

---

# Contents

<b>1</b>	<b>ABC Techniques for Prevention of Filler Complications</b>	<b>1</b>
1.1	(An) Anatomy (Doppler Ultrasound)	1
1.2	Doppler Ultrasound Detection of Important Arteries of the Face	1
1.3	(As) Aspiration with Proper Technique	5
1.4	(B) Big Cannula	5
1.5	(C) Compression	6
1.6	(D) Direction of Injection	6
1.7	(E) Emergency Kit	6
1.8	(F) Filler Techniques	7
1.9	(G) Gentle Injection of a Small Amount	8
1.10	(H) History of Prior Operations or Injections	9
	References	10
<b>2</b>	<b>Hyaluronic Acid Filler Property and Hyaluronidase</b>	<b>11</b>
2.1	Hyaluronic Acid Filler	11
2.2	Rheology—First Parameter of Filler Property	11
2.3	Ideal Filler and Microscopic Finding	11
2.4	Hyaluronidase	12
	References	17
<b>3</b>	<b>Forehead Augmentation</b>	<b>19</b>
3.1	General Considerations	19
3.2	Anatomy	19
3.3	Doppler Ultrasound	20
3.4	Filler Choice	20
3.5	Anesthesia	21
3.6	Injection Layer	21
3.7	Needle vs Cannula	21
3.8	Entry Point	22
3.9	Procedures	22
3.10	Pre and Postop Photograph	23

3.11	Other Techniques . . . . .	25
3.11.1	Make an Entry Point in the Lateral Portion of the Forehead Using a Cannula . . . . .	25
3.11.2	Make the Entry Point at the Hairline and Use a Cannula . . . . .	25
3.11.3	Botulinum Toxin Injection . . . . .	25
	References . . . . .	26
<b>4</b>	<b>Glabellar Wrinkle Correction . . . . .</b>	<b>27</b>
4.1	Vascular Anatomy . . . . .	27
4.2	Injection Layer . . . . .	27
4.3	Doppler Ultrasound Findings . . . . .	27
4.4	Filler Choice . . . . .	28
4.5	Anesthesia . . . . .	29
4.6	Needle vs Cannula . . . . .	29
4.7	Injection Techniques . . . . .	29
	References . . . . .	30
<b>5</b>	<b>Temple Augmentation . . . . .</b>	<b>31</b>
5.1	Anatomy and Considerations . . . . .	31
5.2	Filler Choice . . . . .	33
5.3	Entry Point . . . . .	33
5.4	Anesthesia . . . . .	33
5.5	Injection Techniques . . . . .	34
5.6	Pre- and Post-procedural Photograph . . . . .	35
	References . . . . .	36
<b>6</b>	<b>Nose Augmentation . . . . .</b>	<b>37</b>
6.1	Radix and Rhinion . . . . .	37
6.1.1	Anatomy and General Considerations . . . . .	37
6.1.2	Doppler Ultrasound Findings . . . . .	38
6.1.3	Injection Technique . . . . .	38
6.1.4	Widening Nose . . . . .	38
6.1.5	Filler Choice . . . . .	40
6.1.6	Needle Diameter . . . . .	40
6.2	Nasal Tip . . . . .	40
6.3	Pre- and Post-op Photograph of Nose Augmentation . . . . .	41
	References . . . . .	43
<b>7</b>	<b>Midface Augmentation . . . . .</b>	<b>45</b>
7.1	Tear Trough Deformity . . . . .	45
7.1.1	Anatomy . . . . .	45
7.1.2	Filler Choice . . . . .	47
7.1.3	Anesthesia . . . . .	47
7.1.4	Needle Versus Cannula . . . . .	47
7.1.5	Injection Technique . . . . .	47
7.2	Anterior Malar Augmentation . . . . .	49
7.2.1	Anatomy and General Considerations . . . . .	49
7.2.2	Injection Technique . . . . .	49
7.2.3	Filler Choice . . . . .	50

