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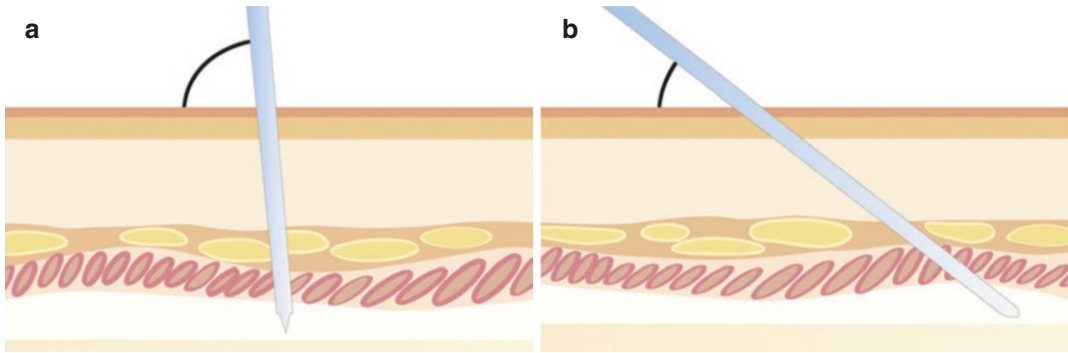


Fig. 6.8 Filler injection. (a) Needle. (b) Cannula

Table 6.1 Comparison between needle and cannula injection

	Needle	Cannula
Size, length	27 G, 30 G × 1/2"	23 G, 25 G × 1", 2"
Pros	Fast, direct, easy	Less bruise, pain, swelling
Advantage	Lifting effect	Precise layer
Recommendation	Superficial wrinkle, temple	Volumizing area

ally little behind the tip area, making precise injection with cannula more difficult compared to needle injection. When a cannula is used, an entry point is first created using a needle with a large diameter. The retaining ligaments might also offer some resistance to the cannula tip. Cannula injection has the advantages of causing less bruising and swelling. For wide areas, such as in forehead augmentation, using a cannula has more advantages as fewer entry points will be created (Fig. 6.8).

The most important advantage of using a blunt cannula is the reduction of the risk for arterial wall penetration. When using needles, the needle tip can be into an arterial lumen, so an aspiration test is usually recommended. With a cannula, it is more difficult to penetrate an arterial wall. Thus, arterial complications are reduced. Previous studies reported that a 27 G cannula is same as 27 G needle and is statistically different from a 25 G cannula [7]. Therefore cannula diameters larger than 25 G (e.g., 23 G cannula) are often recommended (Table 6.1).

Vessels are known to be more resistant than soft tissue to needle penetration. When performing an arterial cannulation or an intravenous injection, adjacent skin stretching is needed. However, a needle can unintentionally perforate

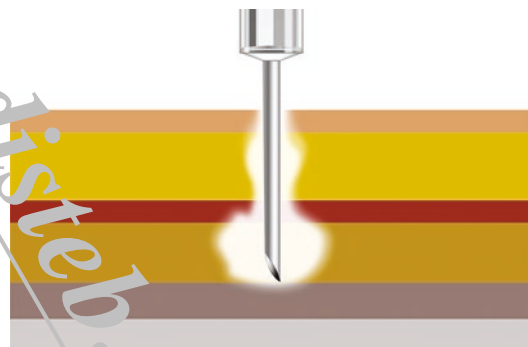


Fig. 6.9 Backflow migration by needle injection

a vessel, and filler injected within, leading to an embolism [8]. Although the topic is controversial, compression is believed to be a more likely cause of skin necrosis than embolism.

Backflow through the needle path should also be considered. A high pressure is often generated when the filler is injected, and this can cause the filler to migrate through needle path. The doctor should also take into consideration filler regurgitation at the entry sites when performing molding compression. Therefore, when the entry point is near the desired location, filler backflow migration might occur (Fig. 6.9). Nasojugal injection is often done using a needle [9].

