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RESEARCH ARTICLE

BLEPHAROPLASTY WITH BLOODLESS ATRAUMATIC TECHNIQUE (BAT) REDUCING DOWNTIME, SIDE-EFFECTS AND COMPLICATIONS

Sergio Noviello MD,

FAACS, FWACS Andrea Maroni MD Massimiliano Tocchio MD Carlo Chirilli MD Tiziano Mirabello MD Gualtiero Cogliandro MD

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ABSTRACT

Introduction: The real explosion of blepharoplasty took place in the 20th century. In the 1960s, with the advent of the beauty and wellness culture, the procedure established itself as an effective solution for those wishing to combat the signs of time. However, blepharoplasty patients have always experienced a recovery and return to full normal activities within 15 days to several weeks, depending on the techniques, the instruments and processes used by surgeons and their staff. For more than ten decades, the norm for patients was prolonged recovery with bruising, swelling, discomfort and impaired vision.

Materials and Methods: The Milano BAT Blepharoplasty Study began in January 2015 and finished in January 2024. We performed a total of 580 blepharoplasties, 340 upper and 240 complete (lower and upper). The procedures were conducted with toil and commitment, in order to reduce the invasiveness, the trauma, and the recovery time. We used fundamental concept derived from biology and physics, video recording with multiple cameras, Ray-Ban Meta glasses and then documenting every action that took place during the procedure.

Results: Delivering Bloodless Atraumatic Technique blepharoplasty results need that surgeons study with attention, practice carefully, employ specific devices, implement all of the procedures and protocols that have been described and identified. Evidence shows undoubtedly that not adopting all of the identified protocols results in a failure to deliver this level of healing and reduction of complications and side effects. During many hours of video analysis, actions that were useless were eliminated and other movements refined or combined to make them more efficient and less traumatic.

Discussion: Materials and instruments were selected appositely and developed to facilitate surgeon visualization, to reduce mechanical and thermal trauma, and to better control the procedure. Surgical techniques were refined to dramatically reduce all kind of trauma to tissues, and to virtually eliminate bleeding and blood soaking into tissues, causing pain, swelling and inflammation and increasing risks of other complications like hematoma, chemosis, conjunctivitis, scleral show.

Conclusion: Bloodless Atraumatic Technique Blepharoplasty presents drastic improvements in recovery, complications, reoperation rates, and patient experience, but it is not possible without substantial commitment of the surgical staff and effort of the surgeon. This advanced level of patient experience requires that cosmetic surgeons learn all the entire method and follow the protocols and specific techniques.

INTRODUCTION

In the fascinating world of cosmetic surgery, few stories are as emblematic and compelling as that of blepharoplasty, the procedure that has transformed not only faces but also lives. This procedure, which today is synonymous with rejuvenation and freshness, has its roots in a past rich in innovation and discovery. The journey of blepharoplasty begins in antiquity. As early as 500 B.C., doctors in ancient Egypt practised rudimen-

*Corresponding author: **Sergio Noviello MD,**

FAACS, FWACS Andrea Maroni MD Massimiliano Tocchio MD Carlo Chirilli MD Tiziano Mirabello MD Gualtiero Cogliandro MD

tary techniques to improve the appearance of the eyes, using ointments and handcrafted instruments. But it was not until the Greco-Roman period that the beauty of the eyes was elevated to a new dimension. Philosophers and artists celebrated the gaze as a reflection of the soul, and doctors began to explore ways to restore the youthfulness and vitality of the eye contour. With the Renaissance, surgery evolved. Anatomical discoveries and surgical techniques were refined, and the concept of blepharoplasty began to take

shape. Doctors such as the famous Ambroise Paré, considered the father of modern surgery, lay the foundations for more complex and safer operations. The art of reshaping the eyelids became a coveted practice, not only for aesthetic reasons, but also to improve vision and quality of life¹.

The real explosion of blepharoplasty took place in the 20th century. In the 1960s, with the advent of the beauty and wellness culture, the procedure established itself as an effective solution for those wishing to combat the signs of time. Plastic surgeons begin to develop innovative techniques, minimising risks and maximising results. Blepharoplasty becomes accessible to an increasingly wide public, becoming a symbol of rebirth and renewal².

However, blepharoplasty patients have always experienced a recovery and return to full normal activities within 15 days to several weeks, depending on the techniques, the instruments and processes used by surgeons and their staff. For more than ten decades, the norm for patients was prolonged recovery with bruising, swelling, discomfort and impaired vision³.

