Supplemental Digital Content 2

Detailed technique for fat grafting in the hollow upper eyelids and the volumetric upper blepharoplasty (VUB):

Anesthesia use depends on the magnitude of complementary procedures. VUB alone is well tolerated by patients under local anesthesia with the addition of 7.5 mg Midazolam orally 30 minutes before surgery.

With a 27 G needle, local anesthesia is first injected in the supraorbital notch near the bundle, producing some mild hydro dissection and providing an easy passage for the cannula later. With the same needle, two intradermal bubbles are made, one in the head of the eyebrow and another lateral to the orbital rim. There, the inner and lateral access points are made using an 18 G needle, entering just 2 mm in the direction planned for the cannula, sharp edge facing horizontally and up.

The retro orbicularis space is slightly infiltrated with the anesthetic solution using the same cannula as used for the fat graft later, through the lateral access point, with 1 cc at most (See Video 1, Supplemental Digital Content 3, which demonstrates the anesthetic solution infiltration though the lateral access, http://links.lww.com/PRS/C393). Although swelling can alter the perception of volume obtained with the fat graft later, this grants some hemostasis control besides the anesthesia. The donor site of the graft is then infiltrated, allowing more time for reabsorption in the eyelids.

Some reports describe the inner knee zone as the ideal donor site for harvest, with a higher graft take rate.2,7 In our experience, this zone usually is less tolerated by the patient under sedation or local anesthesia and can produce interrupted pain episodes in the long term in patients with venous congestion history. Thus, hypogastrium is preferred; it is easier to harvest larger volumes when other facial areas are planned for grafting. This area is well tolerated even under local anesthesia.
Harvest is done with a multi-perforated 15 cm long, 2.5 mm wide cannula, with 1 mm sharp holes and gentle manual aspiration with a 30 cc or 50 cc syringe. Refinement of the graft is accomplished by rinsing with saline solution on a 250-micron nylon cloth. After washing away the oil and debris, the graft is placed in a 10 cc syringe. With the help of a Luer-to-Luer connector, the harvest is transferred 1 or 2 times in a vertical position from one syringe to another, obtaining a homogeneous preparation and one easily detachable air compartment on the top.

Returning to the eyelids, all grafting is performed with a 0.9 mm blunt cannula, with one lateral hole, using 1 cc Luer-lock syringes and injecting in retrograde motion. The first step aims to “build down” the orbital rim. This means starting to graft in the deeper plane and, depending on the amount of “hollowness” extension, grafting will comprehend only the inner aspect (as A-frame deformities) or the complete concave supraorbital rim. This placement is made only through the lateral access point. The cannula is advanced by bimanual maneuvers, palping when the tip reaches the medial limit and then injecting backwards. This is repeated until two or three traces are made (See Video 2, Supplemental Digital Content 4, which demonstrates deep layer fat grafting through lateral access, http://links.lww.com/PRS/C394). Although the volume depletion extends deep beyond the orbital rim, grafting should not shift too deep, to avoid damage to the septum.

The second step consists of grafting the more superficial and larger area, again by retrograde infiltration, in a fan-like pattern, through the lateral access and then through the inner access. The graft must be deposited just below the orbicularis oculi muscle. Using bimanual maneuvers, tension of the eyelid and eyebrow should be maintained during the cannula passage, providing clear distribution on the extended area. The cannula tip can be visualized and its passage should always be gentle. In fact, if no previous misdirected hydro dissection was performed over the muscle, it is very difficult to mistake the position of the cannula (See Videos 3 & 4 Supplemental Digital Content 5, http://links.lww.com/PRS/C395 & Supplemental Digital Content 6, http://links.lww.com/PRS/C396; which demonstrate superficial layer fat grafting through lateral & Video 5, Supplemental Digital Content 7 which demonstrate superficial layer fat grafting through medial accesses, http://links.lww.com/PRS/C397).
As we move cranially with the cannula, we are entering in a more superficial plane for grafting, corresponding to the subcutaneous fat compartment of the eyebrow. Although we are grafting in a different layer, we consider this as part of the second step because the transition between zones is practically unnoticed. This zone includes 0.5 to 1 cc of fat deposited below the tail of the brow for lifting effect and care should be taken to extend the grafting laterally for blending in cases of hollow temples.

To achieve the volumetric upper blepharoplasty, the final step is to resect the skin over the orbicularis muscle, following the preoperative marks. At this point it is possible to inject some anesthetic solution with a 27 G needle before incising, to create an adequate cleavage plane by hydro dissection and to easily spare the muscle. Care should be taken to repeat the pinch test before, checking the closed eyelid tension (See Video 6, Supplemental Digital Content 8, which demonstrates the pinch test repeated before incising the skin, proving no eversion of the eyelashes despite the volume obtained by the graft, http://links.lww.com/PRS/C398). After finishing the skin resection, the muscle is observed intact without any fat over it. At this moment, fat bag herniation can be addressed by simple resection through a minimal hole in the orbicularis or with a 6.0 vicryl stich imbricating the muscle.

Next, a monopolar cautery line is done on the muscle, above the lower wound edge, to enhance the low position of the supratarsal crease and smooth the pretarsal soft tissue surface (See Video 7, Supplemental Digital Content 9, which demonstrates monopolar cautery applied on the muscle, above the lower wound edge, http://links.lww.com/PRS/C399). Closure of the skin with a 5.0 nylon continuous intradermal suture and some final interrupted 6.0 nylon stitches at the lateral end for compensation accomplish the volumetric muscle plicature.

Postoperative care is similar to other traditional blepharoplasties. Night ointment, eye drops, and cooling dressing can be used. In patients with history of periocular edema or swelling, we indicate Arnica for three weeks after surgery but not before, because we feel that this could increase the intraoperative bleeding.