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Original Research

Surface landmark of the facial vein for the dermal fillers injection



Dawinee Chinnawong^{*,1}, Tanvaa Tansatit¹, Piyaporn Phanchart¹, Natthida Rachkaew¹

The Chula Soft Cadaver Surgical Training Center and Department of Anatomy, Faculty of Medicine, Chulalongkorn University and the King Chulalongkorn Memorial Hospital, 1873 Rama 4 Road, Pathumwan, Bangkok 10330 Thailand

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ABSTRACT

Objective: The purpose of this study was to describe the course of the facial vein and identification of surface landmark of the facial vein for dermal fillers injections.

Methods: Thirty flaps of hemiface were turned over to measure the distance between the facial vein and ala of the nose and oral commissure. The vertical distance was measured from the inferior orbital rim to the facial vein. The diameter of the facial vein and the depth from skin surface to the facial vein were measured. Anatomical relationships of the facial vein to its surrounding structure were observed.

Results: The course of the facial vein is a large curved course without tortious from the medial canthal tendon downward along the medial orbital rim. The mean vertical distance from the facial vein to the inferior orbital rim was 6.87 ± 1.14 mm. The average horizontal distance from the facial vein to ala of nose was 21.57 ± 3.95 mm. The average horizontal distance from the facial vein to oral commissure was 27.55 ± 3.97 mm. The average depth values from skin surface to the facial vein at the level of ala of nose and oral commissure were 14.44 ± 2.90 and 15.38 ± 2.40 mm, respectively.

Conclusions: The course of the facial vein at the level of ala of nose and the oral commissure were approximately 2 and 3 cm, respectively at the depth of 1.5 cm.

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1. Introduction

An aging face is a multifactorial process with anatomic, biochemical, and genetic elements. Many exogenous and endogenous factors such as solar exposure, cigarette smoking, medications, alcohol use, body mass index, and endocrinologic status have been implicated as factors that accelerate the facial aging process [1]. In recent years, the number of cosmetic dermatology procedures performed has increased. There are several types of treatment to help combat an aging face such as surgery, botulinum toxin and dermal fillers injection. Among these techniques, the dermal fillers injection is the most commonly used for aging face treatment. Dermal fillers involve filling the wrinkle or crease by the injection of an appropriate filler substances. There are many different types such

as fat, collagen (bovine, human, and purified porcine), hyaluronic acids (HAs), calcium hydroxylapatite (CaHA), and injectable medical devices such as poly-L-lactic acid (PLLA) microspheres [2,3].

The ideal fillers injectable for an aging face should be safe, stable at the implantation site, painless to inject, and minimal complication [4,5]. Complication of dermal fillers injection can be varied and include bleeding, allergic reactions, lower eyelid swelling, and facial vein thrombophlebitis after infection. More serious complications can range from anaphylactic reaction, skin and tissue necrosis, blindness and death [5–9].

It is important for dermatologists to be well informed on the position of anatomical structures beneath the skin at the site of injection. This is because during a filler procedure the needle may come in contact with structures beneath the skin, specifically the facial vein, potentially resulting in venous occlusion [10]. That is often delayed, and presents as a dull pain with bluish discoloration that may simulate a bruise. Therefore, the accuracy knowledge of surface landmarks of the facial vein may help reduce the serious complication that can occur as a consequence of this procedure. The purpose of this study was to describe the course of the facial vein along with accuracy surface landmarks to ultimately allow identification of appropriate dermal filler injection sites.

☆ Asian AOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.

* Corresponding author. Tel.: +66 0899821440; fax: +66 2 2527028.

E-mail address: Dew.DJ@hotmail.com (D. Chinnawong).

¹ Tel.: +66 0818094414; fax: +66 2 2527028.

2. Materials and methods

Dissection was performed on 30 hemi-face specimens of soft embalmed cadavers, from Chula Soft Cadaver Surgical Training Center of King Chulalongkorn Memorial Hospital. Selection criteria required specimens with no history of trauma or surgical procedure on the face. All cadavers were donated to the institute for medical education and research was carried out with the written consent of the family delegate.

2.1. Dissection of the cadavers

Firstly, a skin incision was made on the forehead roughly 2 cm above the eyebrows and continued around the temporal region, anterior to the external ear canal, to the mandibular angle of the jaw line on both sides and along the mandibular border to the midline. All skin and subcutaneous tissue was removed by lifting from underneath the periosteal layer using a periosteal elevator or a surgical blade. The origin and insertion of the temporalis and the masseter muscles were cut to allow removal. An incision was made around the alveolar bone to detach the facial muscle from the maxilla and mandible. For each orbit, the orbital septum was severed from its attachment on the orbital rim. The periorbital was deflected from the orbital rim and continued toward the optic canal and orbital fissure. The optic nerves and additional structures were cut to remove the contents of both orbital cavities. The nasal cartilage was cut and removed as deep as possible to keep the nose intact, and lifted away along the mucosa of the lateral walls of the maxilla along with the head of the inferior turbinate. This allowed the facial flap to be removed en bloc with the facial musculature and innervations still intact. The facial flap was turned over to allow examination to be performed from a periosteal view.