In January 2024, We presented one trial, in one of the most prestigious professional congress in cosmetic medicine and surgery, the IMCAS (International Master Course on Ageing Skin) in Paris (France). The speech focused on a decade of work. We refined all of the protocols, processes, devices, instruments, materials and techniques of surgical blepharoplasty,

This lecture represented one validated methodology that enabled 94% of 580 consecutive patients to resume normal activities within 5 to 10 days of their blepharoplasty. Anticipating the comprehensible diffidence of surgeons who believed that BAT blepharoplasty was impossible, We invited the participants of the congress to personally visit and review all of the data of the trial, and talk with the patients subjected to surgery.

MATERIALS AND METHODS

Milan Bloodless Atraumatic Technique Blepharoplasty Study

The Milano BAT Blepharoplasty Study began in January 2015 and finished in January 2024. We performed a total of 580 blepharoplasties, 340 upper and 240 complete (lower and upper). The procedures were conducted with toil and commitment, in order to reduce the invasiveness, the trauma, and the recovery time⁴⁻⁵⁻⁶. We used fundamental concept derived from biology and physics, video recording with multiple cameras, Ray-Ban Meta glasses and then documenting every action that took place during a blepharoplasty. By analysing

hours of video recordings actions that were vain were eliminated and other movements refined to make them less traumatic. Devices and equipments were selected and developed in order to reduce mechanical and thermal trauma, to facilitate surgeon visualization, and to better control the intervention. Surgical techniques were refined to drastically reduce all kind of trauma to the eyelid delicate tissues, and to eliminate as much as possible blood soaking and bleeding, causing in the postoperative period pain, bruising, swelling, inflammation and increasing risks of other complications like hematoma, chemosis, conjunctivitis, scleral show⁷⁻⁸⁻⁹. We had already demonstrated that BAT blepharoplasty was predictable by applying specific protocols, implementing precise processes and surgical techniques. To date, reviewing all the international literature only few Authors have published equivalent procedures and healing processes in blepharoplasty. We have fully documented our cases and patients with high level of accountability and predictability¹⁰⁻¹¹⁻¹².

RESULTS

How to Achieve Bat Blepharoplasty

Delivering Bloodless Atraumatic Technique blepharoplasty results need that surgeons study with attention, practice carefully, employ specific devices, implement all of the procedures and protocols that have been described and identified¹³⁻¹⁴. Many surgeons implement part of the method, but prefer not to follow the complete process described. Evidence shows undoubtedly that not adopting all of the identified protocols results in a failure to deliver this level of healing and reduction of complications and side effects.

Patients

We provide complete detailed educational materials in order to guarantee the process. Patients have an important role in obtaining BAT blepharoplasty recovery. They must undoubtedly understand the entire technique, and what their responsibilities are. Thorough informations eliminate many normal patient uncertainties, and enables in comply with their preoperative and postoperative care instructions.

Surgeons

The surgeons have to cautiously analyse and control all the surgical theatre and operating room, and must operate in a hospital, clinic or facility where It is assured that They can expect to work with the same personnel. The surgical team including anesthesiologists, nurses and all recovery personnel, will strictly adopt precise protocols and processes¹⁵. Permanent training of the surgeons alone and with their personal staff is of paramount importance. BAT blepharoplasty results are achievable only if dedicated program of practice are implemented.

Eyelid analysis and clinical evaluation

Surgeons must be carefully objective when reviewing data and analysing eyelid structures and periorbital area¹⁶⁻¹⁷. Clinical evaluation has to be performed in the majority of the patients using objective assessment instead of subjective mea-



surements. Surgeons must abandon the use of simple adjectives like blepharoptosis, blepharocalasis, eye bags, or terms like loose skin, puffy eyelids to characterize each individual patients tissue characteristics; employing objective measurements, with a proved without bias and scientifically validated system, offers optimal cosmetic results and the lowest risks of complication, reoperation rate and uncorrectable deformities. The main characteristic of young eyelids is a uniform appearance extending from the eyebrow to the upper eyelid and from the lower eyelid to the cheek. The eyelid-cheek junction is located above the infraorbital rim and is usually 5 to 12 mm below the eyelid margin. The skin has a toned appearance and the tissues appear full but not swollen. There is always an upward tilt from the medial to the lateral canthus and the tarsus tone is normal: a snapback test results in a rapid recovery of the eyelid and the possibility of drawing the eyelid skin will be 6 mm or less. In contrast, the eye in the elderly patient appears hollow, with a clear demarcation defined from the eyebrow to the upper eyelid and from the lower eyelid to the cheek. In most patients, the palpebral fissure becomes smaller and rounder. The eyelid-cheek junction lies well below the infraorbital rim, 15-18 mm from the eyelid margin. The eyelid tone is significantly reduced, with a very slow result on the snapback test and a possibility of drawing the eyelid skin 6 mm or more. These age-related changes develop gradually over time, and are a combination of loss of volume, loss of skin elasticity and downward sloping of tissues (Fig. 1).



