implantation; the mean P-wave amplitude, atrial sensing threshold, atrial lead impedance, and % of AV synchrony were 3.42 ± 1.1 mV; 3.46 ± 1.3 mV; $568 \pm 103.42 \Omega$; $95\% \pm 7\%$ respectively in DDD group, while they were 2.91 ± 1.3 mV; 2.46 ± 1.18 mV; $624.2 \pm 136.26 \Omega$; $90\% \pm 8\%$ respectively in VDD group. Implant time was significantly reduced in VDD patients (61.82 ± 14.6 min.) compared with DDD group (72.62 ± 10.4 min.) ($p < 0.05$). The exposure to radiation (fluoroscopy time) was significantly reduced in VDD patients (6.53 ± 2.9 min.) in comparison with DDD patients (10.37 ± 3.4 min.) ($p < 0.05$).

Conclusion: the dual lead DDD pacing is superior to single lead VDD pacing for long term maintenance of AV synchronous pacing in symptomatic 2nd degree and complete heart block with preserved SA node function. The lower cost, high reliability, and abbreviated implantation time suggest that a VDD pacing is a viable alternative to DDD pacing.

Keywords: DDD pacemaker, VDD pacemaker, AV blocks, AV synchrony and atrial sensitivity threshold.

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Introduction

Most clinicians consider use of dual chamber DDD pacing for symptomatic AV block in order to maintain AV synchrony^(7, 8, 12, 15).

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VDD pacing utilizing a single pass lead with far field atrial sensing bipoles is a potentially simpler approach to provide the physiological benefits of atrioventricular synchronous pacing block with a single lead system^(3, 4, 7). Despite this, VDD pacing is utilized in only one percent of patients receiving pacemakers in some countries like North America, though it is more widely used in other countries like Europe^(5, 10, 11, 14). This