CLINICAL STUDY

Mersilene mesh sling as an alternative to autogenous fascia lata in the management of ptosis

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Abstract

Purpose **To evaluate the use of Mersilene mesh as a brow suspensory material and to compare it clinically against autogenous fascia lata.**

Methods **A prospective study was carried out in which 80 eyes of 56 patients with ptosis and absent, poor or abnormal levator function were operated on. The patients were divided into two groups. In 46 eyes of 32 patients Mersilene mesh was used and in 34 eyes of 24 patients autogenous fascia lata was used. The results were recorded and analysed.**

Results **The age range for the Mersilene group was larger than for the fascia lata group and female patients preferred Mersilene over fascia lata. The improvement in lid height was significant in all cases in both groups. The complication rates were similar in the two groups and the mesh was well tolerated by the patients. No cases of infection, sling exposure or extrusion occurred with the use of Mersilene. Lid lag and lagophthalmos occurred as a complication of the procedure itself and not the type of the sling material. The mean follow-up period was 33.8 months for both groups.**

Conclusion **We believe that Mersilene mesh is an effective alternative to autogenous fascia lata when the use of fascia lata is felt inappropriate.**

Key words Fascia lata, Frontalis sling, Mersilene, Ptosis

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Ptosis is the one of the common lid malpositions encountered in clinical practice. When the condition is associated with poor or abnormal levator muscle function, frontalis suspension surgery is usually indicated.[1–4]

Autogenous fascia lata is the 'gold standard' material used in frontalis suspension surgery and has stood the test of time. When autogenous fascia lata is not available or cannot be used, an alternative material must be looked for. Many different materials have been tried but none has been ideal.[5,6]

Recently, several reports[7–10] have discussed the use of Mersilene mesh as an alternative material to fascia lata in frontalis suspension procedures. Mersilene mesh has been used extensively in general and vascular surgery and has yielded excellent results as a mesh that supports fibrovascular ingrowth and becomes incorporated into host tissues.

The aim of our study was to evaluate the use of Mersilene mesh as a brow suspensory material and to compare it clinically against autogenous fascia lata.

Materials and methods

Eighty eyes of 56 patients with ptosis and absent, poor or abnormal levator function were included in the study. The main aim of our study was to compare the use of Mersilene mesh as a sling material with that of fascia lata. The study was designed as a prospective study and was planned to include patients with different pathologies requiring frontalis sling surgery. All age groups and both sexes were included in the study.

The main prerequisite for a patient to be included in the study was follow-up for a period of at least 24 months. Of 61 patients, 5 were excluded due to lack of follow-up. After counselling, informed consent was obtained from the patients or their parents. The patients or their parents were allowed to share in the decision regarding the choice between an alloplastic material (Mersilene mesh) and autogenous fascia lata. Gender proved to be a factor in the choice of sling material. The necessity of an incision in the thigh to obtain fascia lata was considered by the patients or their parents as a major disadvantage of the procedure, particularly for female patients. When the option of another, theoretically permanent, sling material was given, a large percentage of female patients or their parents selected Mersilene rather than fascia lata.

Accordingly the patients were divided into two groups:

- Group A: 46 eyes of 32 patients in whom Mersilene mesh sling was used.
- Group B: 34 eyes of 24 patients in whom autogenous fascia lata was used.

Pre-operatively, a general ophthalmic examination was performed. Assessment of ptosis as described by Putterman[12] was done with emphasis on the margin reflex distance 1 (MRD[1]), the amount of levator muscle function and the site of the lid crease. Testing of the ocular motility, jaw-winking phenomenon, corneal sensitivity and staining and response to phenylephrine was done. Neurological examination and tensilon testing was performed when myasthenia gravis was suspected.

Cases with 5 mm or more of levator function were excluded and underwent levator resection. Some cases with jaw-winking and a levator function of more than 4 mm had a levator muscle disinsertion and frontalis sling done. In patients with myasthenia, the levator function was variable and ranged from 0 to 8 mm. We believe that a sling procedure can be useful for them.

Surgical procedure

A single pentagon configuration was used in young children while a double rhomboid configuration was used in older children and adults. An incision was placed at the site of the present (or proposed) lid crease and the tarsus was exposed. If no or multiple creases were found, the site of the lid incision was determined by matching with the opposite lid in unilateral cases or fixed at 7 mm from the centre of the lid margin in males and at 8 mm in females in bilateral cases.