Fig.1 Eyelid - Young and old patient

Anesthesia protocols

BAT blepharoplasty healing process and recovery are related to strictly adherence to defined technique of local anesthesia, careful selection of devices and equipments developed to reduce mechanical trauma (i.e. cannulae instead of needles), innovative sedation and post-anesthesia recovery protocols that minimize the amount of medicine a patient receive¹⁸. The anesthesiologists have to agree to follow the BAT guidelines and the surgeons must be able to perform upper and lower blepharoplasty in less than 60 minutes of surgical time or less, eliminating useless, unproductive, time-wasting steps and decision making in the operating room. Local anesthetic injection with percutaneous blunt cannulae is likely one of the most important development in local anesthesia injection technique¹⁹. Fine 27 gauge cannulae (3 cm in length) introduced through skin perforation created by 25 gauge needles allow to infiltrate the

entire periorbital area and the eyelids through one or two needle holes in the upper and lower lid skin with the greatly added benefits of minimal pain and, more important, less bruising than in traditional surgery.



Fig. 2 Injection with blunt tipped cannula.

Surgical Staff and OR

The entire process is assured, as highlighted previously, by the possibility of operating with the same OR personnel, appropriately trained, and in the same facility, eliminating useless waste of precious time and reducing mistakes and complications. Each member of the surgical team has his own targeted role and specific movements. Regular training of the surgical staff itself, with the surgeons and with the anesthesiologists is also highly recommended. The protocols and processes have been carefully described and are forthcoming in scientific articles.

Surgical Techniques, Protocols and Equipments

Surgical techniques and instrumentations have been identified and refined in order to reduce all kind of trauma to periorbital tissues, and to virtually eliminate bleeding along the surgery and blood soaking into tissues, causing in the postoperative period pain, bruising, swelling, inflammation and increasing risks of other complications like hematoma, chemosis, conjunctivitis, scleral show.

Guided by the perfect anatomy knowledge and implementing detailed surgical procedures, equipment and devices it is possible to reach prospective hemostasis, i.e. coagulation of vessels that could eventually bleed after the surgery thus reducing significantly bruising. The surgeon has the possibility to perform skin and muscle removal and reducing fat pads if necessary, preventing over 95% of bleeding that would normally occur with traditional strategies (No Blood Technique). Radiofrequency electrosurgical systems, are the most common energy sources used for hemostasis and cutting in surgery. Unlike the low frequency, high temperature products that are used especially for general surgery, the high frequency, low temperature technology is optimized for applications where minimal collateral tissue damage is desired.

The 4.0 MHz generators, at a frequency 7-10 times higher than standard electrosurgical systems, provide controlled hemostasis and surgical precision. This evolved technology creates minimal lateral thermal diffusion, lowering the injury to surrounding periorbital tissue. The most important clinical benefits are improved healing, minimal scar tissue formation, and minimal if no post-operative pain, all desirable characteristics for advanced cosmetic surgery. By preventing bleeding in the periorbital tissues employing the 4.0 MHz generator and specifically designed electrocautery microforceps to remove the skin and the muscle, blood does not soak into adjacent tissues reducing drastically pain, inflammation, and increased rates of adherence, common events with traditional techniques. In a series of 580 blepharoplasties from 2015 to 2024, the incidence of hematoma has been 0 percent while the incidence of bruising has been 7 percent.

Surgical Planning

To fulfill the requirements of the Bloodless Atraumatic Technique, this procedure is always carried out under local anesthesia with mild sedation, in order to maintain blood pressure and heart rate regular. The patient is given by the anesthesiologist midazolam and propofol to achieve the correct sedation with the help of innovative electronic control pumps. The position, shape and size of the eyes must be determined precisely, preoperatively. Frequently than expected, there is a difference between the two sides.

