JACC Vol. 15, No. 2
February 1990:134A

TRANSOESOPHAGEAL DEFIBRILLATION.

Pascal McKeown, M.B., Simon Croal, B.Sc., Desmond Allen, M.D., John Anderson, Ph.D., Mazhar Khan, F.R.C.P., Jennifer Adgey, M.D., F.A.C.C.. Cardiac Unit, Royal Victoria Hospital, Belfast, U.K.

The use of transoesophageal defibrillation has been limited by the lack of a stable electrode system. We have designed a new quadripolar oesophageal electrode system, which allows bipolar oesophageal ECG recording and energy delivery for DC countershock. To date, 118 cardioversions have been attempted in 94 patients (pts) including 99 episodes (eps) of atrial fibrillation (AF), 14 of atrial flutter, 2 of supraventricular tachycardia (SVT) and 3 eps of ventricular tachycardia (VT). Predicted trans-oesophageal (TOI) and transthoracic (TTI) impedances were recorded in all pts. The mean TOI of 52.6±SD11.8 ohms was significantly lower than the mean TTI of 63.3±SD16.4 ohms (paired t-test, p=0.0001). All eps of atrial flutter, SVT and VT were successfully terminated using a maximal transoesophageal (TO) energy of 50J. Of the 99 eps of AF the maximal delivered TO energy was 100J in 94 eps and 200J in 5 eps. Overall, 81/99(82%) eps of AF were successfully terminated by this route with a mean TO energy of 63.8±SD37.3J and mean peak current of 20.2±SD 5.3A (range 11.9-31.7A). This electrode system has also been electively positioned in 23 pts during electro-physiological studies. During programmed ventricular stimulation, 8 eps of ventricular fibrillation (VF) and 5 eps of VT were induced. All eps of VF were terminated using a maximal TO energy of 100J (6 eps at 50J, 2 eps at 100J - peak current range 17.0-25.3A). All 5 eps of VT were terminated using a maximal delivered TO energy of 50J. This oesophageal electrode system, by reducing impedance, allows the use of low energies in the correction of atrial and ventricular arrhythmias and thus a pocket sized defibrillator is a distinct possibility.

INTRACARDIAC SIGNAL-AVERAGED ELECTROCARDIOGRAPHY IMPROVES PREDICTION OF INDUCIBILITY OF VENTRICULAR TACHYCARDIA IN HYPERTROPHIC CARDIOMYOPATHY PATIENTS

Lameh Fananapazir, M.D., Judith B. Winkler, N.H.L.B.I., Bethesda, Maryland.

We have previously reported that ventricular tachycardia induced by standard programmed stimulation (PS) is strongly associated with a history of sudden cardiac arrest or syncope in pts with hypertrophic cardiomyopathy (HCM). We tested the abilities of intracardiac (ic) and surface (s) signal-averaged electrocardiography (SA) to identify HCM pts with inducible VT were compared in 26 HCM pts who underwent PS. Indications for electrophysiologic studies were: cardiac arrest (6 pts), syncope or presyncope (14 pts), asymptomatic VT (4 pts) and family history of sudden cardiac death (2 pts). SA-ic and SA-s were performed with a Corazonix-Predictor a bidirectional 25 Hz filter to a noise level of <0.3 uV. SA-ic was recorded at PS sites: RV apex, RV outflow tract and LV. SA-s was abnormal if filtered QRS duration (QRS) was >120 ms, Root-Mean-Square was <20 uV or Low Amplitude Signals was >35 ms. SA-ic was abnormal if QRS=>135 ms. PS induced sustained (>30 s duration or requiring cardioversion) VT in 14 pts. Abnormal SA indices were significantly ($p<0.05$) present in pts with inducible VT. Ability of the two SA methods to detect pts with inducible VT was:

	SA-s	SA-ic	SA-s + SA-ic
Sensitivity	47%	67%	78%
Specificity	55%	82%	71%

Thus, SA-ic improves importantly identification of HCM pts with arrhythmogenic ventricles.

