Introduction
Trigeminal schwannomas may appear anywhere along the length of the nerve, and therefore its surgical management requires a spectrum of skull base approaches. In this study, we evaluate two purely endoscopic approaches to the peripheral segments of the mandibular nerve (V3): endoscopic extratemporal subapproach (EESTA), and endoscopic endonasal transpterygoid approach (EETPA).

Methods and Materials
Twelve EESTA and EETPA procedures were performed on 6 fresh non-injected cadaveric heads. In all specimens, a 0° two-dimensional endoscope (4-mm diameter, 18-cm length; Karl Storz, Tuttlingen, Germany) was used to develop each surgical approach, and to identify anatomical landmarks and the respective limitations associated with accessing V3. Anatomical exposure of each approach was defined as the area within 4 anatomic barriers that can be directly visible, and that permits surgical freedom in the sense of unlimited instrument maneuverability.

Results
Endoscopic Extratemporal Subapproach (EESTA): EESTA was performed through mini craniotomy that was placed above the middle third of the zygomatic arch (Fig 1). In this approach, the proximal segment of V3 from its emergence from Meckel’s cave and until it reached the level of the superior head of the lateral pterygoid muscle (LPM), could be well-exposed and accessed in all specimens. The average length of this V3 segment was 1.39 ± 0.6 cm. The average distance from the level of the craniotomy to foramen ovale was 3.1 ± 0.6 cm.

Endoscopic Endonasal Transpterygoid Approach (EETPA): EETPA was performed using an exclusive endoscopic transnasal approach, without adding a Caldwell-Luc incision (Fig 2). In this approach, the distal segment of V3 from its emergence from the foramen ovale and until and beyond its division into two trunks could be well exposed and accessed in all 12 specimens. The average length of this V3 segment was 0.8 ± 0.43 cm. The average distance from the opening of the right nostril to the segment of V3 in the foramen ovale was 9.8 ± 0.77 cm.

Discussion
Based upon our dissections, the trajectories of EESTA and EETPA corresponded with the proximal and distal segments of V3, respectively.

EESTA revealed the course of the proximal segment of V3 from its exit from Meckel’s cave to the level of the superior head of the lateral pterygoid muscle, and provides favorable access to its lateral aspect. The anatomic exposure achieved by this approach is extended from the maxillary division of the trigeminal nerve (V2) and foramen rotundum anteriorly to the greater superficial petrosal nerve (GSPN) posteriorly, and from the retracted temporal lobe superiority to the level of the superior head of the lateral pterygoid muscle inferiorly (Fig 4, region A).

EETPA revealed the course of the distal segment of V3 from the foramen ovale to the ITF, and provided favorable access to its anteromedial aspect. The anatomic exposure achieved by this approach is extended from the temporal muscle in the ITF laterally to the medial pterygoid plate and paraclovical ICA medially, and from the infraorbital branch of V2 superiorly, to the level of the nasolacrimal duct floor (inferiorly) (Fig 4, region B).

Conclusions
The combination of EESTA and EETPA effectively follows the course of V3, from Meckel’s cave to the infratemporal fossa. While the anatomic exposure of EESTA is better suited for a lesion that is located lateral to the proximal V3, the EETPA is better suited for a lesion located anteromedial to its distal segment. These endoscopic minimally invasive approaches may potentially be incorporated into the management of mandibular nerve schwannomas and other pathologies.

References