

thermore, it led to a prolonged chloroprocaine block; normally the block would last only 45–60 minutes. Finally, it led to detectable serum chloroprocaine five hours after administration; normally no chloroprocaine would be detectable 25–30 min following epidural anesthesia in peripartum patients.⁴

Abnormal pseudocholinesterase was verified in two ways. First, it was inadvertently verified by the prolonged apnea following subsequent succinylcholine administration. Second, her dibucaine number at six weeks postpartum was indicative of a homozygote for the atypical cholinesterase variant (E^aE^a) or a heterozygote with one gene for the atypical variant and one gene for the silent variant (E^aE^s).^{5,6} Her dibucaine number in the immediate postoperative period although still abnormal, was probably higher due to the presence of active cholinesterase received from three units of transfused blood.⁷

We are not aware of other reports of unusual reactions to chloroprocaine in patients with abnormal or low cholinesterase. In fact, a lack of any sequelae in a pregnant patient who received an apparent inadvertent intravenous injection of chloroprocaine was reported recently.² However, the latter patient had enzyme levels appropriate for peripartum patients. This case illustrates that an abnormal reaction to chloroprocaine can occur in a patient with atypical cholinesterase.

This case also suggests that an abnormal reaction to chloroprocaine has clinical implications beyond a prolonged epidural block. An abnormal reaction to chloroprocaine should alert the anesthesiologist to the possibility of a pseudocholinesterase deficiency. This in turn, should suggest that the subsequent use of succinylcholine may result in a prolonged neuromuscular blockade.

REFERENCES

1. Kuhnert BR, Kuhnert PM, Reese ALP, et al: Measurement of 2-chloroprocaine in plasma by selected ion monitoring. *J Chromatogr* 224:488–491, 1981
2. Gross TL, Kuhnert PM, Kuhnert BR, et al: Plasma levels of 2-chloroprocaine and lack of sequelae following an apparent inadvertent intravenous injection. *ANESTHESIOLOGY* 54:173–174, 1980
3. Kalow W, Genest K: A method for the detection of atypical forms of human serum cholinesterase. Determination of dibucaine numbers. *Can J Biochem Physiol* 35:339–345, 1957
4. Kuhnert BR, Kuhnert PM, Prochaska AL, et al: Plasma levels of 2-chloroprocaine in obstetric patients and their neonates after epidural anesthesia. *ANESTHESIOLOGY* 53:21–25, 1980
5. Viby-Mogensen J: Succinylcholine neuromuscular blockade in subjects homozygous for atypical plasma cholinesterase. *ANESTHESIOLOGY* 55:429–434, 1981
6. Whittaker M: Plasma cholinesterase variants and the anesthetist. *Anesthesia* 35:174–197, 1980
7. Epstein HM, Jarzelsky D, Zuckerman L, et al: Plasma cholinesterase activity in bank blood. *Anesth Analg (Cleve)* 59:211–214, 1980

Anesthesiology
56:478–480, 1982

Right Atrial Catheter Placement: Use of a Wire Guide as the Intravascular ECG Lead

D. N. WESTHEIMER, M.D.*

Pre-operative insertion of a right atrial catheter is a widely accepted precautionary measure in patients at risk for intraoperative air embolus. Michenfelder *et al.* reported on the use of the intravascular ECG for positioning of the catheter precisely in the right atrium.¹ The author describes the use in 42 patients, of a J-tipped wire guide as the intravascular lead of the ECG.

MATERIALS AND METHODS

An electrically isolated ECG monitor which had been tested previously for absence of leakage current was con-

nected to the patient, and all other electrical devices were disconnected. Under sterile conditions, the right internal jugular vein was cannulated with a 19-gauge thin wall needle. A J-tipped wire guide was threaded into the vessel and the needle removed. A 12-inch 16-gauge Teflon®-coated catheter was passed over the wire guide a sufficient distance to ensure entry into the vein. The wire guide then was withdrawn slowly from the catheter until a sensation of resistance was felt as the J-tip impinged on the proximal end of the catheter. Alternatively, before insertion one could measure the length of wire guide extending from the catheter when the J-tip is in proper position.

The V lead of the ECG was connected with an alligator clip to the distal end of the wire guide at the edge of the sterile field (fig. 1). Then, while observing the ECG, the catheter and wire guide were advanced as a unit. The characteristic ECG changes have been described by Martin.² When the right atrium was entered,

* Staff Anesthesiologist.

Received from the Department of Anesthesiology, The Methodist Hospital, 6565 Fannin, Houston, Texas 77030. Accepted for publication January 4, 1982.

Address reprint requests to Dr. Westheimer.

Key words: Heart: intravascular electrocardiography; J wire electrode. Equipment: catheters, right atrial.

