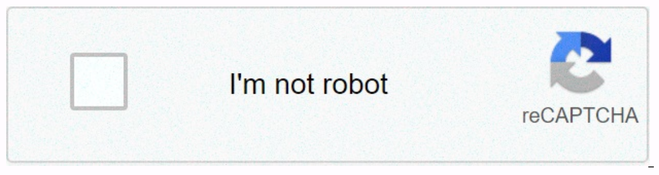

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Infratemporal fossa ct

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Carl H Snyderman, M.D. Professor, Departments of Otolaryngology and Neurological Surgery, University of Pittsburgh Medical Center Carl H Snyderman, MD is a member of the following medical societies: Alpha Omega Alpha, American Academy of Otolaryngology-Head and Neck Surgery, American College of Surgeons, American Medical Association, American Society for Head and Neck Surgery, American Society for Head and Neck Surgery, American North Skull Base Society, Pennsylvania Medical Society The Phi Kappa and Society University Otolaryngologists-head and neck surgeons disclosure: Phacon Consulting Fee Consulting work off-campus? Learn more about our remote access capabilities volume 42, Number 5 Chapter Editor: Dennis Kraus Infratemporal Fossa (ITF) is an area densely packed with neurovascular structures within irregular boundaries. The purpose of this study was to classify the ITF into zones corresponding to its anatomical spaces and the procedures in which they are encountered by endon method (anteroposterior axis). Six cadaveric specimens (12 sides) with injectable coloured latex were dissected. After the endoscopic medial maxillectomy and Denker approach, the gradual exploration of the masticator space and upper paralysis space was completed. A classification of the ITF based on well-defined spaces has been established. The ITF was divided into five zones: Zone 1 (retromaxillary space)-space lying between the posterior wall of the jaw sinus and temporal and pterygoid muscles. Zone 2 (superior interpterygoid space)-area, including superior head lateral pterygoid muscle, V3, and foramen ovale. Zone 3 (inferior space of the head) – includes a lower pterygoid muscles, medial pterygoid, and temporal muscles, and the space that enclosed these muscles. Zone 4 (temporo area)—space sideways to the tempo muscle (mainly fat). Zone 5 (tubopharyngeal space)-includes eustachian tube, tensor, and levator Veli palatini muscles, and structures in the upper parapharyngeal space. The ITF can be visualized as five zones based on spaces consisting of masseter muscles and upper paralysis structures. This new classification system is useful for directing endoscopic methods into the ITF, while reducing the potential for neurovascular structures and pterygoid muscle injury. Infratemporal fossa (ITF) is an anatomical space with irregular boundaries, comprising the masses and upper paraffin spaces (UPPS) and located below the floor of the middle cranial pit.1 In turn, the mastic space includes medial and lateral pterygoid muscles, temporomeibia, internal jaw artery, jaw (V2) and lower jaw (V3) branches of trigeminal nerve, tensor and levator veli palatini muscle and Eustachian tube.2 Stiloid diaphragm consisting of stiloid aponeurosis , divides UPPS into pre-and postyloid divisions.3 Violations related to the ITF include those that originate from space, such as schwannomas, and tumors that invade from adjacent structures such as inverted papilloma, juvenile angiofibroma, adenoid cystic carcinoma, and squamous cell carcinoma.4-7 His complex neurovascular anatomy caused several classical surgical methods under the direction of lateral medial (i.e. preauricular, transceral, transparotide or combined approaches) and front (i.e. upper jaw) or medial (i.e. , transoral) routes.8-10 After endoscopic methods and devices, endoscopic endons or transoral approach benign and selecting FOR MEF MALIGNANT LESIONS, gained popularity.11-13 It should be noted that the removal of tumors that are pre-stiloid parapharyngical through an endoscopic transoral method with the help of robotics has achieved satisfactory results.14 Endoscopic transpterygoid approach to the ITF is properly described and in some cases it can produce similar results as open methods , whose morbidity decreased.1, 2, 15 However pterygopalatine fossa.1 should also be donated many neurovascular bundles pterygopalatine fossa.1. , as sacrificing vidian and more palatine nerve pterygopalatine fossa may cause postoperative xerophthalmia and various sensory (i.e. hypoaesthesia, anaesthesia or deafferentation pain).10, 18 In addition, the lateral and medial pterygoid muscles must also be transmilated or resectioned towards the lateral ITF (mass-point) which may contribute to the postoperative trismus.1 Cadaveric dissections have helped to identify several possible sections covered with pterygoid and time muscles.19 We therefore hypothesized that they could provide safe corridors for surgery to and within the ITF. The purpose of this study was to create a consistent dissection of the ITF, illustrating surgical corridors that can be useful in planning endoscopic methods for specific lesions; Therefore, therefore, effective surgical effect with maximum preservation of neurovascular structures and pterygoid muscles. Endoscopic medial maxillectomy was combined with endoscopic Denker's approach to the ITF in six adult latex injections in cadascopic specimens (12 sides) in the Anatomy Laboratory toward The Otolaryngology of Total Surgical Innovations and Neurosurgery (ALT-VISION) at Wexer Medical Center at Ohio State University. All authors were certified by local regulatory agencies related to the use of human tissue and cadaveric research. For each example, a high-resolution CT scan was performed and its digital data was imported into the surgical navigation system (Stryker Corporation; Kalamazoo, Michigan). 