THE USE OF PROLENE AS A TEMPORARY SUSPENSORY MATERIAL FOR BROW SUSPENSION IN YOUNG CHILDREN

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SUMMARY

Children with severe, unilateral congenital ptosis are at risk of developing amblyopia if the lid obscures the visual axis. In this situation, urgent repair of the ptosis is indicated. These patients generally have very poor function of the levator palpebrae superioris muscle and a brow suspension is required. The suspensory material which gives the best long-term results is autogenous fascia lata. In young children, however, there is insufficient autogenous fascia available. We reviewed 9 patients aged 4 years or less who had undergone surgery for congenital ptosis. In each case a brow suspension was performed using 4/0 Prolene (monofilament polypropylene) suture as a temporary suspensory material. All patients achieved a satisfactory result with the upper lid remaining clear of the visual axis during a mean follow-up period of 18.7 months (range 8–29 months). We suggest that Prolene suture is a readily available material which is suitable as a temporary suspensory material for brow suspension in very young children.

Ptosis repair in patients with very poor levator function requires brow suspension. The material that has been found to give the highest success rate in maintaining a good lid position post-operatively, with fewest complications, is autogenous fascia lata.[1,2] In young children, however, it is difficult to obtain sufficient fascia lata for ptosis repair since the iliotibial tract is not adequately developed and thus this procedure cannot be performed until after the age of about 3–5 years depending on the size of the child.

Other suspensory materials have been investigated to see whether they can give a permanent ptosis repair in very young children. Donor fascia lata is popular with some surgeons and lyophilised fascia[3,4] or stored irradiated fascia[1] have both been used. Unfortunately, many parents today reject the idea of the use of donor material for repair of their child's ptosis. There is also difficulty in collecting donor fascia, which in the past was obtained by using any excess fascia taken from other children undergoing brow suspension. It would now be necessary for these donor children to be screened for human immunodeficiency virus (HIV) and this is considered to be unacceptable practice.

Some surgeons feel that the best results can be achieved by waiting until the child is more than 4 years of age and then performing a definitive brow suspension using autogenous fascia lata. It has been shown, however, that in children with congenital ptosis obscuring the visual axis there is a risk of sensory deprivation amblyopia developing.[5,6] This, together with other indications such as severe chin-up head posture in bilateral congenital ptosis, may force the surgeon into repairing the ptosis in patients younger than 4 years. We have therefore been using 4/0 Prolene (monofilament polypropylene) suture as our temporary suspensory material in brow suspensions performed in children aged 4 years or less. We present the results of 9 children who underwent temporary brow suspension using Prolene suture, 8 of whom were at risk of developing amblyopia and 1 with bilateral ptosis and a severe chin-up head posture.

PATIENTS AND METHODS

A retrospective study was performed on all cases of children aged 4 years or younger who had undergone brow suspension using 4/0 Prolene suture as the suspensory material during the past 5 years. Of the 9 patients reviewed, 5 were boys and 4 girls. All but 1 had unilateral congenital ptosis which obscured the visual axis. The final patient had blepharophimosis syndrome with severe chin-up head posture and underwent bilateral surgery. The average age of the patients at time of surgery was 21.9 months (range 3–48 months). The average follow-up period was 18.7 months (range 8–29 months).

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All patients underwent a Fox procedure frontalis sling[7] with pentagonal design using 4/0 Prolene suture. At the end of surgery the upper lid margin was left at the level of the superior limbus.

RESULTS

The follow-up results were divided into three categories:

1. *Good*: the post-operative lid position was maintained within 1 mm of the superior limbus.
2. *Moderate*: the post-operative lid position dropped more than 1 mm below the superior limbus but remained clear of the visual axis.
3. *Poor*: the post-operative lid position dropped to obscure the visual axis.

The results on the 9 patients are shown in Table I. All patients maintained a lid position clear of the visual axis. Four patients had a good result with the lid position remaining within 1 mm of the superior limbus throughout the follow-up period (range 8–25 months). Five patients had some post-operative drop of the lid; this was apparent immediately post-operatively in 1 patient and within the first post-operative year in 3 patients. In 1 patient there was a gradual progressive drop but the lid was maintained clear of the visual axis until autogenous fascia lata brow suspension was performed at 69 months of age.

During the follow-up period, 3 patients (patients 1, 6 and 7) subsequently had a brow suspension performed using autogenous fascia lata. The Prolene suture was easily removed and had left no scarring.

DISCUSSION

Most studies agree that the highest success rate for brow suspension is achieved by using autogenous fascia lata. In view of this, we feel that a definitive brow suspension should be planned from age about 4 years onwards when autogenous fascia can be taken easily in most children. The question remains as to what suspensory material should be used in very young children in whom autogenous fascia lata is not available but who require brow suspension. In this situation a suspensory material is required that fulfils the following criteria:

1. Readily available.
2. No risk of transferring infection.
3. Does not prejudice future autogenous fascia lata repair, e.g. by granuloma formation.
4. Easily removable prior to autogenous fascia lata repair if likely to interfere with the placement of fascia lata.
5. Maintains the lid position clear of the visual axis until autogenous fascia lata repair is possible.
6. Allows easily repeatable surgery, if required.

