The major concern for ophthalmologist in patients with facial paralysis is the poor eyelid closure and resultant exposure of the cornea. Degree of facial palsy may range from partial to complete which in turn determines the severity of symptoms and signs. It is not unusual to see the patient of congenital facial nerve palsy who adapts to the condition and require no medical or surgical treatment. Conversely an older patient is more susceptible to corneal exposure with acute onset of paralysis.

The management of facial paralysis may be broadly subdivided into:
1. Medical management
2. Surgical management

1. Medical management:
The medical treatment of patient with facial nerve paralysis includes topical lubricants. Tear substitutes without preservatives are of choice and can be administered as frequently depending on patients need. Initial therapy at night may include petroleum based ointment. Individuals with severe exposure keratitis may require the use of the ointment in the day time as well. The most common mistake in medical management is failure to educate the patients that they can use the tear substitutes as frequently as necessary rather than scheduled application. Patient should avoid ocular irritants such as eyelid cosmetics, aerosol spray, chlorinated swimming pool water and air conditioners.

Additional protection of the eye during night time may be required, as chances of exposure and dryness of cornea is more during sleep. Use of ointment and placement of rigid shield taped over the eye could be the simplest method. Standard swimming goggles can be used to create a moisture chamber but is very bulky and impractical. A convenient alternative is the use of small oval piece of plastic wrap placed from the brow to the inferior orbital rim, encompassing the medial and lateral canthus (Fig 1). An additional technique could be taping of the eyelids to protect the cornea. Inappropriate technique of taping can cause corneal abrasion.

Paralytic ectropion of the lower lid is the other cause of discomfort as it pulls the punctum away from the globe resulting in epiphora. Taping the eyelid can temporarily prevent irritation from ectropion. The tape is applied across the lower eyelid which is then pulled outward and upward in sweeping motion (Fig 2A and 2B).

Applying the tape to the upper eyelid will reduce lagophthalmos and lid retraction. The tape is applied vertically across the lid crease when the eye is closed. Tape will prevent the lid from opening completely, which in turn will help the lid to sweep more of cornea during blink (Fig 3A and 3B).

2. Surgical management:
Surgical intervention is considered when the medical management has failed or the cornea is getting compromised. It can also be considered for good cosmetic correction. Corrections of ectropion and brow ptosis are other indications for surgery. The various aspect of surgical management is

Tarsorrhaphy:
For short term protection of patient, the non reactive mono filament suture can be placed from the upper eye lid and can be taped down on to the maxillary region (Fig 4A & 4B).
For the patient with lagophthalmos who does not obtain relief from medical therapy can undergo lateral tarsorrhaphy to reduce the exposed ocular surface. This in turn reduces the ocular discomfort.

A 5 mm wide tarsorrhaphy at the lateral canthus generally reduces the lagophthalmos by 70-80%. After local infiltration and conformer in place, 1 mm depth of the lid margin is excised from the lateral canthus to 5 mm medially. 5-0 polyglactin double armed suture is passed in mattress fashion to pull the lids together with knot away from the cornea (Fig 5A & 5B). The skin is closed with 6-0 polypropylene suture. The exposed corneal surface reduces to significant extent (Fig 6A & 6B).

The gold weight causes mechanical ptosis. Gold implants are available in various weights and ranges from 0.6 to 1.6 grams.

If facial function returns, separating the tarsorrhaphy can be considered. The sutured margin is divided with safety guide in place for the protection of the cornea. The cut edge of the conjunctiva is sutured on eyelid margin to prevent lid from rejoining.

**Lid loading surgery:**

Lid loading is one of the most commonly used surgical techniques which aid the closure of the upper eyelid by weight and gravity. The eyelids in the facial paralysis have the ability to lift the eyelid as the LPS muscle and its nerve supply is intact (Fig 7A). The inability to close the eyelid (Fig 7B) due to paralysis of the facial nerve supplying the orbicularis muscle is taken care by lid loading effect. Various materials like gold, platinum, stainless steel or tantalum mesh have been used as implants to reduce the lagophthalmos. Sheehan proposed lid loading in 1950 using tantalum mesh. Illig proposed lid loading using gold in 1958. Subsequently gold weight implants gained popularity as gold is malleable, highly dense and has minimum tissue reactivity. The implantation of gold weights is also simple and reversible. This gold weight is intended to be placed in upper eyelid and works by the effect of gravity during the eyelid closure with levator relaxation.

