

A curious case of hiccups during laparoscopic surgery

Dear Editor,

We recently anesthetized a patient for laparoscopic appendectomy. A rapid sequence induction was performed with fentanyl, propofol, and suxamethonium followed by maintenance with sevoflurane. Rocuronium at 0.6 mg kg^{-1} and 5 mg morphine was then given before the start of surgery. A few minutes after pneumoperitoneum, the patient developed persistent hiccups occurring several times per minute. A further 5 mg of morphine was given at this point with the patient showing no hemodynamic response to a surgical stimulus. Depth of anesthesia was also increased from an age-adjusted minimum alveolar concentration value of 1.0 to 1.3. Hiccups persisted despite more than adequate analgesia and anesthesia.

Visual estimation of train-of-four stimulation at the orbicularis oculi muscle showed no twitches. Furthermore, two 0.3 mg kg^{-1} doses of rocuronium were given 15 minutes apart with no resolution and no change in train-of-four. There was a single post-tetanic twitch on these occasions. A total of $120 \mu\text{g}$ of clonidine was also given in divided doses with no effect. Ongoing intermittent spasms of the diaphragm disturbed the surgical field and prevented the use of diathermy, greatly prolonging operative time. It was not possible to reduce intra-abdominal pressure owing to surgical difficulty, with the alternative being to convert surgery to an open technique. Interestingly, hiccups stopped near the end of the operation

when peritoneal irrigation and suction was performed and the operating table was returned to a neutral position, despite four visible twitches on train-of-four.

Hiccups are not uncommon under general anesthesia. The pathophysiology involves a reflex arc with the phrenic, vagus, and sympathetic nerves conveying somatic and visceral sensory stimuli to the midbrain central processing unit, which directs efferent motor fibers to the diaphragm and intercostal muscles.^[1] In our case, it was felt that the Trendelenburg position resulted in direct stimulation of the diaphragm muscle by inflammatory peritoneal fluid compounded by the pressure stimulus of pneumoperitoneum. The diaphragm is considered the most resistant muscle to neuromuscular blockade (NMB) and is therefore prone to earlier recovery. Studies have related the reappearance of a single post-tetanic twitch to early diaphragmatic recovery.^[2,3]

In our case, an extremely deep NMB would have been required to prevent hiccups. Our experience suggests that this could have been avoided through more attentive suction during laparoscopic surgery. Returning the patient to a neutral position earlier would have helped to achieve this. Traditionally, prokinetic drugs such as metoclopramide have been used to treat hiccups induced by gastric distension. This is not available in our hospital and gastric insufflation did not occur as we did not bag-mask ventilate the patient prior to intubation. A variety of other interventions based on uncontrolled observations have also been suggested ranging from pharyngeal stimulation to intranasal ice-cold water.^[4] If all else fails, deep NMB

measured by the abolition of post-tetanic twitches is worth consideration.

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Conflicts of interest

There are no conflicts of interest.

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