Contents

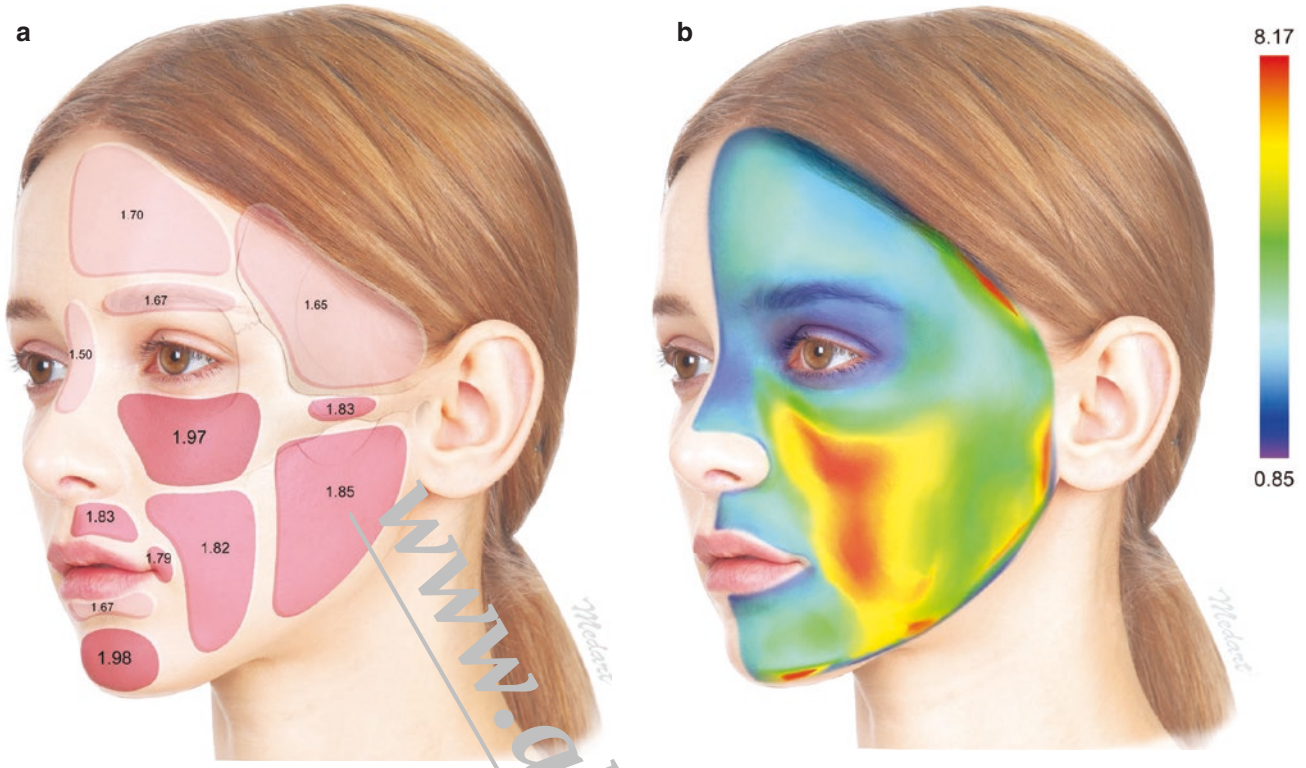

Fig. 1.5 Average skin thickness of the face (**a**) and average thickness of the superficial facial fat (**b**). (Published with kind permission of © Kwan-Hyun Youn 2023. All Rights Reserved)

