ON THE FATE OF SKIN WITHIN THE
MASTOID SEGMENT WITH AN ACCOUNT
OF A NEW PEDICLE FLAP*

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The problem of healing in mastoid cavities is still with us despite many
advances in knowledge and operative techniques. The optimal cavity
should be small, completely lined by flourishing epithelium and accessible
through an adequate meatus. The problem is as old as otology itself but
it has received renewed impetus and urgency from the belated recognition
that however successful tympanoplasty may be in dealing with the middle
ear proper, it is doomed to failure unless it achieves a stable mastoid
segment.

It is not surprising, therefore, that there has been a revival of interest
in various methods that have been devised from time to time for filling
the mastoid cavity with viable inserts. Historically we can perhaps
distinguish four stages:

1. Thiersch grafts on raw bone.
2. Secondary skin grafts on granulations at the seventh day after
operation.
3. Supplementary filling of cavity—muscle, fat, bone, etc.
4. Pedicle skin grafts.

What Ely found in 1878, namely that free skin within an infected
mastoid cavity does not survive, has since been frequently ignored, and
it is not surprising that many of the modern techniques of tympanoplasty
which ignore that fact have proved deeply disappointing. Nevertheless,
this failure of free skin should not blind us to the potentialities of pedicle
flaps.

Such flaps have an excellent prospect of survival provided that:

1. They rest on completely healthy bone.
2. They incorporate a well-nourished mesodermal substrate.

One of the earliest contributions along these lines was the quadruple
flap described by Tumarkin in 1938. Here the principle of the mesodermal
substrate is clearly laid down but the operation was abandoned because
of difficulties with the skin fistula. More recently, Beales has described
a technique which is in some way reminiscent of Tumarkin’s. Beales

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claims that fistulae do not occur and that the comparatively thin post-auricular skin survives quite well in the mastoid cavity.

The concept of the mesodermal basis has also been vigorously pursued from early times as by Kisch and more recently, Rambo. Their use of temporal muscle in the mastoid cavity introduces tissue which, although pedicled and therefore with an adequate blood supply, does not survive in its original form and, as shown by Guilford, degenerates into fibrous scar tissue.

My own aim has been to incorporate the important features of both these concepts whilst avoiding their more obvious defects. The technique I now adopt avoids on the one hand the epidermal fistula which marred Tumarkin’s original work and on the other hand provides the skin flaps with their own natural mesodermal substrate rather than with the somewhat artificial tissues recommended by Rambo, Guilford, Thorburn and others.

Description

The problem of fistula formation is easily overcome by ensuring that the pedicle proper does not consist of skin but of superficial fascia. For this purpose, instead of a peninsula, an island of skin is defined as follows. A post-aural incision AD (Fig. 1) penetrates only to the superficial facia and defines in its lower third an ellipse of skin at B.C. (Fig. 2). An incision now through superficial fascia only, outlines a fascial-skin-pedicle flap (Fig. 3). X.Y.C.B.Z. which is dissected free from the deeper periosteal layer and turned upwards out of the wound (Fig. 4). This flap will subsequently be used to line the roof of the mastoid cavity. It remains to find a comparable pedicle flap for the mastoid bowl itself. This is achieved as follows: permeatal incisions AB and CD are made in the roof and floor of the meatus respectively (Fig. 5). The pinna is then turned forward and the post-aural incision which has already been dissected in the formation of the first flap, is widely retracted. I want to emphasize that in this dissection the mesodermal structures are left intact on the mastoid surface except for the pedicle of the first flap. For simplicity I do not show this first flap. A scalpel is now taken and passed through into the meatus in a manner reminiscent of Sheridan and Daggett’s technique (Figs. 6 and 7). The retractor is now widened (Fig. 8) to expose the original incisions in the external auditory canal. These are now extended into the post-auricular muscle (Fig. 9) fascial mesoderm at BX and CY respectively. This composite flap is now dissected up and turned backwards (Fig. 10) exposing the operative field widely. The bone work is now carried out (Fig. 11) and finally the two flaps turned into position (Fig. 12). In this diagram I now show the two flaps. Here the island pedicle, and here the post-aural pedicle. Here you see the two flaps in position (Fig. 13). The upper flap lines the roof whilst the meatal flap lies against the posterior wall.

