

Measurement of esophageal temperature at two separate sites during pulmonary vein ablation

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Introduction: Pulmonary vein ablation (PVA) has been used to treat persistent supraventricular arrhythmias, in which a cardiologist first isolates and then thermally ablates the source of the arrhythmia. Since the esophagus is in close proximity to the left atrium, heat induced injury to the esophagus may occur. Although the incidence is low, the mortality rate is high. Luminal esophageal temperature (ET) monitoring is one of the most effective measures to minimize the risk of injury. In this retrospective study, we elected to analyze temperature changes during PVA at two different temperature monitoring sites in the esophagus.

Methods: The anesthetic technique was standardized and utilized general anesthesia, endotracheal intubation and an arterial line. ET monitors were placed at two mid-atrial locations, ET1 and ET2 separated by 1-1.5 inches in the esophagus, as determined by cardiologist using fluoroscopy. Temperatures at both ET1 and ET2 locations were recorded simultaneously when radio-frequency ablation was performed at different left atrial sites. The peak ET was recorded at each location. In particular, the increase over baseline ET and the difference between ET1 and ET2, were noted.

Results: Twenty five patients were studied. Ablation sites in the left atrium included the anterior, posterior, inferior regions and the pulmonary veins. The most significant increases in temperature were seen during ablation of the posterior left atrium ranging from 0.1-4.0 degrees. However, in 20 out of 25 patients, measurements of ET1≠ET2. In 10 patients ET1 was > ET2. The absolute value of difference of temperature between ET1 and ET2 ranged from 0.4 to 3.8, with a mean of 1.3 and standard deviation of 1.1.

Discussion: These findings suggest that measurement of temperature at two separate esophageal locations is more sensitive than one location in detecting temperature increases during PVA. The ablating electrode during PVA moves from different areas within the left atrium, and therefore, a wide area of temperature measurement is needed for more accurate monitoring. Furthermore, the most significant increases in temperature occurred when ablation performed in the posterior left atrium, adjacent to the esophagus. The implications of these observations suggest that one location of temperature measurement may not be accurate enough in detecting a "true" esophageal temperature. Further studies are needed to verify these findings in a prospective study and to ascertain whether this has any patient safety ramifications for preventing esophageal injury.

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