

the following words: "His life was full of effort and work! Inexhaustible industry and rare energy distinguished it. A truly good man has been taken from us in the person of Lucae. His memory will, however, always survive in the history of otology as one of the first masters, and it will never fade in the hearts of his pupils and friends."

He was born on August 24, 1835.

D. G.

**IMPROVED TECHNIQUE OF THE THIERSCH GRAFT
FOLLOWING THE RADICAL MASTOID OPERATION:
PRELIMINARY REPORT.**

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IN the technique of the Thiersch graft following the radical mastoid operation, it is absolutely essential that that operation be done in a very thorough manner. Every individual cell is destroyed until hard bone is encountered, or the dura, sinus, or nerve uncovered. This final destruction of cancellous bone is best accomplished with a hand burr. It can be done with a burr driven with electricity, but I prefer the electric burr for the bone of greater density. It is very essential that all the uneven surfaces be made perfectly smooth. The outer part of the bony meatus must be removed sufficiently to be on a horizontal plane with the floor of the tympanic cavity. The posterior bony wall must be cut down to the floor of the newly made bony meatus. By this procedure more room is gained, and the pocket formed by the tympanic cavity is eliminated.

In the removal of the posterior bony meatus and facial spur, great care must be exercised not to injure the facial nerve. This is best overcome by chiselling the wall away with large chisels, and working parallel to the nerve, so that in the event of the nerve being uncovered it would not be cut. This particular method will enable the operator to remove more bone than any other, and with more safety to the facial. The mucous membrane of the tympanic cavity must be entirely removed. I mean that after a very thorough inspection none can be detected. In doing so it will be necessary in most cases to use a hæmostatic agent of some kind, such as hot saline solution, peroxide of hydrogen, or adrenalin. Most careful attention must be directed to the Eustachian tube in

order to remove the mucous membrane thoroughly. The tympanic wall should be so thoroughly removed by chisel and made smooth by burrs that the small searchers of Jansen's will not be arrested.

Everything that has been said so far is important in every radical ear operation. However, it is much more important when the Thiersch grafts are to be applied, as any infection that may remain in the bone will ultimately destroy the graft, and you will fail to accomplish what you set out to do. The Neumann plastic should be adopted in preference to all others for this particular procedure, the upper and lower flap being sutured in place, and the point of the **V** sutured to the auricle. The sutures to be used in holding the **V** part of the plastic should be catgut. The sutures for the upper and lower flap had better be catgut; if not they must be removed when the skin-graft is applied. The other sutures, if allowed to remain, may or may not cause trouble in the after-treatment of the case.

Four days following the radical ear operation the Thiersch grafts are applied. This particular time has been selected because the granulations are comparatively small, although in some cases they are quite large. After trying the grafts both earlier and later, I have selected the fourth day succeeding operation as the best for all cases. In the near future I am going to use this same procedure in detail at my first operation.

On the fourth day, patient having been anæsthetised, the operation field is cleaned in the usual way. The whole cavity will be covered with granulations, all of which must be most carefully removed; special attention must be directed to the tube. At this time I use hot saline solution as a hæmostatic agent, inspecting the cavity from time to time, and finally, to reassure myself, using peroxide of hydrogen several times. When I am satisfied that everything is away, I put in gauze saturated with adrenalin; this gauze is held in the cavity under pressure by an assistant while the grafts are being prepared. At the time I begin my preparation of the ear, the nurses are preparing the leg or part from which the grafts are to be taken. In this preparation bichloride has never been used. Steil salt solution is used in excess, all the other aseptic procedures being followed.

I try to get about three or four grafts $\frac{1}{2}$ in. wide by 1 in. long. Some smaller ones $\frac{1}{4}$ in. by $\frac{1}{2}$ in. Some of the grafts may be lost in preparation or in applying them. The Jansen spatula is used. Grafts are taken from the razor direct to the spatula, and after all edges are straightened they are put aside for use. When the

