



CORRESPONDENCE

A randomized clinical trial of prone position extubation to reduce the severity of coughing in patients undergoing dorsolumbar spine surgery

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To the Editor,

When patients undergoing spine surgery in the prone position are turned supine for extubation, coughing and bucking may occur.¹ We conducted a prospective, randomized clinical trial (CTRI/2014/09/004982) with the primary aim to assess the incidence of coughing and a secondary aim to assess the severity of coughing in patients extubated prone compared to those extubated in the supine position.

Sixty American Society of Anesthesiologists physical status I-II patients (18-60 yr) undergoing dorsolumbar spine surgery in the prone position were randomly allocated (1:1) prior to the induction of anesthesia to either prone (group P) or supine (group S) extubation. Patients with a history of cardiovascular disease, chronic obstructive pulmonary disease, morbid obesity, or obstructive sleep apnea were excluded. Morphine 0.1 mg·kg⁻¹, propofol 1-2 mg·kg⁻¹, and vecuronium 0.1 mg·kg⁻¹ were given intravenously for induction. Desflurane (end tidal concentration 2-4%) with nitrous oxide in oxygen (60:40) was used for maintenance of anesthesia. After turning the patients prone, the head was positioned to one side on a gel-padded head ring. Intravenous diclofenac 2 mg·kg⁻¹ body weight was given for postoperative analgesia at the time of skin closure. No additional opioids were given to any patient after

induction. At the end of surgery, 20 mL of 0.25% bupivacaine was infiltrated along the incision line.

In group P, anesthetics were discontinued after applying the dressing and extubation was completed in the prone position. In group S, anesthetics were switched off just before turning the patient supine, and subsequent extubation was performed in the supine position. In both groups, tracheal extubation was done after reversal of neuromuscular blockade (neostigmine 0.5 mg·kg⁻¹ *iv* and glycopyrrolate, 0.01 mg·kg⁻¹ *iv*), return of adequate spontaneous respiration and oxygen saturation, and when the patient followed commands. After extubation in group P, the patients were turned back to the supine position.

The study's observation period extended from the time of switching off the inhalational agent until 30 min after extubation. The primary outcome was to assess the incidence of coughing during extubation. Severity of coughing was assessed as none, mild (single cough), moderate (more than one cough but unsustained coughing), and severe (sustained \geq five seconds of coughing).² Other secondary outcomes were the time to extubation, various hemodynamic parameters, and adverse events (respiratory insufficiency, loss of airway, significant desaturation).

The sample size was calculated to be 30 in each group using data from a previously published study³ that reported the incidence of coughing during emergence at one minute after extubation as 9% in the prone group vs 40% in the supine group (alpha = 0.05 and power = 0.8). Statistical analysis was conducted using SPSS for Windows (version 15.0; SPSS Inc., Chicago, IL, USA) and a two-sided *P* < 0.05 was considered statistically significant.

The two groups were comparable in terms of demographic variables, duration of surgery, and anesthetic exposure. Coughing occurred in all 30 (100%) patients in group S compared to four of 30 (13%) patients

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Table Severity of coughing

Severity	Prone group	Supine group	<i>P</i>
No cough	26	0	< 0.001
Mild cough	4	7	
Moderate cough	0	11	
Severe cough	0	12	

Values represent number of patients

in group P [relative risk 7.5; 95% confidence interval, 3.0 to 18.7; $P < 0.001$]. Coughing severity (Table) was also different between groups ($P < 0.001$). The mean (standard deviation) time to extubation was 3.7 (1.1) min in group P and 6.6 (3.3) min in group S ($P < 0.001$). Hemodynamic parameters were comparable in the two groups during the extubation phase ($P = \text{NS}$). Adverse respiratory events (insufficiency, loss of airway, desaturation) did not occur in patients of either group.

Prone-positioned extubation was associated with both a lower incidence and severity of coughing without any increased adverse events. The patients who were extubated in prone position also had a shorter time to extubation. A difference in time to extubation was not recorded by the authors of two previous studies.^{1,3} We believe that the methodological differences in the emergence plan and conduct of extubation may be the reason for the variability in the observations.^{1,3}

In contrast to our study, Olympio *et al.* demonstrated that there was a significant increase in heart rate and mean arterial blood pressure of patients who were extubated in supine position.¹ Yorukoglu *et al.* also reported increased systolic and diastolic blood pressure records when patients were positioned supine before extubation. We did not experience any problems of desaturation, respiratory insufficiency, or the need for re-intubation in any of our patients, although our study was under-powered to assess safety.

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Conflicts of interest None declared.

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