INTRODUCTION

Infraorbital fat pad herniation results in a prominence of the lower lids, causing patients to have a tired and aged appearance. These deformities consists of skin, muscle and fat. Orbital fat exerts pressure both on the orbital septum and the orbicularis muscle, causing a bulge ***(Rittes et al., 2004).***

In ***1907, Miller*** of Chicago wrote the first exclusively cosmetic surgical article on the excision of bag like folds of eye lid skin and went on to describe a subciliary incision for excision of lower lid skin and fat for cosmetic reasons (Muscuocutaneous flap) ***(Miller, 1907).***

But this technique showed to carry the risk of many postoperative complications such as scaring, lid retraction, scleral show, ectropion, lateral canthal deformities and suture tracts ***(Zarem and Resnick, 1993).***

In ***1925, Julien Bourguet*** of Paris described a transconjunctival approach to lower lid fat excision ***(Tomlinson and Hovey, 1975).***

Tomlinson and Hovey described transconjunctival blepharoplasty in 1975 with preseptal approach, which occasionally led to injury of the septum with lower lid malposition ***(Tomlinson and Hovey, 1975).***

The popularity of transconjunctival blepharoplasty is largely because of Baylis and Sutcliffe's introduction of the

retroseptal transconjunctival approach in 1983 ***(Baylis and Sutcliffe, 1983).***

Therefore, many different techniques have been described for the treatment of lower lid deformities, some favoring the transconjunctival approach that avoids touching the orbicularis oculi muscle, other recommending the musculocutaneous flap.

Phosphatidylcholine is a phospholipid which is a polar ionic compound composed of an alcohol and a diacylglycerol, or sphingosine, linked by a phosphodiester bridge. It is a part of the membrane of cells and acts as an essential component of bile aiding the solubilization of cholesterol. Supplementation with lecithin (which contains high levels of phosphatidylcholine) has been shown to decrease bile cholesterol levels. All animal cells have a phospholipid bilayer that is principally composed of phosphatidylcholine. This phospholipid compound is also a main component of circulating lipoproteins ***(Tracy and Goldberg, 2006).***

Mesotherapy is the use of intra or subcutaneous injections containing mixture of compounds to treat local medical and cosmetic conditions ***(Rotunda and Kolodney, 2006).***

Moy has injected 0.5 ml/cm^2 of phosphatidylcholine (50 mg/ml) in the trunk, chin and extremities for two

treatments spaced monthly. The outcome was average decrease of 7.45 mm in the subcutaneous fat thickness one month after last treatment with no skin surface irregularities or systemic effects noted ***(Moy, 2004).***

A novel application for phosphatidylcholine is in the treatment of infraorbital fat pad herniation ***(Tracy and Goldberg, 2006).***

The injection of phosphatidylcholine (250 mg/5 ml) into the fat pads is a simple office procedure that may postpone or even substitute for lower eye lid blepharoplasty ***(Ablon and Rotunda, 2004).***

AIM OF THE WORK

The aim of this work is to compare between treatment of lid bulging due to prominent fat pads by blepharoplasty, a surgical procedure, and phosphatidylcholine injection as a non surgical treatment for this condition.

HISTORICAL ASPECT OF BLEPHAROPLASTY

From remote times, till our present time physicians have understood the importance of beauty and have made attempts to help restore and preserve it but there are no traces of surgery ever being performed for purely cosmetic reasons.

Cosmetic lid surgery, the best of our knowledge, dates back to by Avicenna (980–1035 A.D.) Ibn Roshd (1126–1198) and Albucasis (936–1013 A.D.). In fact, these surgeons noticed that excess skin in the upper eyelids was a hindrance to sight, so they removed it and eliminated the eyelid fullness ***(Stephenson, 1977).***

Another century lapsed before Beer proposed a similar technique for correcting baggy eyelids ***(Beer, 1817)***. And in the nineteenth century Alibert (1832), Von Graefe (1836) and Ammon and Baumgarten (1842) used modified versions of this operation ***(Ammon and Baumgarten, 1842).***

Fuchs originated the term blepharochalasia in 1896 which subsequently has been used exclusively for cases with idiopathic recurrent lid swelling. The term dermatochalasia was coined nearly 56 years later by Fox to describe the apparent excess eyelid skin associated with aging ***(Fox, 1952).***

Miller wrote the first exclusively cosmetic surgery article on the excision of bag like folds of eyelid skin and went on to describe a subciliary incision for excision of lower lid skin for cosmetic reasons and placement of the incision in the upper lid crease. The presentation of this technique and the publication of the first book on cosmetic surgery in 1907 were not universally welcomed in academic circles ***(Miller, 1907).***

Kolle published the second book on cosmetic surgery, Plastic and Cosmetic surgery in (1911) and was the first to recognize the importance of marking the amount of skin to be excised before operation ***(Kolle, 1911).***

During the same period a lady surgeon came to the fore. Her name was Susanne Blanche Marguerite Gross and she was born in Laon in the Aisne region of France. She used the name of her second husband, Andre Noel, a physician. With her book *La Chirurgie Esthètique et son Rôle Sociale*, which was immediately translated into German, Susanne Noel (1878–1954) became a famous cosmetic surgeon not only in Europe but elsewhere in the world ***(Noel, 1926).***

She performed cosmetic surgery from the early 1920s and her eyelid operations are illustrated in her book.