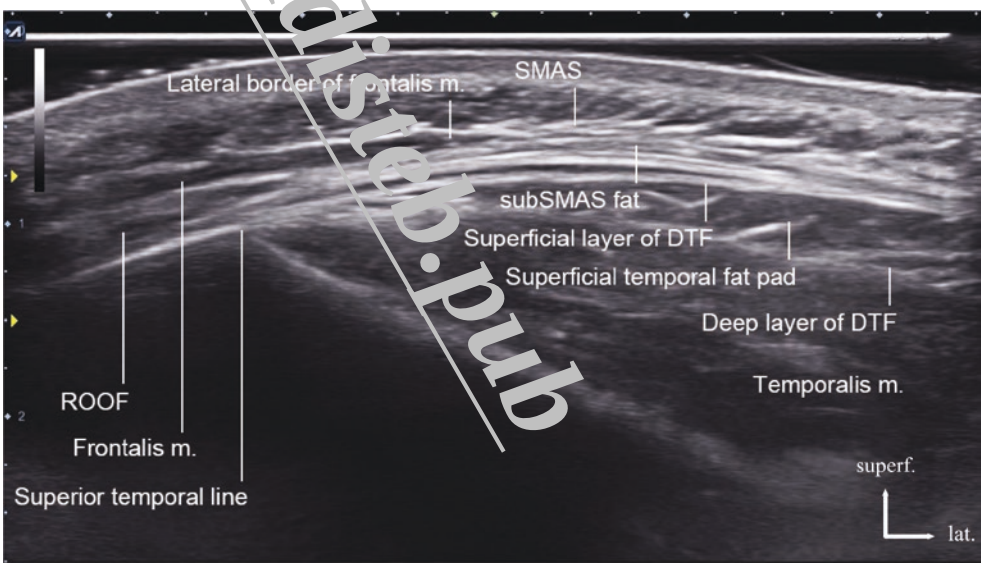

Fig. 1.6 Ultrasonographic image of the forehead and temple (B mode, perpendicular view, 18 MHz by linear transducer). (Published with kind permission of © Hee-Jin Kim 2023. All Rights Reserved)

1.3 Muscles of Facial Expressions and Their Actions

Facial mm. are attached to the facial skeleton, or membranous superficial fascia beneath the skin, or subcutaneous tissue. The topography of the facial m. varies between males and females and between individuals of the same gender. It is important to define muscle shapes, their associations with the skin, and their relative muscular actions in order to explain the unique expressions people can make.

Facial muscles are a group of about 20 flat muscles beneath the facial skin. Most of them originate from the skull or fibrous structures and merge with other muscles or radiate to the skin.

