

AN EVALUATION OF THIERSCH GRAFTING IN MASTOID CAVITIES

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The question whether Thiersch grafting of a mastoid cavity is of definite advantage has been a controversial subject for some years. There is a general trend towards increased popularity in recent years.

Several years ago the author kept records of the period required for complete healing in a series of 38 consecutive cases. This was followed by a consecutive series of 106 grafted mastoid cavities, during which period similar observations were also made on a concurrent group of fenestration cavities.

On surveying the literature one found that there was great variation in the ultimate results. Further perusal showed that this might be due to (a) the technique of Thiersch grafting, or (b) post-operative management. The figures were also dependent on the assessment of a healed mastoid cavity.

This paper is divided into a brief description of

- (1) the types of cases,
- (2) Thiersch grafting and the technique employed,
- (3) the post-operative management and results, and
- (4) the assessment of a healed mastoid cavity; and
- (5) a comparison of the results of other authors, and
- (6) conclusions.

(1) *The Cases*

The total number of cases operated on was 208, including fenestrations. These were European adults operated on in private nursing homes. Almost all cases coming for operation were included. Cases with complications arising from the mastoiditis, such as meningitis, cerebral abscess or sinus thrombosis, were excluded; these numbered only 2. Cases that had previous mastoid operations and where a skin-lined cavity existed were similarly excluded.

(2) *Thiersch Grafting*

There are 3 essentials required in Thiersch grafting, viz. (a) A clean flat-walled mastoid cavity, i.e. one with

no bony overhang and cleared of all pathology, (b) preparation of a tissue-paper-thin epidermal graft, and (c) intimate apposition of this graft to the cavity walls, using a dressing or mould specially chosen for this purpose.

The greatest single advantage claimed for Thiersch grafting is improved epithelialization with subsequent quicker healing.

It is generally accepted that there is a better 'take' on a granulating surface than on bare cancellous bone. Padgett, quoted by Guildford,⁸ states that in primary grafting on bare cancellous bone there is only a 50% 'take'. Also in mastoid cavities, maceration of this epithelium is believed to be more frequent than in skin-grafting elsewhere, leading to slower healing. Luers also believes that mastoid cavities frequently become lined with mucous membrane from the middle ear instead of true squamous epithelium. Primary and secondary skin grafts have been employed by various operators. Each method has its merits.

In secondary skin grafting, the take is almost 100%; a healthier epithelium lines the cavity and infection and maceration are less marked. The graft placed on a granulating surface becomes fixed by fibrin in 24-48 hours. Vascularization begins in 18 hours, and on the 8th day the blood supply is complete. With a greater blood supply there will be less exfoliation of the graft.

These advantages claimed for secondary Thiersch grafting are neutralized by the fact that in secondary grafting 10-14 days are lost and the patient has to be re-admitted for another operation.

In this series the author employed primary Thiersch grafting throughout. The methods of application of the grafts vary; some are simple, some tedious, but the ultimate result is dependent more on the exenteration of diseased tissue, good drainage and an easily accessible cavity, than on the method of application of the graft.

The most perfect graft will not give a dry ear if these other factors are not attended to.

It is not intended to discuss the detailed technique of Thiersch grafting of mastoid cavities, but a summary is presented of the procedure employed. An endaural approach has been used throughout, using the Shambough incision as modified by Meltzer,⁷ who undermines and excises the subcutaneous tissue and some cartilage beneath the concha. In preparing the cavity the gouge, hammer and electric drill are used. A very thin graft is taken from the upper inner thigh and flattened on *tulle gras*, which is then cut to shape and laid into the cavity to cover the middle ear and bony cavity regions completely. Complicated cases were not grafted. Exposed dura, lateral sinuses and facial nerve were grafted over whenever they presented.

An alginate ('Calgitex Red') has been found the most favourable pressure dressing and has been used in all cases, including fenestrations. This dressing possesses certain excellent qualities: (1) It expands into a gelatinous mass, filling the cavity completely and pressing down the graft (I do not think any grafts could be 'floated up' from beneath by blood or exudate). (2) It is non-irritant and allows exudate to escape through it towards the external dressings. (3) It is non-adherent on removal, which procedure becomes almost painless. Its application is simple and not time-consuming.

Expense alone has prevented a more liberal use of this dressing. Mosher¹ used basket moulds. Melted wax moulds were used by Daggett and Bateman.² Farrior^{5, 6} uses synthetic sponge and rayon with great success.

The operation, the post-operative management and the final assessment in this series have been done only by the author and the same trained staff, with a view to attaining a uniform standard of assessment throughout.

(3) Post-operative Management

The first dressing was done on the 5th day, the second on the 7th day and subsequent dressings daily. The *tulle gras* covering the graft was removed on the 10th-14th day. Superficial desquamated epithelium of the grafts was removed from the 14th day. Syringing of cavities was avoided.

The results in the 106 grafted cases were as follows:

1. The grafts took in every case, but not always completely. The 'take' was poorer with thicker grafts. Cholesteatomatous cavities invariably took the grafts very well and healed rapidly.

2. There was much less pain in the early post-operative days owing to the protection afforded by the graft over tender, raw areas.