In 1925, Bourguet described a transconjunctival approach to lower lid fat excision and went on to publish the first before and after photographs of patient who had

undergone cosmetic blepharoplasty. In 1928, he described two separate pockets of fat in the upper eyelid and advocated their removal ***(Bourguet, 1928).***

Bettman discussed the importance of gentle handling of tissues, exact apposition of wounds, and elimination of tension on all wound edges ***(Bettman, 1928).***

Castanares made an important contribution in 1951 when he described the distinct fat compartments in the upper and lower orbit and their relations. He also recognized the importance of the orbicularis muscle, including its hypertrophy and excision as part of the total over all evaluation and techniques in cosmetic blepharoplasty ***(Castanares, 1951).***

Other modern developments include concomitant levator surgery and blepharoplasty and the recognition of brow ptosis as a major contributor of dermatochalasis in the majority of patients. Passot is credited with being the first to use the supraciliary brow incision for the correction of brow ptosis in 1931. Forehead lifting via a coronal incision had been described previously ***(Sheldon, 1954).***

In 1931, two other French surgeons, Passot and Cloure, also used Bourguet's transconjunctival technique, but the procedure went out of favor until Tessier used it in 1955 for obtaining access to the orbital floor. He also used it for fat removal but reported a number of limitations ***(Tessier, 1973).***

Tomlinson and Hovey recommended transconjunctival blepharoplasty in 1975 with pre-septal approach, which occasionally led to injury of the septum with lower eyelid malposition ***(Tomlinsons and Hovey, 1975).***

Smith and Petrelli recognized the importance of diagnosing lacrimal gland prolapse during cosmetic blepharoplasty ***(Smith and Petrelli, 1978)***.

The current popularity of transconjunctival blepharo-plasty is largely because of Baylis and Sutcliff's introduction of the retroseptal trans-conjunctival approach in 1983 ***(Baylis and Sutcliffe, 1983).***

Naugle showed the importance of recognizing lower lid laxity in blepharoplasty ***(Naugle, 1984).***

A new era of endoscopic technique is being conjured up by advancing technology and the desire to perform minimally invasive surgery. The first presentation of the use of the endoscope for brow and face lifting was by Vasconez's group at the plastic and reconstructive surgery meeting in September 1992. Since then, major developers of instrumentation and techniques have included Vasconez, Chajchir, Ramirez, Isse, Toledo, and Aiache ***(Core et al., 1992).*** Aesthetic soft tissue endoscopic surgery is advancing rapidly and has been used for the correction of all forms of facial deformities.

Application of CO_2 laser now includes resurfacing of actinically damaged skin. The laser also has been used for incisional cosmetic surgery ***(Core et al., 1992).***

SURGICAL ANATOMY OF THE LOWER EYELIDS

Layers of the eye lid:

1. Skin
2. Protractors orbicularis oculi muscle
3. Tarsus and orbital septum
4. Conjunctiva

I. Surface topography/skin

The skin of the eyelid is considered the thinnest skin among the body. It is subjected to unusual amounts of stress and relaxation with each blink. Such movement predisposes the paraorbital skin to a number of natural and dynamic topographic landmarks (Fig. 1) ***(Kikkawa and Lemke, 1994).***

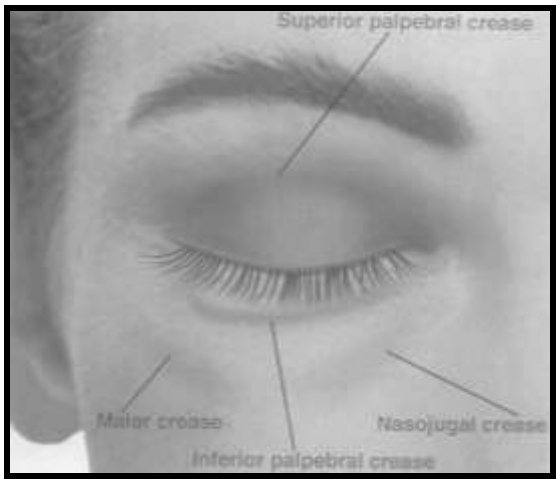

Figure (1): Eyelid topography ***(Kikkawa and Lemke, 1994).***

The lower lid displays three lines. The *inferior palpebral crease* is less noticeable than the superior palpebral crease and corresponds to the lower border of the lower tarsus. It courses from about 5 mm below the lower lid margin medially to about 7 mm laterally. The *nasojugal crease* is located below the medial aspect of the inferior palpebral crease and extends inferolaterally at 45 degrees. The *malar crease* originates lateral to and below the lateral canthus. It courses inferomedially until it meets the nasojugal crease 15 mm below the center of the lower eye lid margin ***(Kikkawa and Lemke, 1994).***