Upper eyelids

The incision lines are always marked in two steps. The first marking is realized while the patient is still conscious. This is because the individual anatomy and physiology can only be assessed with the patient in a waking state and in standing position. We mark the upper resection boundary roughly following the blepharocalasis. This is demarcated by the boundary between the thicker facial skin cranially and the thinner skin of the upper lid. To obtain a better overview, ask the patient to open and close his or her eyes several times. The resection boundaries usually follow the anatomical lines of the upper eyelid. Most of the time, it can be observed that the right and left eyelids are asymmetrical. During the first marking procedure care should be taken to reproduce this asymmetry in order to be corrected later by adjusting the size of the resected area.

The second marking is realized while the patient is not conscious and in a supine position with the head moderately elevated. From a functional standpoint, the amount of skin remaining in upper lid blepharoplasty is more important than the amount that is excised. Markings are performed intraoperatively with a red fine marker and a caliper (Fig. 3).

Design of incisions in upper lid blepharoplasty consists of many different landmarks. Point A is marked 10 mm in women and 8 mm in men from the midpupillary line from the lid margin to the lid crease.



Fig. 3 Markings are performed with a red fine marker and a caliper

Points B and C are above the medial and lateral canthus in the natural sloping lid crease approximately 5 to 6 mm from the lid margin. Point D is used to determine the amount of upper skin to remove over the midpupillary line from the lid margin, most of the cases 10 mm from the eyebrow in women, 12 mm in men. Point E is used to determine the amount of lateral skin to remove over the lateral canthus, usually 12 to 15 mm. It is mandatory to leave at least 2 cm of skin from the inferior eyebrow cilia to the lid margin to allow for adequate lid closure postoperatively.

The incision in the upper eyelid region usually should have a curve slightly upward at the lateral edge and the lateral boundary often coincides with the tail of the eyebrow. This is to tighten the lax skin and prevent drooping postoperatively.

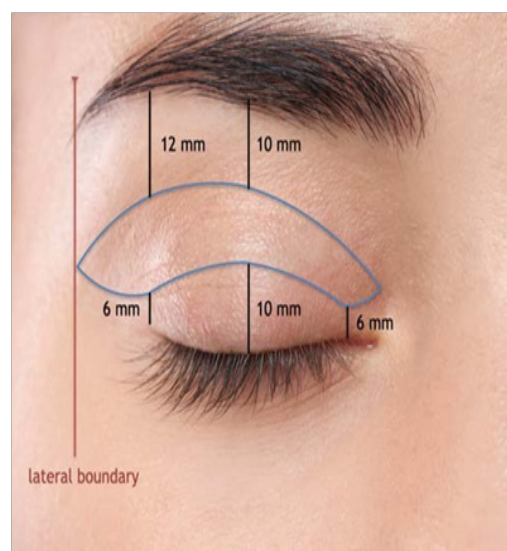


Fig. 4 Upper blepharoplasty markings are performed with calipers.

Lower eyelids

Even in this case the markings are performed in two steps. The first marking is realized while the patient is still conscious. Again this is because the individual anatomy and physiology can only be assessed with the patient in a waking state and in standing position. We mark the possible presence of orbital fat pads, medial, central and lateral. To obtain a better overview,

ask the patient to open and close his or her eyes several times and press gently the upper part of the globe in order to assess the bulging. Most of the time, it can be observed that the right and left fat pads are asymmetrical. During the first marking procedure care should be taken to reproduce this asymmetry in order to be corrected later by adjusting the amount of fat resection.

The second marking is realized while the patient is not conscious and in a supine position with the head moderately elevated. Markings are performed intraoperatively with a red fine marker and a caliper. Design of incisions in lower lid blepharoplasty consists of a series of points one or two millimetres away from the ciliary margin, starting at the level of the inner punctum and ending following the natural shape and crease of the palpebral skin usually 1 to 1.5 cm from the lateral canthus. This lateral boundary of the future incision, again, often coincides with the tail of the eyebrow. In the elderly patient, it is recommended to avoid incisions too close to the ciliary border.



Fig. 5 Lower blepharoplasty markings are performed with calipers.

DISINFECTION

Disinfect the face, the eyes and periorbital area with an antiseptic solution. We suggest Iodopovidone 5% (Oftasteril - Alfa Intes). Saturate a sterile gauze with the liquid and start preparing the eyelashes and eyelid margins. Repeat for the eyelids, cheeks and forehead in a circular fashion until the entire operating field is cleaned. Repeat three times. Wait two minutes, then remove the antiseptic from the ocular surface and the face by irrigating the entire area with sterile saline solution. Insert ophthalmological ointment into the conjunctival sac to protect the conjunctivae. The surgical area is now covered with sterile drapes.

