CHAPTER 1

Introduction and outline of this thesis
INTRODUCTION AND OUTLINE OF THIS THESIS

Introduction

Dermatochalasis is a common condition of skin redundancy of the upper eyelids hanging on or even beyond the eyelashes, mostly caused by aging. It is frequently combined with steatoblepharon, in which orbital fat bulges through a thinned orbital septum into the eyelids.\(^1\) Both conditions can easily be treated by upper blepharoplasty, one of the most commonly performed procedures by (oculo)plastic surgeons. In 2014 206,509 blepharoplasties were performed in the United States (Plastic Surgery Statistics Report 2014, American Society of Plastic Surgeons). While upper blepharoplasty can be considered a purely cosmetic procedure in many patients, the procedure is functional of nature as well and provides the solution for patients that suffer from dermatochalasis-related symptoms of heavy and tired eyelids, nagging headache and even loss of vision.

Clamps to strangulate redundant skin of the upper eyelids, as illustrated and described by George Bartisch in 1583, have been used for years to treat dermatochalasis.\(^2\) However, Avicenna (980 to 1037) performed the first recorded blepharoplasty already a millennium ago, excising excess skin of the upper eyelids.\(^3\) Although upper blepharoplasty has been performed for ages, traditional techniques still undergo changes, new techniques continue to develop and knowledge about potential complications and drawbacks of existing techniques is increasing.

At present, the upper blepharoplasty procedure starts with planning and marking of skin redundancy and the incision sites, which is carried out by many surgeons with the patient sitting upright with eyes in neutral gaze\(^3,5\). Planning with the patient in a supine position, after thorough evaluation and marking the extent of the lateral hooding with the patient in an upright sitting position, can be easy and accurate as well. In general, the lower aspect of the incision follows the upper lid crease (or, depending of the laxity of the eyelid skin, one to two mm below the upper lid crease as the scar tends to move superiorly over time), which is usually located approximately 8 to 12 mm above the lid margin at the midpupillary line.\(^1,4,7\) The
upper limit of excision should be at least 10 mm from the inferior border of the eyebrow\textsuperscript{1,3,4,6,7}, taking into account that eyebrow epilation is commonly performed by female patients which may obscure proper evaluation of eyebrow position. The amount of skin to be excised can easily be determined by the skin pinch test\textsuperscript{1,3-8}. Endpoint is that amount of skin that can be grasped by a forceps just before the upper lid margin everts\textsuperscript{1,5,8} with consideration of a minimum of 20 mm of residual vertical lid height to preserve normal eye closure\textsuperscript{4,5}. Elliptical, lenticular and trapezoidal shapes for excisions are advocated in literature, depending on the distribution of skin redundancy and surgeon preference\textsuperscript{3,5,6,9}.

Asymmetry in the upper eyelids is common and should be recognized preoperatively\textsuperscript{4-7,10} as well as dry eyes\textsuperscript{1,3-5,8,10,11} since these symptoms may worsen after upper blepharoplasty and directly correlate with postoperative complications\textsuperscript{4,8,10}. Preoperative evaluation of ptosis of the eyebrows\textsuperscript{1,3-5,7,8,10,11} and upper eyelids\textsuperscript{1,4,7,8,11} is also paramount in order to assess the need for an eyebrow lift or ptosis repair instead of, or in addition to, upper blepharoplasty.

Cleaning of the upper eyelid skin is carried out next, followed by injection of a local anesthetic solution. Lidocaine 1% or 2% with epinephrine 1:100,000 is one of the most frequently used anesthetics in upper blepharoplasty\textsuperscript{3-5,7,11}. An amount of circa 2-3 ml per eyelid should be injected superficially and slowly by a 27 to 30-gauge needle\textsuperscript{3-5,7,8,11}. Skin incisions can be made either with a no. 15 blade or the tip of monopolar cautery\textsuperscript{3-5,7,8,11}, or with use of a laser\textsuperscript{3,6,7,11}. Redundant skin is excised either with a combination of sharp and blunt dissection using appropriate scissors or the electrocautery unit\textsuperscript{1,3,5,7}. Whether or not to excise orbicularis oculi muscle, directly with or after the skin excision, is still lacking consensus\textsuperscript{12}. In general, there is a tendency to only excise a small rim of muscle; this also provides access to the orbital septum. Care should be taken not to damage the orbital septum by rigorous muscle excision. Meticulous hemostasis is important and should be achieved during every stage of the procedure\textsuperscript{1,3,5}.