00 endoscopes (4 mm in diameter, 18 cm long) connected to a high-definition camera and monitor (Karl Storz Endoscopy, Tuttlingen, Germany) were used to visualize visualization throughout the autopsy. All autopsies were documented with videos and images that were archived for analysis (AIDA system Karl Storz Endoscopy, Tuttlingen, Germany). Photos documenting anatomical relationships were related to severalplanar CT views provided by the imaging system. For bone removal and autopsy, a high-speed drill (Stryker Co., Kalamazoo, Michigan) with a straight piece of handles and 3 to 4 mm coarse diamond splinters was used. After the endoscopic medial method of maxillectomy and Denker, the progressive dissecting of the ITF, including the masses and upper parapharyngical spaces, was completed. Both methods were detailed in previous studies.20, 21 A posterior nasal septectomy was performed to facilitate the technique of two nostrils, four-handed. Under possible anatomical spaces, we divide the ITF into five different zones. Figure 1 shows a schematic description. Zone 1 (retromaxillary space) was defined as the space between the posterior wall of the maxillary sinus and the complex of temporary and pterygoid muscles. After the infraorbital nerve was detected in the orbital floor, the posterior wall of the maxillary sinus mead was removed to pterygopalatine fossa. The remaining lateral wall of the maxillary sinus and its periostheum, directed to the infraorbital nerve, was later washed down to the floor level of the maxillary sinus to reveal the maxillary fat sole (Fig. 2A), which was carefully removed to reveal the inner branches of the jaw artery (Fig. 2B). Later, the branches of blood vessels were donated to reveal temporary and pterygoid muscles (Figure 2C). Zone 2 (higher interppharyngical spaces) is located in a higher part of the ITF and includes the upper head of the lateral pterygoid muscle, V3, and foramen ovale (Figure 3A). After careful dissection in the pterygopalatine pit, the maxillary nerve, pterygopalatine ganglia and the larger palatine nerve were well preserved on all 12 sides. Using the maxillary nerve as a reference to determine the base of pterygoid and the larger sphenoid bone wing, the higher head of the lateral pterygoid muscle was enlarged from the larger sfenoid wing after the sub-periostheal plane (Figure 3A). V3 and foramen ovale were identified as the origin of the posterior lateral plate (Fig. 3B). Zone 3 (inferior interpt.goid space) includes inferior head lateral pterygoid muscles, medial pterygoid, and temporal muscles. The deep temporary nerve in the middle wall of the intermediate part of the muscles (Fig. 4A) on all 12 sides is a reference for the determination of zone 3 (Figure 4B). After pushing the temporal muscle sideways along the space consisting of the temporal muscle and medial and lateral pterygoid muscles in the posterior direction, the linguistic and inferior alveoli nerves lie on the higher medial wall of the pterygoid muscle, and the inner artery of the jaw is detected to enter the butt aspect of the ITF (Fig. 4C). In addition, most of the medial aspect of the mandible calm and deep head of the sciatic muscle fascia can be exposed according to the scope of Guidelines 00 within this corridor (Fig. 4D). Zone 4 (temporo ocycline) is defined as the space transverse to the tempo muscle and contains mainly fat (Figure 5A). The medial aspect of the zygomatic arch and superficial guide to the expansive muscles can be reached through this space (Fig. 5B). Zone 5 (tubopharyngeal space) includes eustachian tube, tensor and levator Veli palatini muscles and UPPS structures. Neurovascular structures such as pterygopalatin ganglia, vidian nerve, larger and smaller palatine nerves, decreasing palatine and phenopathiatin arteries were sacrificed to increase the effect. After the lateral height of the pterygoid muscle from the lateral pterygoid plate, a pterygoid process was drilled and the lateral pterygoid plate was performed. Along the highest wall of medial pterygoid muscle, posterior tenor veli palatini muscle at the anterolateral aspect of cartilage Eustachian tube was identified and resectioned, and the levator Veli palatini muscle