Fig. 6.10 Same outer diameter but different inner diameters

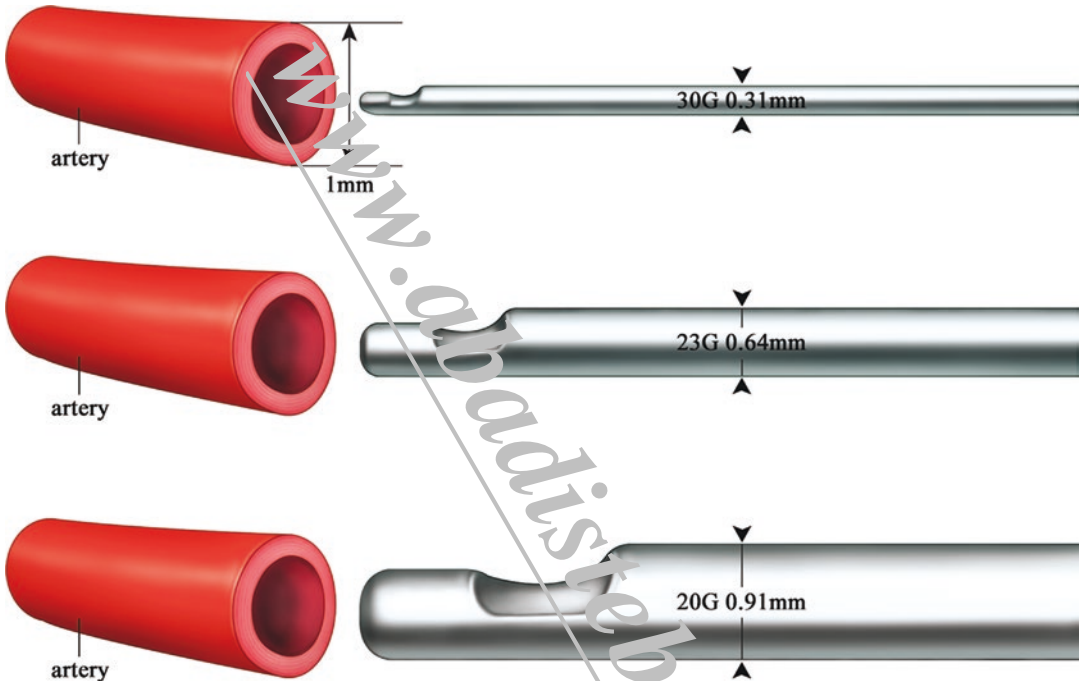


Fig. 6.11 Cannula size and artery diameter

6.5.2 Choice of the Appropriate Needle or Cannula

To ensure good results, appropriate needle and cannula are needed. The needle or cannula diameter is often gauged and written, but the measurement usually corresponds to the outer diameter. The size of the inner diameter is rather more important (Fig. 6.10). When the inner diameter is larger, less pressure is applied, and a smoother injection can be performed. In addition, there are some differences in hole distances from the tip, hole shapes, and hole sizes. These parameters should always be considered when choosing the appropriate cannula, to

ensure better results (Fig. 6.11). Most authors use the 23 G 50 mm cannula, and for precise injection (such as injection in the tear trough area), they use a 25 G 40 mm cannula.

6.6 Regional Injection Techniques

6.6.1 Forehead

The forehead area usually occupies 1/3 of the face and is the widest area for facial filler injection. A large amount of filler is needed to cover all the forehead. The strategy is to use a needle with