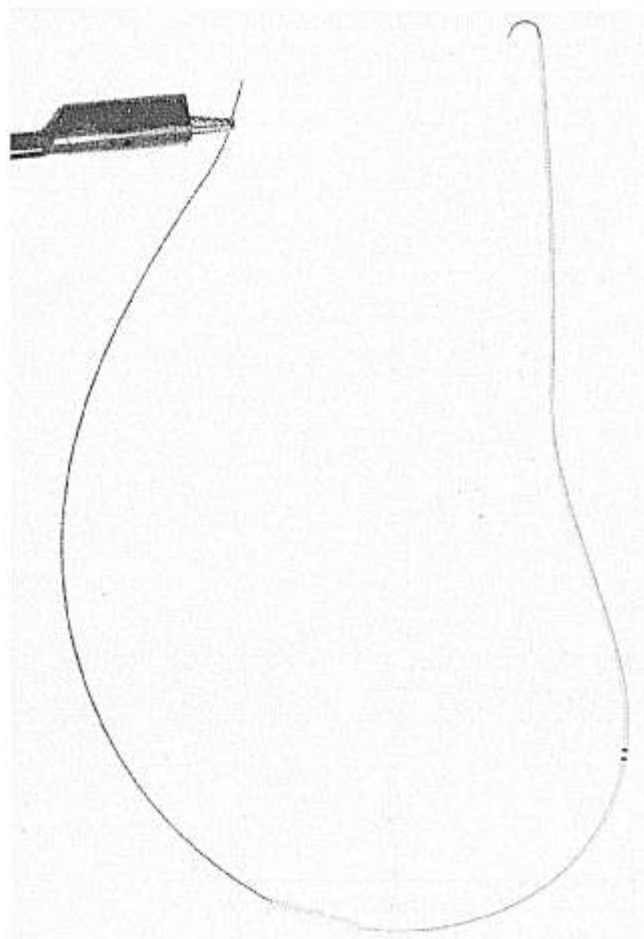


FIG. 1. An alligator clip connects the V lead of the ECG to the distal end of the wire guide. Note that only the J-tip of the wire guide protrudes from the catheter proximally.

as evidenced by a biphasic P-wave larger than the QRS-wave (fig. 2), the wire guide was removed, the intravenous solution connected, and the catheter secured in position.

After placing the patient in the sitting position, a Doppler probe was applied to the precordium overlying the right atrium. To ensure that catheter migration had not occurred during positioning,² and to test the function of the Doppler, fluid was injected forcefully and Doppler sound changes noted as described by Tinker *et al.*³

RESULTS

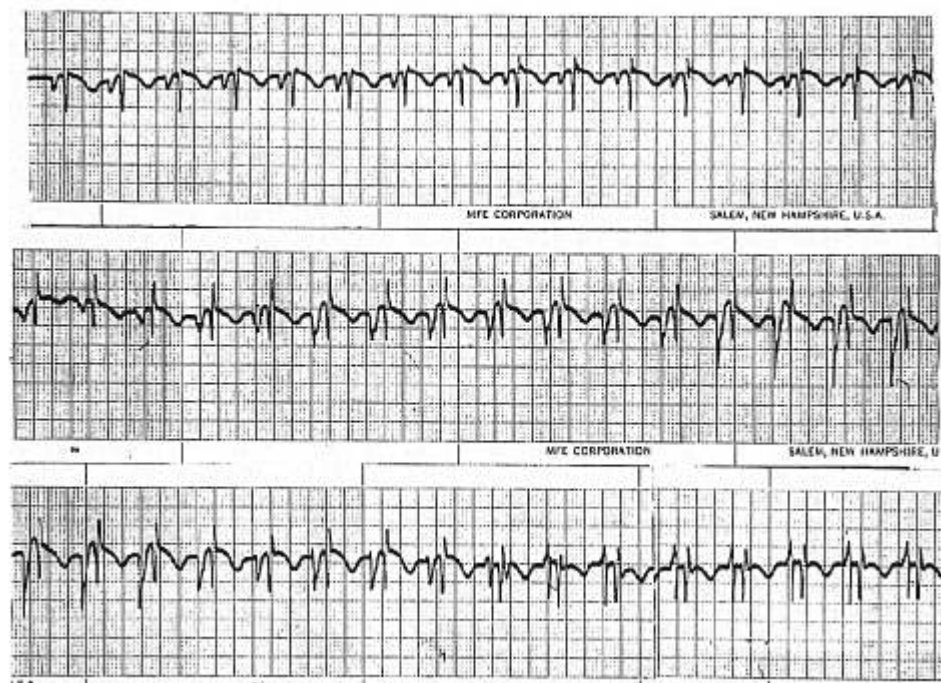
Forty-two patients have had right atrial catheters placed using this method. One patient had a transient ventricular arrhythmia which probably was caused by an excessive length of wire guide extending beyond the tip of the catheter and irritating the right ventricle. No other complications related to this technique have occurred.

DISCUSSION

We feel that the intravascular ECG tracing produced via the wire guide has less artifact than that produced via a saline filled catheter. This could be due to the rigidity which the wire guide gives to the catheter resulting in less whipping of the catheter tip during insertion. The wire guide also offers less electrical resistance than a saline-filled catheter.

Many brands of disposable CVP kits containing J-tipped wire guides are available. They lend themselves nicely to this technique and eliminate the need for any extra equipment such as hypertonic saline and a sterile metal connector in the fluid path.

FIG. 2. Intravascular ECG recorded as wire guide and catheter are advanced from internal jugular vein through superior vena cava (upper recording), approaching right atrium (middle recording), and entering mid right atrium (lower recording).



