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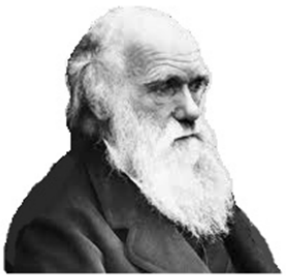

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Cadaveric Training Course on Lower Eyelid Anatomical Dissection Techniques

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ABSTRACT

"Lower Lid Blepharoplasty-Entropion-Ectropion Oculoplastic Procedures Cadaveric Dissection Course" was performed in Bahcesehir University School of Medicine on February 19th, 2017 with the participation of 20 ophthalmologists. Lower eyelid anatomy, lower eyelid entropion-ectropion surgical techniques, subciliary and transconjunctival approach to lower eyelid blepharoplasty, prevention and management methods of surgical complications were shown on the fresh frozen cadaveric eyelids. All the participants were able to follow anatomic demonstrations and surgical techniques performed on the master table by experienced surgeons through live broadcasting. The stages of the lower eyelid cadaveric dissection and details of the anatomical structures were presented to the participants by the recording, reproducing, or broadcasting of moving visual images. Cadaveric workshops as a primary modality of simulation based surgical skills training have been used for a few years in Turkey. Although cadaveric dissection training has some disadvantages such as tissue loss, degeneration of anatomical key points, diversification in the structure, lack of experience in live tissue tonus, difficulties in providing cadavers, and high cost; it is the gold standard technique for surgical skill transfer in eyelid surgery.

***Keywords*:** lower eyelid blepharoplasty, cadaveric dissection, oculoplastic surgery skills training

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1. INTRODUCTION

A good education in oculoplastic surgery should provide surgeons a very detailed anatomic knowledge about eyelids, surgical skill, and experience. The traditional surgical education covers learning and practicing on the patients during surgery. However, on-patient surgical training is very difficult especially during surgery of tissues with relatively complicated anatomy such as the lower eyelid, in procedures performed under local anesthesia, and when the aesthetic expectations of the patient are high [1]. In addition to the difficulty of theoretical learning, it is almost impossible to practice dissection and suturing in real-life surgeries. For this reason, for ophthalmologists who are oculoplastic surgery residents, eyelid anatomy training on human cadaver has critical importance [2, 3].

Although common disadvantages of human cadaver such as high cost, limited availability, low number of centers that can provide storage conditions limits its widespread use; training on cadaver has been becoming increasingly popular because human cadavers are the most valuable model in terms of surgical training and technique development [4]. For this reason, many universities have begun to provide surgical training on cadavers.

Three cadaver oculoplastic surgery cadaveric course were carried out in Bahcesehir University Faculty of Medicine, Turkey. The first oculoplastic surgery cadaveric course was conducted in February 2016. The third course, conducted in February 2017, was “Lower Lid Blepharoplasty-Entropion-Ectropion Oculoplastic Surgery Cadaveric Dissection Course”. In this paper, we summarize the details of this course.

2. RESULT / MATERIALS AND METHODS

Cadaveric Dissection Course

Training Set-Up and Preparation of the Cadaver

It was a one-day course with the participation of 20 ophthalmologists on the lower eyelid dissection for blepharoplasty, and entropion and ectropion surgery.

Bahcesehir University Faculty of Medicine is equipped with different types of laboratories like Rhoton’s anatomy laboratory (Figure 1). Rhotons anatomy laboratory has a master station, on which the master surgeon dissects cadaver and educates participants via the screens along the walls of laboratory which is connected to master microscope. All of the procedures can also be recorded. The participants’ stations have their own surgical microscope, and their dissections can also be recorded separately by their displays.

For the course, unembalmed fresh frozen cadavers (FFC) were used, and all cadavers were tested serologically before usage. To avoid disease transmission, the standard hygienic precautions were provided during the session. FFC can be kept in freezers with the temperatures between –17 °C and –20 °C.

In order to defrost the cadavers for use, they are placed into a refrigerated area at a temperature between +3 °C and +5 °C, which takes up to 2 weeks until they are ready for use. When this technique is used, the skeletal and visceral tissues retain the colors found in the living body. The tissues and the ease or difficulty in separating one structure from another resembles those of living tissue.