anteroinferior aspect was exposed (Fig. 6A). The fat was removed before the stiloid room to reveal the deep lobe of the papular gland (Fig. 6B). Remove stiloid apopneurosis exposed to parapharynous inner carotid arteries (pICA) (Figure 7A). In addition, inferior cranial nerves (IX-XI) and internal flange veins (Figure 7B) may be visualized. Hypoglossal nerve (XII), but is posterior to pICA; thus, its visualization requires the mobilisation of the vessel (Figure 7C). The diagram shows an MRI scan of 1-5 zones. Zone A, 1, Zone 3, Zone 5; Zone B, 2, zone 4; Zone C, Zone 1 (red dot lines), Zone 2 for zone 4 (blue dotted lines) and Zone 5 (green dot lines) for sagittal view. M, medial pterygoid muscle; L, lateral pterygoid muscle (inferior head); T, temporal muscle; Ma, masseter muscle; z, zygomatic arch; E, Eustachian tube; L-s, the head of the high-end lateral pterygoid muscle; pICA, parapharynx internal carotid artery [Color number can be viewed wileyonlinelibrary.com] A, Removal of branches of poster sinus and its periostheum, fat (F) poster alveolar artery (PSAA, blue arrow); B, Main inner branches of the jaw artery (IMA); C, part of the bucanal fat pad was removed to reveal temporal muscle (TM) and lateral pterygoid muscle (LPTM). IOA, lower orbital arteries; DPA, descending palatine artery [Color number can be seen wileyonlinelibrary.com] A, Jaw nerve (MN) can be observed to determine the foramen rotundum (FR), pterygoid base (PB), and higher wing sphenoid bone (GW), superior head lateral pterygoid muscle (LPTM) has been increased from GW subperiosteal plane; B, Foramen ovale (FO) and V3 are visualized [Color number can be viewed wileyonlinelibrary.com] A, Deep time nerve (arrow) is consistently located in the medial wall temporal muscle (TM), which is set in the entrance zone 3

(highlighted part) landmark; Zone B, Zone 3 was surrounded by medial (MPTM) and lateral pterygoid muscle (LPTM) and TM; C, through this space it is possible to detect the linguistic nerve (LN), the inferior alveoe nerve (IAN), the inner artery of the jaw (IMA) and the mandible calm (MR); D, the medial aspect of MR and fascia deep head killer muscle (closed point line) can be accessed [Color number can be viewed wileyonlinelibrary.com] After removal of fat (F) zone 4, A, zygomatic arch (ZA) and superficial guide to the humuo muscle (Ma) can be exposed, B [The colored number can be viewed wileyonlinelibrary.com] A , After transexission tenor veli palatini muscles, Eustachian tube (ET) and the veli palatini muscle (LVPM) can be determined; B, After removal of the fat before the stiloid space, it is possible to view the deep lobe (arrow) of the papular gland. SA, styloid aponeurosis [Color shape can be viewed wileyonlinelibrary.com] A, After removal of stiloid aponeurosis (SA), pICA can be visualized (arrow); B, cranial nerves IX and X may be located between pICA and internal jugular veins (IJV) and cranial nerve XI are posterior to IJV; C, Cranial Nerve XII is visualized posterior to pICA [Color number can be viewed wileyonlinelibrary.com] Despite significant advances in optics, the management of devices and endonmic methods, violations of the ITF through endositic endoscopic method still poses a surgical challenge.15 Surgical approaches to the ITF, based on previously existing pathways consisting of potential anatomical spaces helps to prevent unaffected tissues.22 In addition, maximum preservation of normal adjacent structures (innocent bystanders) , where the infringement is limited to one specific region, maintains postoperative function and quality of life. In this study, the dissection of zones 1 to 4 did not require any manipulation of neurovascular structures pterygopalatine fossa; however, the dissection of zone 5 required its mobilisation or sacrifice, as it involves drilling the pterygoid process and the lower height of the lower head of the lateral pterygoid muscle from the lateral pterygoid plaque. The above-mentioned classification of THEF corridors based on muscle massing and their inervation provides clinically relevant recommendations for access to the relevant zones. Zone 1 (retromaxillary space) is the arteries of the fat and branches of the internal jaw (pterygoid muscles are the posterior aspect) and is best accessible by an endoscopic endopic approach (prelacrimal or transantral). The zhou et al case series included tumour resection, which was exposed after resection of the posterior sinus wall of the jaw according to the description of zone 1 proposed in this study.23 In addition, Zone 1 is also a surgical corridor of lesions extending from the nasal cavity to the anterior ITF hatchery ptperpalgoatin pit (e.g. , angiofibroma).24 Zone 2, or superior interpterygoid space, correlated closely with the foramen ovale, V3, and the upper head of the lateral pterygoid muscles. In theory, this zone should be quite common in the place