

## REVIEW ARTICLE

# THE TRANSCERVICAL APPROACH TO LATERAL SKULL BASE: A SIMPLE AND SAFE ALTERNATIVE

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### ABSTRACT:

The transcervical approach to lateral skull base is a simple and safe alternative to other surgical approaches employed for access to this area. There are definite advantages of this surgical technique which include preservation of hearing, technical ease of operation, improved patient safety and reduced local tissue and function compromise.

**Key Words:** Transcervical approach, neurogenic tumours paragangliomas head neck.

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### INTRODUCTION:

The lateral skull base area is afflicted with a variety of tumours, majority of which are represented by neurogenic tumours, paragangliomas and vascular tumours. Of these, schwannoma, chemodectoma (such as carotid body tumour) and haemangioma constitute the major bulk of pathology. As these tumours show a clinical manifestation in the upper part of lateral neck, it is pertinent to mention that the neurogenic tumours may arise in the medial or lateral compartment of the lateral neck. Neurogenic tumours of medial compartment originate from one of the last four cranial nerves (IX – XII) or the sympathetic trunk, while tumours arising in the lateral compartment may originate from the cutaneous or muscular branches of cervical plexus or brachial plexus.<sup>1</sup>

A variety of skull base approaches, developed over many decades of research, have been utilised for the surgical removal of tumours affecting the lateral skull base. Most of the approaches that target the lateral skull base, as well as the areas of surgical exposure provided by them, are summarised below:

#### (A) Lateral approaches :

- Infratemporal fossa approach<sup>2,3</sup> – mastoid, middle ear, infratemporal fossa - stylomastoid, jugular bulb, internal carotid artery, foramen ovale, pterygopalatine fossa, nasopharynx.

1. Translabyrinthine approach<sup>4</sup> – posterior fossa, tentorium to cranial nerves IX to XI, internal auditory canal to fundus, cerebellopontine angle.
2. Transcochlear approach<sup>5</sup> – posterior fossa, tentorium to cranial nerves IX to XI, internal auditory canal to fundus, cerebellopontine angle.
3. Preauricular subtemporal approach<sup>6</sup> – infratemporal fossa - foramen ovale, pterygoids, middle clivus, all of intrapetrous carotid artery.

#### (B) Posterior approach :

1. Occipital approach<sup>7,8</sup> – posterior fossa, tentorium to foramen magnum, internal auditory canal but not to fundus, jugular bulb and foramen.

#### (C) Anterior approach :

1. Facial translocation<sup>9</sup> – nasopharynx, clivus, cavernous sinus, infratemporal fossa and superior orbital fissure.
2. Maxillary swing approach<sup>10</sup> – pterygopalatine fossa, nasopharynx, parapharyngeal space.

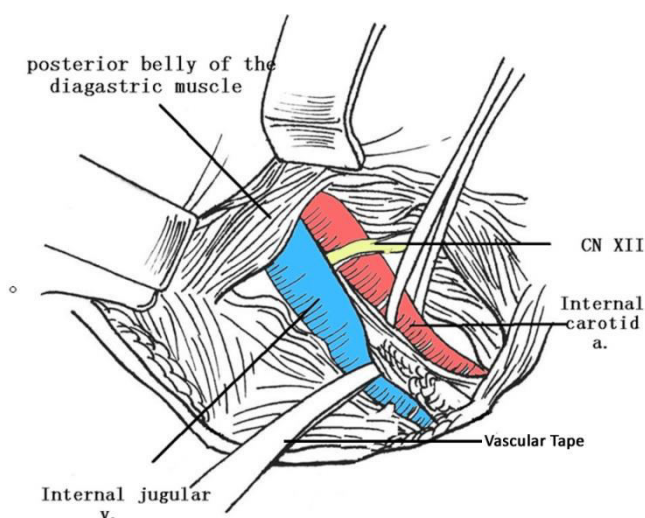
#### (D) Inferior approach :