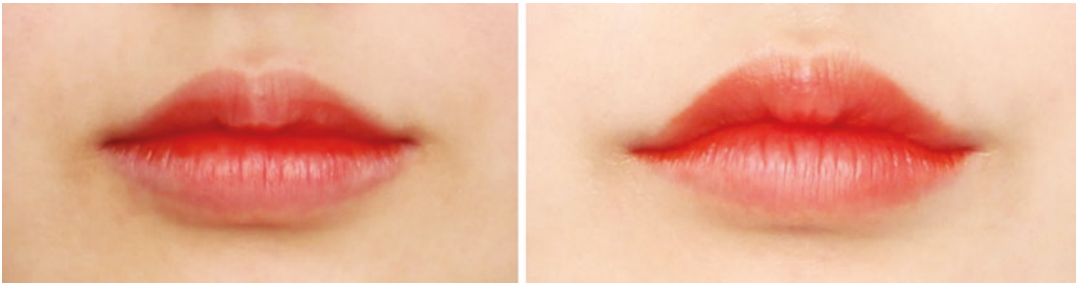


Fig. 6.43 Pre- and post-lip filler injection images

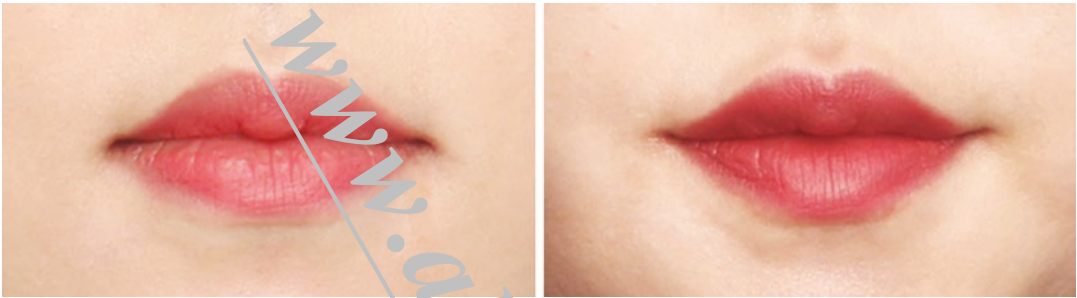


Fig. 6.44 Pre- and post-lip filler injection images

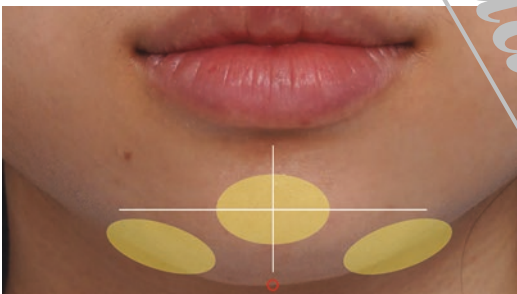


Fig. 6.45 Chin augmentation design

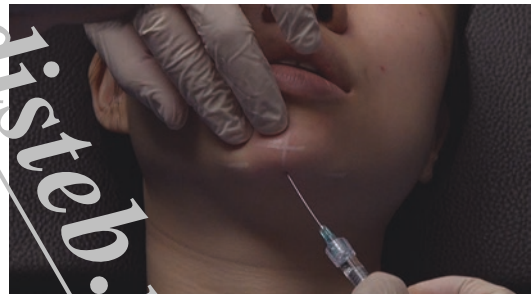


Fig. 6.46 Submental approach using a cannula

6.7 Considerations for a Safe Filler Injection

6.7.1 Pre- and Postoperative Photographs

Patients tend to forget their preoperative appearances. One common complaint after a procedure is asymmetry. Preoperative recordings should always be made to help account for preoperative asymmetry. They should closely examine the patient before the procedure to make preoperative plans and use preoperative photographs to

obtain more precisions on the operative plan. Postoperative photographs should also be taken for the evaluation of the procedure.

6.7.2 Medical Chart Recording

The doctor should take note of the past history of patients. Filler injections are usually performed repetitively; thus a past history of the amount of filler, site of injection, and filler brands should be recorded. Medical history should include the following:

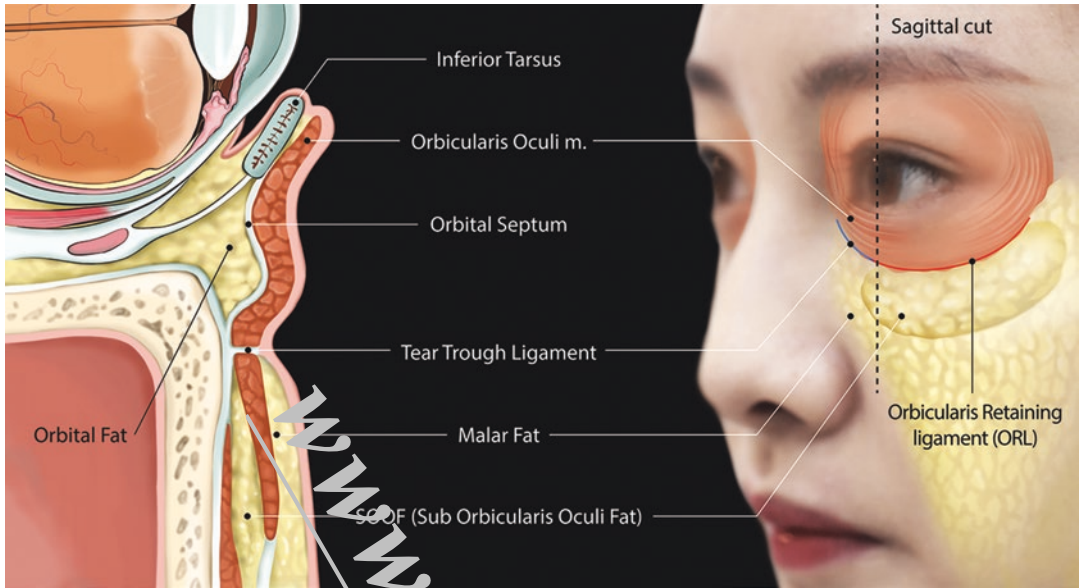


Fig. 7.20 Tear trough ligament and surrounding structures



Fig. 7.21 Doppler ultrasound finding of the angular artery at the tear trough area



