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Clinical Anatomy of the Head and Neck, and Recipient Vessel Selection

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INTRODUCTION

Head and neck reconstruction presents unique challenges to the reconstructive surgeon. Because of the visibility of this region, defects are often difficult to conceal and the demands on the surgeon's reconstructive skills are greater than they are elsewhere in the body where cosmesis may be less vital and function less specialized. The head and neck area includes both static and dynamic structures and contains organs of special function such as the nose, the ears, the lips, and the orbital contents, including the eyelids.

The bony skeleton of the head and neck is related to structure and load, as are bony structures elsewhere in the body. In addition, however, certain structures such as the mandible have a very specialized function and therefore have unique reconstructive requirements. The soft tissues of the face are also unique and provide external cover, internal mucosa, and facial animation. The external cover provides a barrier, which in some cases is specialized such as the hair-bearing skin of the scalp. In addition to the external skin cover, it is frequently necessary to replace the mucosa. The facial muscles provide a unique and very delicate function for facial animation and are innervated by the complex facial nerve. This nerve is sometimes sacrificed to execute an effective tumor ablation and the loss of facial nerve function will further complicate the reconstruction. Not infrequently all of the above elements are involved in the reconstruction. For all of the aforementioned reasons, a thorough knowledge of the anatomy of this region is imperative, not only for the ablative surgeon in cancer cases but also for the reconstructive surgeon, so that the best possible reconstruction can be achieved, to optimally restore the cosmetic and functional elements of the defect.

ANATOMY OF THE HEAD AND NECK

The anatomy of the head and neck is complex. The calvarium provides protection for the underlying brain and is covered with hair-bearing soft tissue. The skin of the rest of the face is intimately related to the underlying musculature and movement of this multifaceted unit not only gives the skin its unique appearance, with multiple lines and wrinkles, but also is responsible for a significant aspect of how we communicate. For this reason, replacing large segments of facial skin with skin from elsewhere in the body often results not only in a color mismatch but also a texture and movement imbalance. Within the head and neck region, there are several structures with specialized function and anatomic distinctiveness, including the eyelids, the nose, the lips, and the ears. All these structures are particularly difficult to replicate and pose significant challenges. Within the head and neck, there are also mucosa-lined cavities, which all lead into the aerodigestive tract. Within the mouth, there is another even more specialized organ, the tongue, which is vital to the functions of speech and swallowing.

ANATOMY OF THE FACIAL SKELETON

The facial skeleton is complex, made up of several individual bony structures, articulated in a complex manner (Fig. 10.1). The calvarium, consists of frontal, parietal, temporal and occipital bones which protects the brain. The cranial bones in turn articulate with the skull base (sphenoid bone) and midfacial skeleton consisting of the maxilla, ethmoid, lacrimal, zygomatic, nasal, palatine, nasal concha, and vomer. The facial skeleton provides protection of delicate structures such as the eye, and also provides protective passage for some vital structures such as the facial nerve, which passes through the temporal bone. Other clinically important nerves to be considered during craniofacial surgical exposures include the supraorbital and supratrochlear nerves (V1), the infraorbital nerve (V2), the inferior alveolar nerve (V3), and its terminal branch, the mental nerve. The supraorbital nerve exits the frontal bone through a foramen or a notch. In elevation of a bicoronal flap or a paramedian forehead flap, transition to subperiosteal dissection 1–2 cm above the supraorbital rim avoids injury to the supraorbital nerve or supratrochlear neovascular bundle. The infraorbital nerve exits the infraorbital foramen 6–11 mm below the inferior orbital rim at the midpupillary line. The mental nerve exits the metal foramen in the body of mandible between the root apices of the mandibular first and second premolars. The ethmoid, sphenoid and maxillary bones, house the intricate system of air cells and sinuses that contribute to humidification of inspired air, and resonance for voice reproduction. The mandible not only provides the structure that defines the appearance of the lower