grafts are in readiness the adrenalin tampon is removed from the ear. The cavity will be found to be absolutely dry, and if not more adrenalin must be used, as the cavity must be free from oozing blood or the graft will not adhere. The first one is fastened with a searcher into the tube, bringing it out over the floor of the tympanic cavity posteriorly; second, superior to the first, brought back over facial into mastoid cavity. The third usually covers the remaining wall of the attic and antrum. The three that have been used are the larger ones. The uncovered areas that are now left are covered by the remaining grafts, the one being selected that will cover the denuded area best. Small pledgets of cotton are now used to fix the grafts; they must be so small that they do not touch either surface while being put in place. The first one is put over the tube, the second firmly applied to the posterior superior quadrant, the next over the stapes, and so on until all the grafts are held well in place, so that they will not be materially disturbed when a dry tampon is introduced. The size of this tampon corresponds to a piece of gauze 4 in. to 6 in. square. After the dry gauze a similar piece of gauze is saturated with the oil of vaseline (Cheseborough), and packed within the mastoid cavity. After this a similar piece, in size larger or smaller, as the occasion may demand, is inserted to fill the entire cavity made by the operation.

The posterior wound is now closed in the usual manner. It will be found that an additional tampon by way of the meatus will assist materially in holding the plastic in the desired position, resulting in a very large meatus, with cut surfaces all within the ear. This materially adds to the comfort of the patient, as well as preventing contracted meatus. The usual outside dressing is applied. The ear tampons are removed on the fourth day.

If there is any difficulty or pain in the removal of the tampons peroxide of hydrogen can be used in excess to soften and loosen tampons, to get rid of blood, and to stop bleeding, so that the small cotton fasteners that were put in to hold the grafts in place can be seen and taken away.

In 50 per cent. of the cases you will look into a white cavity; in fact all of them will be seen to be white if trouble is taken to stop the bleeding that comes from the inner surface of the soft parts that have been sutured and could not be covered with graft.

This is the improved technique of the Thiersch graft in the radical ear operation.

As a matter of fact a graft never adheres sufficiently to the tampons to be torn from its attachment. I have purposely tried to pull one away for experimental purposes, but it was so firmly attached that the ordinary Politzer ear forceps would slip off. I was compelled to use an anatomical forceps and to hold with considerable strength to pull away.

In some of the cases the outer layer of epidermis loosens; this occurs in ten days or two weeks after the graft had been applied, and a delicate epidermis is left that hardens in a very short time. I hardly know how to account for the fact that in some cases the entire graft remains in place while in others the outer layer comes away. The only explanation that I can offer is that in some instances the graft is too thick. However, this does not seem to be serious, as the cases heal in about the same time. Occasionally it will happen that granulation-tissue makes its appearance when the edges of the graft are not in perfect apposition, but it is very easily destroyed with the ring knife. At the next dressing the denuded area will be found to be completely dermatised.

Occasionally, excessive granulation-tissue makes its appearance posteriorly in the region of the plastic. It can be removed with the curette, and the cavity packed tight with gauze saturated with sterile oil of vaseline. Contrary to the teaching of to-day bichloride of mercury 1:3000 is used to irrigate the cavity. This is necessary when there is an unusual amount of pus, or odour from secretion. In other instances when there is more *débris* than should be, I always irrigate with the intra-tympanic cannula and under inspection, so that the force of the stream is directed to the particular spot that requires attention. I also irrigate with normal salt solution, sterile water, and boracic acid solution.

As has before been said, the oiled dressing is removed in four days, or sooner if necessary. In two days a second dressing is made, which usually includes an irrigation of bichloride of mercury of 1:3000, and from this time on the wound is dressed daily until complete recovery.

The particular reason for the bichloride irrigation at the second dressing is to remove the disagreeable odour caused by the oil of vaseline becoming rancid. This happened in all my cases, but I did not care to make a change until this report had been made. In a case operated a few days ago I used $\frac{1}{2}$ per cent. solution of carbolic acid in paraffin oil U.S.P., and to my surprise there was no odour; besides, the mastoid cavity was in

better condition than in any of my previously operated cases. In fact the case is so near well in two weeks that it is difficult to find uncovered areas. I believe this antiseptic added to the oil will further materially improve the technique. This case is not included in those reported.

The final procedure of every dressing is a final drying of the ear. After this pulverised boracic acid is blown into the ear and single small pieces of gauze $\frac{1}{2}$ in. square with a small roll of gauze to fit snugly into the outer meatus are inserted. As a rule the bandage is left off from ten to twelve days after the original operation.

