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Deep temporalis fascia in tympanomastoid reconstruction

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Summary

Various techniques have been described in the reconstruction of mastoidectomy cavity in an attempt to minimize or control the problems of persistent postoperative otorrhoea. We report the efficacy of deep temporalis fascia and its pedicled flap in 34 cases. Retrospective study method was used. There were 34 cases, 19 males and 13 females, the age ranged between 5 and 64 years, mean of 28 years. The clinical pathology included mastoiditis which was common to all the patients, others are middle ear polyp in 7, mastoid abscess 6, meningitis 4, lateral sinus thrombosis 3 and cholesteatoma 2. Comorbidity factors included diabetes mellitus in 2, moderate anaemia in 3 and septicaemia in 7. The procedures comprised of 18 modified radical mastoidectomy (MRM) and 8 atticostomy (AA) with lining of the resulting cavity and tympanoplasty using a pedicled temporalis fascia flap; and 8 cortical mastoidectomy (CM) and tympanoplasty using a graft. The success rate in terms of control of otorrhoea was 55% and there was no case of postoperative wound infection, an improvement compared to an earlier report. In addition there was a reduction in terms of postoperative hospital stay to an average of 9 days. We found the technique simple to learn and needing minimal equipment, hence relevant to otolaryngologic practice in a resource – poor environment. In addition the deep temporalis fascia is an autologous tissue with no risk of immune rejection. We recommend that mastoid reconstruction with the temporalis fascia becomes a routine in mastoidectomy so as to achieve control of chronic discharging ear, particularly in the sub-Saharan Africa where this is still predominant.

Keywords: *Deep temporalis fascia, mastoid reconstruction, otorrhoea, sub-Saharan Africa.*

Résumé

Différentes techniques ont été décrites pour la reconstruction de la cavité mastoïdienne en essayant de minimiser ou contrôler les problèmes d'otorrhée postopératoire persistente. Nous rapportons

l'efficacité de la fascia temporalis profonde et ses facettes chez 34 cas. Dix-neuf mâles et treize femelles âgés de 5-64 ans, d'une moyenne de 28 ans. Les pathologies cliniques démontraient la mastoïdite comme la plus commune chez les patients, 7 cas d'oreille moyenne polype, 6 abcès mastoïde, 4 cas de méningite. Les facteurs de co-morbidité incluaient 2 cas de diabète mellite, 3 cas d'anémie modérée et 7 cas de septicémie. Les procédures comprenaient dix-huit (18) cas de mastoïdectomie radicale modifiée et huit (8) cas d'atticoantrostomie avec une cavité et tympanoplastie et huit (8) mastoïdectomie corticale et tympanoplastie utilisant le greffe. Le taux de succès dans le contrôle de l'otorrhée était de 55% et il n'y avait pas de cas d'infection des blessures postopératoires, une amélioration comparée au rapport précédent. En plus, il y avait une réduction en termes d'admission postopératoire à l'hôpital en moyenne de 9 jours. En conclusion, nous avons trouvé une technique simple à apprendre et demandant des équipements minimaux, ainsi aidant des pratiques otolaryngologiques dans un environnement à ressources réduites. Nous recommandons que la reconstruction de la mastoïde avec la fascia temporalis devienne une routine sans risque de rejet immunitaire.

Introduction

The problems of discharging mastoid cavity has been a major challenge to otology, it still remains so in developing Africa where it accounts for about 25% of out-patient otolaryngologic practice [1]. Various techniques have been described for the management of the mastoid cavity either due to the infection or resulting from surgery. These include the obliteration of the cavity with bone patee, bone cement, cartilage, temporalis muscle bulk or lining of the mastoidectomy cavity and tympanoplasty with a postauricular based soft tissue flap or fascia [2,3,4].

The use of vascularized temporalis fascia flap to line the mastoidectomy cavity and reconstruct the defect in the tympanic membrane was first described in 1959 and has since remained a popular procedure among otologists worldwide [5]. High success rate in terms of healing of the mastoid cavity and control of otorrhoea has been reported by various authors

[2,4]. This is a review of the 34 cases of deep temporalis fascia / flap reconstruction of cortical and open mastoid cavity and tympanoplasty. Access to the fascia was obtained by an extended postauricular incision, an endaural incision and a separate hairline incision.

The anatomy of the temporalis fascia and report of our experience highlighting our limitations and the possible ways of improvement are hereby highlighted.

