Small-Incision Techniques in Ophthalmic Plastic Surgery

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ABSTRACT
A stepped surgical incision, in which an initial small cutaneous incision is followed by progressively longer incisions in the subcutaneous tissues, limits postoperative scar formation in the skin. Placement of incisions parallel to relaxed skin-tension lines further reduces the size of the scar. We describe how these principles may be applied to ophthalmic plastic surgical procedures to improve cosmesis. Autogenous fascia lata can be harvested with scissors through a 15-mm incision parallel to relaxed skin-tension lines, placed over the middle of the iliotibial tract. Lacrimal bypass operations can be performed well and with good cosmesis through a 12 to 15-mm skin wound if the above principles are followed.

Objectives of oculoplastic surgical procedures include preservation of visual and ocular adnexal function and provision of an optimal cosmetic result. Achievement of the latter goal is facilitated by careful surgical technique, with particular attention to postoperative scar formation. Several principles governing the "ideal" method of surgical incision are useful in this regard:

- incision placement in areas of thin skin,
- incision placement in areas of relatively low skin tension,
- incision placement within or parallel to lines of relaxed skin tension and/or perpendicular to the direction of muscular contraction, and
- limitation of incision length.

We describe modified techniques of obtaining fascia lata and of incision placement in lacrimal bypass procedures which minimize the length and prominence of surgical scars in these procedures. Both techniques are based on the principle of the stepped surgical incision, in which a small skin incision is made initially, followed by successively larger relaxing incisions in the subcutaneous tissues (Fig 1). These relaxing incisions allow movement of the skin opening as needed to provide adequate visualization of deeper structures during each step of the surgical procedure.

MODIFIED DACRYOCYSTORHINOSTOMY INCISION
Quickert described a cutaneous incision for dacryocystorhinostomy (DCR) beginning 11 to 12 mm medial to the medial commissure, extending linearly for 20 mm inferolaterally toward the lateral edge of the ala nasa. Callahan prefers a slightly curved incision, 20 to 25 mm long, located in a skin fold. The planning of an incision in the periorbital area is facilitated by study of the relaxed skin-tension lines in this area (Fig 2); we prefer an incision 12 to 15 mm long, located in the thin skin of the lower eyelid at the junction of the lower eyelid skin and the thicker skin of the nose (Fig 3A). Local anesthetic containing epinephrine is injected in the medial canthal region and in the vicinity of the lacrimal sac to promote hemostasis. An attempt is made to identify the...
angular vessels prior to incision, and damage to these vessels can usually be avoided.

The incision begins just above the level of the medial commissure and is directed inferolaterally in a linear fashion toward the lateral ala nasae to minimize the subsequent formation of bowstring scars. The skin incision is made with a #15 blade, held perpendicular to the nose to decrease the chance of damaging the angular vessels, and the edges of the wound are elevated with forceps. The subcutaneous muscle is then buttonholed with sharp scissors, taking care to identify and avoid the angular vessels, and the submuscular space is opened with blunt dissection with scissors.

The muscular layer is then incised sharply with scissors parallel to the direction of the skin incision. Incision of the muscular layer is then continued superiorly and inferiorly for a distance of 5 to 10 mm beyond the superior and inferior ends of the skin incision; these cuts serve as relaxing incisions, allowing stretching of the skin incision and effectively enlarging the surgical wound. Dissection is carried posteriorly to the periosteum of the frontal process of the maxilla (anterior lacrimal crest). The periosteum
is incised with a #15 blade and is reflected anteriorly and posteriorly with a Freer periosteal elevator, with lateral mobilization of the lacrimal sac in its fascia from the lacrimal fossa.

Four double-armed traction sutures of 4-0 silk are placed as demonstrated in Figure 3B. The two traction sutures on the lateral side of the wound are passed through the periosteum just anterior to the lacrimal sac. The two sutures on the medial side of the wound incorporate the elevated medial edge of the periosteum and the muscular layer as well. In order to minimize trauma to the skin edges, no skin is included in these traction sutures. The use of traction sutures instead of the somewhat more bulky self-retaining lacrimal speculum preferred by some surgeons facilitates surgery through a small incision. The remainder of the procedure is then performed according to the preference of the surgeon.