Dissection Procedure

Before we start the practice, we fill the cadavers eyeball and periorbital soft tissues with fluid to enrich the soft tissue volume. A traction suture trough the grayline of the lower eyelid was placed. Transconjunctival approach was made by incision at 4 mm below the inferior border of the tarsus from the level of the punctum to the lateral canthus entering the plane between the orbital septum and the orbicularis oculi muscle (Figure 2a). The orbital fat would remain intact behind the orbital septum as long as the incision was made above the line of fusion of the septum and the capsulopalpebral fascia (Figure 2b). Another traction suture was placed through the upper eyelid, conjunctiva, and the lower eyelid retractors. Dissection proceeded down the plane between the septum and the orbicularis and onto the anterior surface of the infraorbital rim (Figure 2c). A pocket was created beneath the orbicularis muscle over the inferior orbital margin. The arcus marginalis was incised with from medial to lateral along the infraorbital rim down to the periosteum (Figure 2d). The suborbicularis oculi fat was separated from periosteum medially through the nasojugal Groove bluntly. The septum and released preaponeurotic nasal and central fat pads were then advanced over the inferior orbital margin. The inferior oblique muscle was identified between central and paler nasal fat pads with a muscle hook. The advanced nasal and central orbital fat pads were reset onto the periosteum of the maxilla and inferior to the orbital rim with interrupted sutures passed beneath the orbicularis muscle over the anterior lacrimal crest medially and inferior orbital margin centrally, through the full thickness of the eyelids to exit the skin and were then tied, pulling the fat forward and the orbicularis upward over the inferior orbital margin. The lateral fat pad was trimmed (generally because it may not be possible to reposition it adequately). The lower lid retractors were then carefully dissected from the underlying conjunctiva below the Tarsus with Westcott scissors (Figure 2e). Conjunctiva was very fragile. A lateral straight canthotomy was performed and extended to the lateral orbital rim. The inferior crus of the lateral canthal tendon was cut. The anterior and posterior lamellae were split through lateral cantotomy incision using Westcott scissors. The periosteum of the lateral orbital wall was exposed placing the canthoplasty suture along lateral border of tarsus and lateral orbital rim periosteum. The lateral tarsal strip was then formed by cutting along the inferior border of the Tarsus. The eyelid margin was excised. The redundant anterior lamella was excised with the scissors. Conjunctiva was scraped from the tarsal strip using a no. 15 blade. The end of the tarsal strip was sutured to the lateral orbital rim periosteum in a posterior direction against the globe. The orbicularis oculi muscle was now repositioned. After separating the orbicularis oculi muscle from the skin of the lower lateral eyelid using Westcott scissors, a triangular muscle pedicle was created, with the base anchored inferolateral to the lateral canthus. The suborbicularis oculi fat was mobilized by dissecting in the preperiosteal plane using blunt-tipped Westcott scissors, and then sutured to the arcus marginalis and the periosteum of the lateral orbital margin (Figure 2f-h).

The video presentation of the dissection procedure that belongs to the master surgeon's (ŞK) microscope was presented as Supplementary File 1.

3. DISCUSSION

Cadaveric dissections date back to the rise of Ancient Greek medicine, which used this technique as a tool for teaching anatomy in the 3rd century BC [4]. During renaissance, formal

university dissection sessions became a public event in large theatres. Andrea Vesalius, who was referred as the father of anatomy, published an epic on anatomical examination in 1543, titled "Humani Corporis Fabrica" (on the fabric of the human body) [4]. Anatomy Act passed by British Government in 1832 was the most prominent legislation that allowed the use of unclaimed bodies and stopped illegal and unethical practices [5]. In 2004, Human Tissue Act established ethical standards and provided guidance to clinicians to carry out education and training using cadaveric materials [5].

In the present oculoplastic surgery cadaveric dissection course; the details of the lower eyelid anatomy, lower eyelid entropion-ectropion surgical techniques, lower lid blepharoplasty, subciliary incision and transconjunctival approach, and complications and their prevention and treatment methods are shown on the FFC.

In the eyelid skin we experienced a good flexibility and plasticity, but the rigidity was less than the live skin. The cadaveric skin was soft and had almost liquid skin tone. There was less resistance to puncture during suturing, but the strength of the tissue when being manipulated by surgical instruments was not like the live skin.

There are a few other identifiable limitations of training on the cadaver model compared to in vivo training [3]. The most important one is the lack of bleeding on the cadaver model. Orbicularis oculi has a great blood supply in the flesh eyelid. The identification of the orbicularis muscle was not so difficult in cadavers. Orbicularis muscle had bright color, soft, and feel like a live tissue. But, the scenario of "iatrogenic bleeding control" cannot be created to make the participants deal with bleeding disasters when dissecting the muscles as like in the whole dissection.

Suborbicularis oculi fat pads were identified and could be lifted easily. Orbital septum showed anatomic variations. Participants had difficulties in separation of the septum because of degeneration of tissues, unfamiliarity to the color of cadaveric tissues, and thin structure of the septum due to old ages of cadavers.

Lower lid retractors were found out easily and separated from anterior structures, but separation from conjunctiva was much more difficult than the live patient's conjunctiva.

Figure 1. Rhoton's anatomy laboratory of the Bahcesehir University Faculty of Medicine.

