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

Glenn S. Murphy, MD, Joseph W. Szokol, MD, Jesse H. Marymont, MD, Steven B. Greenberg, MD, Michael J Avram, PhD, Jeffery S. Vender, MD, Jessica Vaughn, BA, and Margarita Nisman, BA, *Anesthesia and Analgesia* 2010;111(2):496-505

### Introduction

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The beach chair position (BCP) [defined as 45 to 90° above the horizontal plane] has been used for shoulder surgery for over 20 years and has gained popularity because it offers a number of technical advantages over the lateral decubitus position (LDP) approach. Although rare, catastrophic neurologic events such as brain and spinal cord injury, visual loss, and cerebrovascular events have been reported following BCP surgery. In this study, the investigators sought to determine the incidence of cerebral desaturation events (CDEs) during shoulder arthroscopy in the BCP or LDP. The study was conducted by the Dept. of Anesthesiology at the Evanston/ NorthShore U. HealthSystem, within the U. of Chicago Pritzker School of Medicine, in Evanston, IL, USA.

### Methods

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124 patients (61 BCP/63LDP) were studied. The number of CDEs and types of intervention used to treat low SctO<sub>2</sub> values were recorded. A CDE was defined as a 20% or greater cerebral tissue oxygenation (SctO<sub>2</sub>) decrease from baseline or an absolute SctO<sub>2</sub> value of 55% or lower. Clinicians were blinded to SctO<sub>2</sub> values, but were instructed to treat CDEs by: (1) increasing MAP with either: phenylephrine and/or ephedrine, or a fluid bolus; (2) decreasing minute ventilation to increase PetCO<sub>2</sub>; or (3) increasing FiO<sub>2</sub>. The FORE-SIGHT Absolute Tissue Oximeter provided continuous SctO<sub>2</sub> values. *“Four wavelengths of light allow for more accurate determination of oxyhemoglobin and deoxyhemoglobin levels by compensating for wavelength-dependent scattering losses and reducing interference from other background light absorbers.”*

### Results

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The results from the study showed that cerebral desaturation events occurred frequently in patients in the BCP, unlike those in the LDP [49 or 80.3% of the 61 BCP patients had a CDE while none of the 63 LDP patients did]. After treatment of CDEs, 61% of patients showed increases in SctO<sub>2</sub>, occurring mostly within 30 to 45 seconds. The CDEs occurred despite the use of a protocol designed to maintain systemic MAP and ventilation parameters. Cerebral desaturation events can occur and be unrecognized with conventional intraoperative monitoring. A multi-fold, significant increase in nausea (50.0% vs. 6.7%) and vomiting (27.3% vs. 3.3%) occurred in patients with CDEs than those without (p < 0.001).

### Author's Discussion and Conclusions

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Patients undergoing shoulder surgery in the BCP may be at risk for adverse neurologic events due to cerebral ischemia, which has been associated with cerebral oxygen desaturations. This study found that significant reductions in SctO<sub>2</sub> occur in patients in the BCP despite the use of a protocol designed to maintain systemic blood pressure and ventilation parameters. A strong correlation was found between CDEs and a multi-fold increased incidence of post-operative nausea and vomiting.

### Citation

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Murphy GS, Szokol JW, Marymont JH, Greenberg SB, Avram MJ, Vender JS, Vaughn J, Nisman M. Cerebral oxygen desaturation events assessed by near-infrared spectroscopy during shoulder arthroscopy in the beach chair and lateral decubitus positions. *Anesth Analg* 2010;111(2):496-505.