Local Anesthesia

Starting laterally, slowly infiltrate the surgical area with a solution composed by Lidocaine 2% (30 ml), sterile saline (30ml), Epinephrine (0.5ml) and Tranexamic acid (1.5 ml). Use a 27-gauge cannula; keep the tip pointed upward to prevent injury to the eyeball. The thin palpebral skin can be easily detached in this manner. The solution diffuses toward the medial canthus of the eyelid. A single injection point per eyelid with 2.5/3

ml of solution will usually be sufficient. We hardly suggest to wait at least 15 to 25 minutes before starting the procedure in order to reach maximum pharmacological effect and to prevent bleeding and blood soaking in the periorbital tissue.

Upper Blepharoplasty Surgical Technique

Always follow a strict protocol, so consider to start every time with the right eye. The beginner should check the incision boundaries and reapply the incision markings. Care should be taken that the incision runs curvilinear parallel to the arch of the brow, which serves as a guideline for the new palpebral fold. An adequate amount of local anesthetic enables the skin on the upper eyelid to swell and tighten. This modality is of assistance to the surgeon making the incision with the scalpel with number 15 blade. The assisting surgeon now pulls the upper eyelid downward with his or her left hand while the surgeon pulls the skin upward until it is adequately taut with his or her left hand. The lower incision boundary is now under tension and an incision can easily be made from the medial to lateral canthus and beyond. Subsequently the upper incision boundary is put under tension, and an incision is made again from the medial to lateral canthus along the incision marking.

The assisting surgeon now gently pulls the two cut edges apart. Using delicate surgical micro-forceps, the surgeon pulls the lateral end of the strip of skin upward at a 90 degrees angle and dissects it with the radiofrequency electrocautery with needle Colorado tip moving medially. Since the palpebral skin has already been detached by the infiltration of the local anesthetic solution, it is not difficult to enter the correct tissue layer located directly above the muscle. After 1 cm of subcutaneous dissection, most of the time, we usually dissect under the orbicular oculi muscle and we remove simultaneously the same amount of skin and muscle. Careful hemostasis is now performed with an electrocoagulation micro-forceps over the orbital septum and along the border of the muscle in order to prevent bleeding

before it even occurs. Of paramount importance in the BAT the constant rinsing of the surgical field with saline water in order to eliminate blood traces and to reduce the local temperature after performing hemostasis, thus decreasing the possibility of long lasting edema and infections.

In upper blepharoplasty skin resection alone is frequently sufficient in order to achieve an harmonious result. In the presence of eyelid bulging the surgeon exerts moderate pressure on the globe with the index finger to assess the size and exact location of the medial and central fat deposits under the orbital septum. We suggest to never perform fat removal in the lateral part of the upper eyelid because of the danger of injuring the lacrimal gland. The assisting surgeon pulls the skin firm in the surgical area.



Fig. 6 Dissection with the radiofrequency electrocautery with needle Colorado tip

The surgeon now open the orbital septum medially with the radiofrequency electrocautery with fine needle Colorado tip and then dissects the excess fat; this can be squeezed out by applying light pressure. Hemostasis is again performed now and as soon as a little bleeding appears.



Fig. 7 Fat pads dissection with radiofrequency electrocautery with needle Colorado tip

Using the delicate surgical micro-forceps, the surgeon carefully extracts the fat pad and pulls it upward and out. A small amount of anesthetic solution is infiltrated. Scrupulous hemostasis of the fat pad is obtained. The base of the fat pad is grasped with a mosquito hook. With the bent mosquito hook left in place, the remainder of the excess fat is resected with the delicate radiofrequency electrocautery with fine needle Colorado tip.

With the mosquito hook still left in place, the edges of the incision are carefully coagulated. This is to prevent the fat pad from whipping back and possibly causing retrobulbar bleeding.

The same procedure is followed to remove the central fat pad fat, if presents. We highlight again the paramount importance of the constant rinsing of the surgical field with saline water in order to eliminate blood traces and to reduce the local temperature after performing hemostasis.



Fig. 8 Fat pad resection with the delicate radiofrequency electrocautery with fine needle Colorado tip

The wound is closed, without tension, with simple interrupted cutaneous sutures. A fine needle and 6/0 Ethilon suture material are used. Wound closure starts with two stitches one third from the lateral margin and one third from the medial margin. These are followed by simple interrupted sutures, half the distance. The wound edges should be slightly everted; care should be taken not to suture any subcutaneous tissue. The surgeon now checks whether the eyelid slit is about 2 – 3 mm open (the reduced strength of the orbicularis oculi muscle due to the anesthetic infiltration create this effect) and whether the stitches lie exactly in the palpebral fold. After the same procedure has been performed on the contralateral eye, the symmetry of both eyelids should be checked another time. No medication is needed on the wound except the application of gauzes soaked with fresh saline water.

