

No Increased Risk of Stroke with Beach Chair versus Lateral positioning for Shoulder Arthroscopy

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INTRODUCTION: Beach chair positioning has many benefits including anatomic positioning, improved visibility, ease of intraoperative repositioning, and straightforward conversion from arthroscopic to open procedure. However, this positioning is not without risks, and although rare, the associated complications can be catastrophic. Case reports of patients experiencing neurovascular events following surgery in this position have been noted. Murphy et al, in a review article from 2019, indicated that multiple studies have suggested an imbalance in supply and demand for cerebral oxygenation, but the actual association between this imbalance and negative outcomes are not clearly understood. Furthermore, they stated additional, “studies are needed to define the incidence of adverse neurological adverse events in the beach chair position...” The aim of this study was to determine the short-term incidence of cerebrovascular accident (CVA) following arthroscopic shoulder surgery in the beach chair versus lateral position.

METHODS: Retrospective institutional database review of patients from a single institution from 2015-2020. Patients of five shoulder surgeons were identified using Current Procedural Technology (CPT) codes to identify patients who underwent arthroscopic shoulder surgery in both the beach chair and lateral positions. Using both CPT codes for CVA imaging as well as ICD-10 codes for CVA and late neurological sequela, patient charts were analyzed in the 30-day post-operative period. The anesthesiology record was also queried for data regarding the blood pressure management intra-operatively, recording mean arterial pressures (MAP) and vasopressor administration.

RESULTS: There were 711 patients included in the analysis with 471 in the beach chair cohort and 240 in the lateral cohort. Baseline demographics were similar between groups, except for age and ASA class, with the lateral group being significantly younger ($p<0.001$) and lower ASA ($p=0.001$) than the BC group. Mean body mass index (BMI), history of CVA, TIA, HTN, and PVD were not significantly different. There were no documented CVAs in either cohort. There was no significant difference in the number of post-operative radiologic scans to evaluate for CVA ($p=0.77$) or neurological sequelae ($p=0.48$) between groups. The BC cohort had fewer instances of MAP <65 , higher mean minimum MAP, but a higher percentage of patients who received blood pressure support.

DISCUSSION AND CONCLUSION: There were no significant differences identified in the incidence of CVA between patients undergoing arthroscopic shoulder surgery in the beach chair and lateral positions. However, this study did show that the beach chair cohort required significantly more vasopressor intervention by anesthesia to maintain mean arterial pressures. This provides important data to orthopaedic surgeons in their peri-operative discussions with anesthesia colleagues.

Table 2: Patient Demographic Data

| | Lateral (N = 240) | Beach Chair (N = 471) | p-value |
|---------------------|-------------------|-----------------------|---------|
| Age (mean \pm SD) | 34.6 \pm 12.2 | 57.2 \pm 13.8 | <0.001* |
| BMI | 29.5 \pm 7.2 | 30.5 \pm 7.1 | 0.07 |
| ASA class | 2.1 \pm 0.7 | 2.3 \pm 0.7 | 0.001* |
| 1 (N (%)) | 47 (19.6) | 50 (10.6) | - |
| 2 | 122 (50.8) | 243 (51.6) | - |
| 3 | 68 (28.3) | 171 (36.3) | - |
| 4 | 3 (1.3) | 7 (1.5) | - |
| Comorbidities | | | |
| Hx CVA | 0 | 0 | - |
| Hx TIA | 0 | 0 | - |
| Hx DM | 23 (9.6) | 86 (18.3) | 0.002* |
| Hx HTN | 5 (2.1) | 12 (2.5) | 0.3 |
| Hx PVD | 0 | 3 | 0.2 |
| Operative Time | 93.4 \pm 43.3 | 95.2 \pm 40.6 | 0.6 |
| Pre-operative Block | 228 (95) | 452 (96) | 0.6 |
| Ambulatory OR | 159 (66.3) | 323 (68.6) | 0.5 |

Continuous variables recorded as Mean \pm SD, categorical variable recorded as Number (Percentage). BMI: Body mass index; ASA: American Society of Anesthesiologists physical status classification; CVA: cerebrovascular accident; TIA: transient ischemic attack; DM: diabetes mellitus; HTN: hypertension; PVD: peripheral vascular disease; pre-operative regional anesthetic block administered

Table 3:

| | Lateral (N = 240) | Beach Chair (N = 471) | p-value |
|------------------------------------|------------------------------|------------------------------|---------|
| CVA | 0 | 0 | - |
| Post-op Imaging | 2 | 3 | 0.8 |
| Neuro sequelae | 0 | 1 | 0.5 |
| Patients w MAP <65 | 105 (43.8%) | 188 (40%) | 0.1 |
| MAP recordings <65 mmHg per case | 1.7 \pm 2.8 (Var = 7.9) | 1.2 \pm 2.1 (Var = 4.5) | 0.01* |
| Minimum MAP (mean \pm SD) | 66.2 \pm 10.3 | 67.0 \pm 10.3 | 0.4 |
| Received vasopressor | 106 (44.2) | 294 (62.4) | <0.001* |