The Surgeon Ergonomic Impact of a Tubular-based Digital Camera to Perform a Posterior Cervical Foraminotomy with the Patient in a Seated Position: Case Report and Surgical Technique Description with Ergonomic Assessment

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Disclosure

I have no financial relationships to disclose.
Introduction

- A posterior cervical decompression is a common spine procedure that can be performed with the patient in a prone or sitting position.
- The sitting position provides the potential benefit of more facile retraction of surrounding soft tissues, increased operative field and fluoroscopic visualization, as well as decreased epidural bleeding.
- Unfortunately, the surgeon's ergonomics of this positioning can be quite challenging when using the standard operative microscope to perform the procedure and may cause musculoskeletal harm to the surgeon.

In this case report, we introduce a tubular-based camera system, with video projection onto a screen, to potentially alleviate negative ergonomic impacts with this procedure.

Utilizing the Rapid Entire Body Assessment (REBA) scoring system, we provide objective evidence of the surgeons’ ergonomic changes when using a microscope and tubular-based camera system for this procedure.
Methods

- A sterile digital camera was brought into the field to perform a sitting foraminotomy were completed through the tube retractor at both C6-7 and C7-T1 levels.
- 2 surgeons: 5’10” and 5’0”
- For one half of the procedure, a typical neurosurgical operative microscope was brought into the field to evaluate surgeon ergonomics utilizing the baseline Rapid Entire Body Assessment (REBA) scores for two surgeons of differing stature.
- The digital camera was inserted onto the tubular retractor and REBA scores were calculated.
Methods - REBA

- (Rapid Entire Body Assessment) REBA is a postural targeting method for estimating the risks of work-related entire body disorders.
- A REBA assessment provides a quick and systematic assessment of the complete body postural risks to a worker.
- The analysis can be conducted before and after an intervention to demonstrate that the intervention has worked to lower the risk of injury.

REBA Employee Assessment Worksheet

A. Neck, Trunk and Leg Analysis

Step 1: Locate Neck Position

Step 2: Locate Trunk Position

Step 3: Legs

Step 4: Look-up Posture Score in Table A

Step 5: Add Force/Load Score

Step 6: Score A, Find Row in Table C

Scoring

1 = Negligible Risk
2-3 = Low Risk, Change may be needed.
4-7 = Medium Risk, Further Investigate, Change Soon.
8-10 = High Risk, Investigate and Implement Change
11+ = Very High Risk, Implement Change

B. Arm and Wrist Analysis

Step 7: Locate Upper Arm Position:

Step 8: Locate Lower Arm Position:

Step 9: Locate Wrist Position:

Step 10: Look-up Posture Score in Table B

Step 11: Add Coupling Score

Step 12: Score B, Find Column in Table C

Step 13: Activity Score

Results:

- The procedure was completed in 53 minutes without any intraoperative complications and the surgeons subjectively reported less muscle strain and fatigue during use of the tubular-based camera system.
- While using the neurosurgical operative microscope, the surgeon's neck is flexed forward, the arms are extended, and the stance is widened.
- The smaller statured surgeon's arms were almost at a complete 90 degrees straight out from her body.
- The taller-stature surgeon scored a 5 on the initial REBA scale and the second, shorter-stature surgeon scored a 6, placing both in the medium risk category.
- Once the tubular-based camera was placed, the neck position returns to neutral, the arms are closer to a natural 90-degree bend at the elbow and the stance is at shoulder width.
- Both surgeon's repeated REBA scores were a 3, placing them in the low-risk category.
Conclusion

- Use of the tubular-based digital camera system during a sitting posterior cervical operation improves the ergonomics of the surgeon, objectively shown by improved REBA scores intraoperatively.
- Subjectively, both surgeons felt improved comfort with use the camera.
- This enabling technology can serve as a valuable adjunct in sitting posterior cervical operations compared to a traditional operative microscope.
Thank you!

Please reach out with any questions: Philip.Louie@vmfh.org