Postoperative Treatment and Precautions

The patient can leave the clinic at least 3 hours after the procedure. Sport and strenuous activities should be avoided postoperatively for a couple of weeks. The ideal position for sleeping during the first postoperative week is on the back, with the upper body elevated. To protect the surgical wound and the conjunctivae, the patient should wear sunglasses for several days. An antibiotic treatment per os should be given for three days (Azitromicin 500 mg). Antibiotic eyedrops

should be continued for 3 to 5 days postoperatively (Tobramycin 0.3%) while Hyaluronic acid eyedrops for 14 days. During the first 48 hours, the wound should be intermittently cooled with the application of gauzes soaked with fresh saline water. The sutures can generally be removed 7 days after the surgical procedure.



Fig. 9 Simple interrupted cutaneous sutures

After one month patients should massage a scar-preventing cream (Same Plast gel) onto the skin of the eyelids. To prevent relevant inflammation and the tendency toward swelling, hydrocortisone per os (Betametasone 1 mg) and a mild diuretic (Torasemid 10 mg) should be given for one week.

Lower Blepharoplasty Surgical Technique

Lower lid blepharoplasty is one of the most challenging operations in the facial area. To prevent scleral show, eyelid eversion, or ectropion care must be exercised not to remove too much tissue. The two most important aspects to take in consideration during lower eyelid blepharoplasty are the formation of a strong flap (musculocutaneous) and the moderate removal of fat.

The incision is about 1 – 2 mm below the eyelashes margin. Start at the level of the medial canthus (punctum) and continue laterally to form a natural crow’s foot pattern. Avoid exceeding the lateral margin of the eyebrow, which constitutes the lateral margin of the incision. Like the skin of the upper eyelid, the skin of the lower eyelid is substantially thinner than the adjacent facial skin. Thus the boundaries of the planned undermining are easily determined.

Always follow a strict protocol, so consider to start every time with the right eye. The beginner should check the incision boundaries and reapply the incision markings. With a delicate scalpel and number 15 blade a superficial careful skin incision is performed at the lateral end of the marking starting from the

lateral canthus. The assisting surgeon now gently pulls the skin of the lower eyelid in a downward direction while the surgeon tightens the skin laterally and cranially. The incision is now continued in a medial direction parallel to the eyelid margin with a delicate small straight scissor toward the lacrimal punctum. We underline again that the distance between the incision and the eyelid margin line must be 1 to 2 mm.

To obtain an optimal view of the surgical area, the surgeon places in the midline a nylon 6-0 holding suture through the upper incision edge passing through the tarsus; this suture is then fastened to the head drape under tension with a mosquito hook.

Meanwhile, the assisting surgeon continues to smooth the skin of the lower eyelid gently downward until it is firm. The surgeon now dissects the flap consisting of the eyelid skin and the orbicularis oculi muscle along the markings with the delicate radiofrequency electrocautery with fine Colorado needle tip. Be aware to leave at least 4-5 mm of orbicularis oculi muscle intact in order to preserve the strength of the lid margin. Of paramount importance the constant rinsing of the surgical field with saline water in order to eliminate blood traces and to reduce the local temperature even after performing hemostasis.



Fig. 10 Dissection of the flap with radiofrequency electrocautery with fine needle Colorado tip

The fat pads located under the orbital septum are exposed. If the surgeon is in the correct layer, this dissection proceeds with no loss of blood. The musculocutaneous flap is detached up to the infraorbital margin, which can be easily palpated. The more extensive the dissection, the greater the involvement of the lymphatic vessels in the periorbital region, which results in greater swelling in the postoperative period, also in terms of duration.

The assisting surgeon places an isolated Desmarres eyelid retractor on the musculocutaneous flap in order to keep the edges of the area to be dissected far apart. The surgeon can now assess and expose the medial, central, and lateral fat pads, which

are the real cause of the “baggy” eyelids, by dissecting them with the assistance of the radiofrequency electrocautery with fine needle Colorado tip.