The size of weight to be implanted is determined preoperatively by using silver weights. Silver weights from 0.6 to 1.6 grams are available in the increment of 0.1 gram. The weight is placed in outpatient and the assessment is done after 20 minutes (Fig 8A & 8B). The weight of choice is the one which causes the maximum closure, but allows the eyelid to open as complete as possible. It is important to balance between the closure of the eye and opening of the eye with the weight in place.

Surgical placement of gold weight is done as a day care procedure. The patients are operated under local anaesthesia. Infiltration of a mixture of 2% lignocaine, 0.5% bupivacaine and hyaluronidase 1500 IU is given in the upper lid. A conformer is placed and lid traction sutures are taken using 5-0 silk. An incision is given along the lid crease and a pretarsal pocket is dissected. The gold plate has hole for anchorage. 6-0 polypropylene suture is passed partial thickness through the tarsal plate and through the hole in the gold weight to secure it over the tarsal plate (Fig 9). The orbicularis muscle is closed with 6-0 polyglactin interrupted suture followed by the closure of the skin with 6-0 polypropylene suture (Fig 10A & 10B).
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Figure 10A: Same patient in Figure 8, eye opening postoperatively with Gold weight in situ
Figure 10B: Same patient in Figure 8, correction of lagophthalmos with Gold weight in situ

Figure 11A: Lateral incision exposing the lateral orbital rim and the hole drilled through it, medial incision to expose the medial canthal tendon
Figure 11B: Passed through medial canthal tendon
Figure 11C: Fascia needle used to pass the silicone from the medial site to the lateral incision site
Figure 11D: Silicone passed through the lateral canthus and drilled hole
Figure 11E: Watze sleeve and permanent suture used to fix silicone rod

Arion Silastic Sling:
Arion Silastic Sling is less common surgery. Placement of sling is more difficult than gold weight implant or lateral tarsorrhaphy. The Arion sling can be placed in the upper lid as well as lower lid. The surgery is performed under local anesthesia as fine adjustments can be done. However most of the surgeons use it only for upper lid as the chances for ectropion is more common with the lower lid. 1 mm silicone rod is used for this procedure. After local infiltration, with conformer in place, lid crease incision is made. Incision is also made medially and laterally to expose the medial canthal tendon and lateral orbital rim (Fig 11A). The silicone rod is secured at medial canthal tendon by non absorbable suture (fig 11B). Two holes are drilled on the lateral orbital rim near to orbital tubercle. Silicone rod is sewed through the medial canthal tendon and paved along the tarsal plate to the lateral orbital rim (Fig 11C). The silicone rod is anchored to the tarsal plate with 5-0 polypropylene to prevent ectropion of the eyelid. The rod is placed from inside to outside the hole at the lateral orbital rim (Fig 11D). It is secured with Watze sleeve and sutured on the lateral orbital rim (Fig 11E). It is tightened to such an extent that upper lid overrides the lower lid by approximately 2mm.

The cerclage procedure provides immediate improvement in lagophthalmos. The sling can be adjusted under local anesthesia by just opening the lateral and medial end. Complications include extrusion of silicone rod, infection, ectropion of the lid, lowering of the sling and granuloma formation.

Morel-Fatio Palpebral Spring:
Palpebral spring is stainless steel spring which is used to reanimate the upper lid. The advantages are it allows full closure of the eyelid, retains natural blink, and does not thicken the eyelid.

Disadvantages are, it is complicated procedure. Chances of extrusion and need for adjustment in the tension of the spring. A 0.1mm diameter stainless steel orthodontic dental wire is bent "V" shaped with approximately 5mm diameter fulcrum. Each limb of the spring can be curved to fit the natural curve of the eyelid and orbital bony rim by use of surgeon's fingernails.