---

7.3	Lateral Cheek Correction . . . . .	50
7.4	Tear Trough, Anterior Malar Augmentation, Lateral Cheek Correction Pre and Postprocedural Photograph . . . . .	51
	References . . . . .	53
<b>8</b>	<b>Nasolabial Fold Correction . . . . .</b>	<b>55</b>
8.1	General Considerations . . . . .	55
8.2	Anatomy . . . . .	55
8.3	Doppler Ultrasound . . . . .	57
8.4	Filler Choice . . . . .	57
8.5	Cannula Versus Needle . . . . .	57
8.6	General Considerations . . . . .	58
8.7	Techniques . . . . .	58
8.8	Pre- and Postprocedural Photograph . . . . .	59
8.9	Vascular Complications . . . . .	59
	References . . . . .	60
<b>9</b>	<b>Lower Face Injection Techniques . . . . .</b>	<b>61</b>
9.1	Marionette Lines . . . . .	61
9.2	Chin Augmentation . . . . .	61
9.3	Lip Injection . . . . .	63
9.3.1	Anesthesia . . . . .	65
9.3.2	Lip Border Enhancement . . . . .	65
9.3.3	Lip Augmentation . . . . .	65
9.3.4	Mouth Corner Lifting . . . . .	66
9.3.5	Filler Choice . . . . .	67
9.3.6	Pre- and Postprocedural Photographs . . . . .	67
	References . . . . .	70

Received: 26 March 2020 | Revised: 2 May 2020 | Accepted: 17 May 2020

DOI: 10.1111/dth.13657

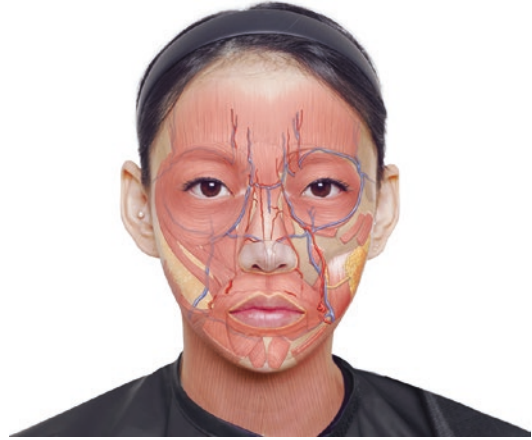
**IMCAS: LETTER**DERMATOLOGIC  
THERAPY **WILEY**

## Prevention of hyaluronic acid filler-induced blindness

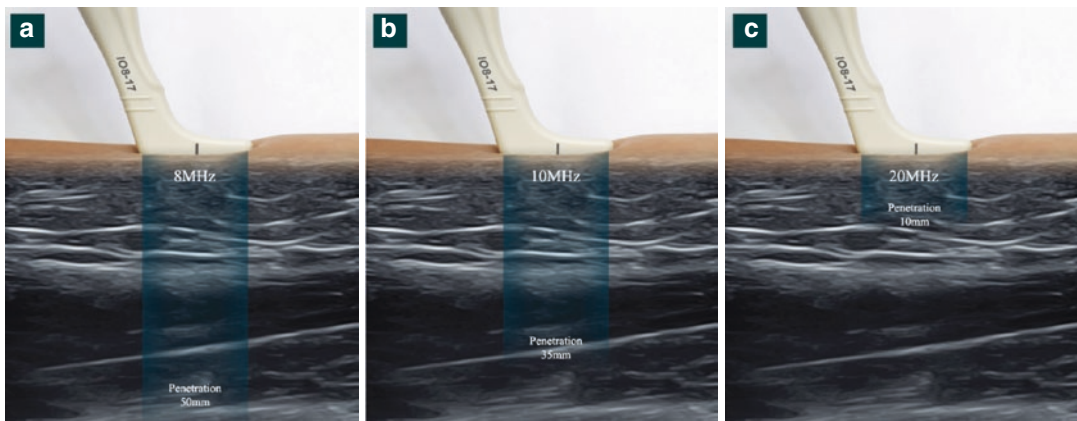
**Fig. 1.1** Prevention of HA filler—Dermatologic Therapy 2020 [1]

