Risk of Noise Induced Hearing Loss in the Orthopaedic Spine Surgeon

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INTRODUCTION: Orthopaedic surgeons understand the risks patients accept when undergoing surgical procedures, including bleeding, infection, and/or injury to surrounding structures. However, the risks these procedures present to surgeons themselves are often overlooked. Noise induced hearing loss (NIHL) affects one's ability to effectively communicate and can negatively impact quality of life. The risk spine surgeons have of developing NIHL due to occupational exposures in the operating room is unknown. Sound levels are considered impermissibly high if the average decibel level (dBA) rises above 105 decibels (dB) for a period of 1 hour. The recommended exposure limit from the National Institute for Occupational Safety and Health (NIOSH) is a maximum of 85 db over an 8-hour time weighted average (TWA). The primary goal of this study is to determine whether surgical procedures commonly performed by orthopaedic spine surgeons place them at an elevated risk for NIHL.

METHODS:

Following Institutional Review Board (IRB) approval, a prospective review was conducted by collecting intraoperative recordings with an external microphone in the operating room (OR). Surgeries included anterior cervical discectomy and fusion (ACDF), posterior cervical decompression and fusion (PCDF), isolated lumbar laminectomies, lumbar interbody fusion (multiple approaches), posterior lumbar decompression and fusion (PLDF), posterior thoracic decompression and fusion (PTDF), microdiscectomy, and sacroiliac screws. Baseline noise levels were established using preoperative recordings to serve as a control. Surgical duration, number of levels involved in the procedure, operating surgeon, and presence of background music were collected. The highest sound pressure level was reported as "maximum dB level," the average dB level projected over an 8-hour time period was reported as "TWA," the percentage of allowable daily noise was reported as "dose," and the dose projected forward over 8-hours was reported as "projected dose."

RESULTS: Sixty-nine recordings of inpatient spinal surgeries were collected comprised of 17 ACDFs, 2 PCDFs, 13 isolated lumbar laminectomies, 18 lumbar interbody fusions (multiple different approaches including ALIF, OLIF, and TLIF), 10 PLDFs, 3 PTDFs, 5 microdiscectomies, and 1 sacroiliac screws. Operative recordings were significantly louder than baseline for all variables including maximum dB level, TWA, dose, and projected dose($p<0.001$). The maximum dB level ranged from 92.3 to 111.4 dB with an average of 102.0 dB. The highest projected dose reported was 104.1% in a microdiscectomy while the highest dose was 13.8% in a posterior thoracic decompression and fusion. The dose per case averaged 6.8% while average projected dose was 19.3% and average TWA was 68.5 dB.

DISCUSSION AND CONCLUSION: Our study demonstrates that spine surgeons are at risk of exceeding cumulative dB limits. Decibel levels are regularly exceeding 85 dB, which is considered damaging. When performing multiple surgeries within a day, accounting for maximum dB levels greater than 90 dB in all recordings and greater than 100 dB in 63%, the aggregate effect of noise cannot be ignored. This study highlights the fact that orthopaedic spine surgeons are at elevated risk for occupational NIHL due to regular OR noise exposure.