Lightning Data Center
Minutes
May 11, 2007

Quotations:

I. From “The Pharos” spring 2005 - The eighteenth and nineteenth centuries was a period during which coronary disease was uncommon because most people died from infections. Sudden death was often accidental, especially related to drowning, asphyxiation, and lightning.

The Leyden Jar, invented in 1746 provided the first electrical device to “invigorate the lifeless body”.

In 1776 John Hunter said, “Electricity is probably the only method we have of immediately stimulating the heart”.

II. Three types of cardiac effects have long been known to result from the direct application of electric current to the exposed heart. (a) Stimulation of ectopic beats, (b) induction of arrhythmia’s, (c) termination of arrhythmia’s. Zoll, P et al circulation volume 14, p. 745, 1956.

The passing of Roy Benson Carpenter was noted. He was president of a lightning protection company and a major force in the field of lightning safety devices.

Members present: Cherington, Estep, McDonough, Mullan, Nibbe, Phillips, R. Spangler, C. Spangler, Yarnell

The theme for the meeting was “Defibrillation and Defibrillators” as lightning fatalities are most often due to cardiac arrest.

A handout from the Pharos/Spring ’05 “Hearts are too good to die”, the history of defibrillation by Silverman was made available. This paper discusses shocking devices from the Leyden Jar to the very small implantable defibrillators and the portable “smart” external defibrillators of the present.

A group of key papers for this historical survey were briefly mentioned. These references were kindly supplied by cardiac electro physiologist, Dr. Richard Helfant are as follow:

1) Historical development of cardiac pacemakers by Zoll, P in progress of Cardiovascular Diseases, March 1972, noted that defibrillators grew from treatment approach to pacing the heart.

2) In “The Effects of External Electric Current on the Heart”, by Zoll et al Circulation 1956, techniques are described for stimulating and “counter shocking” to terminate asystole and ventricular tachycardia/fibrillation. Heretofore this was only an operative technique on the exposed heart.

3) Zoll described “Resuscitation of the Heart in Ventricular Standstill by External Electrical Stimulation” in the N.E.J.M. in November 1952.

4) Lown, B in JAMA 1962 in “New Method for Terminating Cardiac Arrhythmias with Synchronized Capacitor Discharge” transitioned the stimulation from destructive A.C. current to safer D.C. shocks.

5) In NEJM vol. 261, 1952 Farman and Schwedel showed how to use “An Intracardiac Pacemaker for Stokes-Adams Seizures”. They used endocardiac pacing via an electrode threaded into the heart transvenously.

6) John Kastor in Am J of Cardiology 1989 documents “Michael Mirowski and the Automatic Implantable Defibrillators”-story published first in 1970.

We had the privilege to hear from Dr. Richard Spangler, Cardiologist and his son, Chris Spangler discussed the early history of defibrillators in Colorado. They then gave a vivid personal description of a cardiac arrest with a first time layman’s use of a portable automated defibrillator - which only shocks for ventricular tachycardia-fibrillator. It will not shock for other arrhythmia’s. ("There is a > 96% sensitivity for detecting ventricular fibrillation and almost 100% specificity for avoiding false shocks." - Pharos)

Dr. Andrew Smith, Cardiologist, discussed pacing showing a small I.C.D. device and discussed the operative techniques. He noted that even a low voltage D.C. current applied intracardiac over a period of time can induce ventricular fibrillation. He also noted that only a small percentage of the energy applied to the chest actually reaches the heart in the external defibrillation.

Caution was raised re: Fat impedance exercise devices that make use of transthoracic current. Also a report of a taser capturing ventricular rhythm was noted by Dr. Smith.

Dr. Gerry Estep, Emergency Medicine brought defibrillators and showed the differences between the standard machines which monitor the rhythms. This allows the clinician to decide re: types of shocks for cardiac arrhythmia or arrest versus the “smart” external defibrillators for layman use. This “smart” defibrillator shocks for Vtac/Vfib, only. Electrode placement, upper (R) shoulder, lower (L)

axillary rib cage, was also discussed. Dr. Estep felt that lightning most likely yielded asystole by massive depolarization. Clinically, we often find the patient in Vfibrillation. It was stressed that immediate resuscitation is crucial. These efforts are now being more prolonged and aggressive in cardiac arrest per Dr. Estep.

Dr. Howard Wachtel discussed circular aberrant rhythms in the injured myocardium in relation to ventricular fibrillation. This linked to Dr. Spangler and Dr. Smith's discussion of the new field of resynchronization electrical stimulation of the heart with some dramatic improvements in chronic heart dysfunction.

These minutes do not represent official positions of LDC or attending individuals. Any inaccuracy in capturing the discussions presented is solely the writer's responsibility.

These minutes are intended to capture the essence of the meeting as recorded and respectfully submitted by:

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