**Table 1.1** ABCs in the prevention of filler-induced ocular complications

(An) Anatomy (Doppler ultrasound)
(As) Aspiration with proper technique
(B) Big cannulas
(C) Compression
(D) Direction of injection
(E) Emergency kit
(F) Filler technique for augmentation or wrinkle correction
(G) Gentle injection of a small amount
(H) History of prior operations or injections



**Fig. 1.2** Important vessels of the face



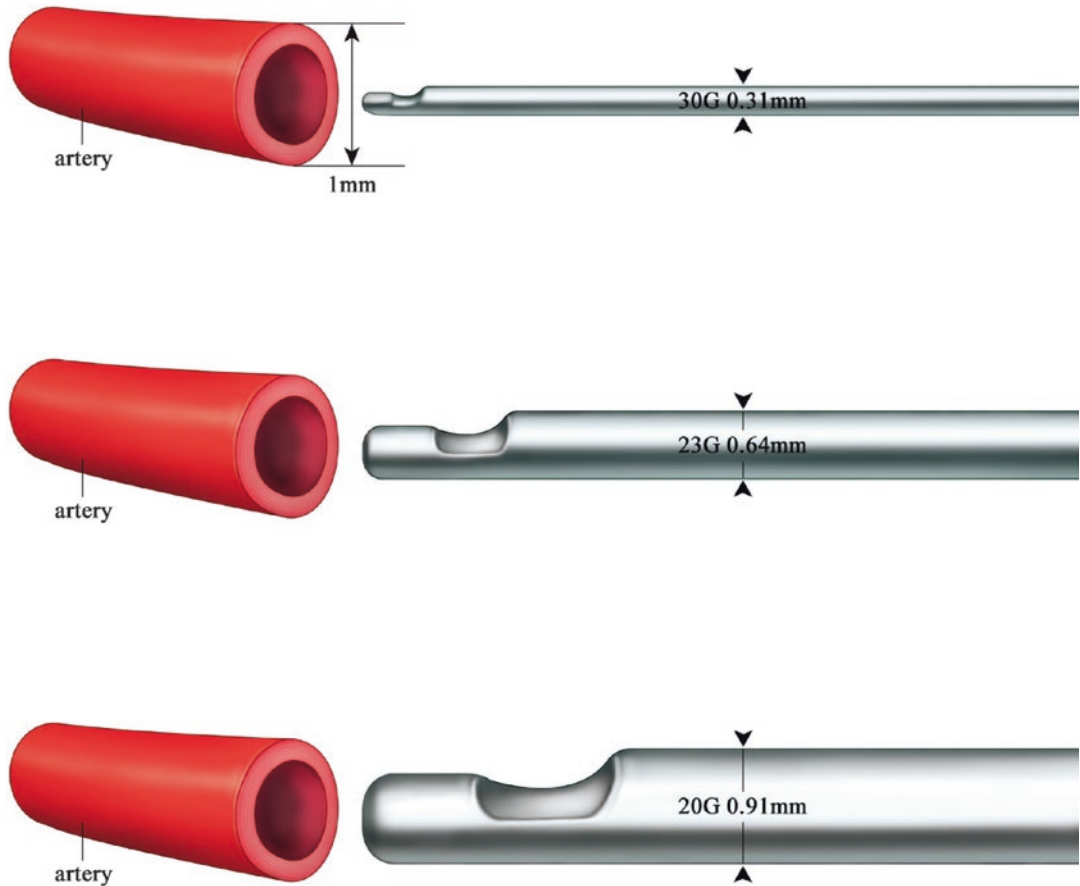
**Fig. 1.3** The depth relationship within ultrasound frequency. Between 8 and 10 MHz frequency is mostly used in plastic surgery fields. (a) Within 8MHz frequency, 50mm depth can be detected. Most of the facial layer can

be detected. (b) Within 10MHz frequency, 35mm depth can be detected. (c) Within 20MHz frequency, 10mm depth can be detected. Dermal layer can be seen precisely

common location of ocular complication was found to be injections at the nose [6]. Injection rhinoplasty is the easiest and most efficient way of nonsurgical rhinoplasty but should be performed very carefully.