Fig. 7.22 In the upright position, direct the cannula tip to the desired layer and inject precisely

7.4.1.1 Tear Trough Deformity Correction Techniques

The Tyndall effect should be considered [35]. A previous study reported the duration to be more than a year [36]. Topical anesthesia is usually administered. Cannula can be positioned at deep layer or superficial layer depending on groove appearance (Fig. 7.22). Pre- and postoperative photos are seen (Fig. 7.23).

7.4.2 Anterior Malar Augmentation

One of the biggest differences, about esthetic opinion, between western and oriental people might concern the malar area and the mandibular

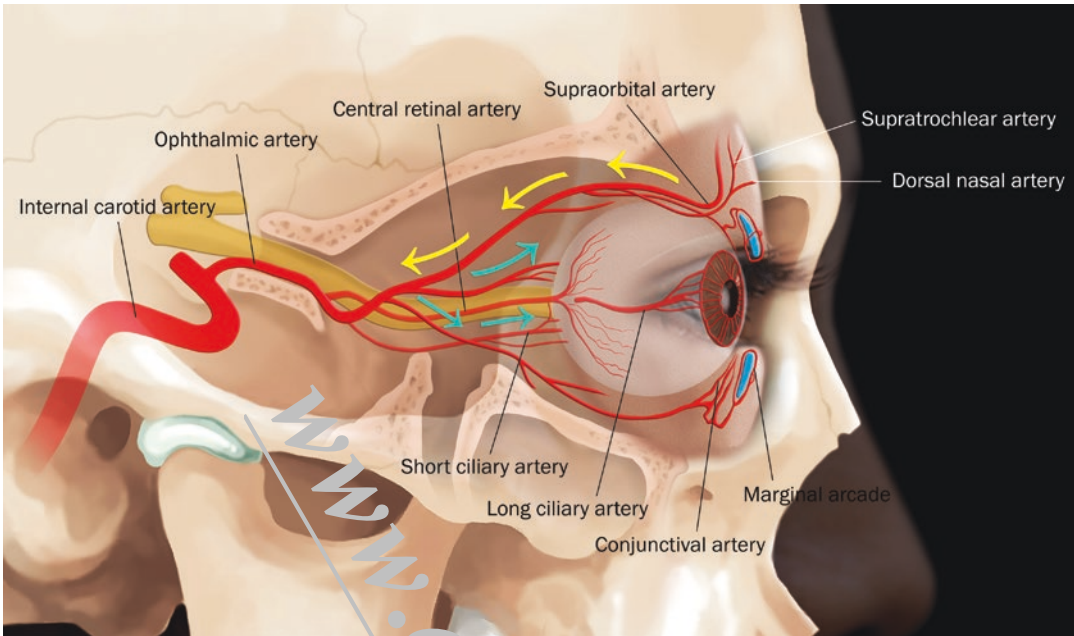


Fig. 8.13 The pathophysiology of filler-induced ocular complications

Table 8.3 The ABCs for prevention of filler-induced ocular complications [13]

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

bital, and facial arteries are very important vessels from the external carotid artery. It is impossible to know the exact pathway as they may vary circumstantially. Recently, detecting arteries using the Doppler ultrasound has been gaining importance as a preventive technique.

Doppler Ultrasonography-Guided Filler Injections

Detailed techniques are described in Chap. 7. The supratrochlear artery can be detected by Doppler

ultrasonography when injecting the glabella area [14]. The dorsal nasal artery can also be detected using Doppler ultrasonography when injecting filler at the nose [5, 15]. One common site for filler injection is the nasolabial fold, which can be encountered through the facial artery. The facial artery can be easily detected using Doppler ultrasonography [16]. When filler injections are performed for temple augmentation, the frontal branch of superficial temporal artery can be encountered. Detected using Doppler ultrasonography [17, 18]. The most definite prevention is to use the Doppler ultrasonography to locate the arteries before filler injection.