of origin of neural tumors such as schwannoma.4 In addition to the management of v3 lesions, endoscopic access to zone 2 also includes a corridor that can reach the middle skull pit and the Meckel cave (through the anterolateral triangle of Chapter V2 and V3).25 Zone 3 or inferior interpgoid space corresponds to a potential space consisting of a potential space consisting of a possible space lateral pterygoid, medial pterygoid and temporal muscle containing fat, head and inner jaw artery and V3 branches. The linguistic nerve and the inferior alveoli nerve that occurs from the rear trunk of the V3 travel through this space, and may also spring nerve-related tumors.9 In addition, this space communicates with the medial aspect of the lower jaw and the ossour muscles; therefore Zone 3 provides a natural corridor, which allows access to lesions resulting from or extended to the medial aspect of the axial calm, which does not lose the need to sacrifice any masseur muscle (i.e. lower head lateral pterygoid muscles, medial pterygoid, or temporal muscles).26 Cadaveric cutting, removal of the maxillary sinus of the posterior joint down to level jaw floor will increase the effect of flush 3. For lesions occurring in the lower part of the ITF around the corner of the lower jaw, we found that the floor of the nasal cavity will limit the effect and use of direct instruments through the transnasal method. Due to this kind of variation, the external transcervin or transparotide method or endoscopic transoral corridor with the help of robotics is perhaps an alternative choice.14, 17 Zone 4 or temporo butcher space, consists of a muscle between temporal and zigolic arches and is mainly fat. It is possible to achieve the medial aspect of zygomatic arch and superficial head ummel muscles; however, lesions are rare in this region. However, this corridor is often used as a means of transposing temporoparietal fascia flap for the restoration of the base of the skull into national law.27 According to endoscopic guidelines, the relocation of temporoparietal fascia flap through a corridor consisting of Zone 4 may eliminate additional damage to ITF structures. Due to its deep position, reaching zone 5 (tubopharyngeal space) includes a complex surgical technique, which requires the victims of some normal structures such as vidian nerve, pterygopalatine ganglia, larger and less palatine nerves and the back branches of the internal jaw artery.1 Our cadaveric dissection, pterygoid process drilling and lateral pterygoid muscle separation were necessary , the nerve of the jaw and the medial pterygoid muscle may be preserved. Lesions in the postyloid section, including pICA, cranial nerves from IX to XII and internal jugular vein, are exposed only after removal of stiloid aneuroneurosis.28, 29 Conversely, lesions caused by the stiloid section do not require the removal of stiloid aponeurosis. In this area, abundant oozing is expected; therefore, to facilitate the technique of four hands, included endoscopic Denker approach21 or an anterior jaw or variant. The most common near zone 5 there are benign lesions (i.e. paraphernic space tumors) that originate from space. Infiltration of penarity space with malignant neoplasm (e.g. nasal and pharyngeal carcinoma), especially those encroeshing on pICA, may be a contraindication to endoscopic endonol.30 According to the authors, this systemic approach to anatomical corridors to the ITF has not been previously reported. However, we recognise that this study includes significant restrictions. It is a preclinical work with normal cadasy specimens that cannot track the variety of anatomical changes caused by the tumor; therefore, its usefulness still needs to be confirmed in live operations. In addition, using virtual reality techniques in future research can help surgeons learn anatomy in this complex area better. In addition, the ITF classification focuses on the endoscopic pernastic method; However, in order to join the ITF, a transceral or transoral approach needs to be adopted in order to achieve the ITF. In addition, poorly pneumatic maxillary sinus will also limit the effect of the ITF on a transnophisticated method. The ITF can be divided into five zones according to the spaces consisting of mastic muscles. This paradigm provides guidance on endoscopic methods of planning the ITF and helps prevent damage to neurovascular structures and pterygoid muscles. Authors do not have funds, financial relationships or conflicts of interest that could be disclosed. 1Falcon RT, Rivera-Serrano CM, Miranda JF, et al. Endoscopic endonosis of the infratemporal pit: anatomical relationship and the importance of the eustachian tube in endoscopic surgery of the base of the skull. Laryngoscope. 2011; 121: 31- 41. 2Theodosopoulos PV, Guthikonda B, Brescia A, Keller JT, Zimmer LA. 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