



# Patient positioning during in-office otologic procedures impacts physician ergonomics



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## Abstract

**Educational Objective:** At the conclusion of this presentation, participants should be able to: 1) discuss how patient positioning during in-office otologic procedures impacts physician ergonomics; 2) demonstrate how repositioning a patient can lower the risk of developing musculoskeletal disorders.

**Objective:** Our aim was to evaluate the impact of patient positioning on physician ergonomics during in-office otologic procedures. A previous simulation study from our institution suggested that placing patients in the supine position during in-office otology procedures is ergonomically favorable. This study aims to substantiate these findings during the routine care of patients in an otolaryngology practice setting.

**Study Design:** Observational study

**Methods:** We observed two neurotologists performing cerumen removal procedures in the office setting with patients either in the seated position (n=24) or supine position (n=24). The Rapid Upper Limb Assessment (RULA), a validated instrument that measures body positioning with a focus on the upper arm, was used to measure ergonomic positioning. RULA scores correlate occupational body positioning with a numeric representation of musculoskeletal injury risk ranging from 1 (minimal risk) to 7 (very high risk).

**Results:** Overall median RULA scores were 4.5 (medium risk) with patients in the seated position, and 2 (low risk) with patients in the supine position (p<0.0001). Similarly, RULA scores were significantly lower with patients in the supine position when each physician was evaluated independently (p<0.0001, for both).

**Conclusions:** Placing patients in a supine position for cerumen removal results in a more favorable ergonomic position for the physician, thus reducing risk for work-related musculoskeletal disorders. This suggests that providers should consider placing patients in the supine position for in-office otologic procedures. Further study is needed to investigate optimal ergonomic positioning for other common otolaryngology procedures.

## Introduction

Physicians work in a demanding environment that rarely emphasizes ergonomically favorable habits. In positioning themselves to conduct procedures, physicians may repeatedly place themselves in postures that can put them at risk for the development of musculoskeletal disorders (MSDs). These musculoskeletal disorders have been associated with increased pain, decreased work satisfaction, and decreased productivity<sup>1</sup>. As many as 83% of physicians report work-related musculoskeletal pain<sup>3</sup>. Otolaryngologists frequently conduct procedures in tight spaces that often result in maladaptive ergonomic positioning to maintain lines of sight and utilize limited areas of space for instrumental manipulation. Pain during such procedures has been reported by some otolaryngologists as a reason to decrease case load, cease procedures, or retire early<sup>4</sup>.

Despite these difficulties, few studies have been done focusing on how otolaryngologists can improve their ergonomic positioning in practice. We previously performed a study simulating in-office cerumen removal that suggested that placing patients in the supine position provided physicians with an improvement in the quality of ergonomic positioning<sup>5</sup>. In the present study, we aimed to determine if these simulated findings translated to clinical practice. We hypothesized that ergonomic positioning of physicians would be more favorable with patients placed in the supine position during in-office cerumen removal procedures.

## Methods and Materials

**Study design:** Observational study of two neurotology physicians at our institution. These physicians were observed during day-to-day practice performing cerumen removal procedures on patients placed in either the sitting or supine position who required cerumen removal as a part of their clinical care.

**Assessment instrument:** The Rapid Upper Limb Assessment (RULA) tool was utilized to assess the ergonomic quality of the physicians while performing the procedure. RULA is a previously validated occupational ergonomic assessment tool that evaluates the joint angles of the upper arm, lower arm, wrist, neck, torso, and leg to assign a numerical value to quantify ergonomic favorability<sup>6</sup>.

**Statistical analysis:** The Mann-Whitney U test was used to test for differences across conditions with a p < 0.05 considered to be statistically significant.

**Table 1. Risk of Musculoskeletal Discomfort by RULA Score**

RULA Score	Level of Musculoskeletal Discomfort Risk
1-2	Negligible risk, no action required
3-4	Low Risk, change may be needed
5-6	Medium Risk, further investigation needed
6+	Very high risk, implement change now

The RULA tool is used to assess occupational ergonomic positioning. Numerical RULA values represent the risk of developing musculoskeletal discomfort if the occupational posture is maintained.

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## Results

48 observations were made during in-office cerumen removal procedures from 37 patients, observations were split equally between seated and supine positions (n=24).

In the overall study cohort, median physician RULA scores were 4.5 when removing cerumen from patients in the sitting position and were 2 when removing cerumen from patients in the supine position (p < 0.0001). Median subset scores of the individual joint angles of the upper arm, lower arm, wrist, trunk, and neck were all more favorable with patients in the supine position (p < 0.05 in all cases). RULA and position scores are listed in Table 2.