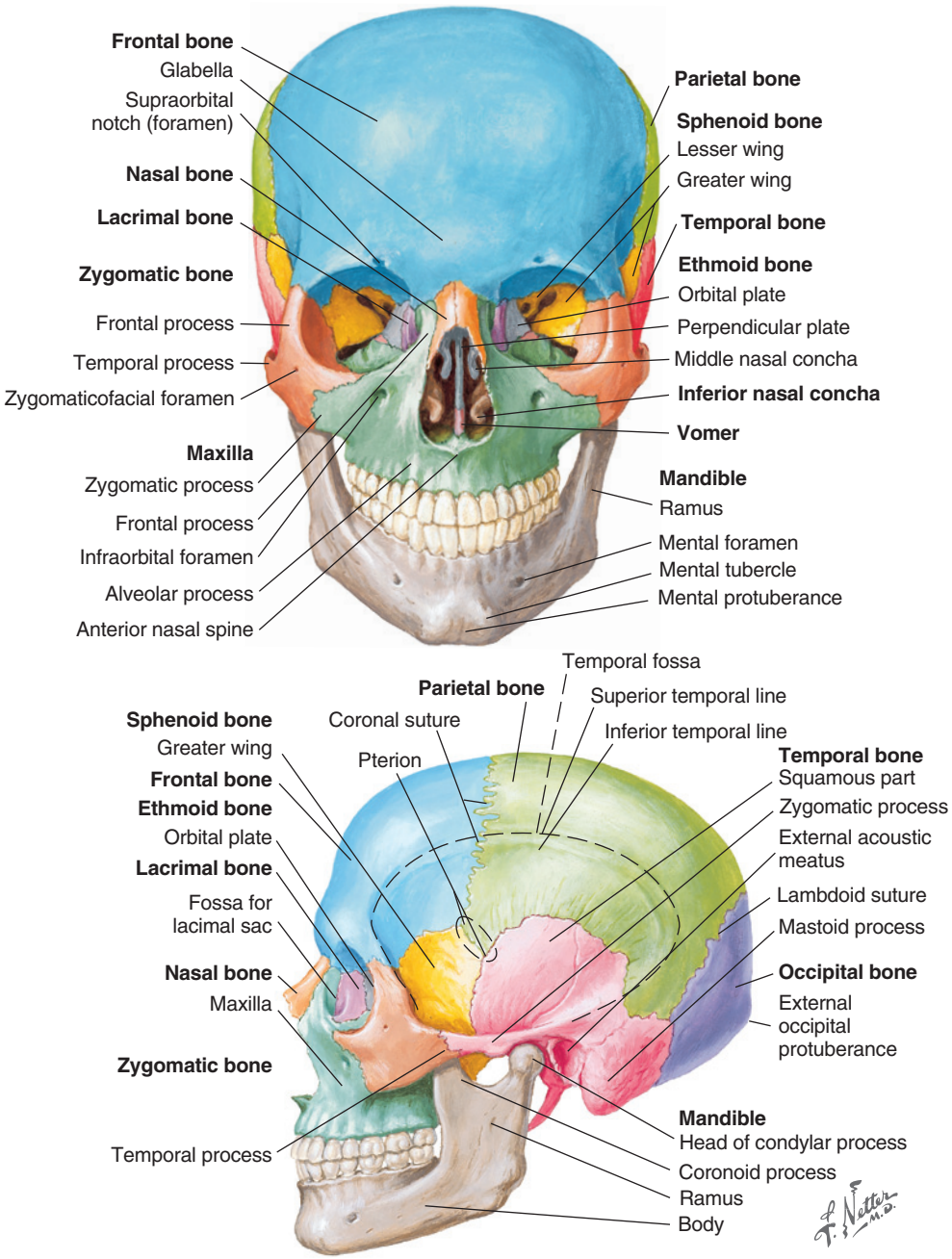

Figure 10.1 Skull. Anterior and lateral aspects. (Reprinted from Netter Anatomy Illustration Collection. ©Elsevier Inc. All Rights Reserved.)

face but, combined with its sister bone, the maxilla, provide a housing for the dentition and defines the confines of the oral cavity and all that it contains. Finally, the facial skeleton also provides the framework from which the facial muscles take origin.

THE FASCIA OF THE HEAD AND NECK

An understanding of the fascia of the head and neck is paramount (Fig. 10.2), as they provide important landmarks for important anatomic structures during surgical exposures such as the facial artery, facial nerve, superficial temporal vessels, and other recipient vessels in head and neck reconstruction. In general, the two main fascial layers investing the head and neck are the superficial and deep fascial layers, which are interconnected as they envelop the various muscles. The superficial fascia is an anatomically continuous layer that is named differently according to the zone it covers. Most cephalad, the galea aponeurotica, is a fascial expansion that connects the paired frontalis and occipitalis muscles and runs in an anteroposterior direction over the vertex of the head. The lateral extension of the galea aponeurotica is continuous with the temporoparietal fascia (TPF), also known as the superficial temporal fascia, lateral to the superior temporal line. The TPF is continuous with the galea superiorly, the frontalis muscle anteriorly, and the SMAS inferiorly. Inconsistent nomenclature of the