Thromboembolic Events after Arthroscopic Knee Surgery: Increased Risk at High Altitude

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Objectives: The purpose of this study was to evaluate the incidence of thromboembolic events in patients undergoing arthroscopic surgery of the knee in surgery centers located at elevations near sea level and comparing those rates with the patients undergoing the same operations at surgery centers located in cities at high altitude. Methods: A retrospective review was conducted using a database of a major health care system with surgery centers located throughout the United States. Over 115 surgery centers located in 15 different states were analyzed for any reported thromboembolic events including deep vein thromboses (DVT) and pulmonary embolism (PE) in patients who had undergone knee arthroscopy over a 2 year period. The surgical centers located at elevations lower than 1000 ft were considered sea level centers. Those centers located at elevations above 4000 ft were considered high altitude centers. Any surgical center located between 1000 ft and 4000 ft elevation was excluded. Results: 35,877 patients underwent a knee arthroscopy procedure at a low altitude center between 2011-2012. 10,181 patients underwent a knee arthroscopy procedure at a high altitude center between 2011-2012. During that same time period, 45 total VTEs including 12 PEs occurred at centers considered low altitude while 50 VTEs including 4 PEs occurred at centers considered high altitude. The incidence of VTE at centers considered low altitude was 0.13%. The incidence of VTE at centers considered high altitude was 0.49%. The difference was statistically significant with a p-value <0.0001. The relative risk of developing a VTE was 3.8 times higher at high altitude. Conclusion: Patients undergoing arthroscopic procedures of the knee in cities located at high altitude are at higher risk of developing a VTE than those undergoing the same procedures at cities located at elevations near sea level.