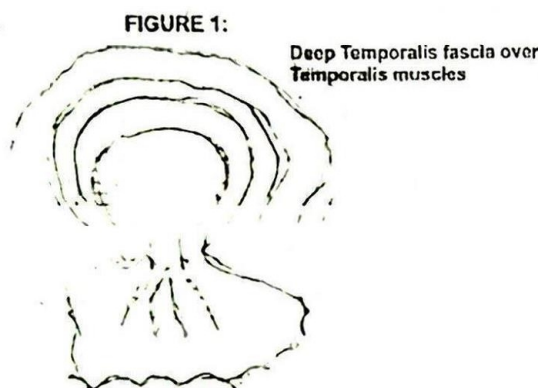


Fig. 1:

Anatomy

The deep temporalis fascia is a distinct fascial layer applied to the outer surface of the temporalis muscle [5,6]. It is different from the superficial temporalis fascia which is directly below the fatty layer and hair follicle and it spans from the zygomatic arch to the vertex attaching to the galea above, the frontalis muscle anteriorly and the occiput behind. Histological sections confirm middle temporal artery, a small branch of the superficial temporal artery, running superficial to the zygoma to enter the deep temporalis fascia while the superficial temporal artery supply the superficial fascia [5,6,7]. They are both accompanied closely in their course by the veins. The total surface area of the deep fascia on either side of the head is 260m², thus implying that the fascia should always be available for repair even in repeat surgery [7,8]. The existence of a separate

blood supply to the superficial temporalis fascia makes it easy for the two to be used differently. The fascia based on its pedicle provides a large surface area of richly vascularised tissue with ample width and length to line the surgically created cavity and construct the tympanic membrane. (Figure 1)

Clinical profile of patients

From the year 2003 through 2005, 34 surgical procedures were done on 32 patients managed (2 patients had repeat procedures). There were 19 males and 13 females, the age ranged between 5 and 64 years, mean of 28 years. Diabetes mellitus in 2, moderate anaemia in 3 (Packed cell volume between 26 - 29%) and septicaemia in 7 constituted preoperative comorbidity factors, they were all routinely tested and found to be HIV – negative. Surgery was done after control the comorbid condition.

The pathology in the 34 cases was complications of chronic suppurative otitis media (CSOM). These include mastoiditis which was common to all the patients, in addition, we found middle ear polyp in 7, mastoid abscess 6, meningitis 4, lateral sinus thrombosis 3 and cholesteatoma 2.

The 34 surgical procedures included 18 modified radical mastoidectomy (MRM), 8 atticoantrostomy(AA) and 8 cortical mastoidectomy (CM). The deep temporalis fascia flap was used both for lining of the resulting cavity and tympanoplasty in the 18 MRM and 8 AA while the 8 cortical mastoidectomy had tympanoplasty using a graft. The need for obliteration of the mastoidectomy cavity and tympanoplasty was the wide size of the cavity and communication with the exterior which could predispose to recurrent infection and persistent otorrhoea.

Principally, the incisions used were postauricular in 30, endaural in 4, and hairline extension was adopted for rotation of large flap in 14 MRM and 1 AA (Figures 2 and 3). We used surgicel pack/gel foam for middle ear packing and support of the graft while mercurochrome – impregnated surgical gauze was used for external ear canal (EAC) packing postauricular wound closed in layer.

Postoperatively, antibiotic/steroid ear drop were applied on the EAC dressing daily. The postauricular sutures were removed between 3rd and 5th postoperative day; the EAC dressing were

removed on postoperative day 5 and direct ear drop continued till day 21. Patients were discharged home between 6th and 21st postoperative day. An average of 9 days.

The tympanic membrane graft was intact in 18 (55%) while there was loss of the graft with suppurative otitis media in 15, this was observed between 21 and 90days after surgery. The intact tympanic graft had intermittent exudation for about 2 to 4 months before it assumes the consistency of normal tympanic membrane. Hearing test done between 3 and 6 month revealed no hearing gain in 16/18 patients and hearing gain of 20dB gain in 2/18. Postoperative facial nerve palsy was recorded in 1 patient. The histology of the middle ear mucosa/polyp revealed cholesteatoma in 3 while the rest was chronic pyogenic infection with hyperplastic mucosa.

FIGURE 2:

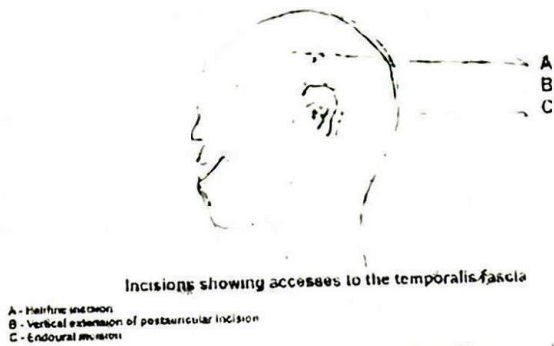
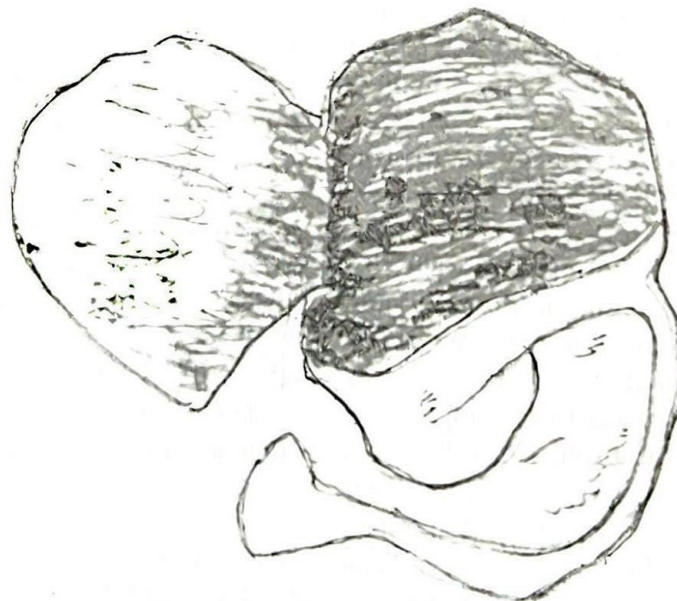