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Fig. 1.

Fig. 2.

Fig. 3.

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Fig. 4.

Fig. 5.

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This technique may appear to you unnecessarily elaborate but in point of fact it is surprisingly simple. For one thing the exposure and access are so complete that the bone work can be carried out most expeditiously. The cavity epithelializes rapidly and this I attribute mainly to the vitality of the lower flap derived from the twin virtues of full thickness pedicled skin in continuity with its own mesodermal substrate of subcutaneous fascia and periosteum.

For this and other reasons I prefer my own flap to the muscle technique of Rambo. Although initially that muscle has a rich blood supply it
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rapidly falls into a degenerative fibrosis, as Guilford has shown, and we have no assurance that a process of cicatrization thus initiated, might not ultimately devitalize the superjacent skin. This consideration has indeed deterred me from exploiting to the full the possibilities of my own first flap. It is obvious that we could construct an island of almost any required dimensions, and such an island might at first sight be ideal for tympanoplasty. That remains to be seen. My preoccupation so far has been with the advanced mastoid sepsis that constitutes so much of our clinical material.

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In cases of this nature orthodox tympanoplasty has, in my opinion, but little to offer.

It has been suggested to me that by using such a large superior flap one might more or less obliterate the mastoid cavity. That indeed is the avowed aim of the technique recently described by Thorburn. I am reluctant to admit that such complete obliteration is necessary or in fact desirable. I prefer to retain some access to the mastoid bowl, more especially the sino-dural angle. That being so I prefer that the two flaps should not be so large as actually to meet. Given adequate exenteration of bone disease, both flaps are vigorous enough to ensure complete epithelialization. The resulting cavity, whilst smaller than most standard cavities, is yet large enough to ensure adequate access without fear of stenosis. In that respect I would draw attention to the fact that the lower flap, originally intimately adherent to the posterior meatal wall and mastoid cortex, lines the mastoid cavity in a natural position of minimum anatomical and physiological displacement and can be expected to persist and indeed to flourish.

What sort of results can we expect from this technique? Of 30 such cases during the past 2 years, 20 are completely dry and 10 remain moist. Of these 10, four have dry mastoid segments, whilst the remaining six are moist throughout. Thus the procedure has achieved its purpose in 24 out of 30 cases. I must emphasize that since the operation is reserved
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for the most severe and intractable examples of chronic tympano-mastoid suppuration, it has only been indicated in 30 cases during the past 2 years, and that viewed in this light the results are such as to inspire considerable confidence in the procedure.

To sum up:

(1) Skin pedicle flaps are introduced into the mastoid cavity, but the complication of fistula formation has been overcome.

(2) Partial obliteration of the mastoid cavity is achieved whilst unimpaired access is maintained. We have not aimed at total obliteration, which we consider may not be entirely free from risk.

(3) A natural mesodermal skin substrate is provided for the skin flaps.

(4) These are lying in more or less normal position.

In conclusion Sir, although I have described this as a new technique, it will be obvious that the principles underlying it are basic and familiar. In reviewing the literature I find that something like the first flap was described by Vicenzio in 1959. With regard to the second flap I was somewhat mortified to discover its essential features had been described no less than 36 years ago by Smyth of Boston in an article entitled “A Skin-Periosteal Flap for the Radical Mastoid”. He himself hardly tries to hide his chagrin at having to omit the word new from the title on discovering that a very similar flap had been reported by a Dr. E. M. Holmes in 1907. How true are the words of the preacher.

“The thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun.”

REFERENCES

Ecclesiastes i. 9.
Tumarkin, A. (1938) J. Laryng., 53, 737. [This is the second part of an article for which the first part starts on p. 685.]