3. Fewer granulations formed in the healing mastoid cavities. In no grafted case was there any adhesion formed between the dura and facial ridge. The high incidence of dry ears was gratifying and no meatal stenosis occurred in a single case. I attribute these results, chiefly to vigilant after-care by highly trained staff; ribbon gauze pressure-dressings were used in the cavity and meatal opening, changed daily or alternate days for a period of 3-6 weeks in every case. Ear drops were not used or advised. Cavities that were discharging were mopped dry and powdered with a urea-boracic-

sulphonamide powder and more recently with a mixed antibiotic powder. Bacterial flora were not investigated, and all cases were given penicillin only whilst in hospital for a period of 7 days. One mild form of perichondritis occurred (in the 38 ungrafted cases 3 cases of perichondritis occurred).

(4) Assessment of a Healed Mastoid Cavity

The criteria employed by different authors varies considerably. It might be a cavity that has been absolutely dry for a week, or for a month, or one where there are still traces of moisture or one where it is only obvious discharge that has ceased.

Epithelialized cavities are not necessarily quite healed, while imperfectly epithelialized cavities can be dry for long periods. In this series, a cavity has been assessed as healed when all traces of moisture have disappeared for a minimum period of 1 month, the ear being inspected every week for traces of moisture.

(5) Results and Comparisons

In arriving at results, the arithmetical mean of the healing time of each of the 3 series of cases has been taken separately. Certain cases, however, have to be excluded and these are:

All operated cases (grafted or ungrafted mastoids or infected fenestration cases) where there is a persistent discharge and healing appears to be delayed indefinitely. This is done for the reason that such cases will cast an incorrect reflection on the cases that have healed. The healing of a cavity has been counted as indefinitely delayed where discharge has persisted for over 6 months or where breakdown has occurred frequently. Country cases whose follow-up have not been possible have been excluded as well.

Fenestration Cases

The author is fortunate in having had these cases available as a control, since a fenestration cavity merely requires to become epithelialized without having to overcome pre-existing bone infection. There were 62 ungrafted fenestration cavities, and the average healing time of these was 10.5 weeks.

The ungrafted mastoid cavities, 38 in number, took an average healing time of 15.3 weeks.

In the 106 grafted (endaural) mastoid cavities the average healing time was 9.2 weeks.

In the published results of other authors one finds the following results.

Daggett and Bateman² grafted 71 cases, using delayed grafting. They claimed improved results, but have not estimated the periods of healing.

Farrior^{5, 6} strongly supports primary Thiersch grafting, but quotes no cases although judging from his papers he has done a large series of both fenestrations and mastoids.

H. L. Williams³ used primary grafts on 14 cases; dry cavities followed in 8 weeks in 13 out of 14 cases. He sews the graft over moulds of conical-shaped sponges and sutures the graft to the skin edges of the cavity.

Cunning¹⁰ states that the healing time in ungrafted cavities varies between 8 and 16 weeks. He used primary

grafts in 72 cases and advocates the method strongly, but gives no analysis of his healing time.

Guildford⁸ used secondary skin grafts in 60 fenestrations. The average healing time was 9.3 weeks for all cases—including cavities with delayed healing. With secondary skin grafting in uninfected cavities his average was about 7 weeks. In 100 cases of fenestrated cavities ungrafted, the average healing time was 18 weeks.

Withers, Dickson and Wattleworth⁹ quote 20 ungrafted mastoid cavities. The healing times average 9.3 weeks.

Leon White¹¹ collected 100 cases and states that there was no difference between grafted and ungrafted cavities.

(6) Conclusions

Although the author's series is comparatively large, one cannot draw definite conclusions. There are, however, certain deductions that can be made, which are shared by several other operators.

Primary Thiersch grafting definitely lessens the healing time in endaural radical and modified radical cavities, but where for some reason otorrhoea is persistent post-operatively, some other factor besides failure of epithelialization is operating and then grafting is of no avail.

It is interesting to note that grafted mastoid cavities take the same time to heal as ungrafted fenestration cavities, or less. It follows, then, that grafted fenestration cavities should heal still more rapidly, possibly in under 9 weeks. The author has as yet had no opportunity to graft fenestration cavities, but hopes to produce a series in time.

In the series recorded by the other authors quoted there is great variation in the healing time. In ungrafted cases it varies from 9 to 25 weeks. Some of the series too are very small.

Amongst the number of greatly varying factors which one cannot standardize in such series are:

(a) The variation of types of cases operated on. Williams³ grafted only 'radical' cavities, Shambough⁴ 'modified radical'. Farrior^{5,6} describes endaural mastoid cavities which includes, presumably, radical and modified radical cavities.

(b) The assessment of a healed cavity.

(c) The variation in technique in applying grafts.

(d) The variation of grafts, e.g. primary or secondary.

The validity of comparison is therefore dubious, but certainly less dubious in a triple series emanating from one source as reported in this article.

SUMMARY

Thirty-eight ungrafted endaural mastoid cavities were observed in order to assess their healing time, i.e. the time taken to acquire a dry and healed mastoid cavity. A series of 62 fenestrations (ungrafted) were investigated in a similar manner concomitantly with a series of 106 grafted mastoid cavities. The technique was uniform throughout and so were the post-operative conditions and final assessment of cases. The results calculated on the arithmetical mean of each individual series showed that (a) ungrafted cavities took 15.3 weeks to heal, (b) fenestration cavities 10.5 weeks, and (c) grafted cavities 9.2 weeks.

In reports by other authors, there was great variation in healing time, due obviously to the great number of variable factors, e.g. type of operation, post-operative management, assessment of a dry ear, and the number of surgeons contributing to a single series. The general conclusion, however, was that grafting of mastoid cavities definitely reduces healing time.

Grafting should therefore be of even greater value if employed in fenestration cavities.

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