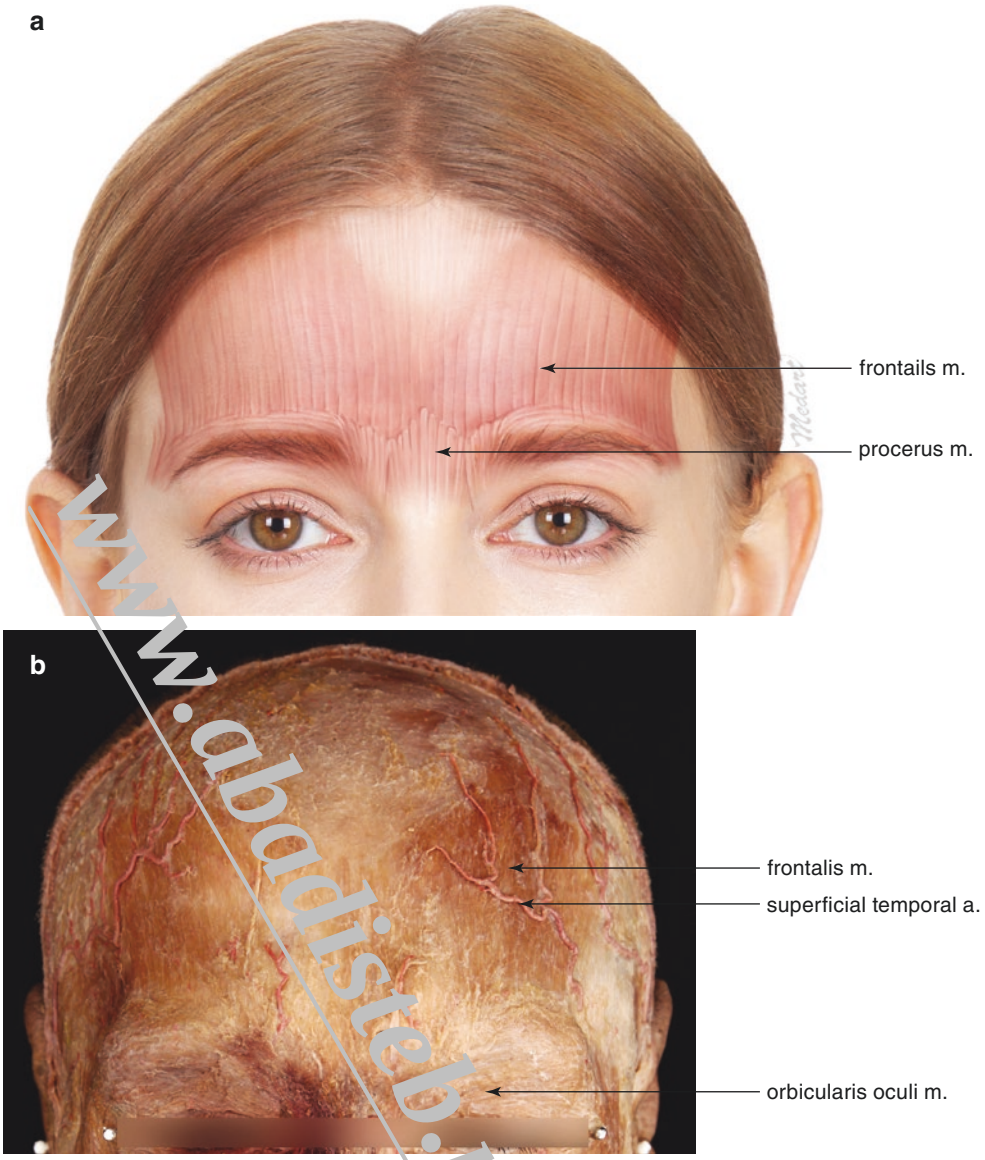

Fig. 1.8 Frontalis muscle of the forehead (**a**, **b**). (Published with kind permission of © Hee-Jin Kim and Kwan-Hyun Youn 2023. All Rights Reserved)

the orbicularis oculi and the corrugator supercilii m. near the superciliary arch of the frontal bone. The overall soft tissue thickness of the forehead region ranged from 4.3 to 5.3 mm, with an average thickness of 4.7 ± 0.3 mm. The frontalis m. lies beneath the skin of the forehead (2.0–3.3 mm in average), though the depth can differ considerably between individuals (Fig. 1.8). The lateral margin of the frontalis m. is found beyond the temporal line in a majority of the cases (about 84%).

The location of the superior temporal line can be estimated by palpating above the temporal crest fusion line on the skin surface. The lateral border of the frontalis m. is located approximately 1 cm (similar to the width of the index finger) lateral to the superior temporal line in most cases (Fig. 1.9).

1.3.2 Temporal Region (or Temple)

The temporal region is confined within the boundary of the temporal fossa. Within the temporal fossa, a fan-shaped temporalis and its vessels and nerves occupy this concavity. The temporalis m. is divided into two layers: superficial and deep. A majority of the temporalis belong to the deep layer and arise from the broad temporal fossa, whereas the superficial layer of the temporalis m. arises from the internal aspect of the deep temporal fascia (temporalis muscle fascia). The deep temporal fascia (temporalis muscle fascia) is the tenacious fascia attached superiorly to the superior temporal line and inferiorly to the upper margin of the zygomatic arch. Though the superficial layer of the temporalis developed in four-legged animals, the superficial layer in humans

seems very thin and rudimentary. All the temporalis muscle fibers converge as a tendon and attach to the tip of the coronoid process and to the anteromedial side of the mandibular ramus. The temporalis holds a flat, fan shape due to its broader origin and narrower attachment.

