

Ergonomic Impacts on Female Otolaryngologists During Bedside Laryngoscopy

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Summary

Female surgeons in Otolaryngology reportedly have higher rates of musculoskeletal injuries. To address the gap in quantitative data we kinematically evaluated male and female otolaryngologists during bedside flexible laryngoscopy using a portable motion tracking system. A modified Rapid Upper Limb Assessment (RULA) was used to evaluate ergonomic risk, focusing on neck, lower back, shoulder, elbow, wrist, hands, and lower limbs. Female surgeons had significantly higher left arm, cervicothoracic (trunk and neck angles), and total modified RULA scores compared to males ($p < 0.05$, $p < 0.05$, and $p < 0.01$, respectively), suggesting greater risk for musculoskeletal strain. Future studies will expand on these outcomes to improve surgeon well-being and performance across a range of procedures.

Introduction

Recent research indicates female surgeons across various specialties, including Otolaryngology, experience higher rates of musculoskeletal injuries compared to their male counterparts [1]. Qualitative findings suggest that female ENT surgeons face notable ergonomic challenges [2,3]; however, there is limited quantitative data to confirm whether their operating positions place them at higher risk. The proposed study aims to fill this gap by using motion capture technology and the Rapid Upper Limb Assessment (RULA) tool to assess and compare ergonomic risk during flexible laryngoscopy—a common office procedure—across male and female ENT surgeons at different training levels. The goal is to pinpoint how body positioning may contribute to increased strain for female surgeons and identify specific ergonomic adjustments to mitigate this risk. Ultimately, these findings will serve as a foundation for broader investigations into ergonomic improvements in other ENT procedures and the development of targeted interventions to enhance surgeon well-being and performance.

Methods

Male and female otolaryngology residents and early- to mid-career faculty were recruited. After providing consent, each participant completed a demographics and health questionnaire. A wireless motion tracking system (Awinda, Xsens, Inc.) recorded neck, lower back, shoulder, elbow, wrist, hand, and lower limbs positions during bedside laryngoscopy and a video procedural stages to motion data via timestamps. A modified Rapid Upper Limb Assessment (RULA) provided ergonomic scores.

Results and Discussion

The modified RULA sub-scores showed that female surgeons had significantly higher left arm scores than males ($p < 0.05$), reflecting greater strain while stabilizing the laryngoscope tube. The right arm, responsible for handling the scope body, also showed a trend toward higher scores in females ($p = 0.10$), though not statistically significant.

Additionally, the cervicothoracic component which in this modified RULA scale, incorporates both trunk and neck ergonomic angles—was significantly higher in female surgeons ($p < 0.05$). This indicates greater strain in the neck, back, and pelvis regions during laryngoscopy for females. When combining upper-limb and cervicothoracic postural factors, the total modified RULA score was also significantly higher for female participants ($p < 0.01$), Figure 1.

These findings suggest a need for ergonomic adjustments, particularly to reduce left arm fatigue and cervicothoracic strain during office-based laryngoscopy.

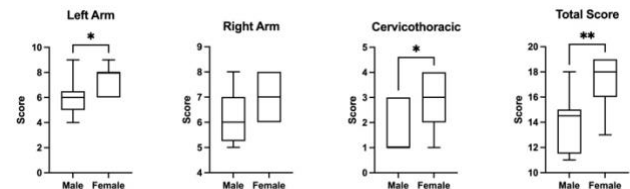


Figure 1: Comparison of modified RULA sub-scores (Left Arm, Right Arm, Cervicothoracic) and overall Total Score in male vs. female otolaryngologists. Higher scores indicate poorer ergonomics and increase musculoskeletal risk.

Conclusions

Our data suggest that female otolaryngologists are at higher ergonomic risk than their male counterparts during office-based laryngoscopy, particularly in the cervicothoracic region. This finding highlighted the need for targeted interventions to reduce strain and improve overall musculoskeletal health among female ENT surgeons.

References

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