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 cholesteatoma, a problem, which need ossicular reconstruction. Many trials Were done for ossicular chain: reconstruction using autologous graft with remarkable results (Plester, 1959 Hall & Rytzner, 1961). The usefullness 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 alloplasflc grafts, but several reports pointed to the unpredictable results with such materials(Rubin & Clegg, 1980; Sanna et al.,1984). Doubts which developed with the use of homografts and allografts 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 micronsthick 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 (wlth 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 observasion 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 w-ithout evidence of chronic inflammatory reaction, (Fig. 3). Penetration of cholesteatoma into the deep vuscular 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

persistency be ascertained.

DISCUSSION

The difficulty of reimplantation of ossicles in cholesteatomatus middle ears has been investigated by numeruos authors and universally confirmed. Austin (1971) pointed to the occaaional 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 choleateatoma recurrence, as was observed in a amall 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 suggeated 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 neglicable after autoclaving.

Bone resorption occuring 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 diecarded 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 occuring 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 tranaplanted 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. Peneteration 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 bacteriologicaly sterile. Our histopathological and bacteriological findings have encouraged us to consider reimplantion of autogenous drilled autoclaved ossicles as nearly safe and risk - free process.

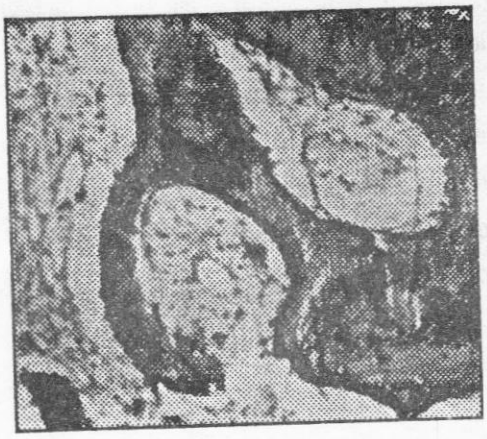

Fig (I) : Areas of bone resorption and scalloped margins at the periphery of the ossicles (Hx&Ex40)

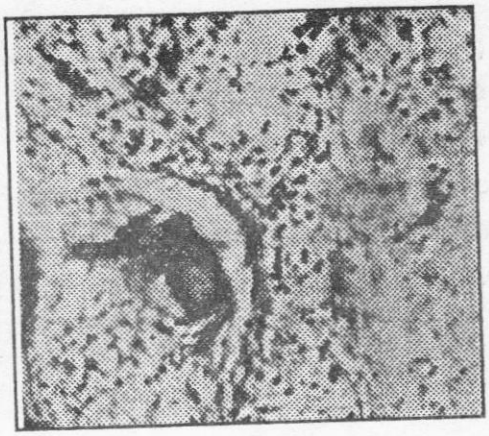

Fig (3) : squamous epithelium of cholesteatoma tissue being separated from the bone by granulation tissue and inflammatory cells.(Hx&Ex4d)

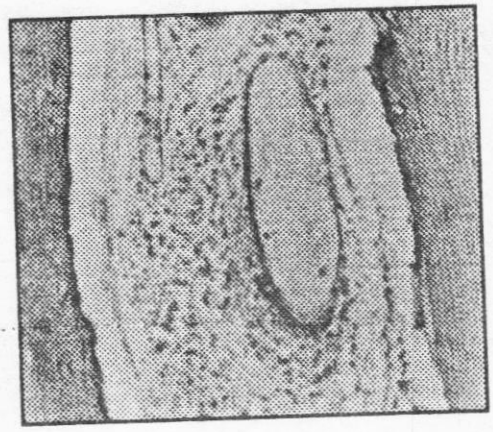

Fig (2) : Enlarged vascular spaces indicating internal bone resorption (Hx&Ex40).

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امكانية أعادة الزرع الذاتى لعظيمات الاذن الوسطى فى حالات الالتهاب المزمن المصحوب بالكلويتياتوما (دراسه باثولوجيه اكلينيكية)

أجريت هذه الدراسة لمعرفة التغيرات الباثولوجيه وتقدير مدى الاصابة فى عظيمات الاذن الوسطى فى حالات التهاب الاذن الوسطى المزمن والمصحوب بالكلوستياتوما . وكان الغرض من هذه الدراسة هو معرفة مدى امكانيه اعادة زرع هذه العظيمات فى المرضى. وقد جرى البحث على عدد ٣٠ عظيمه قسمت إلى ثلاث مجموعات كالتالى :

المجموعة الأولى : عدد ٢٠ عظميه استخرجت عند إجراء جراحة وحفظت مباشرة فى محلول ١٠٪ فورمالين وجهزت للفحص الميكروسكوبى العادى بعد إزالة الكالسيوم وثبت من الفحص أن نسيج الكلوليستيا توما لم يلاصق أبداً سطح العظمه وأنه كان مفصولاً عنها بأنسجة التهابية رخويه. وثبت أن تخوخ العظام الناتج يؤثر فقط فى الطبقة الخارجية ولايخترق داخل العظمه إلا فى الحالات الشديدة الإصابة.

المجموعة الثانية : عدد ٥ عظيمات أزيلت منها الأجزاء الرخوه وكذلك ازيلت الطبقة الخارجية بسمك ٢مم من كافة الحواف وجهزت للفحص كما سبق وثبت من الفحص خلو العظيمات من أى أنسجة التهابية أو أنسجة الكلولستياتوما.

المجموعة الثالثة : عدد ٥ عظيمات عوملت كما سبق فى المجموعة الثانية بالاضافة إلى حفظها فى الاتوكلاف لمدة ٥ دقائق عند درجة حرارة ١٣٤. ثم جهزت للفحص الميكروسكوبى كما سبق. وثبت أنه لاتوجد أى آثار للأنسجة الالتهابية أو أنسجة الكلولستياتوما بالإضافة إلى خلوها من أى ميكروبات كما ثبت من الفحص الميكروبيولوچى.

ونخلص من النتائج السابقة أنه من الممكن إعادة زرع عظميات الاذن الوسطى فى المريض بعد إزالة الأنسجة الالتهابية وأنسجة الكلولستياتوما وكذلك بعد تعقيمها فى الاوتوكلاف.