Fig. 11 Isolation of fat pads with radiofrequency electrocautery with fine needle Colorado tip

The surgeon first removes the medial fat deposits. The assisting surgeon pulls the skin firm in the surgical area. The surgeon now open the orbital septum medially with the radiofrequency electrocautery with fine needle Colorado tip and then dissects the excess fat; this can be squeezed out by applying light pressure. Hemostasis is again performed now and as soon as a little bleeding appears. Using the delicate surgical micro-forceps, the surgeon carefully extracts the fat pad and pulls it upward and out. A small amount of anesthetic solution is infiltrated. Scrupulous hemostasis of the fat pad is obtained. The base of the fat pad is grasped with a mosquito hook. With the bent mosquito hook left in place, the remainder of the excess fat is resected with the delicate radiofrequency electrocautery with fine needle Colorado tip. (With the mosquito hook still left in place, the edges of the incision are carefully coagulated. This is to prevent the fat pad from whipping back and possibly causing retrobulbar bleeding. We highlight again the paramount importance of the constant rinsing of the surgical field with saline water in order to eliminate blood traces and to reduce the local temperature after performing hemostasis.

The same procedure is followed to remove the central and lateral fat pads, if present. Finally, the surgeon exerts slight pressure on the eye globe to assess that the fat has been homogeneously removed.

If hypertrophy of the ciliary margin or an excess of the orbicularis oculi muscle is present, it is possible to remove a limited portion of this muscle. Using the delicate surgical Adson micro-forceps, the surgeon now grasps the cranial margin of the orbicularis oculi muscle located beneath the lower edge of the cutaneous incision and resects with a delicate straight

scissor a 3–5 mm wide muscular strip. Careful hemostasis is mandatory in order to prevent bleeding in the postoperative period. At the same time, this maneuver paves the way for the cutaneous resection by preventing unevenness and thickening on the incision surface.

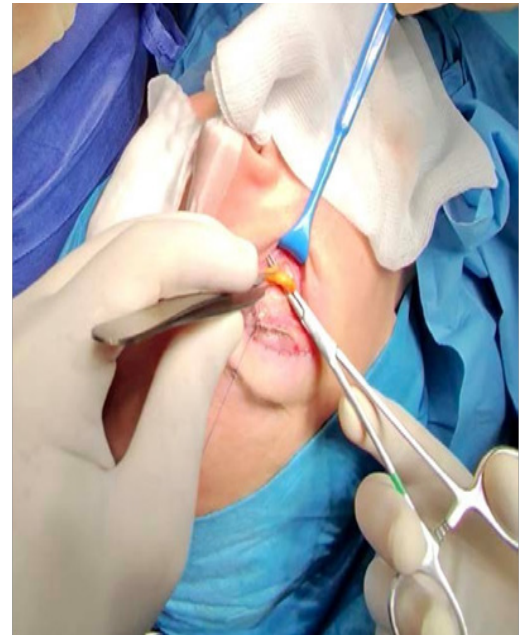


Fig. 12 Fat pad resection with the delicate radiofrequency electrocautery with fine needle Colorado tip

Removal of skin from the lower eyelid is sometime not necessary. The holding suture with Nylon 6-0 is now removed and the excess skin in the lower eyelid is pressed out cranially and smoothed with a gentle maneuver. It is of paramount importance to ensure that only the skin which can be laid down over the eye globe without any tension should be resected. Tension is to be completely avoided. The surgeon, with the help of an assistant, marks the resection margins with a gentle fine tip marker, overlapping the free eyelid skin edge with the incision line and marking this incision line on the surface skin. Before skin removal thorough hemostasis is mandatory for the BAT in order to prevent bleeding from the incisional edges. The surgeon now grasps the skin on the lateral corner of the eyelid, at the level of the lateral canthus, with the small Adson micro-forceps and exerting mild tension resects the excess skin parallel to the lower eyelid along the markings toward the punctum. Then skin resection is carried from the lateral canthus out in the lateral periorcular angle in a crow's foot pattern. (Fig. 5.36)

In general, canthal sutures are not always necessary. These maneuvers are made only in cases with very thick skin and pronounced lower eyelid drooping. A small part of the muscle is attached to the periosteum of the lateral bony orbital margin with a 6/0 PDS suture to relieve the tension on the overlying eyelid skin. We strongly suggest to avoid multifilament resorbable sutures like polyglactin (Vycril Ethicon) in order to prevent inflammatory response.

Before palpebral cutaneous sutures are made, a small amount of fibrin adhesive could be distributed in the wound to prevent again bruising and swelling. The skin flap is then adequately modeled over the edges of the incision without any tension.

Suturing of the eyelid skin starts at mid pupillary line, with simple interrupted 6-0 Nylon sutures, toward the lateral incisional ocular extremity. After the same procedure has been performed on the contralateral eye, the symmetry of both eyelids should be checked another time. No medication is needed on the wound except the application of gauzes soaked with fresh saline water.

