AUTOGRAFT OSSICLES IN CHOLESTEATOMATOUS EARS: A CLINICO-PATHOLOGICAL STUDY

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INTRODUCTION

Ossicular discontinuity is a common problem in patients with chronic otitis media especially those with cho- lesteatoma, a problem, which need ossicular reconstruction. Many trials were done for ossicular chain: recon- struction using autologous graft with remarkable results (Plester, 1959 Hall & Rytzner, 1961). The usefulness of autologous grafts is however challenged and considered to be risky by many authors, because of the danger of reimplantation of tiny squamous cells, Which not infrequently adhere to the ossicles (Steinbac and Hildmann, 1972). The previous restrictions led many atologists to replace autografts with homografts or alloplastic grafts, but several reports pointed to the unpredictable results with such materi- als (Rubin & Clegg, 1980; Sanna et al., 1984). Doubts which developed with the use of homografts and allo- grafts stimulated Us to reconsider the autografts of the ossicles being easily available, trying to evaluate the extent of histopathological changes to see whether it is possible to reuse it or not.

MATERIAL AND METHODS

Ossicles removed at surgery from 30 chronic middle ears associated with cholesteatoma were processed for histopathological examination. In 20 cases the ossicles were fixed in formaline 10 % and decalcified in 2 per cent nitric acid. Specimens were embedded in paraffin after dehydra-
tion in increasing concentrations of alcohol solutions. Serial sections 4-7 micron thick were stained with hematoxylin-eosin.

In 5 ossicles all the soft tissue was carefully removed and the ossicles were immediately autoclaved, for 5 minutes with 134 a°, before processing. In another 5 ossicles after soft tissue removal, the outer 2 mm. of the whole circumference of the ossicle was drilled then the ossicle was autoclaved and processed as before. 4 of the auditory ossicles treated with autoclaving (with or without surface drilling) were sawed open and a smear of the surface and another one from the interior were sent for bacteriological examination.

RESULTS

The presence of cholesteatoma tissue was confirmed histologically in all the obtained specimens. Areas of bone resorption were encountered in nearly all specimens of the first group. These areas were found either at the periphery of the ossicles, which exhibited an irregular eroded border or even a scalloped margin (Fig. 1), or inside the bone, as indicated by enlarged vascular spaces (Fig. 2). Of specific interest was our observation that changes inside the ossicles were restricted to those ossicles showing pronounced destruction on the surface while partially eroded ossicles showed no affection of the medullary spaces. No stratified squamous epithelium was ever found in direct contact with the destroyed areas of bone being separated from them by granulation or connective tissue with or without evidence of chronic inflammatory reaction, (Fig. 3). Penetration of cholesteatoma into the deep vascular spaces of the bony ossicles was never encountered in our specimens.

In all the autoclaved ossicles the external shape remained generally unchanged and the typical structure of a haemopoietic marrow enclosed in a shell of periosteal bone was preserved. Vital epithelial rests or chronic inflammatory cells were not found in any of the serial sections. In the bacteriological test neither on the surface, nor in the interior could any germ
persistence be ascertained.

DISCUSSION

The difficulty of reimplantation of ossicles in cholesteatomatus middle ears has been investigated by numerous authors and universally confirmed. Austin (1971) pointed to the occasional instance of absorption of the graft, while Bellucci and Wolff (1966) warned against the possibility of progressive osteitis. However, the invasion of the ossicles with squamous epithelium with possible postoperative cholesteatoma recurrence, as was observed in a small percentage of cases by Jako and Jensen (1966) or in a large percentage of cases by Baron (1967), represented the main risk.

Rudi (1958) and Tumerkin (1958) suggested that bone resorption is the result of direct pressure on the bone by cholesteatoma. Later, Thomsen et al. (1974) and Sade et al. (1981) observed that eroded middle ear ossicles were always surrounded by an inflammatory reaction and suggested that inflammation is the major cause of bone resorption. It has been shown that the granulation tissue adjacent to the eroded bone is capable of producing a variety of enzymes and mediators that enhance bone resorption. Since the keratin produced by cholesteatoma stagnates and is only partly cleared, it creates ideal conditions for bacterial growth with subsequent progressive infection and secondary inflammatory reaction. Accordingly, in order to arrest this inflammatory reaction, Sade and Berko (1974) stressed on complete removal of the keratinizing stratified squamous epithelium.

Through removal of the cholesteatoma matrix together with the underlying soft tissues from the surface of the ossicle followed by autoclaving assure sterilization and control of infection. This was proved in our study when no growth of germs could be detected in the bacteriological test, and although Austin (1971) did not relate bone resorption to the inflammatory reaction, he observed that resorption becomes negligible after autoclaving.

