

## SCIENTIFIC REPORT

## Functional results and complications of Mersilene mesh use for frontalis suspension ptosis surgery

P Mehta, P Patel, J M Olver

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**Aims:** To assess the functional results and complications of Mersilene (polyester) mesh frontalis sling suspension to correct poor levator function ptosis.

**Methods:** Retrospective case series. 32 eyelids of 20 patients (12 children and eight adults).

**Results:** Follow up 1–69 months (mean 32). *Children:* eight patients had bilateral and four unilateral surgery (20 eyelids). Good long term functional results were achieved in 73% (8/11 children) and 77% (14/18) eyelids. Two children had early postoperative wound infection requiring removal of mesh in one; the other was lost to follow up following medical treatment. *Adults:* four patients had bilateral and four unilateral surgery (12 eyelids). Good long term functional results were achieved in 75% (6/8 patients, 9/12 eyelids). One postoperative wound infection and one mesh exposure were treated definitively by surgical excision of mesh.

**Conclusion:** Mersilene mesh provides good functional results but up to 20% of patients have early soft tissue complications. Other materials such as monofilament suture or autogenous fascia lata should be considered.

Frontalis sling surgery (brow suspension) is the surgery of choice for poor levator function ptosis ( $<5$  mm)<sup>1–3</sup> and autogenous fascia lata (AFL) is the gold standard with which other materials should be compared.<sup>4</sup> Surgeons and patients sometimes prefer non-autogenous material,<sup>5–27</sup> because surgery can be done under local anaesthesia in adult patients and a second incision can be avoided. It is also preferred when AFL is not available as in very young children with short legs.<sup>4 15 16</sup>

The use of Mersilene mesh as an alternative material in frontalis suspension surgery was described by Downes and Collin in 1989<sup>5</sup> and others<sup>6–14</sup> have discussed its use. Mersilene is a sterile wrapped polyester fibre. It has good tensile strength and forms a permanent scaffold for fibrovascular tissue ingrowth, and hence good long term functional results.<sup>5–14</sup>

Materials for frontalis suspension should have good long term results with a low complication rate. Human sclera, banked fascia lata, expanded poly(tetrafluoroethylene) (ePTFE or Gore-Tex), braided polyester, monofilaments, and silicone rod have also been used.<sup>15–28</sup>

Important results include eyelid height, skin crease depth, and eyelid contour. The aim of this study was to determine the long term results and complications of Mersilene mesh in frontalis suspension surgery for the correction of poor levator function ptosis.

## MATERIALS AND METHODS

Mersilene mesh for frontalis suspension was used in 20 patients (32 eyelids) with poor levator function ptosis (0–

5 mm). There were 12 children (20 eyelids) and eight adults (12 eyelids). Eight patients had unilateral (four adults, four children) and 12 had bilateral surgery. Four adult patients had undergone previous ptosis surgery. In three of these the details were unavailable; one had undergone an anterior levator resection.

## Surgical procedure

A modified Fox pentagon<sup>3</sup> was used with five stab incisions, two in the eyelid and three above the eyebrow. The sterile Mersilene mesh sheet was cut into strips 5–7 mm wide, 150 mm long, along the long axis of the oval mesh pore. The strips were soaked in antibiotic solution immediately before use (gentamicin or chloromycetin). A Wright's fascial needle was used to insert the strip deep to orbicularis and frontalis muscles. The eyelid stab incisions were closed with 8.0 Vicryl. The two ends of the mesh at the apical brow incision were secured together by a half knot and 6.0 Vicryl suture. This gave a small sized "knot" buried deep to frontalis muscle.

The brow incisions were closed in two layers using 6.0 Vicryl subcutaneous and interrupted 8.0 Vicryl (child) or 6.0 Novafil (adult) to skin. Oral broad spectrum antibiotics (erythromycin in children and Augmentin in adults) were prescribed for all patients for 1 week. Topical antibiotics and lubricants were routinely used for the first week and then as required.

## RESULTS

The records for all patients were retrieved. Mean follow up was 32 months. One child (case 1) whose family moved to another part of the country had a follow up of only 1 month.