Conservative orbital fat excision from the medial compartment can be performed as part of upper blepharoplasty\textsuperscript{1,3-5} as well as lateral canthopexy\textsuperscript{3}. Repositioning, instead of excision, of prolapsing medial and central fat pads by bipolar coagulation
of the orbital septum, is also propagated by some surgeons.\textsuperscript{13} In addition to the transcutaneous approach, some surgeons advocate a transconjunctival approach in upper blepharoplasty, which is especially an effective method for treating medial upper eyelid fat pads.\textsuperscript{14,15}

Various suture materials and techniques can be used for formation of the lid crease and skin closure. Commonly used sutures are 5-0 to 7-0 Vicryl, Prolene and Ethilon with stitching of the skin in a running subcuticular or interrupted transcutaneous fashion.\textsuperscript{1,3-5,7,8,16,17} Alternatively, cyanoacrylate glue has been used successfully for skin closure.\textsuperscript{4,17,18} Non-absorbable sutures should be removed after five to seven days.\textsuperscript{1,4,5,7,16}

Major and devastating complications after upper blepharoplasty are unusual and include retrobulbar or orbital hemorrhage with loss of vision or even blindness as a result.\textsuperscript{1,3,5,10,19-22} Some minor and often temporary complications are diplopia\textsuperscript{3-5,19-22}, dry eye syndrome or keratoconjunctivitis sicca\textsuperscript{5,10,20-23}, exposure kerathopathy\textsuperscript{1,10,21}, corneal abrasion\textsuperscript{5,21,22}, lagophthalmos\textsuperscript{3-5,10,19-23}, epiphora\textsuperscript{5,10,19-22}, conjunctival chemosis\textsuperscript{5,10,20-23}, blepharoptosis\textsuperscript{3,5,10,19-23}, lid crease asymmetry\textsuperscript{5,10,19-21}, wound dehiscence\textsuperscript{5,19}, visible or excessive scarring\textsuperscript{5,19-23}, hypoesthesias\textsuperscript{5}, suture abscesses, cysts or granulomas\textsuperscript{5,19,20,23}, ecchymosis or hematoma\textsuperscript{3,19-21,23} and (wound) infections\textsuperscript{3,5,10,20-23}.

Preoperative and postoperative care varies widely, usually depending on the experience and preference of the treating surgeon. Various methods have been recommended to improve recovery and outcome. An example is the perioperative use of Arnica montana, which is ought to limit postoperative edema, ecchymosis and to reduce pain.\textsuperscript{10,19} Ice packs on the surgical site during the first day(s) after surgery are also often advised in order to minimize postoperative swelling and ecchymosis.\textsuperscript{1,4,8,10,11,19-21,23} Avoidance of bending over and heavy lifting or straining for two weeks is another frequent request\textsuperscript{5,10}, as is sleeping with the head elevated\textsuperscript{10,19,21,23}. Patients with coexistent dry eyes usually are prescribed artificial tears to be applied while awake and lubricating ointment while asleep to prevent and alleviate exposure keratopathy in the direct postoperative period.\textsuperscript{1,3,20,22,23}
Furthermore, antibiotic ophthalmic ointment to the incision sites is a common recommendation.\textsuperscript{1,4,5,7,8}

Many of the aforementioned preoperative, peroperative or postoperative steps, actions and interventions in blepharoplasty surgery are based on the cumulative experience of surgeons and are taught as such to the next generation of surgeons. Surprisingly little scientific evidence is available to support the majority of the measures that both surgeons and patients consider to be contributing to a successful blepharoplasty procedure and postoperative outcome. This does not imply that these measures are ineffective or useless by definition. However, it does call for a critical appraisal and justifies studies to investigate uncertainties to further delineate the way that care for blepharoplasty patients should evolve.