(3) Facial artery.

The nasolabial fold correction is one of the most performed filler injections. The facial artery runs under the mimetic muscle or over the mus-



**Fig. 1.15** The diameter of the important arteries (dorsal nasal artery, supratrochlear artery, and supraorbital artery) is approximately 1 mm diameter [12]. From the compara-

tive diagram between arterial diameter and cannula, a relatively large diameter cannula cannot penetrate the artery

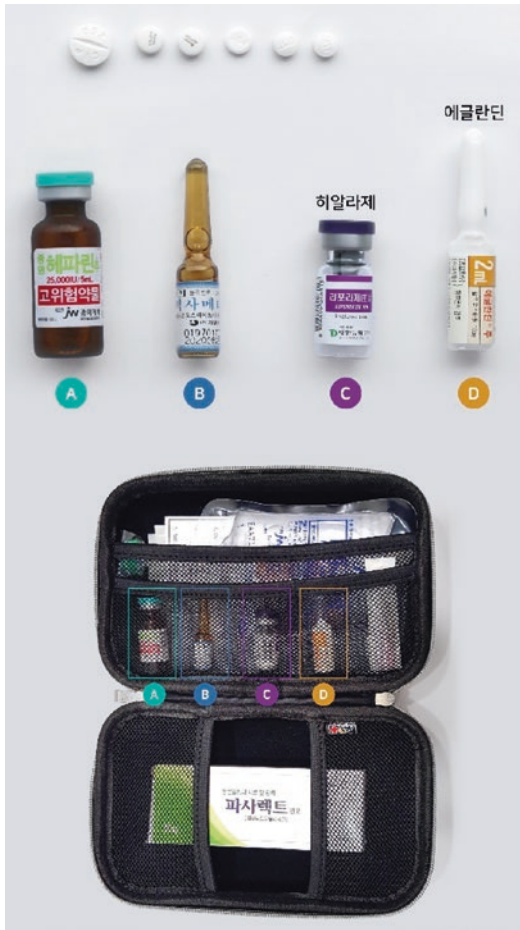


**Fig. 1.16** Supratrochlear arterial pathway compression during glabellar wrinkle line correction

patient would panic. So, we should always prepare an emergency kit and mediate as soon as possible [13]. The author always prepares an emergency kit at the clinic (Fig. 1.19).

## 1.8 (F) Filler Techniques

The bolus technique is an effective technique for lifting tissue at a specific point. But we should inject a relatively large amount of volume. The aspiration test should be performed. In contrast, the linear threading technique moves the tip con-



**Fig. 1.19** Emergency kit (A. Heparin, B. Dexamethasone, C. Hyaluronidase, D. E glandin)

Actual ejection pressure is much higher than normal blood pressure. This means the filler can reach the ophthalmic artery with a small injection force. A gentle injection with minimal force is needed (Fig. 1.21).

### 1.10 (H) History of Prior Operations or Injections

One preventive method is to ask about previous operation history or injection history. A previous operation would alter the vasculature. For example, the open rhinoplasty technique always interrupts the columellar artery and the nasal tip vasculature has to change. So extreme caution is needed for a previous operation site. The previous filler injection also might alter the vasculature. The vasculature might be compressed by previous filler injection and secondary injection space is decreased. Often we can find that the vascular complication occurs when performing a “retouching process.”

Filler injection is a relatively simple technique. The patient needs a minimal invasive procedure for more aesthetic improvement and doctors also want to perform a minimal procedure. But there are some tragic complications and there are also no 100% safe techniques. But when performing a relatively safe procedure and per-

ORIGINAL CONTRIBUTION



## Comparison of hyaluronic acid filler ejection pressure with injection force for safe filler injection

Yongkoo Lee PhD<sup>1</sup> | Seung Min Oh MD, MMBA<sup>2</sup> | Won Lee MD, PhD<sup>3</sup> | Eun-Jung Yang MD, PhD<sup>4</sup>

**Fig. 1.20** Pressure of hyaluronic acid filler injection

(5) Vascular complications.