We have used this small-incision technique in 20 lacrimal bypass procedures over the past 15 months and found that it affords excellent visualization. Rare complications attributable to the limited surgical incision include only minor inadvertent tearing and laceration of the edges of the skin incision. These complications have not compromised a good, final, cosmetic result.

**MODIFIED TECHNIQUE FOR OBTAINING FASCIA LATA**

Autogenous fascia lata is employed in several ophthalmic plastic procedures, including frontalis suspension, socket reconstruction, and operations for the management of facial nerve paralysis and its complications. One common method of obtaining fascia lata entails creation of an incision 7 to 8 cm long, approximately 5 to 6 cm above the knee, along a line joining the anterior superior iliac spine and the head of the fibula. Fascia lata is then obtained using a special instrument, the fascia lata stripper.

We have developed a technique for obtaining fascia lata through a smaller incision, using only instruments that are readily available in a general surgical set.

**Review of Anatomy**

The fascia lata (deep fascia of the thigh) is continuous distally with the fasciae of the leg and proximally with the external abdominal and thoracolumbar fasciae through attachments at the inguinal ligament, crest of the ilium, the sacrotuberous ligament, the ischium, the pubic arch, and the anterior surface of the pubis and the pubic tubercle. The fascia lata demonstrates considerable variations in thickness; on the medial side of the thigh it may be quite thin, while laterally it condenses to form a band of coarse tendinous fibers extending from the tubercle of the iliac crest to the lateral condyle of the tibia, known as the iliobibial tract (Fig 4). The iliobibial tract receives tendinous insertions of the gluteus maximus and tensor fasciae latae, and may be viewed as the
FIGURE 3B: The traction sutures incorporate muscle (M) and periosteum (P) but do not pass through skin (S). (B, bone)

FIGURE 4: Anatomy of the lower extremity and fascia lata (FL).
conjoint aponeurosis of these muscles. The contractile force generated by the gluteus maximus and the tensor fasciae latae lies largely in a vector directed supero-inferiorly along the iliotibial tract. The iliotibial tract constitutes the most substantial portion of the fascia lata and is the source of fascia lata preferred in oculoplastic surgical procedures.

**Surgical Technique**

The incision is 15 mm long, located along an imaginary line midway between the anterior superior iliac spine and the head of the fibula. The incision is placed over the middle of the iliotibial tract and is oriented transversely as shown in Figure 5, perpendicular to the direction of contraction of the tensor fasciae latae and gluteus maximus muscles, which insert into the iliotibial tract, and parallel to the relaxed skin-tension lines. Such an orientation of the wound, limits the development of postoperative scarring, as noted above. Relaxing incisions are then made for a distance of 10 mm in the subcutaneous tissues at each end of the skin incision, effectively enlarging the surgical wound, as noted in the discussion of small-incision lacrimal surgery. Relaxing incisions may also be made in the subcutaneous tissues at the midpoint of the skin incision perpendicular to the skin incision to facilitate subsequent dissection.

The assistant then elevates the superior and inferior edges of the incision alternately with a fine rake retractor, while the surgeon introduces small Metzenbaum scissors in the space directly external to the iliotibial tract. The thin layers of connective tissue external to the iliotibial tract are then incised, and the surgeon bluntly separates overlying soft tissues from the iliotibial tract superiorly toward the anterior superior iliac spine and inferiorly toward the fibular head (Fig 6A). The appropriate anatomic landmark may be palpated with the surgeon's other hand for guidance during this maneuver. This blunt dissection is performed for a distance generally equivalent to the length of the blades of the scissors (approximately 12 to 15 cm) in each direction.

