

Patient Awareness of High Frequency Jet Ventilation to Minimize Cardiac Motion during Interventional Procedures

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Introduction

High frequency jet ventilation (HFJV) is used to minimize pulmonary and hence, cardiac motion during interventional procedures. Patient awareness during routine use of HFJV has not been evaluated in this setting. A Bispectral index (Bis) value of less than 60 is generally accepted as appropriate level of sedation during general anesthesia.

Objectives

Evaluate patient tolerance and awareness of HFJV.

Methods

Seventy two consecutive patients underwent EP studies including ablation for supraventricular and ventricular arrhythmias (n=74) in an invasive EP laboratory using HFJV. Any EP studies where ablation was attempted were included for analysis. Patients underwent induction of general anesthesia with endotracheal intubation using inhaled positive pressure ventilation with sevoflurane in the EP laboratory prior to vascular access. HFJV was then provided by a commercial system (Monsoon Universal Jet Ventilator, ACUTRONIC Medical Systems AG) with initial settings: ventilation rate at 100 cycles/min, FIO₂=0.6, humidity 40–100% (adjusted for PIP, mucus plugging, or condensation), driving pressure of 20–25 psi. The peak pressure was set at 24 cmH₂O, PIP at 28 cmH₂O, and inspiratory time set to 30% of the cycle (I/E=30%). Total intravenous anesthesia was then provided with dexmedetomidine and propofol as well as fentanyl and rocuronium titrated to Bis score (bis Monitor Model A2000, Aspect Medical Systems, Inc., Natick, MA).

High Frequency Jet Ventilation

Prior to intracardiac mapping and ablation, HFJV was instituted using a double-lumen orotracheal catheter (Laser Jet catheter, ACUTRONIC Medical Systems AG, Hirzel, Switzerland) as shown in Figure 1. HFJV consists of artificial ventilation by high-velocity insufflation of gas through a narrow nozzle into the open airway. Figure 2 depicts the major differences between conventional IPPV and HFJV. Figures taken from Williams et al.

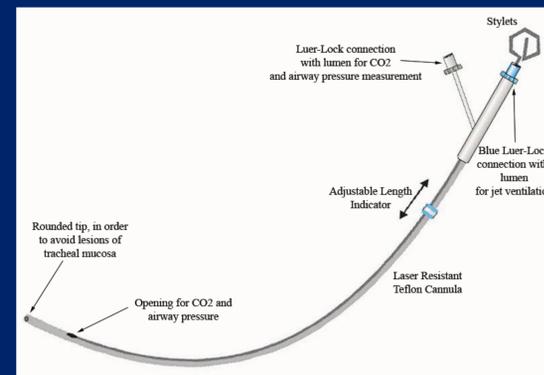


Figure 1. Double lumen orotracheal catheter used for high-frequency jet ventilation.

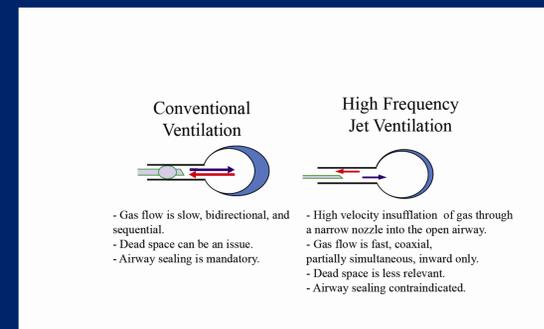


Figure 2. Comparison of conventional intermittent positive pressure ventilation with high-frequency jet ventilation. (Originally adapted from Dr. Peter Biro, University Hospital Zurich, Zurich, Switzerland)

Results

The overall mean age of patients was 55±18 years (range=18-84years) with an overall mean Bis score of 40±5.3 (see Figure 3). No patient experienced awareness during the procedure. There were no intraprocedural or major complications. There was a 6.9% rate of minor complications (n=5). Only one of 72 (1.4%) procedures required discontinuation of general anesthesia and HFJV to induce arrhythmia (right ventricular outflow tract ventricular tachycardia).

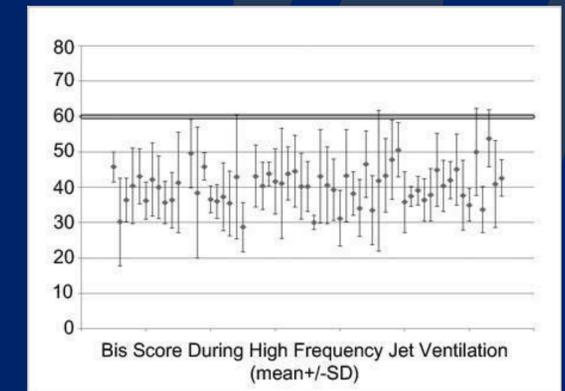


Figure 3. Bis scores during High Frequency Jet Ventilation.

Conclusions

This is the first report of patient tolerance using high frequency jet ventilation in an invasive electrophysiology laboratory. We demonstrated that HFJV is well tolerated by patients with an average Bis score of 40±5.3 and no patient experienced procedural awareness.

Reference

Williams et al, "High Frequency Jet Ventilation During Ablation of Supraventricular and Ventricular Arrhythmias: Efficacy, Patient Tolerance and Safety," The Journal of Innovations in Cardiac Rhythm Management, 2 (2011), 1–7.