Table I. Results of brow suspensions using Prolene suture as the suspensory material

Patient no.	Side	Age at surgery (months)	Follow-up time (months)	Result	Timing of drop (months)
1.	Right	33	14	Moderate	Immediate
2.	Right	14	12	Moderate	4
3.	Bilateral	8	25	Good	–
4.	Left	16	25	Good	–
5.	Left	48	23	Moderate	12
6.	Right	46	23	Moderate	Gradual
7.	Left	21	29	Moderate	3
8.	Right	8	8	Good	–
9.	Left	3	9	Good	–

We feel that Prolene fulfils these criteria well. As in all studies examining the success of suspensory materials in maintaining lid position, the use of Prolene for brow suspension is likely to have a higher failure rate in the long term. However, since the material is being used for a planned temporary repair until autogenous fascia lata brow suspension is performed, the absolute maximum follow-up period required is 48 months, by which age sufficient autogenous fascia is available.

Many alternative suspensory materials have been tried which were hoped to give a permanent result in young children. Crawford[8,9] has stated a success rate using banked fascia lata of more than 90%. However, the follow-up period is not stated and longer-term studies have been proposed by Townsend and Crawford[10] to prove the permanence of stored fascia lata. Wilson *et al.*[3] investigated the permanency of banked lyophilised human fascia lata in a study with a mean post-operative follow-up of 7.2 years and found increasing numbers of failures with increasing length of follow-up, the success rate from surgery falling from 90% at 2–3 years to 50% at 8–9 years. They felt that the longest-lasting repair is provided by autogenous fascia lata which acts as a permanent 'living suture'. They continue to use banked fascia lata for repair in young children but warn all parents that further surgery will be required in more than 50% of cases. Fox[11] found a high recurrence rate with absorbable sutures, in which group he included preserved fascia. This dropped to almost nil with autogenous fascia.

Many parents feel that the use of donor material in their children is unacceptable because of the perceived risk of transfer of infection. Synthetic materials have been used to try to achieve permanent repair, the most popular being Supramid Extra[12–14] which is a nylon polyfilament cable-type suture. Despite the hope that this would give a permanent result following ptosis repair by being integrated into tissues, Wagner *et al.*[1] showed a high failure rate due to ptosis recurrence (28.1% with mean follow-up of 31.5 months [range 6–66 months]) and granuloma formation (12.4%). The latter complication may prejudice the success of final surgery using autogenous fascia lata and they recommend that the use of Supramid Extra be avoided.

Downes and Collin[15] have described the use of a Mersilene mesh (interwoven polyester fibre) sling as the suspensory material in cases where autogenous fascia lata is inappropriate, i.e. in young children or in adults undergoing surgery under local anaesthesia. The Mersilene mesh is integrated into the host tissue and is therefore used to give a permanent tissue fixation. They report good results in all but 1 of their 15 patients over a minimum fol-

low-up period of 12 months. However, in the 1 patient where a re-operation was required 3 months after initial surgery, the mesh had been firmly integrated into the lid and brow tissue, making removal difficult. Although this patient underwent a successful repeat procedure, the difficulty in removing the Mersilene may prejudice further surgery in some cases.

The amount of stretch in the suspensory material may theoretically influence the operative results. The degree of 'stretchability' can be estimated by the 'extension to break' measurement of the fibre, which is 32% (average figure for 1993; Ethicon Ltd) for 4/0 prolene compared with 22% for 4/0 Mersilene raw fibre. However, the 4/0 prolene and Mersilene mesh strips do not appear to differ in their handling during surgery and are treated similarly. We believe that the recurrent ptosis with Prolene is due not to stretching of the Prolene but to the suture 'cheesewiring' through the tissues. Our practice to date has been to use 4/0 Prolene, but we have recently introduced 2/0 Prolene (extension to break = 38%) to see whether this gives better results.

Other materials such as collagen and preserved fascia have been used, but these too have been found to have a high failure rate.[11]

We suggest using Prolene suture for a planned temporary repair of ptosis until a brow suspension can be performed using autogenous fascia lata. In our experience Prolene maintains the lid position satisfactorily until definitive surgery can be performed. The material is readily available and easy to use. It is inert in tissues and does not provoke a marked tissue reaction, which reduces the risk of granuloma formation. It can be removed quickly without residual scarring and is acceptable to parents for use in their children.

The authors have no proprietary interest in Prolene.

Key words: Amblyopia, Brow suspension, Congenital ptosis, Fox procedure, Prolene.

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