Langer lines (Fig. 2) are present in the upper and lower lids and the canthal areas. These natural static skin lines are formed by collagenous, reticular, and elastic fibers in the reticular layer of the dermis. Surgical incisions are made within these lines to enhance scar camouflage. *Gravitational lines* are formed with age by progressive thinning of relaxed skin. These lines are removed or softened following cosmetic blepharoplasty. *Dynamic lines* (Fig. 3), on the other hand, result from repetitious relaxation and contraction of paraorbital muscles ***(Robert et al., 2003)***.

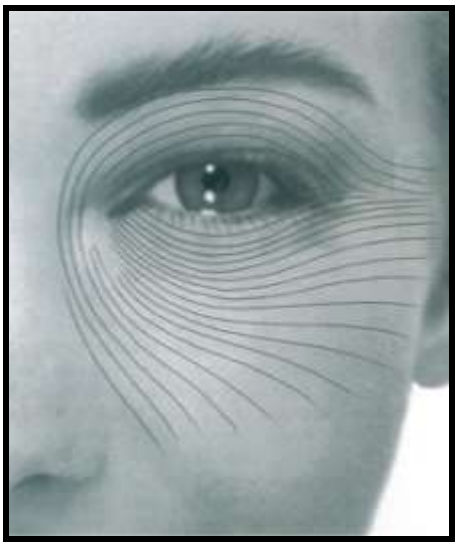

Figure (2): Langer lines. Scar Camouflage is enhanced when surgical incisions are placed within langer lines ***(Robert et al., 2003).***

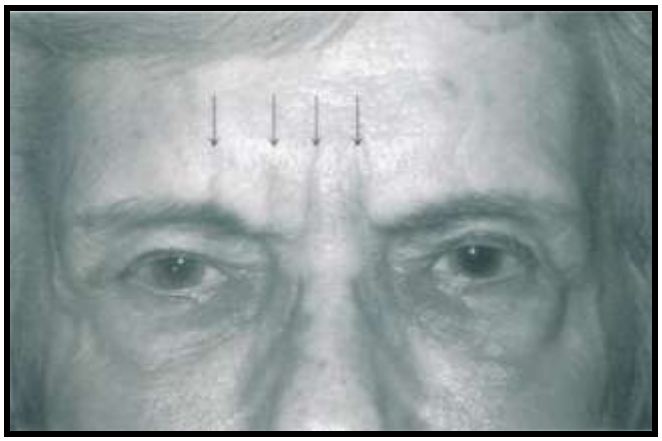

Figure (3): Dynamic lines. Repetitive action of the procerus and corrugator superciliaris muscles creates these glabellar frown lines (arrows) ***(Robert et al., 2003).***

II. Protractors (orbicularis oculi muscle)

The oribicularis oculi muscle is a thin sheet of concentrically arranged muscle fibers covering the eyelids and periorbital region (Fig. 4). It is horizontally oval,

corresponding to the palpebral opening. Contraction of the orbicularis oculi muscle results in the protraction or closure of the eyelid.

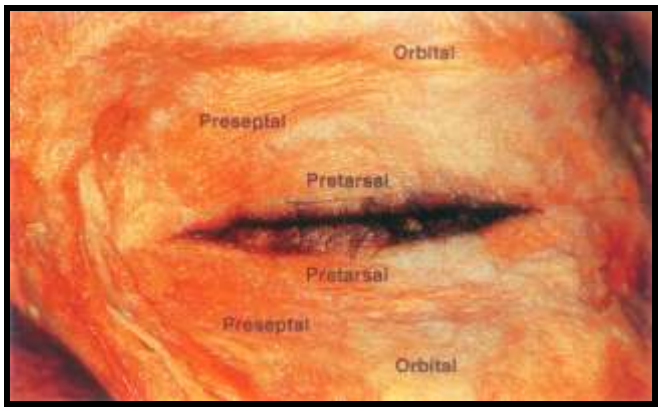

Figure (4): The orbicularis oculi muscle (cadaver dissection). It is arbitrarily divided into three regions: orbital, preseptal, and pretarsal ***(Jones, 1961).***

Lester Jones divided the orbicularis oculi muscle into three regions: orbital, preseptal, and pretarsal ***(Jones, 1961).***

SOOF and SMAS:

The suborbital orbicularis oculi fat (SOOF) is located immediately deep to the orbital portion of the orbicularis oculi muscle (Fig. 5). Its thickness varies from medial to lateral, being most prominent in the central and lateral portions.