A consultant oculoplastic surgeon operated on 18/20 patients and an oculoplastics fellow 2/20.

## Long term functional results (table 1)

All eyelids had improvement in the lid height with a good deep skin crease. Height was maintained at 2 years in 73% (8/11) of children and 75% (6/8) of adults. This represented good long term functional results in 77% (14/18) of eyelids in children and 75% (9/12) of eyelids in adults. Two children with unilateral ptosis had a poor functional result from not using their frontalis muscle and one a poor skin crease. There were no overcorrections.

Two of 20 patients (four of 32 eyelids, 12.5%) required further surgery for recurrent ptosis following Mersilene excision (cases 2 and 3).

## Soft tissue complications

Four patients (two bilateral and two unilateral surgery) developed soft tissue complications 1–4 weeks after surgery.

## Case 1

This was a 4 year old girl with bilateral congenital dystrophic ptosis. Two weeks after surgery a small raised red lesion was seen on the medial aspect of the left brow, a presumed

**Table 1** Results of frontalis suspension surgery using Mersilene mesh

Total number of patients	20 (14 male, 6 female)
Age range	2–78 years
Total number of eyelids	32
<b>Diagnosis</b>	
Congenital dystrophic ptosis	12
Blepharophimosis	3
Congenital third nerve palsy	1
CPEO	1
Oculopharyngeal muscular dystrophy	1
Myotonic dystrophy	1
Ocular myopathy	1
<b>Preoperative findings</b>	
MRD (mm)	
Mean	0
Range	0–1
Levator function	absent to poor (0–5 mm)
<b>Postoperative findings</b>	
Minimum 24 months after surgery	n = 17 (26 eyelids)
MRD (mm)	
Mean	+3.4
Range	+2.5 to +4.0
Follow up (months)	
Mean	32
Median	36
Range	1–69
Good skin crease (minimum follow up 12 months after surgery)	26/31 eyelids
<b>Complications</b>	
Lagophthalmos—initial marked	5
Temporary corneal exposure	1
Infection/granuloma	3
Exposure of mesh	1

CPEO = chronic progressive external ophthalmoplegia; MRD = upper margin reflex distance.

forehead wound infection. Following a further course of systemic antibiotics she was lost to further follow up as her family had moved out of the region. Details of her subsequent outcome were not available despite several attempts to trace her.

### Case 2

This was a 6 year old boy with bilateral congenital dystrophic ptosis. Ten days after surgery he developed inflamed red lumps at the site of the eyelid and brow stab incisions. He did not reattend until 3 weeks after surgery by which time he had micro abscesses (fig 1A). Following systemic antibiotics the forehead and eyelid abscesses were excised along with a length of infected Mersilene mesh. There was no bacteriological growth. He required maximum levator resection for recurrent ptosis.

### Case 3

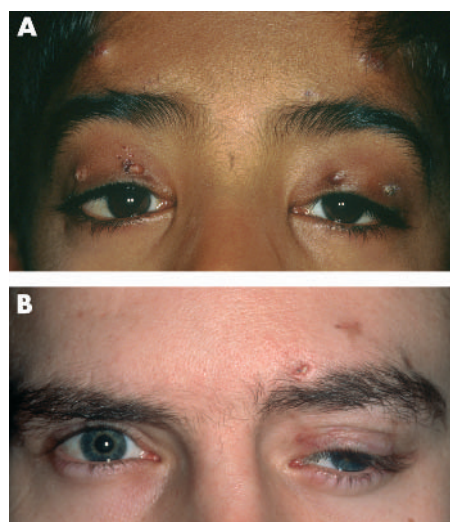
This was a 30 year old man with congenital dystrophic ptosis. One week after surgery he developed bilateral eyelid wound infections. He was given a further course of systemic antibiotics but it failed to settle and the mesh was excised 2½ weeks later. Four months later he required AFL frontalis suspension for recurrent ptosis.

