Endoscopic Caldwell-Luc Approach for Infratemporal Fossa Access: A Cadaveric Feasibility Study

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Abstract

Background: Recently, there has been an increase in interest in endoscopic approaches to the infratemporal fossa (ITF). The standard Caldwell-Luc approach provides a direct route to this region, but is limited by visualization and surgical freedom. In this cadaveric study, we attempt to determine if endoscopes usage through the Caldwell-Luc approach resolves these limitations. We photodocument the surgical technique for achieving this access and investigate visualization and surgical maneuverability allowed through this route.

Methods: Cadaveric dissection with photo and video documentation was used to perform the surgical steps to provide endoscopic access to the ITF via the Caldwell-Luc Route. Visualization and ease of surgical maneuverability were assessed.

Results: Using 4 cadaver heads (8 sides), the surgical technique and steps required to perform an endoscopic Caldwell-Luc approach to the ITF were clearly demonstrated. The endoscopic Caldwell-Luc approach provided adequate access, visualization, and surgical maneuverability to most areas of the ITF in all anatomic specimens.

Conclusions: The endoscopic Caldwell-Luc approach can be used to access most areas of the ITF with adequate visualization and satisfactory surgical maneuverability. This approach can be combined with other endoscopic ITF approaches when additional surgical freedom is warranted.

Introduction

Traditionally, infratemporal fossa (ITF) access was obtained through external lateral or anterior approaches that can cause facial scars and significant morbidity including conductive hearing loss, dental malocclusion, longer operative times, and increased blood loss. Recent advances in endoscopic sinus surgery (ESS) have allowed endoscopic access to the ITF.

Sewall in 1928 described the first open transantral approach for exposure of the sphenopalatine ganglion within the pterygopalatine fossa (PPF). The Caldwell-Luc approach was commonly used for maxillary sinus disease but has largely been abandoned for endoscopic techniques except in some cases of invasive fungal disease or extended maxillactyctomy. Endoscopic sublabial approaches are described in conjunction with transnasal access, but rarely alone. Endoscopic dissection employing endoscopic transnasal and sublabial approaches offers greater posterior and lateral exposure to the ITF including access to V3, the middle meningeal artery, and the cervical proximal carotid artery. The variable pathology encountered within the ITF highlights the importance of adequate easily reproducible surgical access to this region.

We describe and photodocument through cadaveric dissection the endoscopic-assisted Caldwell-Luc approach to the ITF to provide greater instrument access and maneuverability within the lateral and posterior ITF (Fig. 1). This exposure provides adequate access to the most important neurovascular structures within the ITF.

Results

Four cadaveric dissections were completed with photodocumentation of the surgical steps described previously. The Caldwell-Luc window allowed ample access and maneuverability for instrumentation in the ITF in each of the dissections using 0- and 30-degree endoscopes (Fig. 2). Surgical access to structures such as the Eustachian tube, neurovascular structures, and muscles of the ITF was adequate. The endoscopic-assisted ipsilateral Caldwell-Luc approach improved anteroposterior and lateral access, and provided a direct pathway for manipulation with significant surgical freedom.

Conclusion

The endoscopic-assisted Caldwell-Luc approach can be used to access most areas of the ITF with adequate visualization and satisfactory surgical maneuverability. This approach can be combined with other endoscopic ITF approaches when additional surgical freedom is warranted.

Materials and Methods

Cadaver Dissection

We dissected four fresh cadaver heads, supplied within one week of death, without prior dissection or manipulation based on availability. Dissection was performed by one operator, with standard techniques. All dissections were performed using the same surgical instrumentation, which included Gyrus series (Gyrus ACMI, Southington, MA) power dissector blades and burrs and a standard endoscopic sinus instrumentation. Zero and 30° rigid endoscopes were used throughout the dissections. A standard endoscopic sinus tower was used for video and photo-documentation. This study qualified as exempt status per the “nonhuman subject research” protocol set by the Institutional Review Board of the University of Medicine and Dentistry of New Jersey (UMDNJ)-New Jersey Medical School.

Description of Operative Technique

This approach involves creation of an ipsilateral sublabial incision in standard Caldwell-Luc fashion. Blunt dissection in a subperiosteal plane elevates the buccal soft tissue and provides access to the anterior maxillary antrostomy. Care should be taken to avoid injury to the infraorbital nerve at the superior limit of the antrostomy and the teeth roots at the inferior limits of the antrostomy. This route can then be used for endoscopic access and instrumentation of the structures of the infratemporal fossa.

References