

Prevention of rocuronium injection pain

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The introduction of rocuronium bromide to the anesthetic field has led to its replacement of succinylcholine for rapid-sequence intubation because of its rapid onset time and intermediate duration. Rocuronium is an especially good choice for children because it avoids the complications of succinylcholine; however, injection pain or withdrawal movement (IPWM) has been reported [1]. IPWM is characterized by sudden flexion of the wrist and arm after rocuronium infusion, lasting 10–20 seconds [2]. The incidence of rocuronium-induced IPWM is reportedly 50–80%.

Some authors have argued against the necessity of alleviating IPWM based on the lack of convincing data regarding negative patient outcomes caused by IPWM [3]. However, pain on injection and other stressful stimulation during anesthetic induction may cause bronchospasm or myocardial infarction [4,5]. Additionally, a case of pulmonary aspiration caused by rocuronium-induced generalized spontaneous movements has been reported [6]. These findings highlight the importance of alleviating IPWM caused by rocuronium.

In an article published in this issue of the *Korean Journal of Anesthesiology*, Na et al. [7] demonstrate the efficacy of sevoflurane combined with remifentanyl against withdrawal movement associated with rocuronium injection in children. The incidence and severity of IPWM are higher in children than in adults [8]. The high incidence of generalized movements in children could cause injury or dislodgement of the venous catheter. Thus, it is more important to prevent IPWM in children than in adults.

According to Na et al. [7], 54 and 20% of children who received 2.0 vol% sevoflurane exhibited withdrawal movement and generalized movement respectively; these rates were similar among children who received remifentanyl (57 and 17%, respectively). However, when 2.0 vol% sevoflurane was combined with remifentanyl at 0.5 µg/kg, the incidence of withdrawal move-

ment decreased to 17% while all generalized movement ceased.

In two recently published studies [9,10], the 50% effective end-tidal concentration of sevoflurane (ETsev) was 2.4 vol% in adults and 2.9 vol% in children. In those same studies, the 95% effective ETsev was 3.0–3.5 vol% in adults and 4.3 vol% in children. The 2.0 vol% sevoflurane reported by Na et al. [7] was relatively lower concentration to prevention of IPWM.

The remifentanyl dose used by Na et al. [7] was also relatively lower than that used in other studies. There was no withdrawal movement in 77% of patients treated with 1 µg/kg of remifentanyl [11]. Kim et al. [12] reported that remifentanyl at 1.0 µg/kg prevented IPWM after rocuronium more effectively than did remifentanyl at 0.5 µg/kg. O'Hare et al. [13] reported that remifentanyl at 0.5 µg/kg did not adequately control the hemodynamic changes that occurred after intubation. However, higher doses could result in side effects. Remifentanyl at 1.0 µg/kg caused coughing in 14% of patients [11].

Many types of drugs have been investigated for the prevention of IPWM [14,15]; however, few studies have attempted to evaluate the combined effects of more than two drugs on IPWM after rocuronium administration. Na et al. [7] evaluated the effect of a combination of sevoflurane and remifentanyl. Separately administered low doses of sevoflurane and remifentanyl did not prevent IPWM effectively after rocuronium administration. However, when these drugs were combined the effect was comparable with that of higher doses. Additionally, combined treatment could minimize the side effects of higher doses of sevoflurane or remifentanyl.

In conclusion, the combination of an inhalation agent with an intravenous agent to prevent IPWM caused by rocuronium is a proper approach, especially for children, who require rapid airway management.

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