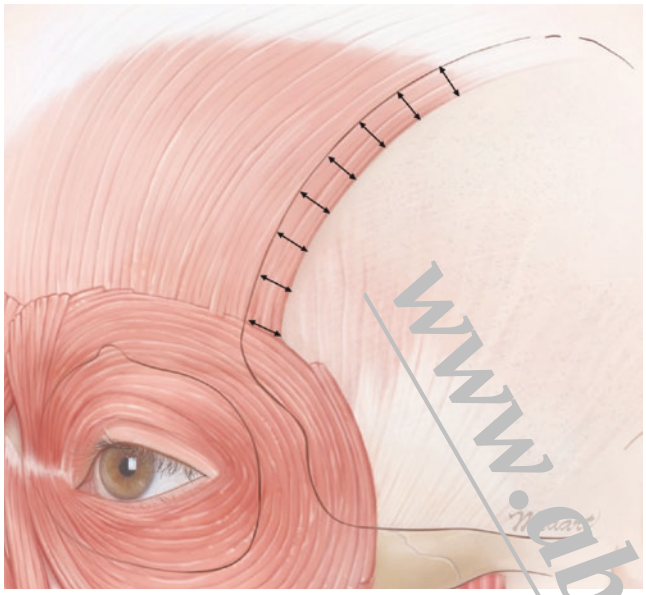

Fig. 1.9 Lateral border of the frontalis muscle. (Published with kind permission of © Kwan-Hyun Youn 2023. All Rights Reserved)

There is a region in which the muscle fibers transition into tendons. The upper half of the temporalis superior to the zygomatic arch is composed only of the muscle belly, and the lower half (roughly two- or three-digit widths) is occupied by a converged tendon and a part of the deep layer of the temporalis that is covered by the aponeurotic structure.

The temporalis m. is divided into three parts: anterior, middle, and posterior temporalis m. While its anterior temporalis fibers proceed almost vertically, the fibers of the posterior temporalis run almost horizontally. The main functions of the temporalis differ according to muscular orientation. A whole temporalis m. raises the mandible when mouth is closing, providing tension to prevent the mouth from opening against gravity. The temporalis m. is innervated by the anterior, middle, and posterior deep temporal nerves from the mandibular n. It is supplied by the anterior and posterior deep temporal arteries for the anterior 2/3 of the temporalis and by the middle temporal a. for the posterior 1/3 region as well (Figs. 1.10 and 3.31).

1.3.3 Orbital Region

The shape of the eyes is well-framed by moving muscles that surround it, which determine basic facial expressions. Orbicularis oculi m. is a broad, flat, elliptical muscle composed of an orbital part and a palpebral part. The palpebral

