Transpterygopalatine approach

The transpterygopalatine approach, also known as the transpterygoid approach, is a surgical technique primarily used in skull base surgery to access lesions located in the infratemporal fossa, pterygopalatine fossa, cavernous sinus, petrous apex, and surrounding areas. This approach is particularly valuable in otolaryngology and neurosurgery for accessing deep-seated tumors or vascular lesions that would be challenging to reach through more traditional pathways.

Indications

The transpterygopalatine approach is used to access:

- Tumors of the pterygopalatine fossa (e.g., juvenile nasopharyngeal angiofibroma)
- Lesions in the infratemporal fossa
- Vascular lesions such as carotid aneurysms in the petrous or cavernous segments
- Infections or inflammatory processes in these areas
- Some types of maxillary or sphenoid sinus tumors that extend laterally

Surgical Anatomy

- **Pterygopalatine Fossa (PPF):** This small, deep space, situated between the posterior wall of the maxillary sinus and the pterygoid plates, contains important neurovascular structures, including the maxillary nerve (V2), sphenopalatine artery, and pterygopalatine ganglion.
- **Pterygoid Process:** The process of the sphenoid bone is often partially resected to gain wider access to the lateral recess of the sphenoid sinus and adjacent areas.
- **Structures at Risk:** The maxillary nerve (V2), internal carotid artery, and sphenopalatine artery are vulnerable structures, requiring meticulous dissection and awareness of the surrounding anatomy.

Procedure Overview

1. **Approach and Exposure:**
    - The surgery typically begins with an endonasal approach, where the lateral wall of the nose and portions of the maxillary sinus are accessed.
    - A lateral or medial antrostomy is performed for better visualization and access.
2. **Resection of Pterygoid Process:**
    - The pterygoid process is carefully resected to expand the surgical corridor into the infratemporal and pterygopalatine fossae.
    - This step allows access to the lateral recess of the sphenoid sinus and facilitates the visualization of deeper neurovascular structures.
3. **Target Lesion Removal:**
    - Depending on the location and nature of the lesion, additional bone removal and retraction might be necessary.
    - If the lesion involves the internal carotid artery, special care is taken to prevent vascular injury.
    - Tumor removal or vascular lesion management is then carried out with a combination of

microscopic and endoscopic techniques.

Advantages

- Minimally invasive, with reduced morbidity compared to more open skull base approaches.
- Provides direct access to deep-seated lesions, minimizing the need for brain retraction or large skull openings.
- Useful for treating lesions that extend into complex areas like the infratemporal and pterygopalatine fossae.

Challenges and Complications

- **Complex Anatomy:** Requires thorough knowledge of skull base anatomy due to the proximity of critical neurovascular structures.
- **Vascular Injury:** Risk of injury to the internal carotid artery and sphenopalatine artery.
- **Neural Damage:** Potential for damage to the maxillary nerve, leading to numbness in the midface.

The transpterygopalatine approach is a powerful technique in skull base surgery, providing access to lesions that would otherwise be challenging to reach. Its success depends heavily on surgical precision, a deep understanding of the anatomy, and careful planning based on the lesion's characteristics.

Surgical correction of the lateral sphenoid recess encephalocele is achieved via one of two endoscopic approaches: extended sphenoidotomy or transpterygopalatine. Extended sphenoidotomy is preferred if the angle between the access door and lateral extension of bone defect is greater than 35°1. Otherwise, the transpterygopalatine approach is used. Intraoperative video demonstrating an extended sphenoidotomy approach to correcting a lateral recess sphenoidal encephalocele has not previously been published.

Sindewald et al. present a case of a 41-year-old female who presented with meningitis, a cerebrospinal fluid leak, and an incidental sphenoid mass. Brain MRI redemonstrated the mass in the sphenoid sinus consistent with an encephalocele occupying Sternberg's Canal. The patient consented to the procedure. The video demonstrates the skull base approach, encephalocele extraction, collagen inlay, and nasal septal bone and vascularized pedicled nasoseptal flap placement. Postoperative imaging confirmed the placement of the collagen inlay and nasal septal bone autograft. The patient recovered from surgery and was discharged on post-operative day 3 with no cerebrospinal fluid (CSF) leak recurrence. Postoperative follow up demonstrated viable nasoseptal graft without evidence of CSF leak. For patients with favorable anatomy, an extended sphenoidotomy approach to lateral sphenoid sinus encephalocele resection is a preferred alternative to the transpterygoid approach. This surgical video demonstrates the technique for managing lateral sphenoid sinus encephaloceles occupying Sternberg's canal, including endonasal approach, encephalocele resection and posterior sphenoid wall repair [1)]

1)

Sindewald RW, Brandel MG, Wali AR, Yan CH, Santiago-Dieppa DR. Surgical management of a lateral sphenoid sinus encephalocele: 2-Dimensional operative video. World Neurosurg X. 2024 Sep

27;25:100402. doi: 10.1016/j.wnsx.2024.100402. PMID: 39484663; PMCID: PMC11526047.

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