Fig.2:

Discussion

The open cavity mastoidectomy is one procedure that has employed the basic surgical principle of wide access to facilitate removal of all mastoid disease, however the resulting cavity needs meticulous care to control recurrent infection and suppuration. The use of bone dust, bone patee and bone cement has



Deep Temporalis fascia displayed before reconstruction of mastoidectomy cavity.

Fig. 3:

Outcome

The patients were seen in otorhinolaryngology clinic for a period of between 9 months to 2 years after surgery. All the patients were reviewed by the authors and trainees using the simple otoscopy and microotoscopy.

not been popular because of unaffordably high cost of procurement. In our setting in Africa, the deep temporalis fascia would seem to be the best alternative for the lining of this cavity and tympanoplasty. The advantages being minimal additional cost and as an autologous tissue, it is

compatible. The decision to use a graft or a flap seem to depend mainly on wide size of the mastoidectomy cavity however there is no hard and fast rule it was rather a subjective assessment. The need for reconstruction is the tendency to re-infection and persistent suppuration in large - sized cavities. The major requirement of this technique is good surgical training and magnification technology. The benefit to patient include short postoperative stay in the hospital and simple postoperative care. This is the rationale behind commencement of antibiotic drop within 2 days after surgery, it is easy for patients/ relation to apply after discharge from the hospital, forms an additional antiseptic and keeps the external ear canal pack moistened for ease of removal. In addition it obviates the need for a bulky mastoid dressing. The absence of wound infection in this series is also a remarkable benefit to patients. In an earlier report, the incidence of postoperative wound infection was 16% [9], we feel that the excellent surface provided by the living fibrous layer of the deep temporalis fascia provides the optimal substrate for epithelial resurfacing of the cavity and the wound thus allowing healing even under unfavourable circumstance. We reported a success rate of 55%, this is still not comparable with a success rate of 97% reported by van Hasselt *et al* [10]. The high proportion of postoperative otorrhoea and graft failure, 45% may be attributed to many factors. This includes incomplete surgical excision of disease attributable to the lack of operating microscope, difficulty in maintaining asepsis, presence of advanced disease, immunosuppression and preoperative septicaemia in the patients. While it is generally advocated that reconstruction and tympanoplasty should follow mastoidectomy in order to control chronic suppuration, careful patient selection for a one - stage or two - stage procedure is mandatory because of the risk of postoperative wound sepsis and graft failure. The other constraint is the difficulty in getting financial support to pay for the second surgery due to poverty and unaffordable hospital bill. The decision on the tilt of the balance will usually be acquired with experience. In this report, 30 procedures were done under direct vision while 4 cases were done using operating microscope. Further is the limited availability of disposable operating equipment such as gel foam for middle ear packing and absence of sponge for hemostasis and bismuth iodide paraffin for external ear packing. All these hindered strict

maintenance of asepsis in the operative and postoperative environment, thus contributing to graft failure and prolonged stay in the hospital postoperatively. However this is the first report of the series, it is hoped that our expertise in the technique will improve. This will involve continuing education in otology and temporal bone dissection. This may reduce the effect of the surgeon's factors which have been identified by Sade *et al* [2] as contributing to achievement of a dry ear. These include keeping the cavity as small as possible, lowering the facial ridge, closing the Eustachian tube and creating a well proportioned wide external meatus. In our setting otologic education has been grossly inadequate due to paucity of trained otologists and lack of the necessary infrastructure needed for contemporary otologic practice. However it is our impression that this technique is simple, easy to learn and equipment need is minimal. In addition to immense benefit to the management of mastoid cavity and other causes of skullbase defects, instrumentation is simple, affordable to non - specialist and mission hospitals in resource - poor and underfunded environment. This is relevant to the otolaryngologists practicing in the sub-Saharan Africa where persistent ear suppuration and its complications account for the highest proportion of the practice.

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