

Complete atrioventricular block during anesthesia in a patient with sick sinus syndrome under atrial pacing

Yoshihiro Inuma, Koichi Maruyama, and Katsumi Hara

Department of Anesthesiology, Iida Municipal Hospital, 438 Yawata, Iida, Nagano 395-8502, Japan

To the Editor: We describe a patient with an atrial pacemaker for sick sinus syndrome (SSS) in whom sudden atrioventricular (AV) block occurred under sevoflurane anesthesia with lumbar epidural block.

A 79-year-old man was admitted for removal of an inflammatory tumor of the abdominal wall. An atrial pacemaker had been implanted for 5 years to treat symptomatic SSS. Atrioventricular conduction had been evaluated by electrophysiological study (EPS) before the pacemaker implantation. The AH and HV intervals were 100 ms and 45 ms, respectively, and the PQ interval was 140 ms. These values were all within normal limits. The patient developed physiological second-degree type I AH block at 140 stimulation·min⁻¹ of overdrive atrial pacing during the EPS study. This finding suggested that AV nodal conduction was not impaired at that time [1]. The patient was followed up regularly by a cardiologist, and the PQ interval obtained by routine measurement before surgery was 140 ms. Rhythm was regularly paced at 70 bpm.

The pacemaker was switched from inhibited to fixed mode for the operation. After insertion of an epidural catheter through the L3–L4 intervertebral space, we confirmed that there were no signs of unintentional intravascular, subarachnoidal, or subdural cannulation by a test injection of 2 ml 1% lidocaine containing 1:200 000 epinephrine. General anesthesia was induced by intravenous administration of 150 mg thiamylal, 6 mg vecuronium, and 0.1 mg fentanyl, and anesthesia was maintained with 1% sevoflurane in 50% oxygen/50% nitrous oxide and intermittent injection of epidural mepivacaine.

Fifteen minutes after the first epidural injection of 4 ml 1% mepivacaine with 3 mg morphine, complete AV block with ventricular rate of about 30/s appeared, leading to hypotension. Intravenous administration of 4 mg ephedrine and transcutaneous pacing were ineffective. Paced rhythm was

successfully restored only after intravenous administration of isoproterenol at 0.005 µg kg⁻¹ min⁻¹ over 10 min. The isoproterenol was stopped 30 min after restoration of the paced rhythm. Thereafter, another episode of conduction failure with AV block occurred 25 min after an additional administration of 20 mg mepivacaine. It was resolved with 0.5 mg intravenous atropine. The serum concentration of mepivacaine determined during the second episode of AV block was 0.4 µg ml⁻¹, which is far below the cardiotoxic level. The AV block never appeared again during continuous ECG monitoring for 24 h following surgery, and the patient did not complain of any symptomatic episodes of AV block.

AV block is reported to occur in approximately 1.7% of patients per year who have single-chamber atrial pacing or single-chamber atrial pacing with a rate modulation pacemaker implanted for SSS [2]. Although relatively rare, it is possible that the AV nodal conduction in our patient was already impaired and that the AV block was elicited by autonomic imbalance caused by the anesthetic state. Therefore, it might have been better to use intravenous isoproterenol throughout the period of anesthesia to avoid the second episode of AV block. We must be alert to the risk of conduction failure caused by the development of AV block in patients with an AAI pacemaker implanted for SSS.

Acknowledgments. The authors thank Dr. Kazuya Yamamoto, cardiologist, for his help in critically discussing and improving this manuscript.

References

1. Narula OS (1979) Electrophysiology of normal impulse propagation. In: Narula OS (ed) Cardiac arrhythmias: electrophysiology, diagnosis and management. Williams & Wilkins, Baltimore/London, pp 57–65
2. Kristensen L, Nielsen JC, Pedersen AK, Mortensen PT, Andersen HR (2001) AV block and changes in pacing mode during long-term follow-up of 399 consecutive patients with sick sinus syndrome treated with an AAI/AAIR pacemaker. Pacing Clin Electrophysiol 24:358–365

Address correspondence to: K. Hara

Received: March 25, 2004 / Accepted: September 13, 2004