### Case 4

This was a 23 year old man with a congenital third nerve palsy. Four weeks after surgery exposed mesh was noted at the brow incision site (fig 1B). He underwent excision of the stab incision area and underlying mesh. Postoperative his eyelid height was adequately maintained without further ptosis surgery.

## DISCUSSION

This case series confirms the good long term results of Mersilene mesh when used for frontalis suspension (76%



**Figure 1** (A) Bilateral postoperative eyelid and forehead wound infection in 6 year old boy (case 2). (B) Forehead Mersilene mesh exposure in a 23 year old man with congenital third nerve palsy (case 4).

eyelids), but it was not as good as AFL (92%).<sup>4</sup> Soft tissue complications such as extrusion, granuloma, and infection unfortunately do occur. Surgeons should be aware of the risks of this material, especially as removal of the mesh may result in gradual recurrence of the ptosis. Extrusion of Mersilene mesh used as an upper eyelid spacer has also been reported in 20% cases.<sup>29</sup>

AFL is considered the best frontalis suspensory material, as it is not degraded and is believed to allow fibrovascular tissue ingrowth leading to biointegration without significant inflammation. AFL has good long term functional results with maintenance of lid height and well formed skin crease. There are only occasional reports of postoperative wound infection.<sup>4 13</sup> Stored fascia lata has a higher rate of late ptosis recurrence.<sup>28</sup>

There is a wide choice of non-autogenous materials for frontalis suspension<sup>15–28</sup> (table 2).

Monofilament synthetic materials—for example, Prolene and silicone rod, are not incorporated into tissues and their functional results are often less satisfactory than autogenous fascia lata, with ptosis recurrence and loss of skin crease,<sup>18 20 23–24 28</sup> but they have low rates of infection and exposure/extrusion and are easily removed if the eyelid is too high.

Mersilene mesh has been promoted as an alternative to autogenous fascia lata because it acts as a scaffold for fibrovascular ingrowth and becomes integrated with tissue.<sup>6 11 28–30</sup> Initial results with Mersilene mesh were very encouraging.<sup>3–6</sup> It avoids the need for a second surgical site and has a good long term effect. Reported complications of Mersilene and of Gore-Tex frontalis suspension include extrusion, granuloma and infection<sup>8–14 19 28 29</sup> (table 3).

Surprisingly, El-Toukhy<sup>13</sup> had no complications in 46 eyelids. This may be attributed to their surgical modification where instead of eyelid stab incisions, there is a full eyelid crease incision and the Mersilene is sutured to the anterior surface of the tarsus. This ensures deep placement of the mesh within the eyelid, reducing the risk of exposure and infection. However, they have may have ignored the presence of small resolvable granulomas/low grade infection.

Meticulous wound closure with well buried mesh should reduce complications.<sup>8</sup> Low grade infection may occur along the mesh from either the eyelid or forehead incisions,

**Table 2** Complications of frontalis suspension surgery with non-autogenous materials and autogenous fascia lata

Author, year	Material used	No of patients	No of eyelids	Mean follow up (months)	Complications (infection/extrusion/granuloma)
<b>Silicone</b>					
Carter, 1997 <sup>22</sup>	Silicone rod	35	61	22	Extrusion, 3 Recurrence, 4
Goldberger, 1991 <sup>23</sup>	Silicone rod	10	12	24	Exposure keratopathy, 1 Skin bulging over silicone rods, 1
Leone <i>et al</i> , 1981 <sup>24</sup>	Silicone rod	15	20	–	Infection, 1
<b>Monofilament</b>					
Wasserman, 2001 <sup>28</sup>	Monofilament Nylon	–	13	24	Recurrence, 9 Infection/granuloma, 1
Manners, 1994 <sup>20</sup>	Polypropylene	9	10	18.7	Recurrence, 5
Wasserman, 2001 <sup>28</sup>	Polypropylene	–	8	24	Recurrence, 3
<b>ePTFE (Gore-Tex)</b>					
Wasserman, 2001 <sup>28</sup>	ePTFE	–	11	6	Infection/granuloma, 5
Steinkogler, 1993 <sup>19</sup>	ePTFE	26	37	36	Rejection, 1
<b>Stored fascia lata</b>					
Wasserman, 2001 <sup>28</sup>	Banked, donor, irradiated fascia lata	–	35	18	Recurrence, 18
Esmaili, 1998 <sup>26</sup>	Banked, donor, irradiated fascia lata	72	132	120	Infection/granuloma, 2 Reaction to donor fascia lata, 2
Mauriello, 1998 <sup>27</sup>	Cadaveric fascia lata	27	36	44	None
<b>Autogenous fascia lata</b>					
El-Toukhy, 2001 <sup>13</sup>	Fascia lata	24	34	33.8	Infection, 1 Hypertrophic leg scar, 1
Wasserman, 2001 <sup>28</sup>	Fascia lata	–	24	30	Recurrence, 1 Infection/granuloma, 2
Deenstra, 1996 <sup>25</sup>	Fascia lata	81	119	54 (median)	Exposure keratopathy, 12
Kemp, 1986 <sup>4</sup>	Fascia lata	–	99	30	Infection, 1 Overcorrection, 2 Slipped, 2