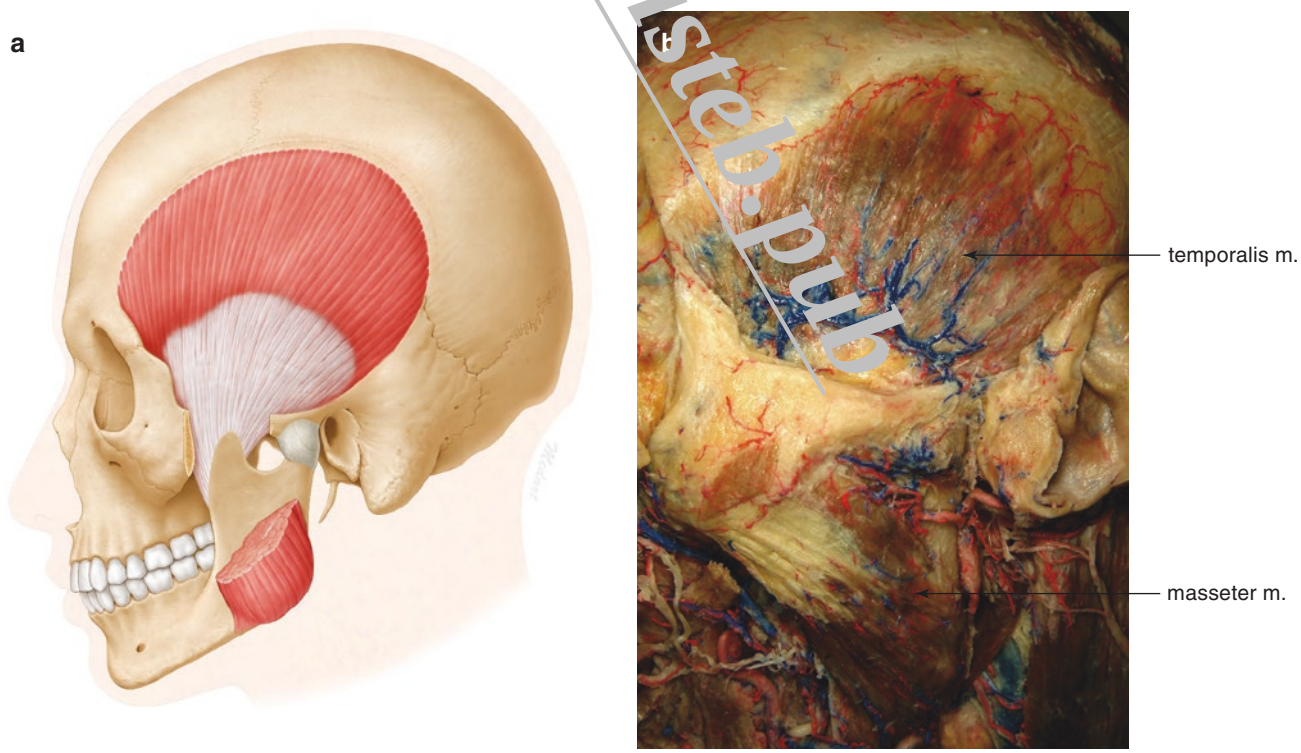

Fig. 1.10 Temporalis muscle of the temporal region (**a**, **b**). (Published with kind permission of © Hee-Jin Kim and Kwan-Hyun Youn 2016. All Rights Reserved)

part is then divided into a superficial portion (ciliary bundle) and a deep portion (lacrimal part).

The main function of the orbicularis oculi m. is to mediate eye closure. The orbicularis oculi m. has many neighboring muscles (e.g., corrugator supercilii m., procerus m., frontalis m., zygomaticus major m., and zygomaticus minor m.), and various direct and indirect muscular connections exist between the orbicularis oculi m. and the surrounding musculature. These connections may participate in the formation of various facial expressions. In Asians, the lateral muscular band and the medial muscular band of the orbital portion of the orbicularis oculi m. are observed in 54% and 66% of the cases, respectively (Figs. 1.11, 1.12 and 2.5). Furthermore, it is observed that 89% of Asians possess direct muscular connections between the zygomaticus minor m. and the orbicularis oculi m.

The corrugator supercilii m. originates from the periosteum of the frontal bone on the medial side of the superciliary arch, proceeds superiorly and laterally, and then merges with the frontalis m. It consists of two distinct bellies—the transverse and oblique belly. The origin of the transverse belly of the corrugator supercilii m. is superior and more lateral than the origin of the oblique belly, and most of them attach to the frontalis m. (Fig. 1.13) and to the superolateral orbital part of the orbicularis oculi m. The transverse belly is located deeper and proceeds in a more horizontal direction than the oblique belly. This muscle makes narrow, vertical wrinkles on the glabellar region and presents an aged appearance by producing these wrinkles with the frontalis m. The depressor supercilii m. is a fan-shaped or triangular-shaped muscle that originates from the frontal process of the maxilla and from the nasal portion of the frontal bone above the medial palpebral ligament. The depressor supercilii m. proceeds through the glabellar region while being mixed with the corrugator supercilii m., and it intermingles with medial fibers of the orbicularis oculi m. (Fig. 1.12).

1.3.4 Nose Region

The nose is a dynamic structure that moves nasal cartilages and plays an important role in the nasal physiology. Muscles of the nose and the nose region contain the procerus m., the nasalis m., and the depressor septi nasi m., along with several other muscles attached to the nose ala.