Following the separation of soft tissues from the iliotibial tract, the assistant elevates the superior edge of the wound, and the surgeon, using a #15 scalpel blade, creates an incision 10 to 12 mm long in the iliotibial tract, approximately 1 cm posterior to the tract's anterior edge, along a line connecting the anterior superior iliac spine and the head of the fibula. Under direct visualization the surgeon then places one blade of the scissors through the incision, as shown in Figure 6B. The concave side of the scissors is directed away from the strip of fascia lata to be harvested, as depicted. The scissors are then partially closed to facilitate the passage of the instrument superiorly, and the scissors are moved in a sliding motion toward the anterior superior iliac spine. The iliotibial tract generally separates easily during this maneuver, and actual cutting motions with the scissors are usually unnecessary.

This sharp dissection is continued upward as far as possible (generally for the length of the blades of the instrument), and the scissors are then removed.

The scissors are then directed inferiorly and are reinserted at the inferior end of the initial incision in the fascia lata. The concave side of the instrument again faces away from the strip to be harvested. The incision is then extended inferiorly toward the fibular head. Heavy-toothed forceps are used to stabilize
FIGURE 6A: Small Metzenbaum scissors are used to free the fascia lata (FL) from the overlying soft tissues.

FIGURE 6B: Incisions are made along the upper edge (ab) of strip of fascia lata to be harvested, as described in the text. The concavity of the scissors is directed away from the strip of fascia lata.

FIGURE 6C: Incisions are made along the lower edge (cd) of the strip of fascia lata.

the anterior edge of the fascia lata strip, and the scissors are introduced with blades closed on the deep surface of the fascia lata and are advanced superiorly to separate the fascia lata from the underlying muscle.

The scissors are then withdrawn and reinserted to
perform similar blunt dissection of underlying muscle from the inferior portion of the fascia lata band. The surgeon then makes a second incision in the fascia lata band, approximately 6 to 8 mm posterior to the initial incision with a #15 blade and scissors, as described above (Fig 6C). The scissors are directed superiorly toward the anterior iliac crest, removed, and then directed inferiorly toward the fibular head. This step results in a strip of fascia lata approximately 10 to 15 cm in length, anchored in place at each end. The scissors are again used bluntly to separate overlying and underlying soft tissues from this fascia lata strip.

Once this step has been completed, the scissors are again withdrawn and are reintroduced through the initial posterior incision of the strip. Heavy-toothed forceps are used to stabilize the strip and provide countertraction. Under direct visualization, the blades are opened and positioned beside the strip, with the convex side of the scissors toward the strip. The blades are then partially closed, taking care to avoid transection of the strip at this point. The scissors are then advanced smoothly up the leg; if resistance is encountered, the scissors are opened partially, and are then withdrawn and reintroduced in order to bluntly lyse residual soft tissue adhesions. The scissors are then reintroduced beside the fascia lata strip and advanced upward for the length of the instrument. The surgeon exerts traction at the base of the fascia lata strip with forceps, and when the scissors can be advanced no further, the blades are closed and the strip is transected (Fig 6D).

This procedure yields a segment of fascia lata 5 to 7 cm long and 6 to 8 mm wide, attached inferiorly to the iliotibial tract. This portion of the fascia lata strip is removed from the wound, and the strip is grasped with a toothed forceps at its base. The scissors are opened partially and are introduced through the posterior incision around the inferior segment of fascia lata, with the concave surface of the blades facing the strip to be harvested. The scissors are then passed downward in the manner described above to the fibular head, taking care to avoid premature transection of the fascia lata strip. Residual adhesions
are divided bluntly. When the scissors can be advanced no further, the strip is transected. The knee joint is not entered with this technique. The fascia lata strip is then removed and cleaned in the usual fashion. Hemostasis is obtained, and deep tissues are closed with buried interrupted sutures. The skin is closed with vertical mattress sutures (Fig 6E).

This technique generally yields a fascia lata strip 10 to 15 cm long and 6 to 8 mm wide; up to three such strips may be obtained per leg. In our experience, the major limitation of this method is the occasional premature transection of the strip, resulting in a segment of fascia lata that is shorter than desired. On such occasions we have successfully obtained satisfactory tissue from the leg on the second or third application of this technique. When a strip of fascia lata of suboptimal length but adequate width is obtained, the strip may be divided longitudinally in half for most of its length, forming a strip essentially twice the length and half the width of the original segment, as described by Levine.

REFERENCES