Title : GASTRIC PRESSURE AND FASCICULATIONS DURING RAPID ANESTHETIC INDUCTION

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INTRODUCTION. Acute rise of intragastric pressure (IGP) and regurgitation is a potential hazard when succinylcholine (SC) is used to facilitate tracheal intubation,[1,2] especially in patients with full stomach. Fasciculations of the abdominal wall following intravenous SC are generally assumed to cause these elevations of IGP. We examined the relationship between quantitatively measured abdominal muscle activity (integrated electromyogram, IEMG) and IGP in patients undergoing a rapid IV anesthetic induction with thiopental (TP) and SC.

METHODS. After overnight fast and premedication, 48 consenting adults (age range 25-88 years) underwent nasoesophageal insertion of a balloon-tipped catheter under lidocaine topical anesthesia prior to anesthetic induction for elective surgery. The air-filled balloon was advanced and gastric placement verified by acute transition to positive-pressure deflections on the pressure transducer/oscilloscope/recorder system during spontaneous inhalation. IEMG was measured by 3 surface-type gel electrodes placed lateral to the midline at the umbilicus and connected to an amplifier with electronic integrator. After 5 minutes of spontaneous oxygen breathing, patients underwent IV induction with TP 4 mg/kg followed 20-40 seconds later with SC, both drugs injected over 10-20 seconds. Of the patients studied, 14 were "pretreated" with d-tubocurarine 4 mg IV 5 minutes prior to induction and given SC 1.5 mg/kg IV for intubation. The other 34 patients were the "non-pretreated" group and received SC 1.0, 1.5, or 2.0 mg/kg IV. IGP and IEMG were continuously recorded from pre-induction through tracheal intubation 1-2 minutes following SC; patients remained apneic and undisturbed until intubation. In 33 patients an observer scored abdominal muscle activity subjectively from 0 (none) to +3 (severe). Statistical significance was assumed for $P < 0.05$.

RESULTS. The change in IEMG and subjectively-scored fasciculations correlated in a linear fashion, r=0.99 (figure 1). Control, post-TP, and post-SC IEMG and IGP varied widely and mean values (Table) were not significantly different for the two groups. Using analysis of variance for each patient, however, we found that increased IEMG activity followed SC injection in 32% of non-pretreated patients, but was eliminated by pretreatment. The incidence of increased IEMG activity was not directly dose-related. In non-pretreated patients having significant increase in both IEMG and IGP after SC, there was a positive, linear correlation of the 2 variables, $r = 0.83$, $P < 0.01$ (figure 2). In 44% of all patients, injection of TP reduced IGP significantly without altering IEMG, and 1 patient had a rise in IGP after SC despite pretreatment, without change in IEMG.

DISCUSSION. Efforts to eliminate muscle fasciculations[3] after SC in full-stomach patients assume a direct relationship between IGP and abdominal muscle activity. Current anesthetic practice in this area is based upon coincident observations of a high incidence of gross fasciculations and sporadic elevation of IGP. Our data demonstrate that rises in IGP after SC are not only temporally but also quantitatively related to the magnitude of fasciculations as measured by increased IEMG activity. Our analysis shows significant reductions in IGP occurring during rapid IV induction, without IEMG change, after TP injection. We conclude that while observed IEMG changes correlate with IGP increases after SC, net change in IGP is the sum of multiple factors in the anesthetic induction sequence.

REFERENCES.

1. Roe RB: The effect of suxamethonium on intragastric pressure. Anaesth. 17:179-181, 1962
2. Andersen N: Changes in intragastric pressure following the administration of suxamethonium. Br. J. Anaesth. 34:363-366, 1962
3. Miller RD, Way WL; Inhibition of succinylcholine-induced increased intragastric pressure by non-depolarizing muscle relaxants and lidocaine. Anesthesiology 34:185-188, 1971

Figure 2.

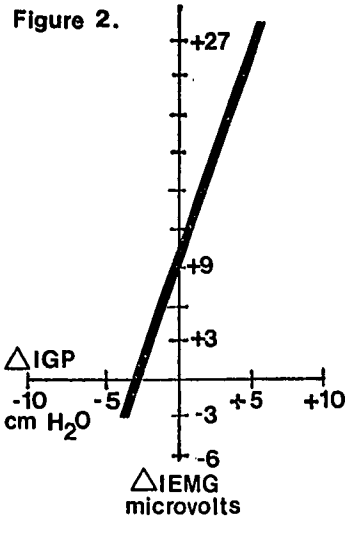

Figure 1.

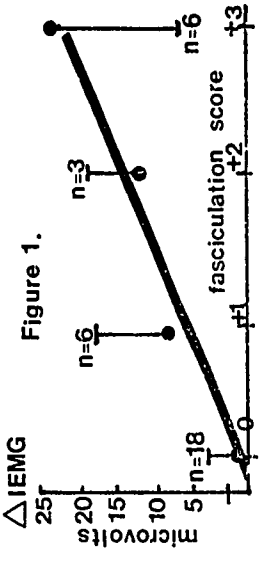

TABLE.

Mean IGP (cm H_2O, ± S.E.)

		awake control	after TP	after SC
Non-pretreated	(n=34)	8.1 ± 0.7	6.7 ± 0.8	6.6 ± 0.8
Pretreated	(n=14)	6.7 ± 1.4	5.8 ± 1.2	4.6 ± 1.2
All patients	(n=48)	7.7 ± 0.6	6.4 ± 0.7	6.1 ± 0.6

Mean IEMG (microvolts ± S.E.)

Non-pretreated	(n=34)	12.5 ± 1.4	12.8 ± 1.4	16.2 ± 2.1
Pretreated	(n=14)	11.3 ± 2.8	11.1 ± 2.6	10.8 ± 7.5
All patients	(n=48)	12.2 ± 1.3	12.3 ± 1.2	15.0 ± 3.0