The procerus m. is a small muscle that originates from the nasal bone, proceeds superiorly, and attaches to the skin of the radix. Fibers of the frontalis m. at the insertion point are cross-locked. The morphology of the procerus is classified into two types in accordance with the shape in the transverse view (Fig. 2.17). The procerus m. is located deeper below the skin surface at the glabella than that of the sellion (3.8 vs. 2.9 mm). The width of the procerus increases from the sellion (11.0 mm) to the glabella (14.5 mm), whereas its thickness decreases (from 1.6 to 1.1 mm). This muscle makes a horizontal line on the radix below the glabella by pulling the medial side of the eyebrow down (Fig. 1.14).

The nasalis consists of a transverse part and an alar part. The transverse part is a C-shaped, triangular muscle raised from the maxilla and the canine fossa to the nose ala. The transverse part extends from the superficial layer of the levator labii superioris alaeque nasi m. The alar part is a small rectangular muscle arising from the maxilla superior to the maxillary lateral incisor and inserting into the deep skin layer of the alar facial crease of the alar cartilage. The transverse

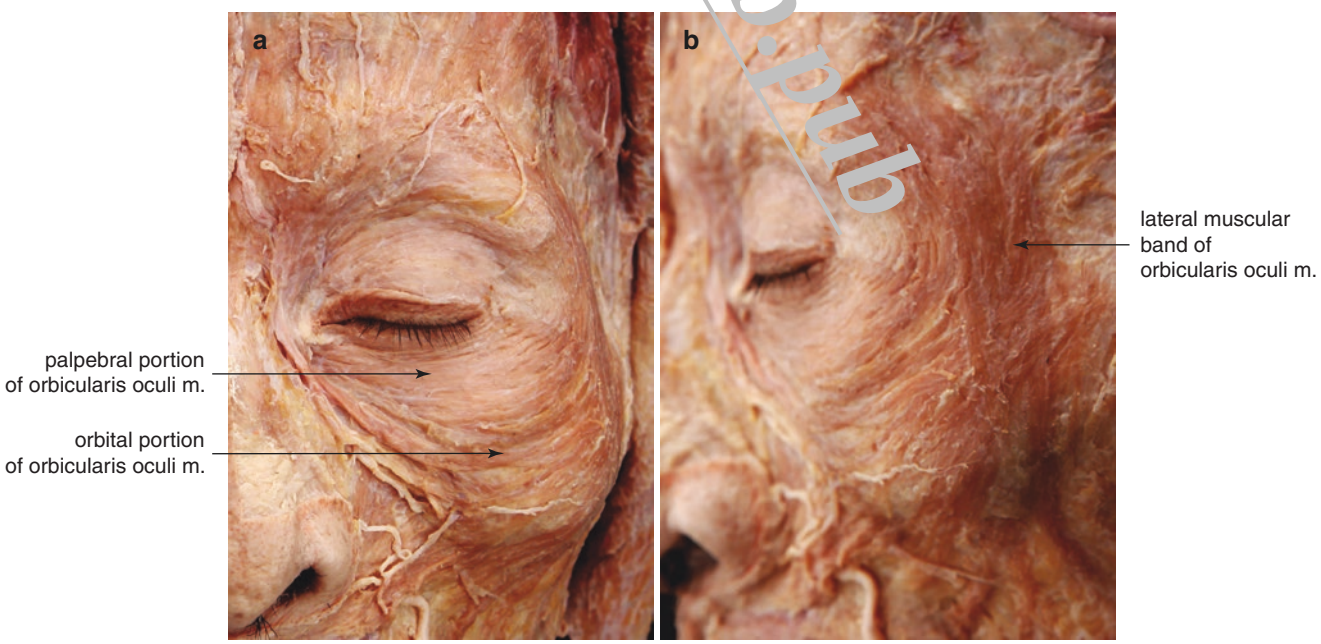

Fig. 1.11 Orbicularis oculi muscle of the orbital region. Frontal view (**a**) and lateral view (**b**). (Published with kind permission of © Hee-Jin Kim 2016. All Rights Reserved)