The spring is autoclaved after all the adjustments are made. Incision is made along the lid crease extending to the lateral canthus. The tarsal plate, the lateral orbital rim and superior orbital wall exposed. 16 G needle is used to advance the spring from lateral orbital incision to central eyelid incision (Fig 12A). The sharp end of the spring is bent into three quarter curve to avoid the end extrusion. The lateral limb of the spring should extend 2mm beyond the midline medially. A dacron mesh is used to anchor the spring on to the tarsal plate. The fulcrum of the spring is attached to the periosteum of the lateral orbital rim with 4-0 polypropylene suture. Once the fulcrum is well fixedated, the orbital limb is secured just inside the periosteum with multiple interrupted 4-0 polypropylene sutures along the entire length (Fig 12B). The orbicularis is closed with 6-0 polyglactin suture and skin with 6-0 polypropylene suture. Adjustment in the tension of the spring in the post operative period can be done by 1cm incision over the fulcrum of the spring.
Temporalis Muscle Transfer:
Another technique which can help closure of the eyelid in facial palsy is the transposition of the temporalis muscle fascia. In the long term the technique avoids infection, inflammation or extrusion for the eyelid closure.

A vertical incision is taken at the hairline to expose the temporalis fascia (Fig 13A). The strip of fascia is freed inferiorly and reflected superiorly (Fig 13B). The frontalis muscle is freed from the epicranium. Incision is made at the lateral canthus for passage of temporalis muscle fascia complex (Fig 13C).

Another incision is made at the medial canthus to expose the anterior head of the medial canthal tendon. Wright fascia needle is used to pass the temporalis muscle fascia complex from lateral canthal incision to medial canthus incision (Fig 13D). The inferior pass is near the lid margin where as superior pass is one half way to one third above the tarsal plate. The fascia is passed beneath the medial canthal tendon (Fig 13E) and tightened to produce full closure of the eyelid. The fascia is fixed to the medial canthal tendon with permanent suture (Fig 13F). The patient has to learn to close the eyes with the clinching action of the teeth. It has good success rate except for the possible loosening of the fascia with time. Better long term stability can be achieved by additional fixation suture at the lateral canthus and on the tarsal plate, made through stab incision at the middle and lateral third of the eyelid.

Management Of Ectropion:
Paralytic ectropion of the lower lid in facial palsy can be best managed by lateral tarsal strip or lateral canthal sling. After local infiltration and conformer in place, lateral canthotomy and inferior cantholysis is made (Fig 14A). Once the lateral canthus of the lower lid is totally free, it is grasped with tooth forceps and pulled laterally and overlapped to appropriate tension (Fig 14B).

The redundant full thickness of the lid is excised. The lateral end of the tarsal plate is shaped and attached on to the periosteum of the lateral orbital rim by 5-0 polypropylene suture. The suture is brought out externally and tied over the bolster. The lateral canthal angle is reformed (Fig 14C) and then the canthotomy is closed with 6-0 polypropylene interrupted suture (Fig 14D).

Management of Lacrimal System:
Patients with symptomatic drying can find relief with occlusion of the lacrimal system as this would prevent existing tears from draining away. This few patients can find good relief with punctal occlusion. Punctal occlusion can be done with cautery, Herick’s plug or placement of mucous membrane graft over the punctum. It can be done as a temporary measure and once relieved of symptoms a permanent technique can be done.

When tearing is due to medial ectropion, a surgery to correct the ectropion and tightening of the lid would suffice. Z-T plasty can be done. ‘Z’ is drawn at the medial canthus, the flaps are incised and undermined. The posterior lamellae of the lid are exposed. Now full thickness vertical lid incision and horizontal spindle of conjunctival lid retractors are marked for excision. Finally the Z plasty are transposed which causes vertical relaxation of skin at medial canthus for inward turning of the eyelid.
Other surgical procedures done in patients with facial paralysis are blepharoplasty and browplasty. These can be performed years after the onset of facial paralysis. They provide not only good cosmesis but also improve the peripheral field of vision. A field test done preoperatively can help the patient claim from their insurance company that the surgery has been done for functional correction.

Browplasty corrects the dermatochalasis to some extent. It also limits the amount of excision required during blepharoplasty. Blepharoplasty in such patients should be done carefully as excessive excision of eyelid skin can further accentuate the corneal exposure.

References