Two stab incisions were placed just above the brow opposite the medial and lateral ends of the lid incisions respectively. A third stab was placed 3 mm above the brow opposite the centre of the eyelid. A 3 mm strip of the material was threaded through the incision using a Wright fascia needle. The sling material was fixed to the front of the tarsus with two 6/0 vicryl sutures, one in each end. The two ends of the sling were pulled to adjust the lid height to the desired level and then tied together at the central brow incision with a double-armed 6/0 vicryl suture. The excess sling material was then trimmed. The fact that Mersilene does not lose tensile strength with time allowed us to adjust lid height intraoperatively to the required level, as determined for each case, and not to a higher level as is advised initially for other synthetic materials.

A tunnel was created underneath the frontalis muscle with sharp dissection and the two ends of the double-armed vicryl suture were passed through the tunnel to emerge on the skin about 3 mm above the central brow incision. The two ends were then tied together on the skin. This suture attaches the upper ends of the sling to the undersurface of the frontalis and is not removed but left to resorb.

In older children and adults two strips of the sling material were needed to lift the lid in a double rhomboid configuration. The strips were sutured to the front of the tarsus. The ends of each strip were tied together at the medial and lateral brow incisions respectively.

The fascia lata was harvested using a fascia lata stripper through a lower thigh incision 4 cm in length. The Mersilene mesh strips were fashioned using a scalpel from the 30 cm × 30 cm Mersilene mesh sheet produced by Ethicon Inc., NJ.

Meticulous closure of the lid and brow incisions was done with 6/0 chromic sutures. The lid crease incision was closed in two layers in a fashion similar to that used after inserting a gold weight implant.

The Mersilene mesh sheet was sterilised by ethylene oxide after each procedure and stored. It was also autoclaved immediately before the procedure. We did not soak the Mersilene mesh in antibiotic solution before use as originally described by Downes and Collin.[7]

Systemic broad-spectrum antibiotics were used for 1 week post-operatively for all patients. Bacitracin ointment was used on the lid and brow incisions for 1 week and eye lubricants were used as necessary.

Results

Intraoperatively surgery was uneventful and no intraoperative difficulties were encountered.

The age range for patients in the Mersilene group was 6 months to 78 years. In comparison, the range for the fascia lata group was 4 years to 48 years. The difference in the age distribution was significant and is considered a definite advantage for Mersilene. It is possible to harvest fascia lata from children less than 3 years of age when the risk of amblyopia from a ptotic lid is maximal. Our study strongly shows that Mersilene mesh sling would be successful in preventing these patients from developing amblyopia during the critical period of visual maturation. Mersilene mesh sling obviated the need for any further surgery during our follow-up period (about 33.8 months).

As far as gender was concerned, the number of male patients was 33 of 56 (59%) and the number of female patients was 23 of 56 (41%). The same percentage was almost maintained in the Mersilene group: 54% males and 46% females. However, in the fascia lata group the percentage changed markedly, with 66% of patients being male and only 33% of patients being female.

The levator function determined pre-operatively ranged from 0 to 8 mm in the whole series with a mean of 2.28 mm in the Mersilene group and 2.57 mm in the fascia lata group. Measurements of 6 mm and 8 mm of function were obtained in cases of myasthenia.

Our results showed a significant improvement in lid height in both groups. In the Mersilene group, the pre-operative mean MRD[1] was 0 while the post-operatively it was +3.33 with a range from +2.0 to +4.0. In the fascia lata group, the pre-operative mean MRD[1] was +1.0 while post-operatively it was +3.4 with a range from +2.0 to +4.0.

Stability of the achieved lid height was documented in all cases when either Mersilene mesh or fascia lata was used. The lid height level at 6 weeks post-operatively, when any operative lid oedema has resolved and muscle tone to both orbicularis oculi and frontalis muscles has returned, was always maintained thereafter. The attained lid height was maintained throughout the follow-up period, which ranged from 27 to 43 months with a mean of 33.8 months.