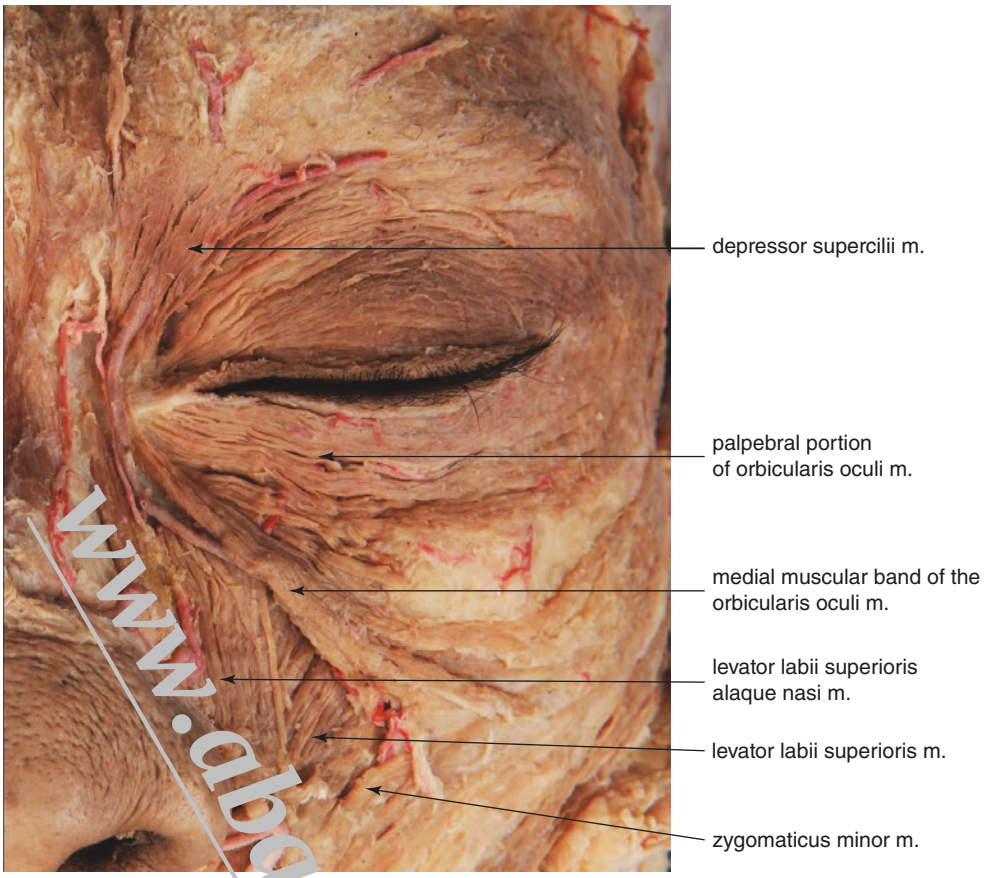

Fig. 1.12 Medial muscular band of the orbicularis oculi muscle and upper lip elevators. (Published with kind permission of © Hee-Jin Kim 2016. All Rights Reserved)

Fig. 1.13 Corrugator supercilii muscle. (Published with kind permission of © Hee-Jin Kim 2016. All Rights Reserved)

part compresses and decreases the size of the naris, while the alar part serves to enlarge the size of the naris (Fig. 1.15).

The depressor septi nasi m. is located on the deep part of the lip. This muscle arises from the incisive fossa (between the central and lateral incisors) and inserts into the moving part of the nasal septum. It pulls the nose tip inferiorly to enlarge the size of the naris (Figs. 1.14 and 2.23).

Furthermore, it was observed that all of the LLSAN m., 90% of the LLS m., and 28% of the additional fibers of the zygomaticus minor m. were attached to the nose ala.