WHAT ARE THE DETERMINANTS OF TRANSTHORACIC SHOCK CURRENT REQUIREMENTS FOR VENTRICULAR TACHYCARDIA? A PROSPECTIVE MULTICENTER STUDY.

Richard E. Kerber, MD, FACC, Michael G. Kienzle, MD, FACC, Brian Olshansky, MD, FACC, Albert L. Waldo, MD, FACC, David Wilber, MD, FACC, Mark D. Carlson, MD, FACC, Ann M. Aschoff, RN, Sally Birger, RN, Laurie Fugatt, RN, Susan Walsh, RN, Martin Rockwell, MSEE, Francis Charbonnier, Ph.D. Univ of Iowa, Iowa City, IA

Our purpose was to evaluate potential determinants of transthoracic shock success for the termination of ventricular tachycardia (VT) using low shock currents (18 or 25 amperes [A], equivalent to 100-200 joules). We prospectively studied 87 patients and compared the following VT parameters: monomorphic VT (MVT) (uniform morphology, any rate) vs. polymorphic VT (PVT) (varying morphology, rate <300/min), RBBB vs. LBBB, superior vs. inferior axis (SA vs. IA), VT rate (<200/min vs. ≥200/min) and VT duration to first shock (<30 secs vs. ≥30 secs). Results (**=p<.01, chi-square).

	# of shocks	# Successful	% Successful	
PVT	27	12	44%	] **
MVT	140	103	74%	
RBBB	22	16	73%	
LBBB	29	16	55%	
SA	29	17	59%	
IA	18	13	72%	
≥200/min	86	51	59%	] **
<200/min	64	52	81%	
<30 secs	24	12	50%	
≥30 secs	37	21	57%	

Thus, the major determinants of the effectiveness of low energy or current transthoracic shocks for VT are whether the VT is MVT or PVT, and the VT rate. BBB morphology, axis and duration do not influence the success of low current shocks for VT.

RADIOFREQUENCY CURRENT MODULATION OF ATRIO-VENTRICULAR NODAL CONDUCTION: IMPLICATIONS OF UNINTENTIONAL THIRD-DEGREE CONDUCTION BLOCK

Erica D. Engelstein, M.D., Klaus-P. Kunze, M.D., Wolfgang Duckeck, M.D., Karl-H. Kuck, M.D., F.A.C.C. University Hospital Eppendorf, Hamburg, F.R.G.

In 26 pts (10 m, 16 f) with various supraventricular arrhythmias ventricular rate control was intended by radiofrequency current (RFC) modulation of atrioventricular (AV) nodal conduction. RFC applications (range 1-20) of 20-90 W x 10-30 s induced unintentional third-degree AV block (AVB III°) in 15 pts. While AVB III° was still present at the end of procedure in 7 pts (group A), AV nodal conduction returned within 2 s to 30 min (median 2 min) in the remaining 8 pts (group B, PQ=215-320 ms). During hospitalization (2 weeks) AVB III° was permanent (n=5) or intermittent (n=2) in all group A pts, requiring pacemaker (PM) implantation. AVB III° recurred within 1 to 5 days in 6/8 group B pts during continuous in-hospital ECG monitoring: it remained permanent in 2/6 and became intermittent in 4/6 pts, leading also to PM implantation. 2/8 group B pts had no documented recurrence of AVB III° within the first year of the procedure. In 9/15 pts RFC-induced AVB III° had persisted for ≥3 min during the modulation procedure and was associated in all with permanent or intermittent recurrent AVB III°, whereas AVB III° recurred in only 2 of the 6 pts in whom unintentional AVB III° had persisted for <3 min. Conclusions: 1. RFC-induced AVB III° lasting for ≥3 min during AV nodal modulation always requires PM implantation. 2. In pts with AVB III° lasting for <3 min ECG monitoring during the first week after the procedure is mandatory. 3. If modulation (as opposed to ablation) of AV nodal conduction is intended, induction of even short episodes of AVB III° should be avoided.