Bone resorption occurring at deeper
levels of the ossicles represents the only drawback of our technique being often inaccessible to surgery. Nevertheless, our observation that such changes are restricted to ossicles with marked erosion on the surface can be of help; any bone with more than mild erosion should be discarded in favour of homografts. We did not go so far, as Pulec & Sheehy (1973) to consider removal of the matrix and autoclaving sufficient in any ossicle not totally destroyed by cholesteatoma.

Penetration of a cholesteatoma into the ossicles was mentioned by Sade (1972) as a rare incidence occurring in 6 out of 50 of his studied series. Wayoff et al. (1987) confirmed this finding although they found it more rare (2 out of 100 cases). However, this not recorded in any of our cases which showed only squamous cells occasionally adherent to the ossicles. Drilling of the outer 2 mm of the surface of these ossicles eliminated such cells and subsequent autoclaving destroyed any squamous epithelium that might have invaded deeper as was proved by absence of any vital squamous cells in our treated sample.

Our histological and bacteriological findings have encouraged us to reimplant autogenous drilled autoclaved ossicles in 6 middle ears with cholesteatoma. Transposed ossicles have not been removed thus permitting microscopic study on an ossicle which had been transplanted for several months or years. Nevertheless, these patients have been followed carefully with periodic examination and hearing tests for at least 24 months.

In non of them have Any sign of recurrent cholesteatoma, repulsion of the ossicle or deterioration of the initial hearing gain been observed. This was pointed to before by Pulec and Sheehy (1973) who stated that autoclaving does not alter the behaviour of the ossicles when reimplanted.

**SUMMARY**

The results of this study revealed that squamous epithelium was never found in direct contact or in the deeper vascular spaces. In almost all cases it was separated from the bone by
granulation tissue. Penetration of cholesteatoma into the deep vascular spaces of bony ossicles was never seen in our specimens. The examined ossicles after autoclaving showed no vital epithelial rests and were bacterio-
logically sterile. Our histopathological and bacteriological findings have encouraged us to consider reimplantation of autogenous drilled autoclaved ossicles as nearly safe and risk-free process.
Fig (1): Areas of bone resorption and scalloped margins at the periphery of the ossicles (Hx&Ex40)

Fig (3): Squamous epithelium of cholesteatoma tissue being separated from the bone by granulation tissue and inflammatory cells (Hx&Ex4d)

Fig (2): Enlarged vascular spaces indicating internal bone resorption (Hx&Ex40).

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REFERENCES


أمكانيّة عادّة الزرع الذاتي لعظِمات الآذن الوسطي
في حالات الالتهاب المزمن المصحوب بالكلورتيكايِثوُما

دراسة باثولوجية اكلينيكية

أجريت هذه الدراسة لمعرفة التغيّرات الباثولوجية وتقدير مدى الإصابة في عظِمات الآذن الوسطي في حالات الالتهاب المزمن المصحوب بالكلورتيكايِثوُما. وكان الغرض من هذه الدراسة هو معرفة مدى أمكانيّة إعادة زرع هذه العظِمات في المرضى. وقد جرى البحث على عدد 30 عظِمة قسمت إلى ثلاث مجموعات كالتالي:

المجموعة الأولى: عدد 10 عظِم تم استخراجه عند إجراء جراحة وحفظت مباشرة في محلول هالار مجزأ وجهزت للفحص الميクロسكوبِي العادي بعد إزالة الكالسيوم وتبيث من الفحص أن نسيج الكولستيما تزامبا لم يلمس أبدًا سطح العظِم وأنه كان مغطوًا منها بأسلحة التهابية رخوية. وثبت أن تخفُّى العظام الناتِجة يؤثر فقط في الطبقة الخارجية ولايتفق داخل العظِم إلا في الحالات الشديدة الإصابة.

المجموعة الثانية: عدد 5 عظِمات أُغليت منها الأجزاء الرخوة وكذلك أُزيلت الطبقة الخارجية بسُكماً من كافة الخواف وجهزت للفحص كما سابق وتبيث من الفحص خطر العظِمات من أي نساجة التهابية أو نساجة الكولستيما تزامبا.

المجموعة الثالثة: عدد 5 عظِمات عمِلت كما سابق في المجموعة الثانية بالإضافة إلى حفظها في الألكولاف لمدة 5 دقائق عند درجة حرارة 134. ثم جهزت للفحص الميクロسكوبِي كما سابق وتبيث أن لا يوجد أي آثار للنَّساجة التهابية أو نساجة الكولستيما تزامبا بالإضافة إلى خُروها من أي ميكروبات كما تبيث من الفحص الميكلروبُولوجي.

وتعتبر النتائج السابقة أنه من الممكن إعادة زرع عظِمات الآذن الوسطي في المرضى بعد إزالة النَّساجة التهابية وانسجة الكولستيما تزامبا وكذلك بعد تعقيمها في الألكولاف.

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