41490: Endoscopically-Assisted Targeted Keyhole Retrosigmoid Approaches for Microvascular Decompression: Quantitative Anatomical Study

Evgenii Belykh, MD¹,²
Naomi R. Onaka, BS¹
Xiaochun Zhao, MD¹
Claudio Cavallo, MD¹
Kaan Yagmurlu, MD¹
Ting Lei, MD¹
Vadim A. Byvaltsev, MD²
Mark C. Preul MD¹
Peter Nakaji, MD¹

¹Department of Neurosurgery and ²Neurooncology Research, Barrow Neurological Institute, St. Joseph’s Hospital and Medical Center, Phoenix, Arizona
²Irkutsk State Medical University, Irkutsk, Russia
Disclosures

- **DISCLOSURES:** None

- **FINANCIAL SUPPORT:** This research was supported with funds from the Barrow Neurological Foundation, the Women’s Board of the Barrow Neurological Institute, and the Newsome Chair in Neurosurgery Research to Dr. Preul.
Introduction

• Modern neurosurgical era demands less invasive procedures for functional operations such as microvascular decompression
• Endoscope is an effective inspection tool to assist operating within a narrow trajectory.
• Study evaluating the effectiveness of fully endoscopic keyhole microvascular decompression and comparing maneuverability among different trajectories.
Methods

• Maneuverability targeting upper, middle, and lower neurovascular complexes using different trajectories were quantitatively evaluated and compared between keyhole craniotomy and conventional craniotomy on 10 sides of 5 cadaveric heads.

• The petrosal fissure of the cerebella was dissected, and the surgical trajectory within this fissure was quantitatively evaluated and compared with trajectories not using the petrosal fissure.
Results

Various trajectories through the upper and lower keyholes were used for endoscopic exploration of the CPA nerves. Dotted line shows superior trajectory to the cranial nerve V through the supracerebellar space. Solid line shows middle trajectories to the CN V, VII&VIII, and LCNs through the upper keyhole. Dashed line shows lower trajectories to the same nerves through the lower keyhole. CN, cranial nerve; LCN – lower cranial nerves.
Stepwise illustration of a targeted keyhole approach to CN V

Stepwise illustration of a targeted keyhole approach to CN VII
Dissection through the petrosal fissure (A) between the superior and inferior semilunar lobules lead to the horizontal fissure. Intracranial dissection of the postclival fissure (B) between superior semilunar lobule and simple lobule does not provide a favorable trajectory and working space. *Inf*, inferior; *Sup*, superior.
Results: Conventional retrosigmoid approach provided significantly greater surgical freedom of CN V, VII and VIII, and LCNs, primarily due to larger bone opening.

Angle of attack: comparison of keyhole and conventional craniotomy

Angle of attack compared in by different approaches. CN V, trigeminal nerve; CN VII, facial nerve; LCNs, lower cranial nerves.
**Results:** Petrosal fissure splitting significantly increases the vertical angle of attack for the CN V and CN VII root entry zones.

Comparison of the vertical angle of attack before and after splitting of the petrosal fissure. **CN V**, trigeminal nerve; **CN VII**, facial nerve; **LCNs**, lower cranial nerves.
Conclusion

• The targeted endoscope-assisted retrosigmoid keyhole MVD is safe and effective, but require detailed understanding of the three-dimensional anatomy in order to create convenient and appropriate corridors.

• Assistance with endoscope can maximize the visualization and identification of the delicate neurovascular structures.

• Splitting of the petrosal fissure can compensate the maneuverability loss from the smaller craniotomy.