Fasciaform Tympanoplasty

Fasciaform tympanoplasty, also known as formaldehyde-formed fascia graft, or fasciaform graft technique, is not a new procedure. Fasciaform tympanoplasty was first described by Rodney Perkins in the 1970s [1] and has been described in this country by Pfleiderer and Moffat in the 1980s [2]. I learned the procedure a few years ago under the tutorship of Brian Westerberg whilst in Vancouver, Canada on an Otology / Neurotology fellowship. Brian Westerberg learned how to perform the procedure directly from Rodney Perkins himself.

The main indication for performing this procedure is for closing large tympanic membrane perforations. Many other techniques exist to achieve this, but this technique has the advantage of reproducing the characteristic dustbin lid shape of a normal, healthy tympanic membrane, together with its corresponding physical and functional properties. The procedure involves removing the whole of the remnant tympanic membrane with annulus and replacing it with a preformed temporalis fascia graft that has been fixed in formaldehyde. The aldehyde cross-links the collagen fibres of the fascia graft to increase tensile strength and provide a memory so that the graft retains its shape even after rehydration and exposure to blood.

The one thing prohibiting the use of this technique upon my return to the UK from Canada was the unavailability of an essential piece of equipment – the tympanoplasty mould. My efforts to acquire these moulds at home and abroad proved unfruitful so I turned to a medical instrument company by the name of DTR Medical to see whether they could reproduce this vital piece of equipment for me. The process of design and manufacture was complex, high-tech and time-consuming, but the resultant product was well worth the wait (Figure 1).

Indications

The main indication for fasciaform tympanoplasty is for the closure of large tympanic membrane perforations, particularly those lying close to the malleus or a fibrous annulus. Other indications according to Perkins [3] include previous reconstruction with a resultant lateralised tympanic membrane or persistent large true or retraction perforation, the presence of middle ear cholesteatoma with significant involvement of the medial surface of the tympanic membrane, ears that have undergone irradiation and as a technique to address non-healing perforations after slag burn or blast injury.

Technique

I perform this procedure under general anaesthesia with the patient in the standard supine position, but it can be performed under local anaesthesia. After preparation of the operative site the following key elements of the procedure are performed in turn:

1. The area behind the pinna and ear canal is injected with local anaesthesia in the traditional manner.
2. Permeatal incisions into the ear canal skin are made to encircle the tympanic membrane 1 mm lateral to the annulus. Two medial to lateral incisions are made, one at 6 o'clock and one at 11 o'clock (based on the right ear being the operated ear); this allows two skin flaps to be raised in a retrograde fashion, one anterior and one posterior.
3. A post-auricular incision is made and the post-auricular soft tissues are elevated forward to lift the posterolateral ear canal skin out of the ear canal.
4. Temporalis fascia is harvested via an incision that is directly superior to the ear and separate to the post-auricular incision. The quality of the temporalis fascia in this area is considered to be better for this procedure as it is thinner and more regular. Perkins feels that fascia that is thick and irregular may close a perforation but fall short in providing a restoration of function [3].
5. The fascia is placed over a preformed fasciaform tympanoplasty mould (Figure 2) and then dried using a small hair dryer. The mould and fascia are then placed in a small basin of 4% formaldehyde for 12 minutes (Figure 3). The mould and fascia are then placed in three baths of Ringer’s solution.