2.2. Observation and measurement

Following attainment of the facial flap, the buccal fat pad was removed to allow identification of the facial vein situated beneath the parotid duct. We observed the course of the facial vein from the anterior border of masseter muscle to the medial canthal ligament (Fig. 1). The horizontal distances between the facial vein and ala of nose and oral commissure were measured using calipers. The vertical distance from the inferior orbital rim to the facial vein was also measured. The diameter of the facial vein and the depth from the surface of the skin were measured at the level of ala of nose and oral commissure (Fig. 2). Additionally, the anatomical relationship between the facial vein and the surrounding structures was observed. At the lower border of the mandible two anatomical landmarks were defined: the anterior palpable border of the masseter and its anterior recess at the inferior mandibular margin. We divided the relationship of the facial vein with the insertion of the masseter muscle into 3 patterns as follows: Type 1, the facial vein was situated lateral to the anterior border of the insertion of the masseter muscle. Type 2, it crossed the mandibular margin medial to the anterior recess. Type 3, it ran between the anterior recess and the anterior border.

3. Results

3.1. Level of the medial canthal ligament

The facial vein crossed over the medial canthal ligament together with a few branches of the angular nerve from the upper buccal branch of the facial nerve. At the medial canthal ligament, the facial vein was covered by a small fascicle of the levator labii superioris alaque nasi muscle. The facial vein lied very close to the periosteum of the frontal process of the maxilla under the medial

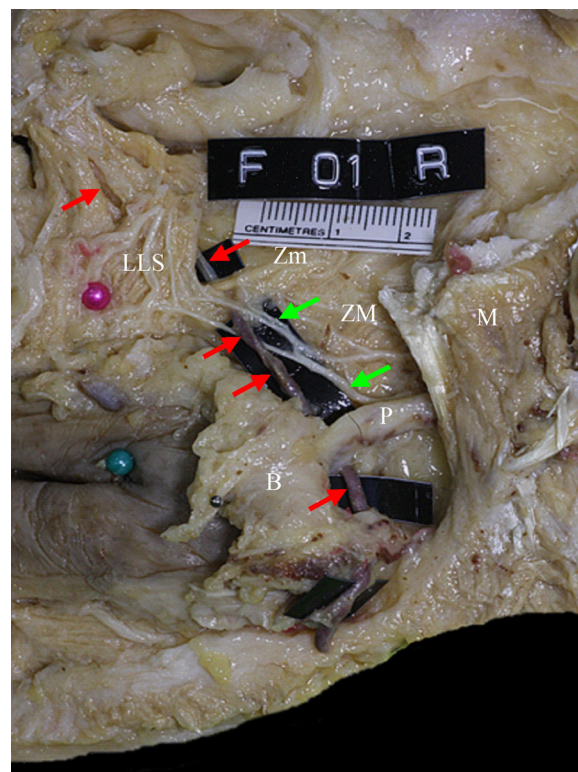


Fig. 1. The facial vein (red arrow) ran beneath the levator labii superioris (LLS) muscle and the zygomaticus minor (Zm) muscle and crossed over the zygomaticus major (ZM) muscle, while running between the branches of buccal branch (green arrow) of the facial nerve. The facial vein ran under the parotid duct (P) and buccinator muscle (B) along the anterior border of the masseter muscle (M). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

band of the orbicularis oculi muscle. The mean vertical distance from the facial vein to the inferior orbital rim was 6.87 ± 1.14 mm (Fig. 3).

3.2. Level of the canine fossa

The facial vein coursed between the origin of the levator labii superioris muscle and (under) the medial band of the orbicularis oculi muscle just medial to the malar eminence. It ran along the medial orbital rim above the infraorbital foramen for a short distance where it deviated and descended downward before it reached the origin of the masseter muscle. In every specimen the facial vein lied superficial to the sublevator space as well as superficial to all four descending branch of the infraorbital nerve up to the ala of nose and upper lip. At the level of ala of nose, the average horizontal distance from the facial vein to ala of nose was 21.57 ± 3.95 mm. The mean diameter of the facial vein was 2.44 ± 0.72 mm. The average depth from the skin surface to the facial vein was 14.44 ± 2.90 mm (Fig. 1).

3.3. Level of the masticator space

At the level of the masticator space the facial vein descended obliquely along the medial border of the buccal fat pad and the masseter muscle. In this area the facial vein was usually found accompanying the middle or the lower trunk of the buccal branch of the facial nerve. The superior labial vein running from the medial side drained into the facial vein. It reached the genu of the parotid duct while the parotid duct looped around the masseter muscle to enter the buccinator muscle. The facial vein lied under the insertion

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