1. Transmandibular approach<sup>11-13</sup>: parapharyngeal space, ipsilateral nasopharynx, clivus, upper vertebrae.

Many of the approaches mentioned above are highly technique-sensitive and complex, a reason why they can be mastered by very few surgeons, being mainly practiced in advanced surgical centers where tertiary level facilities are available. A simple and safe alternative to the above approaches, for the treatment of neurogenic tumours and vascular lesions of the lateral skull base, is the transcervical approach. The applicability of this approach is well justified by the fact that it is a commonly employed surgical technique at the most advanced centers of head and neck surgical oncology, such as the Memorial Sloan-Kettering Cancer Center.<sup>1</sup>

### Surgical Technique:<sup>1,14,15</sup>

The surgery must be done under general anaesthesia with oral or nasotracheal intubation. The patient is placed supine with the head extended and the chin turned away from the side of the tumour, for adequate exposure. A submandibular skin incision is employed, which begins above and posteriorly at the tip of mastoid, then extends anteriorly and downwards along a skin crease of the upper neck, upto the midline of the neck in the submental region. The incision is then deepened through the platysma, following which, upper and lower cervical skin flaps are developed in the subplatysmal plane. Next, the marginal mandibular branch of the facial nerve is identified, followed by incision of the superficial layer of deep cervical fascia parallel to the anterior border of sternocleidomastoid muscle. The muscle is then retracted posteriorly to expose the carotid sheath. Thence, the common carotid artery must be identified and dissected (Fig. 1), so that it can be retracted anteriorly with the help of vascular tapes.



**Figure 1:** Dissection of common carotid artery

The inferior jugular vein is then identified and retracted posteriorly. Subsequently, the hypoglossal and vagus nerves are identified and protected. For extended exposure and blunt dissection of tumours in lateral skull base area, the posterior belly of digastric muscle and the angle of mandible have to be retracted anterosuperiorly.

Whenever major neural structures are involved in the tumour, the feasibility of separating the tumour from the main trunk of the nerve, must be carefully assessed. At times, magnification loupes may be required for this assessment. After removal of the tumour, a thorough haemostasis is achieved and a suction drain may be placed in the depth of the wound, the outer end of which is brought out through a separate stab incision. The wound is then closed in layers. The drain is then connected to continuous negative suction pressure box.

### Discussion:

The transcervical-retropharyngeal approach for resection of tumours at lateral skull base was originally described by Stevenson et al<sup>14</sup>, for resection of clival chordomas, in 1966. The approach provides anterolateral access to the lower clivus, craniovertebral junction and cervical spine. The applications of the approach, in this relation, are rare because other surgical approaches have been developed and utilised to target the above mentioned anatomical areas. However, it is an excellent alternative for surgical treatment of tumours in the lateral skull base areas.

Indications of the transcervical approach include lesions on extracranial surface of the lateral skull base, in the infratemporal fossa and the parapharyngeal space. In terms of pathology, the technique is usually employed for surgical removal of benign lesions such as schwannoma and haemangioma. Its major limitation is that the exposure of lateral skull base achieved, is limited and as a consequence, management of lesions involving the jugular bulb and intrapetrous portion of the internal carotid artery, is difficult using the transcervical approach. However, there are definite advantages of this surgical technique as compared to other approaches to lateral skull base, which include preservation of hearing, technical ease of operation, improved patient safety and reduced local tissue and function compromise.<sup>14,15</sup>

### Methods:

Using Pubmed and Google<sup>TM</sup> Scholar, a literature search was performed up until January 2016, for articles published in English, using the search terms 'transcervical approach' and 'lateral skull base tumours'. The abstracts of all the studies found in the search were analysed to judge their relevance and

inclusion. Articles with insufficient data were excluded. References of the selected articles were searched to identify further related studies. The lack of prospective studies and randomization precluded a formal meta-analysis.

### Results:

The transcervical approach to lateral skull base is a simple and safe alternative to other surgical approaches employed for access to this area. There are definite advantages of this surgical technique which include preservation of hearing, technical ease of operation, improved patient safety and reduced local tissue and function compromise.<sup>14,15</sup>

### Conclusions:

The transcervical approach to lateral skull base can be successfully employed for removal of tumours in selected cases. This approach provides a simple and safe alternative to other surgical approaches.

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