Complications occurred in both groups. Residual ptosis, defined as MRD[1] of +2.0 or less, occurred in 8 eyes (10%). Two of these patients were in the Mersilene group and one required repeat surgery to re-lift the lid to a higher level. The other was a 71-year-old man with third nerve palsy. Due to fear of corneal exposure, no further surgery was warranted.

In the fascia lata group, 4 patients (6 eyes) had residual ptosis. In 2 of them (4 eyes), the undercorrection was planned pre-operatively because of the nature of their diagnosis: cerebral palsy in one and third nerve palsy in the other. In the third patient surgery had to be redone to re-lift the lid to a higher level. The parents of the fourth patient refused any additional surgery. No cases of overcorrection were noticed.

Repeated surgery was required on 2 patients for undercorrection, 1 in each group. In addition, 1 patient in the fascia lata group developed wound infection and required wound revision. The overall incidence of repeated surgery was 3 of 56 patients.

Asymmetry or difference between the two lids of more than 1 mm occurred in 6 patients. In the Mersilene group, 3 of 32 patients had asymmetry between the two lids and similarly 3 of 24 patients in the fascia lata group. All 6 patients had surgery done only on one side.

Lagophthalmos occurred in 22 of 46 eyes in the Mersilene group and 14 of 34 eyes in the fascia lata group in the first 6 weeks. This gradually improved with time and at the 6 months follow-up visit the incidence was 11 of 46 eyes in the Mersilene group and 9 of 34 eyes in the fascia lata group.

Table 1. *Comparison between Mersilene and fascia lata*

	Mersilene	Fascia lata
No. of patients	32	24
No. of eyes	46	34
Diagnosis		
Congenital	21	18
Blepharophimosis	None	1
Third nerve palsy	3	1
Jaw-winking	None	2
Myasthenia	3	None
Trauma	1	None
CPEO	1	None
Neurofibromatosis	1	None
Double elevator palsy	1	None
Post-enucleation	1	None
Cerebral palsy	None	1
Unknown	None	1
Pre-operative findings		
MRD[1] (mm)	0	+1.0
Levator function (mm)		
Mean	2.28	2.57
Range	0–8	0–5
Post-operative findings		
MRD[1] (mm)		
Mean	+3.33	+3.4
Range	+2 to +4	+2 to +4
Follow-up (months)	33.8	33.8
Complications		
Residual ptosis	2/46 eyes (5%)	6/34 eyes (18%)
Repeated surgery	1 patient	2 patients
Asymmetry	3 patients (10%)	3 patients (13%)
Lagophthalmos		
First 6 weeks	22/46 eyes (48%)	14/34 eyes (41%)
6 months	11/46 eyes (24%)	9/34 eyes (26.5%)
Corneal exposure	1 patient	2 patients
Infection	None	1 patient
Exposure of sling	None	None
Lid peak	1 patient	None
Leg incision		Hypertrophic scar in 1 patient; muscle bulge on contraction in most patients

CPEO, Chronic progressive external ophthalmoplegia; MRD[1], Margin reflex distance.

Corneal exposure with superficial punctate keratopathy occurred in 3 patients in both groups and lasted for 1–3 months. These patients required frequent instillation of artificial tears until the condition resolved. In no patient was lowering of the lid height needed.

Wound infection occurred in 1 case in the fascia lata group 1 week after surgery due to improper wound closure. The patient required systemic antibiotics together with wound revision and drainage of pus. The sling was not affected and the lid height was maintained.

None of the patients in either group had sling exposure. One patient in the Mersilene group developed a central lid peak. This was believed to be the result of unequal tension on the two Mersilene strips.

Thigh incision complications were noted in one darkly pigmented patient who developed a hypertrophic scar at the incision site. Most patients noticed a small muscle bulge on contraction of the thigh muscles at the site of the incision. Due to the use of the fascia lata stripper and the small size of the incision, there was no functional compromise associated with the bulge.

The results are summarised in Table 1.

Discussion

It is well recognised that occlusion of the visual axis by a ptotic upper lid in infancy and early childhood may lead to amblyopia. Ptosis also markedly influences vision, after maturation of the visual pathways, if severe enough to partially or totally occlude the visual axis.

