

A Prospective Observational Study on Transcutaneous CO₂ Monitoring in Children undergoing Rigid Bronchoscopy

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Background

During rigid bronscopies:

- Maintaining spontaneous ventilation and adequate anesthesia depth is challenging and often sub-optimal ventilation is present¹
- EtCO₂ monitoring during rigid bronchoscopy procedures is unreliable/unavailable
- Transcutaneous CO₂ monitoring is a reliable CO₂ monitoring system²

Objective:

To investigate the incidence of hypercapnia (TcCO₂>50 mmHg) in children undergoing rigid bronchoscopy

Methods:

- Prospective observational study
- Inclusion criteria: patients <18 years scheduled for rigid bronchoscopy
- TcCO₂ was measured continuously from induction to PACU admission, until values in PACU were < 50 mmHg
- The OR team was blinded to the TcCO₂ values.

Table 1. Primary outcomes

Occurrence of TcCO ₂ > 50 mmHg in OR, number of patients, (%)	27 (100%)
Occurrence of TcCO ₂ 50 - 90 mmHg in OR, number of patients, (%)	22 (81%)
Occurrence of TcCO ₂ > 90 mmHg in OR, number of patients, (%)	5 (19%)
Occurrence of TcCO ₂ > 50 mmHg in PACU, number of patients, (%)	18 (67%)
Occurrence of TcCO ₂ 50 - 90 mmHg in PACU, number of patients, (%)	18 (67%)
Occurrence of TcCO ₂ > 90 mmHg in PACU, number of patients, (%)	0 (0%)

Data are presented as frequency and percentage (%)

Figure 1: TcCO₂ trends in the OR

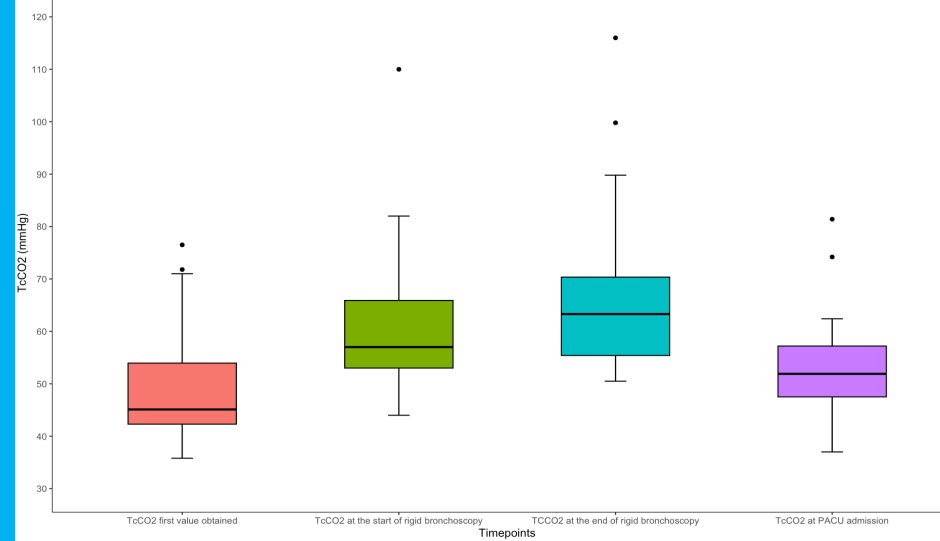
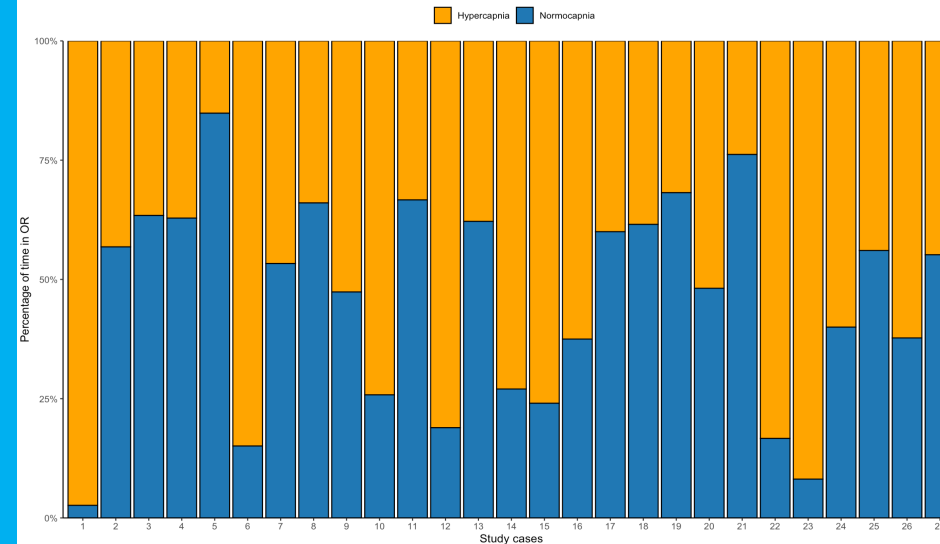


Figure 2: Percentage of time spent in hypercapnia and normocapnia in OR



Results:

- 27 patients enrolled so far (planned sample size: 30)
- Median age was 4 years [IQT 1.6 - 8.5], 82% were male and 85% of patients were ASA II-III.
- 59% of rigid bronscopies diagnostic, 22% interventional and 19% both diagnostic and interventional.
- All patients experienced hypercapnia in the OR. Table 1 illustrates the primary outcomes. TcCO₂ trends are displayed in figure 1 and figure 2.
- Median time for signal stabilization and for obtaining first TcCO₂ value was 8 min [IQT 5-11]. Median length of rigid bronchoscopy was 13 min [IQT 6-19]
- In PACU, 67% of patients presented hypercapnia. The median TcCO₂ value at PACU admission was 52 mmHg [IQT 47-57].

Conclusion:

- During rigid bronchoscopy, a high incidence of hypercapnia is noted.
- Almost 20% of the patients presented severe hypercapnia.
- Further studies are needed to determine the clinical significance of such transient acute hypercapnia states.

References:

1. Chaddha U, Murgu S. Complications of rigid bronchoscopy. *Respirology*. 2021;26(1):14-8.
2. Tobias JD. Transcutaneous carbon dioxide monitoring in infants and children. *Paediatr Anaesth*. 2009;19(5):434-44.