The most tragic complication is a vascular complication. Doctors always prepare for vascular complications such as skin necrosis or ocular complications. Even though doctors are aware of vascular anatomy, there are always variations so it might occur with any patient.

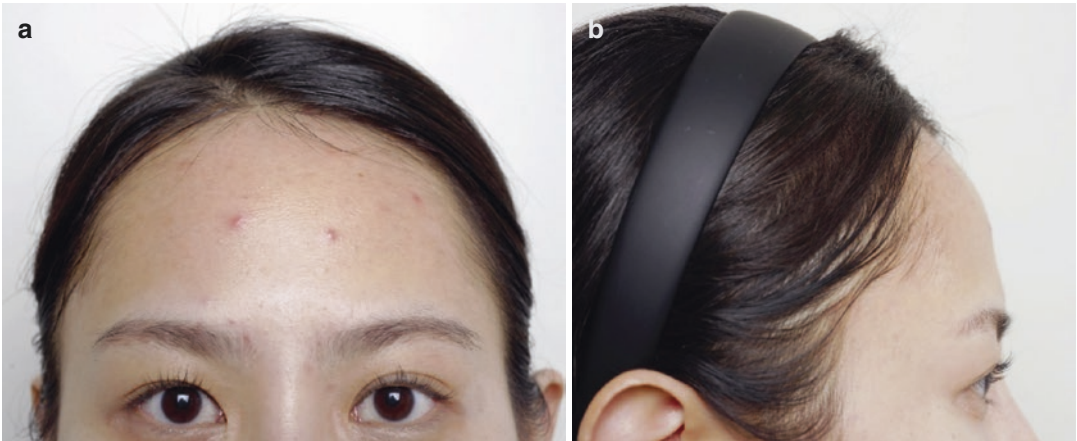
What dose of Hyaluronidase should be injected?

Dr. Lorenzi proposed the dose of skin necrosis (Fig. 2.9) [6]. But multiple factors should be considered (Table 2.4).

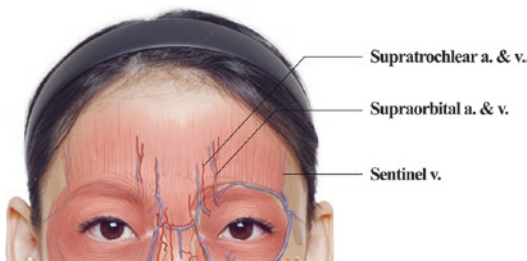
Among these considerations, repetitive injections are very important. The author also conducted a rabbit experiment that found that an appropriate dose of hyaluronidase is needed and repetitive injections at 30 mins to 1 hour are needed [7].

**Fig. 2.9** Dose for skin necrosis. The dose should be considered by various types of hyaluronidase product





**Fig. 3.1** Forehead considerations. (a) Front view and (b) Lateral view



**Fig. 3.2** Forehead vessels

**Table 3.1** Forehead considerations

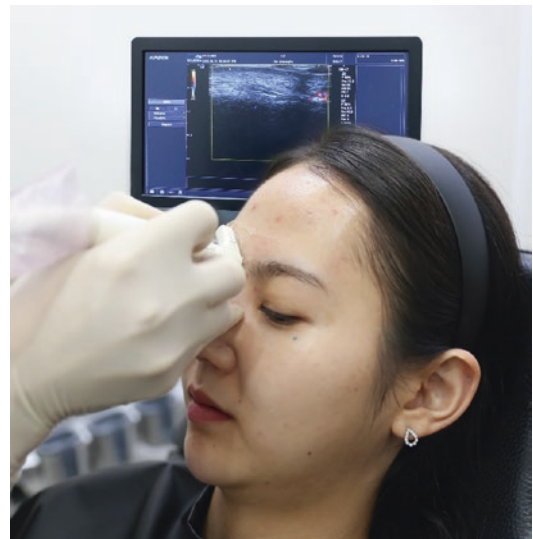
Considerations of forehead augmentation by HA filler

1. The height of supraorbital ridge which is located near the eyebrow should be considered.
2. The highest desired location point of forehead should be considered.

gently and carefully when performing injections of HA filler deeply above the eyebrow, especially from eyebrow to 2 cm above.