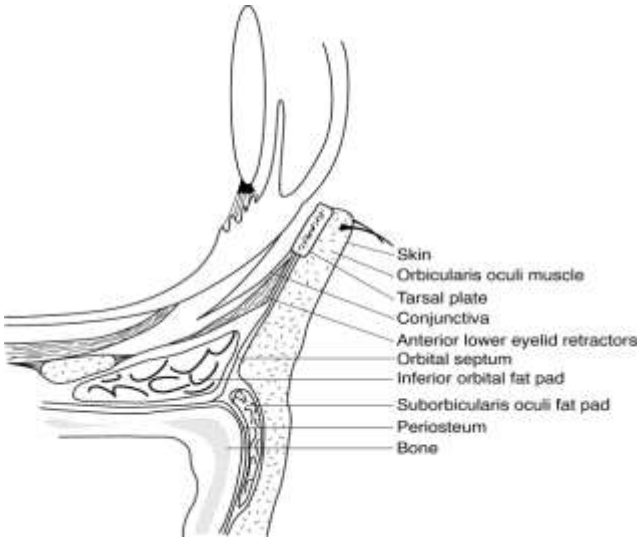

Figure (5): Cross section of a normal lower eyelid showing the location of the suborbicularis oculi fat (SOOF) ***(Norman and Gulian, 2007)***.

By grasping the SOOF at the level of the infraorbital rim, the entire cheek can be mobilized ***(Norman and Gulian, 2007)***.

The SOOF is analogous to the retro-orbicularis oculi fat (ROOF) located in the brow area, and is continuous with the superficial musculoaponeurotic system (SMAS). The SMAS is a discrete fascial layer that is an extension of the superficial cervical fascia. During the aging process, the forehead and ROOF ptosis contribute to fullness in the supraorbital region. Many surgeons sculpt this fat during routine upper eyelid blepharoplasty. Similarly, the inferior orbicularis muscle and SOOF become increasingly ptotic with age ***(Norman and Gulian, 2007)***.

III. The orbital septum of the lower eyelid

In the lower eyelid, the orbital septum (Fig. 6) arises from the inferior orbital rim as a condensation of the periosteum and the periorbita. It continues anteriorly and

superiorly to a point 4 to 5 mm below the inferior tarsus, where it joins with the lower eyelid retractors and, as a single structure, inserts on the lower border of the inferior tarsus. Medially, the orbital septum splits and is carried posteriorly by the pretarsal orbicularis muscle (Horner's muscle) and attaches to the posterior lacrimal crest. Laterally, the orbital septum also splits and is carried deep by the insertion of the orbicularis ***(Putterman and Urist, 1974).***

Clinically, the orbital septa of the upper and lower eyelids form an anatomic barrier between the preseptal and orbital structures. Infectious processes anterior to the orbital septa are considered more benign than those posterior to the septa ***(Robert et al., 2003).***

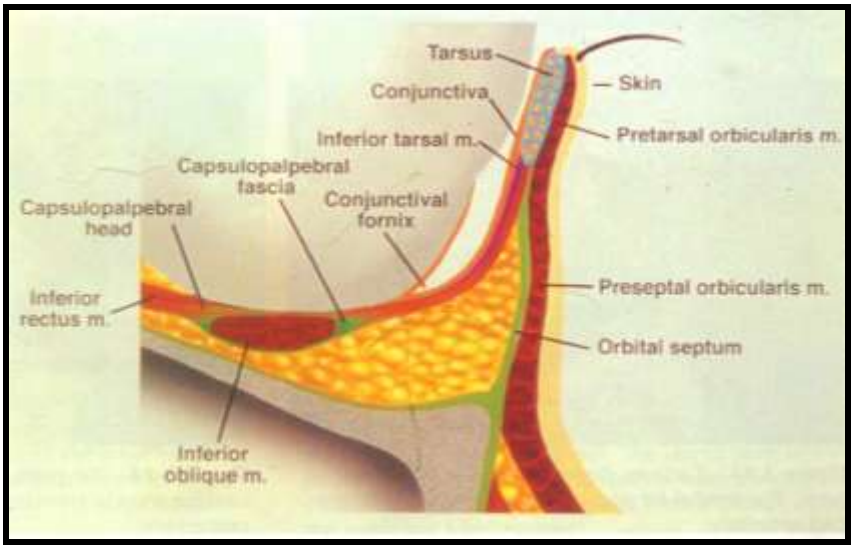

Figure (6): Cross section of the lower eyelid ***(Putterman and Urist, 1974).***