Postoperative Treatment and Precautions

The patient can leave the clinic at least 3 hours after the procedure. Sport and strenuous activities should be avoided postoperatively for a couple of weeks. The ideal position for sleeping during the first postoperative week is on the back, with the upper body elevated. To protect the surgical wound and the conjunctivae, the patient should wear sunglasses for several days. An antibiotic treatment per os should be given for three days (Azitromicin 500 mg). Antibiotic eyedrops should be continued for 3 to 5 days postoperatively (Tobramicin 0.3%) while Hyaluronic acid eyedrops for 14 days. During the first 48 hours, the wound should be intermittently cooled with the application of gauzes soaked with fresh saline water. The sutures can generally be removed 7 days after the surgical procedure. After one month patients should massage a scar-preventing cream (Same Plast gel) onto the skin of the eyelids. To prevent relevant inflammation and

the tendency toward swelling, hydrocortisone per os (Betametason 1 mg) and a mild diuretic (Torasemid 10 mg) should be given for one week.

Lower blepharoplasty is followed by a little bit longer recovery period than upper eyelid surgery. Mild swelling and light bruising can persist for up to 10 14 days. We advocate lymph drainage in order to solve the swelling more quickly. After the sutures have been removed, any bruises can be covered with camouflage makeup.

DISCUSSION

Redefined surgical techniques, devices and equipments determines radical reduction of thermal and mechanical trauma to periorbital and eyelid tissues together with minimal if no postoperative pain and swelling (No Touch Technique). Selected surgical instruments allows surgeons to obtain optimal anatomical visualization while minimizing trauma to tissues, and to remove skin, muscle, and fat pads excess with much less trauma compared to blunt or sharp cutting and dissection used by many surgeons that rip and tear skin and muscular tissue with a finger, an instrument, a lancet or a scissor and cause much more bleeding.

All kind of trauma, bleeding and blood soaking into tissues, causing pain, swelling and inflammation could increase the risk of bruising and long term edema. Implementing itemized surgical methods and instrumentations, as realized in BAT, allow to reach a prospective hemostasis, it means the surgeon has the possibility to realize the surgical procedure while preventing bleeding before it ever occurs (No Blood Technique). Another contributing factor may be the time spent intraoperatively on hemostasis, longer in the Bloodless Atraumatic Technique than in Traditional Blepharoplasty. As We have high-

lighted before while it may seem obvious, the greater the diligence in intraoperative hemostasis, the lower the postoperative bruising, swelling and hematoma rate. Bloodless Atraumatic Technique blepharoplasty offers also objective improvements in complications, reoperation rates, recovery and the overall patient experience, but do not happen in a predictable manner without substantial commitment of the surgical staff and effort primarily of the surgeon.



Fig. 13 Immediate postoperative result before BAT implementation



Fig. 14 Immediate postoperative result before BAT implementation

Precise protocols have been identified for patient recovery both in the surgery facility and after returning home. The optimal reduction in tissue trauma and bleeding implementing the processes, the techniques and the instruments described, results in decrease in bruising, swelling, discomfort and side effects, and return to normal activities within 7 to 10 days. Patients do not have to tolerate the inconvenience of many commonly used devices like plasters and dressing or rigid instructions to remain immobile and restrict activities²⁰.



Fig.15 Immediate postoperative result after BAT implementation



Fig. 18 Immediate postoperative result after BAT implementation



Fig.16 Immediate postoperative result after BAT implementation



Fig. 19 Immediate postoperative result after BAT implementation



Fig. 17 Immediate postoperative result after BAT implementation



Fig. 20 Immediate postoperative result after BAT implementation

CONCLUSIONS

Bloodless Atraumatic Technique Blepharoplasty presents drastic improvements in recovery, complications, reoperation rates, and patient experience, but it is not possible without substantial commitment of the surgical staff and effort of the surgeon. This advanced level of patient experience requires that cosmetic surgeons learn all the entire method and follow the protocols and specific techniques. We underline that only regular and update program of training with the surgical staff enables BAT

blepharoplasty results. We highlight that BAT processes have been extensively and scrupulously described in many scientific papers. In conclusion, we could not offer in all the patients the same high standard of surgical experience and recovery, due to unexpected complications, but over the last ten years since we identified the techniques for BAT blepharoplasty, over 95% of our patients in a predictable manner had such an innovative and unique experience.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

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