In several of the cases vertigo was complained of for some time. In three instances it continued after the ear was entirely dry. The only explanation that I can offer is that of a circumscribed labyrinthitis that has not entirely recovered—there remains a hyperæmia of the bony canal—or possibly it occurs because the canal is simply covered by epidermis and is more or less influenced by the atmospheric temperature. To counteract this latter I packed the meatus, but it did not seem to have any influence. Another reason that occurred to me was that of pressure on the stapes by the graft.

The only cases that were excluded from this series of twenty-one cases were one of labyrinth suppuration and two in which the dura was so diseased that it would not have been safe to use a skin-graft.

CASE 107.—Hearing not improved. Can offer no explanation. In my history-card she is marked "lengthened Schwabach."

CASE 119.—Hearing made worse. This case had an acute serous labyrinthitis which subsided; two weeks after had a similar attack.

CASE 121.—Hearing made worse. Can offer no other explanation than an impaired cochlea, which was shown by the Schwabach test; this patient had a circumscribed labyrinthitis as well. This is also one of the patients who has more or less vertigo and tinnitus; this is disappearing and, I believe, in a comparatively short time will be gone.

CASE 123.—Perfect result, but have no way of measuring the hearing.

I wish to say that never before in the history of otology have eighteen cases been brought to healing in so short a time.

That never before in a series of 18 cases were 4 cured in 3 weeks. That never before in a series of 18 cases were 10 cured

in 4 weeks. That never before in a series of 18 cases were 4 cured in 6 weeks. (This latter statement may not be correct.) That never before in a series of 18 cases was the hearing improved in 14 of them. That never before in a series of 18 cases were 11 of them made to hear a whisper 15 feet or more. That never before in a series of 18 cases were 7 made to hear a whisper at 25 feet or more.

In conclusion, I will now make the statement for the first time, unreservedly: Every case of chronic suppuration is dangerous to the individual and should be operated, and that all cases will recover if properly operated.

Second, that the hearing will be improved in the large majority of cases.

Third, that there is no danger associated with the operation provided that the labyrinth is intact. The latter statement is based approximately upon two hundred mastoid operations.

Table of Cases.

| Case. | Age. | Sex. | | Duration of discharge. | Operative findings. | Hearing. | | Duration of after-treatment. |
|-------|------|-------|---------|------------------------|---------------------|-------------------|------------------|------------------------------|
| | | Male. | Female. | | | Before operation. | After operation. | |
| 104 | 26 | | + | Childhood | Cholesteatoma | Whisper 6 in. | Whisper 6 ft. | 6 weeks |
| 105 | 14 | + | | 2 years | " | Speech 6 ft. | Speech 15 ft. | 4 " |
| 107 | 28 | + | | Childhood | " | Whisper 3 ft. | Whisper 3 ft. | 6 " |
| 108 | 19 | | + | " | " | " 12 ft. | " 26 ft. | 4 " |
| 109 | 10 | + | | " | " | " 1 ft. | " 25 ft. | 4 " |
| 110 | 14 | + | | " | " | " 1 ft. | " 25 ft. | 4 " |
| 111 | 25 | | | 2 years | " | " 3 in. | " 6 ft. | 6 " |
| 113 | 33 | | + | Childhood | " | " 3 ft. | " 20 ft. | 3 " |
| 115 | 26 | + | | 1 year | " | " 15 ft. | " 26 ft. | 4 " |
| 117 | 16 | + | | Childhood | Caries | " 1 ft. | " 6 ft. | 4 " |
| 118 | 12 | + | | 5 years | " | Speech 3 ft. | " 25 ft. | 3 " |
| 119 | 16 | + | | 2 " | " | Whisper 25 ft. | " 3 ft. | 4 " |
| 120 | 9 | + | | 7 " | Cholesteatoma | " 1 ft. | " 6 ft. | 3 " |
| 121 | 29 | | + | Childhood | Caries | " 6 in. | Speech 6 ft. | 3 " |
| 122 | 29 | | + | " | " | " 3 ft. | " 3 ft. | 4 " |
| 123 | 4 | | + | 3½ years | Cholesteatoma | — | Good | 4 " |
| 124 | 30 | + | | Childhood | " | Whisper 2 ft. | Whisper 15 ft. | 5 " |
| 125 | 18 | | + | 10 years | " | Speech 2 ft. | " 25 ft. | 4 " |

18 cases in all; 11 male, 7 female; 13 cholesteatoma and 5 caries.

The duration of after-treatment dates from the day of the radical mastoid operation and not from the date of graft, which was four days later.