Cardiac Pacemakers Step by Step



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Preface

The impetus for writing this book came from our observations that many health care professionals and young physicians working in emergency rooms, intensive and coronary care units were unable to interpret simple pacemaker electrocardiograms correctly. Over the years we also heard many complaints from beginners in the field of cardiac pacing that virtually all, if not all, the available books are too complicated and almost impossible to understand. Indeed, the ever-changing progress in electrical stimulation makes cardiac pacing a moving target. Therefore we decided to take up the challenge and write a book for beginners equipped with only a rudimentary knowledge of electrocardiography and no knowledge of cardiac pacing whatsoever. Because many individuals first see the pacemaker patient after implantation, the book contains little about indications for pacing and implantation techniques. The book starts with basic concepts and progressively covers more advanced aspects of cardiac pacing including troubleshooting and follow-up.

As one picture is worth a thousand words, this book tries to avoid unnecessary text and focuses on visual learning. We undertook this project with the premise that learning cardiac pacing should be enjoyable. Cardiac pacing is a logical discipline and should be fun and easy to learn with the carefully crafted illustrations in this book. The artwork is simple for easy comprehension. Many of the plates are self-explanatory and the text in the appendix only intends to provide further details and a comprehensive overview.

Many of the images used to create the illustrations in this book are taken from CorelDraw and Corel Mega Gallery clipart collections.

We are grateful to Charlie Hamlyn of Blackwell Publishing and Tom Fryer of Sparks for their superb work in the production of this book.

> S. Serge Barold Roland X. Stroobandt Alfons F. Sinnaeve





RECORDING PACEMAKER ACTIVITY

- * 12-lead ECG during transvenous pacing
- * Standard chest electrode positions
- * Grid for measuring intervals
- * The electrical axis in the frontal plane
- * Determination of the mean frontal plane axis 1
- * Determination of the mean frontal plane axis 2
- * A rule of thumb for the mean frontal plane axis















paced event ; Vs = ventricular sensed event

THE ELECTRICAL AXIS IN THE FRONTAL PLANE





DETERMINATION OF THE MEAN FRONTAL PLANE AXIS CONT'D





SUMMARY : the QRS axes of the heart (not paced)







FUNDAMENTALS of ELECTRICITY

- * Ohm's law
- * Water equivalent
- * Impedance
- * Common units for pacemaker variables
- * Battery 1
- * Battery 2
- * Battery impedance and battery voltage
- * Battery capacity

























VENTRICULAR STIMULATION

- * Myocardial refractory period
- * Asynchronous ventricular pacing (VOO)
- * Ventricular depolarization by pacing
- * The output pulse of the pacemaker
- * The programmer and telemetry
- * Panic button
- * Programming amplitude and pulse width
- * Determination of pacing threshold with constant pulse width
- * Determination of pacing threshold with constant voltage
- * Strength-duration curve
- * Safety margin for capture
- * Autocapture
- * Bipolar vs unipolar pacing -
 - stimulus on analog recorder
- * Variable stimulus appearance on digital recorder