### 3.3 Doppler Ultrasound

The superficial temporal artery is easily detected by the doppler ultrasound and the supratrochlear artery and the supraorbital artery can also be detected by ultrasound (Fig. 3.3). It is recommended to detect the supratrochlear artery and



**Fig. 3.3** Doppler ultrasound finding before forehead filler injection

the supraorbital artery before any HA filler injection because these arteries are directly related to the ophthalmic artery [2].

### 3.4 Filler Choice

The forehead is a wide area so an even injection is quite important. Also, frontalis muscle action should be considered. Not only is the augmenta-





**Fig. 4.5** Design the correction of glabellar wrinkle lines



**Fig. 4.6** Detect supratrochlear artery by doppler ultrasound



**Fig. 4.7** Draw the detected artery



**Fig. 4.8** Inject HA filler. Use 27G ~ 30G needle and direct needle far from the eye. It is recommended to compress the medial side of the orbit



**Fig. 4.9** Immediately after HA filler injection

## References

1. Scheuer JF 3rd, Sieber DA, Pezeshk RA, Gassman AA, Campbell CF, Rohrich RJ. Facial danger zones: techniques to maximize safety during soft-tissue filler injections. *Plast Reconstr Surg.* 2017 May;139(5):1103–8. <https://doi.org/10.1097/PRS.0000000000003309>.
2. Cong LY, Phothonng W, Lee SH, Wanitphakdeedecha R, Koh I, Tansatit T, Kim HJ. Topographic analysis of the supratrochlear artery and the supraorbital artery: implication for improving the safety of forehead augmentation. *Plast Reconstr Surg.* 2017 Mar;139(3):620e–7e. <https://doi.org/10.1097/PRS.0000000000003060>.
3. Lee W, Moon HJ, Kim JS, Yang EJ. Safe glabellar wrinkle correction with soft tissue filler using doppler ultrasound. *Aesthet Surg J.* 2020 Jul 9:sjaa197. <https://doi.org/10.1093/asj/sjaa197>.
4. Belezny K, Carruthers JD, Humphrey S, Jones D. Avoiding and treating blindness from fillers: a review of the world literature. *Dermatol Surg.* 2015 Oct;41(10):1097–117. <https://doi.org/10.1097/DSS.0000000000000486>.

## 5.5 Injection Techniques (Figs. 5.7, 5.8, 5.9, 5.10, and 5.11)

Doppler ultrasound detection of the superficial temporal artery is performed. Then a local anesthesia is injected at the hairline. After a needle puncture of the entry point, a 21G cannula is inserted. The STF is perforated easily by cannula but the DTF is hard to perforate so the cannula tip can be located between the STF and DTF easily. Inject HA filler when the cannula tip is located correctly. Inject gently using the retrograde threading technique.

The superficial temporal artery is located at the STF so locate the cannula hole downward. The left hand can feel during HA filler injection.



**Fig. 5.6** Local anesthesia at entry point



**Fig. 5.7** Approach 21G cannula between STF and DTF. STF is easily perforated



**Fig. 5.8** Proceed gently with cannula tip between STF and DTF



**Fig. 5.9** Gentle injection by linear threading technique



**Fig. 5.10** Place the patient in upright position and inject filler if there is insufficient location



**Fig. 6.4** Local lidocaine anesthesia at infralobular area



**Fig. 6.7** When the cannula tip passes the nasal bone, the doctor should feel bone scratch (periosteum) to locate the suprapariosteal layer



**Fig. 6.5** Puncture by 21G needle



**Fig. 6.8** Perpendicular needle injection. The needle tip should be located at the suprapariosteal layer (an aspiration test should be performed before the injection)



**Fig. 6.6** Approach cannula tip



**Fig. 6.9** When performing a nose injection, compression of the dorsal nasal artery pathway is recommended