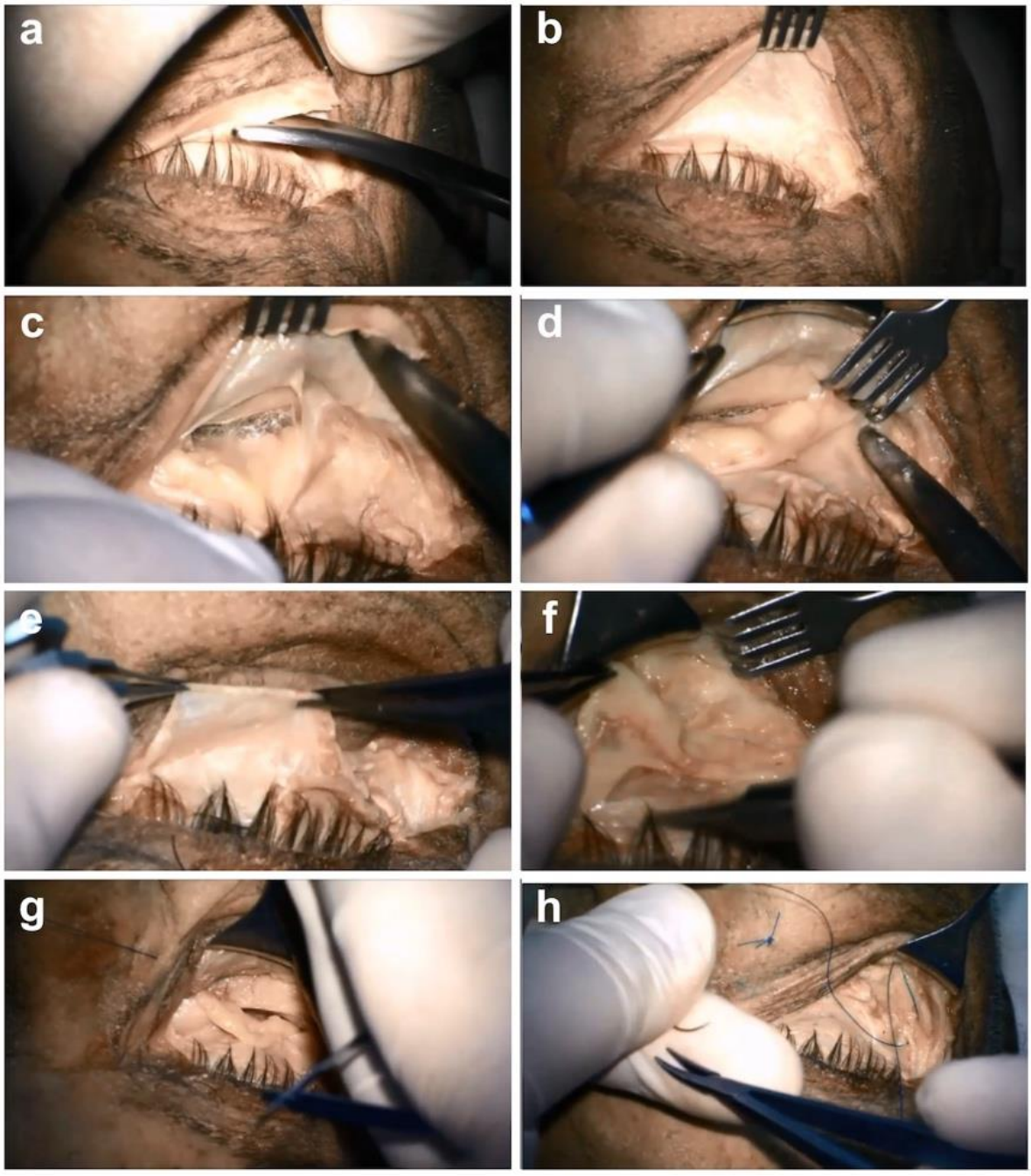

Figure 2. Steps of lower eyelid cadaveric anatomical dissection prodecure.

Although the closest anatomical model to resemble a live patient is fresh human cadaver, it is understood that cadaver model cannot completely match a live patient in all aspects. Simulation using FFC material is thought to be more realistic than other forms of simulation. The usefulness of fresh cadavers to practice surgical skills is unique [6, 7]. Advantages of FFC are being flexible and realistic with minimal tissue change. By FFC courses, the participants can achieve the chance to study many anatomical points in a life size

model, discover the basic anatomy and variations in human being, help improve their surgical technique, gain the sense comfort and confidence into their operating room, decrease the risk of postoperative complications, and learn the legal framework around anatomy, including ethics (how to treat human remains with dignity) and confidentiality (when not to discuss their activities openly) [2, 3, 5].

However, there are some disadvantages of FFC. The FFCs cannot be used repeatedly like embalmed ones (max 10 times). The risk of infection is higher than embalmed cadavers. The period available before deterioration is short. There is a possibility of inadequate thawing due to inadequate time needed for thawing. A full equipped laboratory to store and thaw frozen cadavers, and full protective equipment for the personal are needed. There are ethical and legal requirements to fulfil, which varies according to the regulation of the country. The high cost of FFC also limits its wider use in surgical education. We overcome this difficulty by ensuring their use for a range of disciplines, e.g., neurosurgeons, ear nose and throat surgeons, or dentists.

4. CONCLUSIONS

As the need for surgical experience increases in oculoplastic surgery, studies and courses on cadavers will also increase. The use of fresh human cadavers provides an effective and safe environment for surgical education. Thus, cadaveric training courses should be supported in our country. However, economic, technical, social, and hygienic deficiencies have to be overcome.

Supplementary File 1. The video presentation of the dissection procedure that belongs to the master surgeon's microscope.

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The bodies used as human cadaver, generously bequeathed by donors to advance medical science and education, are often referred to as "silent teachers". We owe specific respect and grace to these silent teachers.

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