\textbf{Aim of our studies}

With our investigations, compiled in this thesis, we have attempted to clarify some of the prevailing uncertainties and ambiguities in upper blepharoplasty care. First of all, we have addressed two technical aspects of the procedure: the use of an alternative anesthetic agent to reduce pain during injection (\textit{Chapter 2}) and a suture technique to reduce suture abscess formation (\textit{Chapter 3}). Two (potential) consequences of upper blepharoplasty are addressed next, namely the sensory disturbances (\textit{Chapter 4}) and the asymmetry (\textit{Chapter 5}) that can occur or aggravate after the blepharoplasty procedure. Last but not least, we have focused on to two widely applied rituals in upper blepharoplasty care and have investigated if postoperative cooling (\textit{Chapter 6}) or the use of arnica (\textit{Chapter 7}) reduces postoperative swelling, bruising and pain.
Outline of this thesis

Lidocaine with epinephrine is a widely used local anesthetic in upper blepharoplasty surgery. Since most patients experience considerable pain during infiltration of the upper eyelid skin with this anesthetic, it is worthwhile to find ways or alternatives to reduce patient discomfort. In the search for a less painful infiltration with an anesthetic agent and based on the findings from previous studies, we designed a comparison study between prilocaine with felypressin on one hand and lidocaine with epinephrine on the other. As such, the aim of this study (Chapter 2) was to investigate whether infiltration of the upper eyelid skin is less painful with the prilocaine mixture than with lidocaine mixture.

Inflammation associated with wound closure after an upper blepharoplasty procedure, which may include erythema, swelling, and suture abscess formation, is a minor postoperative complication that is commonly seen at the medial aspect of the incision site. Based on clinical observations, we hypothesized that postoperative medial wound inflammation and suture abscess formation could be controlled by a measure as simple as introducing the suture medially from within the wound instead of through intact skin. Therefore, the purpose of this study (Chapter 3) was to assess whether a modified suture technique in upper blepharoplasty may reduce the occurrence of suture abscess formation and focal inflammation.

Patients regularly notice a diminished sensibility of the upper eyelid skin after upper blepharoplasty. Although it is commonly assumed that this loss of sensibility will improve over time, the precise occurrence of disturbed sensibility, the nature and severity, and the duration and degree of recovery have not been well documented. Knowledge of these phenomena would benefit upper blepharoplasty patients in their preoperative and postoperative consultations. Therefore, the objective of this study (Chapter 4) was to investigate the pattern of changes in sensibility of the upper eyelid skin following upper blepharoplasty.

After upper blepharoplasty, patients sometimes notice asymmetry between their upper eyelids and/or position of eyebrow. It is well known that asymmetries are a common preoperative finding, yet most patients are not aware of it. Obviously,
addressing asymmetries at time of surgery is a crucial part of the procedure. Thus far, it is unknown if, and to what extent, asymmetry between eyebrows and upper eyelids is corrected or persists during upper blepharoplasty surgery. As such, we conducted a study (Chapter 5) to evaluate dermatochalasis, eyebrow position, and (a)symmetries in patients undergoing upper blepharoplasty.

One of the most commonly applied measures after upper blepharoplasty is cooling of the eyelids. Usually, cooling is initiated immediately after the procedure and it is recommended that cooling should be continued for the first 24 hours postoperatively to reduce pain and minimize edema, erythema, and hematoma of the eyelids. Interestingly, despite its widespread application, there is no scientific evidence that cooling of the eyelids after upper blepharoplasty does indeed reduce pain, edema, erythema, or hematoma. Moreover, some studies report that cooling of the eyelids with ice packs is a cause of unpleasant sensation in some patients. The aim of this study (Chapter 6) was to investigate whether cooling of the eyelids after upper blepharoplasty in the first 24 hours leads to a reduction of postoperative pain, edema, erythema, and hematoma.

Another ubiquitous advice from upper blepharoplasty surgeons on one hand or request from blepharoplasty patients on the other hand is the perioperative use of arnica, a mountain herb also known as Arnica montana. Although arnica has been traditionally used after traumatic injuries such as sprains and bruises, arnica also gained popularity as a preventive measure to reduce swelling and ecchymosis following elective surgical procedures. Previous studies have demonstrated that numbers of arnica users among upper blepharoplasty patients are high, despite a lack of evidence to support its treatment effect. Therefore, the purpose of this study (Chapter 7) was to investigate the efficacy of arnica ointment after upper blepharoplasty.
References