Only the J-tip of the wire guide should extend beyond the catheter during intravascular ECG monitoring because the catheter serves as electrical insulation for the rest of the wire guide (fig. 1). If the wire guide protrudes from the catheter, the electrical signal will not be localized to the catheter tip, but will enter the wire along the entire length which is exposed. As with any intravascular ECG monitor, the risk of electrical microshock must be considered.

In summary, I describe the use of a J-tipped wire guide as the intravascular ECG lead used for positioning a catheter precisely in the right atrium.

The author thanks Dr. Bruce Levy for assistance in preparation of this manuscript.

References

1. Michenfelder JD, Terry HR Jr, Daw EF, et al: Air embolism during neuro-surgery: A new method of treatment. *Anesth Anal (Cleve)* 45:390-395, 1966
2. Martin JT: Neuroanesthetic adjuncts for patients in the sitting position III. Intravascular electrocardiography. *Anesth Anal (Cleve)* 49:793-808, 1970
3. Tinker JH, Gronert GA, Messick JM Jr, et al: Detection of air embolism, a test for positioning of right atrial catheter and doppler probe. *ANESTHESIOLOGY* 43:104-106, 1975

Anesthesiology
56:480-482, 1982

A Unique Method for the Anesthetic Management of Laryngeal Foreign Bodies

LINDA S. ROBERTS, M.D.,* ROBERT L. RAYBURN, M.D.,† MICHAEL E. MATLAK, M.D.,‡
GEORGE W. NIXON, M.D.§

REPORT OF TWO CASES

Reports dealing with the diagnosis and management of patients with laryngeal foreign bodies are rare,¹⁻⁴ in spite of the fact that partial obstruction of the airway at the level of the larynx is a critical, potentially life-threatening, and challenging problem. The following cases illustrate the importance of good radiographic diagnosis and the heretofore unreported usefulness of a small cuffed endotracheal tube as an aid in the anesthetic management of foreign bodies aspirated into the larynx.

Patient 1. A five-year-old boy arrived in the emergency room with aphonia, inspiratory stridor, and a history of recent aspiration of a thumb tack. The patient was apprehensive but rational, and vital signs were stable. No cyanosis was noted, and no blood was seen in the oral cavity. Frontal and lateral roentgenograms of the upper airway demonstrated the tack to be located in the larynx (fig. 1).

Due to concern that the tack would become dislodged and obstruct the airway, or that puncture of the nearby carotid artery might occur, the patient was taken directly to the operating room. An inhalation induction of anesthesia technique was fully explained to the patient. Induction of anesthesia was accomplished using 50 per cent nitrous oxide in oxygen and halothane. When consciousness was lost, an intravenous infusion was started. Anesthesia was deepened using 100 per cent oxygen and halothane with spontaneous respiration. When the patient was deeply anesthetized, direct laryngoscopy confirmed that the tip of the tack was imbedded in the trachea just below the true vocal cords and the head of the tack was in a vertical plane between the cords. Over the next five to ten min, using careful direct laryngoscopy, a 3.0 mm cuffed endotracheal tube was molded and remolded using a stylet until the tip of the tube passed safely around the tack and into the distal trachea. The cuff was inflated, and the patient was able to breathe easily. The tack was then removed with forceps using direct laryngoscopy. The patient's recovery was uneventful.

Patient 2. A 20-year-old retarded man had a sore throat, fever, inability to swallow and respiratory distress. He was quite anxious, sat in an upright position with his jaw thrust forward, and saliva drooled from his mouth. A reliable history could not be obtained. A roentgenogram of the lateral neck demonstrated a radiodensity in the area of the larynx, but a specific diagnosis was not established. With ventilatory support available, a xerogram (fig. 2) was performed, which demonstrated a bone sticking into the base of the epiglottis and extending into the larynx and upper esophagus.

The patient was taken to the operating room and an intravenous

* Pediatric Anesthesiology Fellow, Primary Children's Medical Center, and Instructor in Anesthesiology, University of Utah Medical Center, Salt Lake City, Utah.

† Staff Anesthesiologist and Pediatrician, Associate Director of Intensive Care and Respiratory Therapy, Primary Children's Medical Center, Assistant Clinical Professor of Anesthesiology and Pediatrics, University of Utah Medical Center, Salt Lake City, Utah.

‡ Assistant Professor of Surgery and Pediatrics, Primary Children's Medical Center and University of Utah Medical Center, Salt Lake City, Utah.

§ Pediatric Radiologist, Primary Children's Medical Center, and Associate Professor of Radiology, University of Utah Medical Center, Salt Lake City, Utah.

Received from the Departments of Anesthesiology, Pediatric Surgery, and Radiology, Primary Children's Medical Center and University of Utah Medical Center, Salt Lake City, Utah. Accepted for publication January 4, 1982.

Address reprint requests to Dr. Rayburn: Department of Anesthesiology, Primary Children's Medical Center, 320 Twelfth Avenue, Salt Lake City, Utah 84103.

Key words: Airway: obstruction, foreign body. Equipment: airway, artificial.