LVOT VTI were similar but improved compared to RV septal pacing. This provides a potential indication for physiologic pacing in patients with long PR.

PO-619-04

MIMIC HEART RATE VARIABILITY ALGORITHMS FOR PACEMAKERS

Magdalena Maria Defeo MD; Leopoldo Garavaglia and Isabel Irurzun Prof

Background: Heart rate variability (HRV) is the physiological variation in the duration of cardiac cycles. HRV is a complex signal composed of multiple frequencies that give it chaotic characteristics. These characteristics are not taken into account in current cardiac pacing devices, whose operation is fundamentally periodic, with variations according to the level of activity.

Objective: In this work we propose an algorithm to imitate the heart rate variability of a healthy individual. This algorithm can be used in all currently available cardiac pacing devices.

Methods: Electrocardiographic records of adult individuals were examined in order to establish relationships between different cardiac intervals (RR, RT, TP, PR, TR, RP, and PT). Based on the HRV series of about 700 healthy individuals of both genders, in an age range from 1 month to 99 years, we established mathematical relationships that are used in this work to mimic HRV in pacemakers.

Results: The figure shows the dependence of the mean value of the RR intervals (\( \overline{RR} \)) and the standard deviation (SDRR) on age and gender ((a) and (b) respectively). The HRV series can be normalized to \( \overline{RR} \) and SDRR, and the power spectrum can be simulated by mixing pink noise and brown noise (c). Time series with the same power spectrum can be mathematically generated (d) and then used as stimuli in a pacemaker. Figure (e) and (f) show the synchronization between the RR interval and all the intervals containing the TP. The TP interval is the basic interval, and the end of the repolarization process indicates the beginning of the cardiac cycle.

Conclusion: Cardiac pacing devices can mimic the HRV of healthy individuals if the intervals are measured from the end of the repolarization period.

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DYNAMIC CHANGES IN HIS BUNDLE STRENGTH DURATION CURVES FAVOR SELECTIVE PACING STRATEGIES

Michael V. Orlov MD, PhD; Timothy G. McIntyre MSBE, CEPS, CCDS; Ahad Jahangir MS; David A. Casavant MSBE, FHRS, CCDS and Darya Lee HSDG

Background: His bundle pacing (HBP) has been hampered by unpredictable increase in chronic pacing thresholds (PT). Little data is available on changes in HBP strength-duration curve (SDC).

Objective: To characterize acute and chronic HBP SDC, compare them to RV SDC and come up with programming recommendations.

Methods: Acute (post implant) or chronic (6 months) PT measurements were performed in 26 pts. Dynamic (both acute and chronic) data were available in 9 pts. Rheobase and chronaxie were calculated. Rheobase characterizes the flat portion of SDC (lowest PT at that portion of the curve) and chronaxie value (pulse width at twice the rheobase PT) allows to program outputs at safety margin.

Results: Chronic SDC for HBP is shifted up and left compared to acute SDC. Chronic HBP chronaxie decreases and RV chronaxie