

## Resource for Unit 4 Lesson 4 Botulinum Toxin in Practice Frontalis - Forehead Lines

Anatomy: horizontal rhytids are resultant from contraction of the frontalis muscle. The length of the lines indicate how lateral the injection should be administered – with some cases reaching the lateral/temporal crest and into the frontal/temporal hairline. The orientation of the rhytids (horizontal vs. wavy) indicate the direction of the frontalis muscle fibre orientation, with wavy lines indicating a more lateral frontalis muscle location.

### **Frontalis:**

**Attachments:** Frontalis forms the anterior part of the occipitofrontalis muscle. Made up of vertical striations in a fan-like distribution. Originates posteriorly from galea aponeurotica which can be identified with the hairline. Inferomedially, it interdigitates with procerus and inferolaterally it attaches to orbicularis oculi and corrugator. Usually terminates laterally at the temporal ridge (linea temporalis).

The bulk of it is located right above the brow and it is thinnest most laterally, which is the first area to sag with age, causing lateral brow ptosis and dermatochalasis (sagging eyelid skin) laterally. The lateral extent of the muscle may be asymmetric in up to 20%-33% of individuals. There is considerable anatomical variation with 45% having no bifurcation of the muscle and 15% having complete separation with central galeal aponeurosis .

### ***Arterial supply:***

**Branches of the internal carotid artery:** Medially, the muscle is supplied by the supratrochlear (medially via orbit) and supra-orbital arteries (supraorbital foramen). Both are branches of the ophthalmic artery. Both separate into superficial and deep branches. Deep branches supply periosteum, superficial branches supply everything else.

**Branches of the external carotid artery:** Laterally, the muscle is supplied by the frontal branch of the superficial temporal artery. Both vascular territories anastomose with each other.

### ***Venous drainage:***

*Medially:* supratrochlear vein

*Mid-portion:* supraorbital vein

*Laterally:* lateral frontal vein

The three veins also connect with transverse supraorbital vein which runs superior to the orbit. The transverse supraorbital vein connects medially to the angular vein, which eventually drains into the ophthalmic vein and cavernous sinus

### ***Innervation:***

**Motor:** Frontal (aka.temporal) branch of facial nerve (CN VII). Facial nerve exits skull at stylomastoid foramen and its temporal branch crosses over the zygomatic arch, passing through the areolar tissue on the superficial surface of the temporoparietal fascia, finally entering the frontalis muscle from the underside laterally.

**Cutaneous:** supratrochlear and supraorbital nerves from ophthalmic division of trigeminal nerve innervate overlying skin.

***BoNT-A injections:***

- The aim is to avoid complete paralysis of the frontalis muscle
- Injections carried out directly into the muscle bulk
- 10 to 20 units of OnaBoNT-A distributed across the forehead yields satisfactory relaxation of horizontal rhytids
- Injection is done at the sites of rhytids that form when a patient engages in maximal contraction of frontalis, with pinching of the overlying skin and inserting the needle to one third of its depth.
- A safe zone for frontalis muscle injections is 2 cm above the brow. This reduces the risk of the toxin spreading to levator palpebrae superioris which in turn results in non-permanent ptosis.
- Injection of lower part of frontalis may result in brow ptosis due to the unopposed depressor action of orbicularis oculi muscles. As such, injections should be done above the line of convergence (60% of forehead length).
- Spock or Mephisto deformity: occurs when too much BoNT-A is injected into the medial frontalis, leaving the lateral portion capable of contraction. This results in brow ptosis medially.
- To avoid eyebrow ptosis, it is important to also treat the depressors of the glabellar complex and the lateral periorbital lines. This is especially true in patients who present with low and flat eyebrows.

In the case of severe dynamic and static lines at rest, supplementary filler injections may be considered, though remember that this is a high risk area for dermal fillers.