ePTFE = expanded polytetrafluoroethylene (Gore-Tex).

**Table 3** Complications of frontalis suspension surgery with Mersilene mesh

Author, year	No of patients	No of eyelids	Mean follow up (months)	Complications (infection/extrusion/granuloma)
Kemp, 2001 <sup>14</sup>	20	29	11	Late extrusion, 1
El-Toukhy, 2001 <sup>13</sup>	32	46	33.8	0
Wasserman, 2001 <sup>28</sup>	–	11	8	Recurrence, 3 Infection/granuloma, 1
Mutlu, 1999 <sup>12</sup>	52	79	Unknown	Granuloma, 3 Extrusion, 2
Yalaz, 1997 <sup>11</sup>	15	19	50	Granuloma, 3 Extrusion, 2
Gabrieli, 1996 <sup>10</sup>	14	20	18	None recorded
Can, 1969 <sup>9</sup>	22	23	25	Extrusion, 1
Hintschich, 1995 <sup>8</sup>	54	76	20 (median)	Infection, 1 Extrusion, 3 Granuloma, 8
Elder, 1993 <sup>7</sup>	13	17	13.8	Localised discharge, 1 Migration, 1
Downes, 1990 <sup>5</sup>	15	23	15	Preseptal cellulites, 1
Downes, 1989 <sup>5</sup>	11	17	10 weeks	Preseptal cellulites, 1

particularly if there is fibre exposure. Suturing the eyelid stab incisions with 8/0 Vicryl did not prevent infection in 2/20 (10%) patients in this study. Our overall soft tissue complication rate was 20%, higher than in other reported studies (table 3). Complications occurred within a month of surgery, suggesting foreign body reaction,<sup>12</sup> or infective aetiology despite postoperative antimicrobial prophylaxis. It was felt that a piece of overly wide mesh had contributed to the mesh exposure in case 4.

Removal of the mesh may result in ptosis, especially as a long length of mesh is dissected out both from the eyelid and between the eyelid and brow.<sup>31</sup>

There is a trade-off between complications and effectiveness for non-autogenous frontalis suspension materials.

Prolene suture and silicone rod have low infection and extrusion rates but their functional effect may diminish with time. Mersilene mesh and Gore-Tex suture have more soft tissue complications but a good long term functional effect. Only Autogenous fascia lata has both low morbidity and is long term effectiveness.

Mersilene mesh is an alternative to autogenous fascia lata for frontalis suspension surgery as it gives similar good functional results. Being a synthetic material it carries the risk of potential infection, granuloma formation, and extrusion. We now prefer to use alternative non-autogenous materials such as Prolene 2.0 suture or autogenous fascia lata, recognising their advantages and disadvantages.

# Authors' affiliations

P Mehta, P Patel, J M Olver, Western Eye Hospital, Marylebone Road, London NW1 5YE, UK

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Correspondence to: Miss Jane M Olver, Oculoplastic Service, Western Eye Hospital, Marylebone Road, London NW1 5YE, UK; janeolver@aol.com

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