To achieve satisfactory correction of severe blepharoptosis associated with poor levator function, brow suspension surgery is necessary. While general agreement exists regarding the indications for brow suspension surgery, there is no such common consensus concerning the suspensory material used.[6,7]

Factors considered in the choice of material have included accessibility, ease of handling, degree of permanency, infection and rejection rate and the ptosis recurrence rate. The ideal material should be chemically inert, non-carcinogenic, capable of resisting mechanical stress, capable of being fabricated in the form required and sterilisable. It should not be physically modified by tissue fluids nor excite a foreign body reaction or induce a state of allergy or hypersensitivity.

As many studies have shown, autogenous fascia lata is regarded as the best material for brow suspension procedures, but this method has some disadvantages.[11] The rationale behind using Mersilene mesh was to avoid the disadvantages of fascial harvesting and to test its use in young children when fascia lata is not yet developed. Mersilene mesh acts as a permanent scaffold which supports fibrovascular ingrowth. This permanent tissue fixation should promise excellent function with low recurrence rate and should minimise extrusion.[9,12] The stability of Mersilene mesh as a sling material over time (mean follow-up 33.8 months) was also reported by other investigators.[7,8]

In our series, the lid height at 6 weeks post-operatively was always maintained thereafter. Hintschich *et al.*[8] reported the stability of the lid position, during a mean follow-up period of 23 months, in 60 of 66 lids operated on using Mersilene mesh. All failed cases were evident in the early post-operative period. Similarly, Elder[9] confirmed that no changes in lid position occurred in 17 lids operated on using Mersilene mesh from the second week assessment until the final assessment.

When realising that gradual droop of the lid and recurrence of ptosis is the main drawback of homogeneous fascia lata and is one of the main complications of other synthetic slings,[5] the value of Mersilene mesh becomes apparent. Autogenous fascia lata is considered a 'living suture'[4] as it becomes integrated within the lid structures, and we believe that Mersilene mesh supports tissue ingrowth and attains a similar effect. This has been confirmed by other investigators.[10] The repeat surgery on the patient originally operated on with Mersilene mesh required careful dissection. The mesh was easy to find, with evidence of its integration into the lid and brow tissues. The re-operation was done 5 weeks after the initial surgery. A similar case was reported previously[8] and the author concluded that a repeat Mersilene sling procedure is possibly despite significant fibrovascular ingrowth.

As mentioned earlier, it is possible to adjust the lid height intraoperatively whether Mersilene mesh or fascia lata is used, due to a stable tensile strength. The lid position was carefully adjusted in all cases to avoid overcorrection and reduce the post-operative incidence of lagophthalmos and/or exposure keratopathy.

Corneal complications occurred in 3 of our patients in both groups and lasted for several weeks. The condition resolved with the frequent use of artificial tears. This condition can be prevented to a great degree by avoidance of overcorrection.

Also, deliberate undercorrection is advised in elderly patients with reduced tear production and patients with neurological disorders and/or poor Bell's phenomenon (e.g. following third nerve palsy). The use of a reversible sling material that can be undone in case severe keratopathy ensues is recommended. We believe Mersilene mesh is superior to fascia lata in this respect.

Thigh incision complications were uncommon. One darkly pigmented patient developed a hypertrophic scar at the incision site in the lower thigh. It is our recommendation to avoid fascia lata harvesting in patients who developed keloids or are at risk of developing keloids or hypertrophic scars. Mersilene mesh could have been a better choice in this patient. Harvesting fascia lata, using any technique, would always carry the risk of scar formation. This was a concern, particularly for female patients in our study. None of the previous studies comparing Mersilene mesh with fascia lata addressed this issue.

The use of Mersilene mesh eliminates the inconvenience of having to harvest autogenous fascia lata, which is time-consuming, always requires a general

anaesthetic and cannot provide satisfactory material in children younger than 3 years. Mersilene mesh is readily available, inexpensive, easily prepared and implanted. It is strong, durable, clinically tested for years and can be sterilised and guaranteed free of infection. The material can be removed when necessary.

In terms of both improvements in eyelid height and an apparent lack of significant complications, it surpasses all currently available synthetic and homogeneous suspensory materials. Mersilene mesh sling can be used if the use of autogenous fascia lata is felt inappropriate, as in young children, patients with tendency to scar formation or females concerned about scar formation. When a temporary sling or a sling that may be reversed is needed, we believe that Mersilene mesh can be used instead of autogenous fascia lata.

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