Cerebral Oxygen Desaturation Events Assessed by Near-Infrared Spectroscopy During Shoulder Arthroscopy in the Beach Chair and Lateral Decubitus Positions

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Objective

The aim of this prospective cohort study was to **determine the incidence of cerebral desaturation events (CDEs) in the beach chair position (BCP)** and compare this cohort to subjects undergoing shoulder surgery in the lateral decubitus position (LDP). In addition, the relationship between CDEs and early clinical recovery was examined.

Patients

Data were collected on **124 patients undergoing elective shoulder arthroscopy** in the BCP (61 subjects) or LDP (63 subjects). Exclusion criteria included preexisting cerebrovascular disease or orthostatic hypotension, age < 18 years, ASA physical status IV or V.

Protocol

Anesthetic management was standardized in all patients. Regional cerebral tissue oxygen saturation (SctO2) was quantified using near-infrared spectroscopy (FORE-SIGHT system). Baseline heart rate, mean arterial blood pressure, arterial oxygen saturation, and **SctO2 were measured before patient positioning and then every 3 minutes for the duration of the surgical procedure. SctO2 values below a critical threshold (>20% decrease from baseline or absolute value <55% for >15 seconds) were defined as a CDE** and treated using a predetermined protocol. The number of CDEs and types of intervention used to treat low SctO2 values were recorded. The association between intraoperative CDEs and impaired postoperative recovery was also assessed.

Results

There were no differences between groups in age, weight, height, sex, preoperative hemoglobin values, preexisting medical conditions, or ASA physical status. Intraoperative hemodynamic variables did not differ between groups.

SctO2 values were lower in the BCP group throughout the intraoperative period (P < 0.0001). **The incidence of CDEs was higher in the BCP group** (80.3% vs 0% LDP group), as was the median number of CDEs per subject (4, range 0–38 vs 0, range 0–0 LDP group, all P < 0.0001).

Table 3. Primary Outcome Variables

	Beach chair group	Lateral group	Difference or median difference (95% CI)	*P* value
No. of patients	61	63	—	—
Patients with cerebral desaturation events	49 (80.3%)	0 (0%)	80.3% (68.7%–88.4%)	<0.0001
Interventions for $Scto_2$ decreases	2 (0–11)	0 (0–0)	2 (2–3)	<0.0001
Interventions for MAP decreases	1 (0–6)	0 (0–9)	0 (0–1)	0.008
Episodes $Scto_2$ ≤55	0 (0–4)	0 (0–0)	0 (0–0)	0.003
Episodes ≥20% decrease $Scto_2$	4 (0–38)	0 (0–0)	4 (2–5)	<0.0001

CI = confidence interval; $Scto_2$ = regional cerebral tissue oxygen saturation; MAP = mean arterial blood pressure.
Data are number of patients (%) or median (range).

Among all study patients without interscalene blocks, **a higher incidence of nausea** (50.0% vs 6.7%, P = 0.0001) **and vomiting** (27.3% vs 3.3%, P = 0.011) **was observed in subjects with intraoperative CDEs compared with subjects without CDEs.**

Conclusions of the authors

Patients undergoing shoulder surgery in the **beach chair position may be at risk for cerebral hypoxia** because of decreases in cerebral perfusion pressure (CPP). An **association between intraoperative cerebral desaturation events and postoperative nausea and vomiting** was also observed.

Key message

Shoulder surgery in the beach chair position is associated with significant reductions in cerebral oxygenation.

For patients undergoing shoulder surgery in the beach chair position, cerebral desaturation events were observed in 80.3% of subjects.

Intraoperative cerebral desaturation events were associated with a higher incidence of nausea and vomiting in the PACU.

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