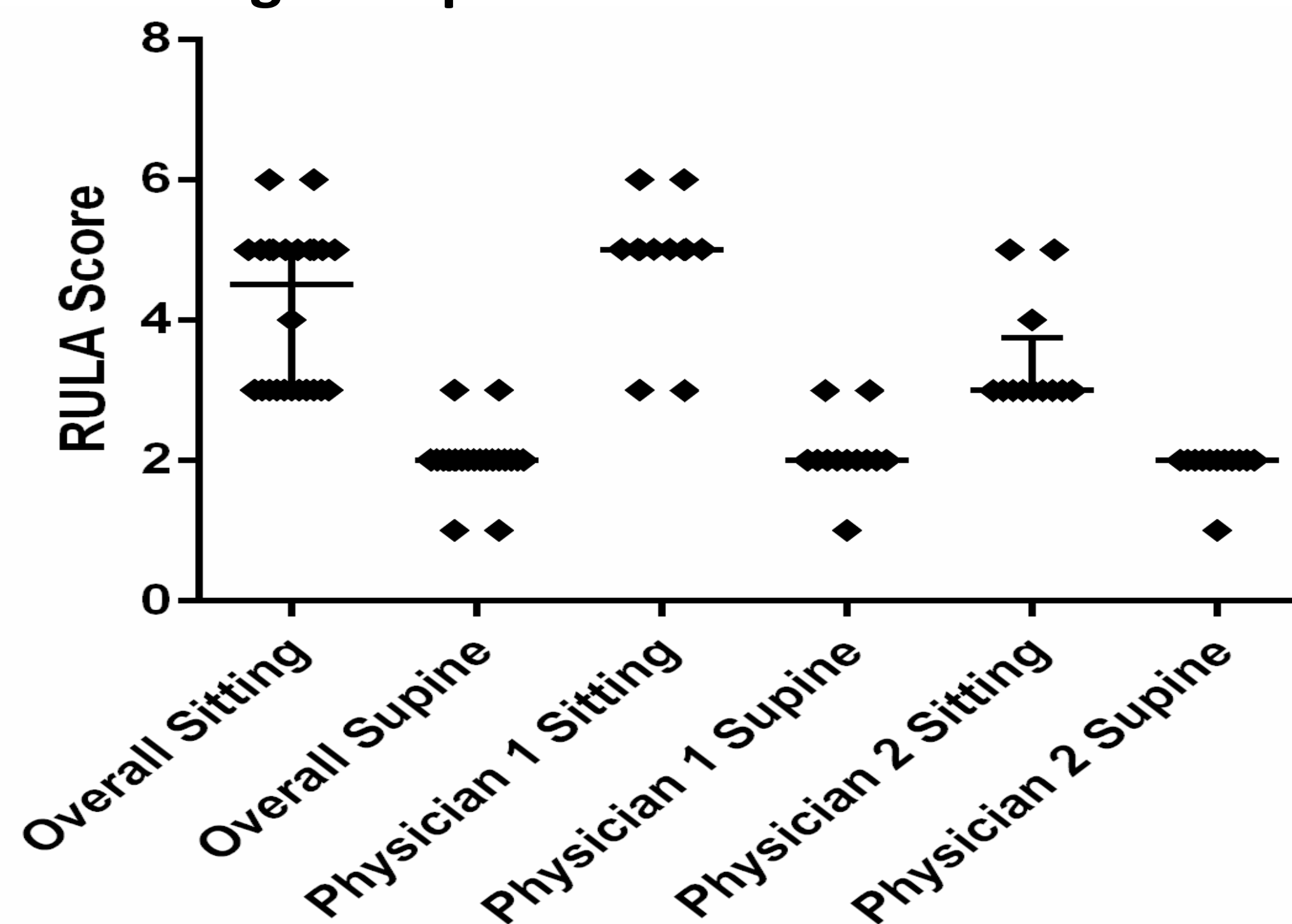
Each physician, when analyzed individually, exhibited statistically significant improvement in RULA scores and several positional scores between the seated position and the supine positions (p < 0.0001).

**Table 2. Median RULA and Positional Scores**

Position Category	Overall Sitting	Overall Supine	Physician 1 Sitting	Physician 1 Supine	Physician 2 Sitting	Physician 2 Supine
RULA	4.5	2*	5	2*	3	2*
Upper Arm	3	1*	3	1*	3	1*
Lower Arm	2	1*	2	1*	2	1*
Wrist	2	1.5*	2	1.5*	2	2*
Neck	3.5	2*	4	2*	3	2*
Torso	2	1*	1	1	2	1*
Leg	1	1	1	1	1	1

Data for the overall cohort are highlighted in the box on the left and broken down by physician participant on the right. \*denotes statistically significant change (p < 0.05)

**Figure 1: Sitting vs Supine RULA Score Distributions**



RULA scores and interquartile distributions are displayed for the overall data set (n=24) and by physician (n=12) in the sitting and supine positions. Diamonds represent individual observations while horizontal lines represent medians and whiskers represent interquartile ranges.

## Discussion

1. The results of this study confirm our hypothesis that the ergonomic positioning of physicians performing in-office cerumen removal procedures is more favorable with patients placed in the supine position.
2. The observed physician RULA score with the patient in the sitting position suggests low to moderate risk for development of work related MSDs. The simple change of placing patients in the supine position led to an observed RULA score that suggests negligible risk of MSDs.
3. Individual joint component scores of the upper arm, lower arm, wrist, torso, and neck were all decreased, suggesting that placing patient in the supine position during in-office otologic procedures decreases risk of MSDs by improving ergonomic positioning globally, rather than simply affecting change in one or two key body areas.

## Conclusions

For in-office cerumen removal procedures, the data from the present study strongly suggests that otolaryngologists should consider placing patients in the supine position to improve ergonomics and decrease strain. Future studies designed to evaluate ergonomic positioning during other procedures and practice settings is needed. Otolaryngologists should remember to evaluate their own ergonomic positioning in their clinical practice to lower their risk of occupational MSDs.

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