8.4.3.2 Aspiration Test

When the needle ends perforate the arteries and syringe regurgitation is performed, blood can be seen. This is called an “aspiration test.” The aspiration test remains controversial but is theoretically an effective procedure performed by many doctors. However, the possibility of false negatives is increased when the needle end is located

inside the arterial lumen, but no blood is seen. The needle prime substance, retraction time, retraction pressure, and needle lumen diameter also affect the risk of false negatives. One experiment assessed the aspiration test with the needle-priming substance [19]. Both in vitro and in vivo tests were performed and when the needle was filled with the filler, false negatives might occur (Fig. 8.14). Thus, it is important to detect the needle lumen before the aspiration test is performed.

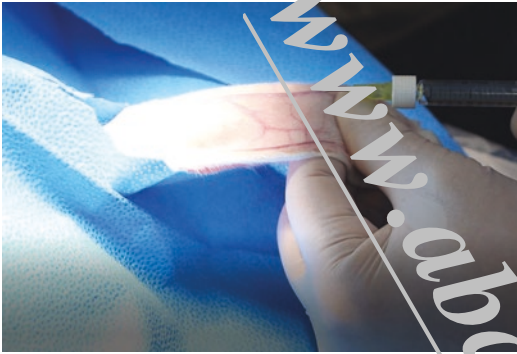


Fig. 8.14 The in vivo aspiration performed in the facial artery and central auricular vein in a rabbit

8.4.3.3 B: Big Cannula

Almost all doctors recommend cannulas as safer options than needles. However, the cannula is not 100% safe. The author recommends using cannulas with diameters comparable to those of the dorsal nasal or supratrochlear arteries (Fig. 8.15).

8.4.3.4 C: Compression

Compression of the periorcular region can occur during filler injections. For example, the supratrochlear pathway compresses during glabella wrinkle correction using filler injections (Fig. 8.16).

8.4.3.5 D: Direction

When filler injections are performed, injecting in the direction toward the eye is not recommended. For example, when filler is injected into the facial artery, filler can reach through angular artery and dorsal nasal artery to create an embolism at the ophthalmic artery.

8.4.3.6 E: Emergency Kit

An emergency kit should be ready for use when vascular or ocular complications occur, as they

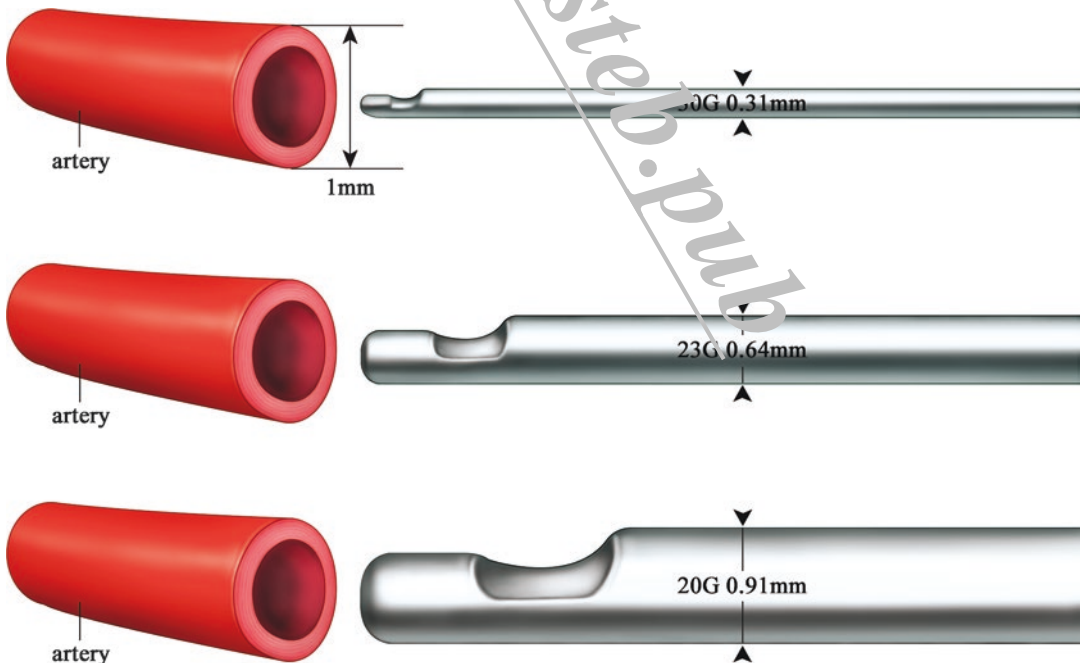


Fig. 8.15 The comparison between the diameters of arteries and cannulas