

## Anatomy is important in dental implant surgery

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### ABSTRACT

Dental surgeons must have a thorough understanding of the nerves and blood vessels of the maxillofacial region, especially those related to the mandible, maxilla, tongue muscles, and salivary glands. Additionally, it's important to have a solid understanding of the mandibular canal, palate, and maxillary sinus structures. In this investigation, the arteries and nerves in the maxillofacial region were studied. There were some differences in

the inferior alveolar artery's origin. Notably, a double origin for the inferior alveolar artery and differences in the inferior alveolar artery's origin from the external carotid artery were noted. Therefore, the external carotid and stapedius arteries may be the source of the maxillary artery. The ensuing points are crucial.

**Key Words:** *Surgical care; Dental anatomy; Oral surgery; Dental implant surgery*

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### INTRODUCTION

Compared to prosthodontic and conservative dental procedures, dental implant surgery is a modest maxillofacial surgical procedure. It is critical to understand the nerves and blood vessels in the maxillofacial region, especially the anatomical features of the maxilla and mandible, such as the tongue's muscles and salivary glands additionally, it's important to fully comprehend the specifics of the structures in the mandibular canal, palate, and maxillary sinus. When performing procedures on patients, all dental professionals draw on their understanding of anatomy. Despite the availability of many anatomy textbooks with common anatomical drawings and information, dentists sometimes find wide differences in the nerves, arteries, and abnormalities of the teeth in their day-to-day work. The distribution of nerve and vessels may differ anatomically in 100 persons. Dental professionals should implement. However, the interactions between the nerve, artery, vein, glands, and palatal mucosal membrane in the palate are intricate. For surgical treatments, the arrangement of the nerve and artery layers is extremely crucial. The structures that can be severed should be taken into account when practitioners make an incision into the mucous membrane's outer layer. Whenever possible, the greater palatine nerves are found close to the greater palatine arteries. Near the palatal process of the maxilla and the horizontal plate of the palatine bone, the larger palatine artery can be found. The pieces were thoroughly

dissected after the palatal components were removed to show where the nerves and arteries were distributed. Medial and lateral branches of the larger palatine artery are possible divisions. Greater than the greater palatine nerve, the arteries were situated deeper. An alternative would be the presence of a single, sizable larger palatine artery, which would be deeper and lateral to the artery. An anastomosis between the lateral and medial branches of the artery has occasionally been seen. Across the board, the greater palatine arteries were found to be deeper than the greater palatine nerve. In addition, the skulls' hard palates were found to have a bone groove and bridge. When inserting pterygoid and zygomatic implants, obtaining connective tissue grafts from the palate, and performing dental implant surgery, understanding the anatomy of the larger palatine nerve and artery is crucial. The pterygopalatine portion of the maxillary artery gives birth to the posterior superior alveolar artery. The gingiva and buccal mucosal membrane are encircled by it as it divides near the maxillary tuberosity, enters the alveolar foramen, and travels through the alveolar canals to reach the maxillary molars. Between the foramen and the molars, the maxilla's bony wall contained the alveolar canals. CT scans can pick up on this canal. During implant treatments, extra care must be taken while inserting pterygoid implants or extracting hard and soft tissue from the maxillary tuberosity. Information from CT imaging can be highly helpful during implant procedures to prevent severing the main trunk

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of the artery. The maxillary sinus' lateral wall is likewise supplied by this artery. Therefore, during sinus lift surgeries, attention to detail is necessary.

The mandibular portion of the maxillary artery gives rise to the inferior alveolar artery, which then enters the mandibular foramen and passes via the mandibular canal. In Japanese people, the middle meningeal artery typically arises close to the inferior alveolar artery in terms of the branching pattern of the maxillary artery. Most of the time, the maxillary artery follows the lateral pterygoid muscle superficially. On the other hand, when the maxillary artery travels profoundly down the lateral pterygoid muscle, the inferior alveolar artery arises close to the middle meningeal artery. Near the point where the maxillary artery crosses the anterior margin of the lateral pterygoid, the superficial trunk and deep trunk of the maxillary artery came together to form a complete loop. In this instance, the superficial trunk gave rise to the inferior alveolar artery, whereas the deep trunk gave rise to the middle meningeal and auxiliary middle meningeal arteries. Additionally, we saw instances of the inferior alveolar artery with various origins, the external carotid artery was the source of the inferior alveolar artery. The middle meningeal artery was the source of the inferior alveolar artery. There were two origins of the inferior alveolar artery. The frequency of the medial course of the maxillary artery varies between Caucasoid and Japanese people. In the current study, the frequency of the medial type is comparable to that which other Japanese authors have reported. However, compared to Japanese people, Caucasoid tended to have a substantially higher frequency of the medial form. The superficial trunk of the maxillary artery gave rise to the inferior alveolar artery, and the deep trunk of the artery gave rise to the middle meningeal artery. Therefore, a case of a divided and rejoined maxillary artery in the infratemporal region was recorded. This suggests that a portion of the deep trunk, in this instance, may be equivalent to the trunk of the medial type of the maxillary artery. In Claire's research, the maxillary artery split into deep and superficial branches near the distal end of the anterior tympanic artery divergence. In the infratemporal area, the deep and superficial branches are connected to form a full loop. In that instance, the maxillary artery's courses came together at the infratemporal fossa's anterior boundary. According to Padget, the inferior alveolar artery, which originates at the intersection of the maxillary and mandibular branches of the external carotid artery, connects with the lower division of the stapedia artery. The part of this trunk that lies above the recently finished anastomosis with the internal maxillary artery (the maxillary artery) becomes identifiable as the stem of the middle meningeal artery as soon as the common trunk of the maxillomandibular division of the stapedia artery becomes surrounded by the auriculotemporal nerve. This shows that the maxillary artery's genesis may not have a straightforward mechanism. Traditionally, the middle meningeal artery may have extended into the inferior alveolar artery, making the inferior alveolar artery the third branch of the stapedia artery. Tandler and Padget assert that the third branch of the stapedia artery generated the inferior alveolar artery. Additionally, we noted that the inferior alveolar artery had a variety of origins, including the middle meningeal artery, the external carotid artery, and occasionally two origins. As a result, we propose that additional potential arteries as

well as the extension of the third branch of the stapedia artery may be the source of the inferior alveolar artery. We hypothesized that the arterial loop surrounds the lateral pterygoid muscle during the fontal period, but that the underlying section of the loop vanishes, typically leaving only the superficial part of the loop. However, more research is required to fully understand the development of the inferior alveolar artery. Understanding the nerves and blood vessels in the maxillofacial region, notably the mandibular and maxillary anatomical components, the tongue muscles, and the salivary glands, is crucial for dental surgeons. Additionally, it's important to have a solid understanding of the mandibular canal, palate, and maxillary sinus structures. Although there are many anatomy textbooks with standard anatomical illustrations and information available, dentists frequently encounter significant variations in the nerves, vessels, and anomalies of teeth in their daily practice. All dental professionals should have in-depth anatomical knowledge when operating on patients. The location of the nerves and vessels in one hundred patients may differ anatomically in many ways. Therefore, dental professionals should possess a thorough understanding of anatomy, including the maxillofacial region and its variations. For implant surgery, additional consideration may be needed for the greater palatine artery and nerve, posterior superior alveolar artery, lingual artery and nerve, and inferior alveolar artery and nerve. The ensuing points are crucial: Always deeper than the greater palatine nerve is the greater palatine artery. The dense bone of the maxilla frequently passes over the posterior superior alveolar artery. CT scans can be used to see the artery's canal. It has been noted that the inferior alveolar artery's sources vary. Depending on the location of the maxillary artery, the inferior alveolar nerve may have a different origin. All dental professionals use anatomical knowledge when operating on patients, and despite the availability of many anatomy textbooks with standard anatomical illustrations and information, practitioners frequently come across significant variations in nerves and vessels, much like anomalous teeth, in daily practice. In fact, anatomic differences in nerve and vascular distribution may be seen in patients. Therefore, dental professionals need to have a thorough understanding of anatomy, including its variances, in the maxillofacial area. The likelihood of difficulties following implant surgery has been anticipated to rise with the growing number of dental professionals. Accidents and difficulties during surgery do happen, and they could harm crucial anatomical structures. Infection, inflammation, and finally implant loss are other possible outcomes. Millions of radiographs are obtained every year for the purpose of diagnosis and treatment as radiographic examination is a crucial component of implant surgery. In addition to the patient's medical history and clinical examinations, selecting an informative radiographic picture should take into account the diagnostic quality, region of interest, radiation dose, cost, and accessibility. Misreading a radiograph might have catastrophic consequences. These issues may result in the destruction of nearby teeth and/or the invasion of crucial areas, such as the maxillary sinus and/or inferior alveolar nerve. According to a report, there is a chance that implants will mistakenly dispense into the maxillary sinus. The location with the most risk during implant surgery was the posterior mandible. The proximity to the mandibular canal and mental foramen during

implant surgery has enhanced the likelihood of IAN injury. It was discovered that the most frequent etiological risk factor for nerve damage was dental implants. Thorough preoperative evaluation is essential before to placement in order to prevent these problems. When accurate diagnosis and treatment planning are used, the majority of implant procedures can continue without incident and satisfy functional and aesthetic requirements. It is crucial to measure the height of the residual alveolar bone in the places where dental implants are intended to be placed, especially the posterior parts, prior to the procedure. The surgical technique used in this region is directly influenced by the size of the maxillary sinus and how it interacts with the upper teeth. The anatomical restrictions must therefore be understood by all oral surgeons, especially in the maxillary molar region. For these reasons, they ought to use acceptable surgical techniques and warn patients of potential risks before doing surgery. The majority of mandibular posterior teeth have little free bone between the tip of the root and the inferior alveolar canal. This underlines the importance of paying close attention when inserting implants in this region. In contrast, IAN injury may ultimately result in a bleed into the canal and/or neurosensory problems. The lingual nerve (28.8%) and this nerve were revealed to be the two most often damaged nerves during oral surgical procedures. The altered sensation typically ranges from mild paresthesia to total anesthesia, depending on the severity of the damage. Therefore, it is crucial for the surgical management of any patient to have a proper understanding of the anatomical placements of the mental foramen.