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The use of cortical bone grafts in ossiculoplasty III: Audit of costs

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Abstract

This paper describes the results of a comparative audit of the costs of using artificial prostheses and cortical bone. The costs of using a bone graft have been calculated by estimating the expenses incurred as a result of the additional time required for preparation of the grafts. The mean cost of preparing a graft was £29.10, while the mean cost of using a prosthesis was £65.01.

Key words: Ossicular replacement prosthesis, cortical bone; Cost benefit analysis

Introduction

Cortical bone grafts appear to be suitable alternatives to ossicular grafts in that similar hearing results are obtained with both (Mills, 1993). They are not extruded from the middle ear and when inspected at revision surgery they do not appear to be reduced in size.

The use of cortical bone grafts when the incus is unavailable for use as a graft saves money, in that a prosthesis does not have to be purchased. However, it does have cost implications because of the time required for harvesting and preparation. This study examines the relative costs of these two procedures.

Method

The time taken to harvest and prepare 16 cortical bone grafts for ossicular reconstructions was recorded. The mean preparation times for grafts designed to reconstruct ears with and without an intact stapes arch were calculated independently. As these proved to be very similar, the mean for the whole group was used in subsequent calculations.

The costs incurred as a result have been calculated using a method devised by one of us (I.G.G.) for use in purchaser/provider agreements. Staff costs are derived from the salaries of the various grades of doctors (surgeon and anaesthetist) and nurses involved and their hours of work. Anaesthetic costs take account of the drugs used, the rate of use and the method of intravenous access employed. An additional 30 per cent is added to take account of other overheads. Data from three operations in which cortical bone grafts were prepared by a consultant otologist (R.P.M.), each with a different grade of anaesthetist involved, were studied and the mean cost per minute was calculated.

A comparison was then made with the cost of purchasing a prosthesis for ossicular reconstruction. Prices for a total of 43 different prostheses were obtained from the manufacturers. They were then divided into groups depending on which ossicles they were designed to replace and the mean price for each group was determined.

Results

The mean preparation time for a cortical bone graft was 30 minutes (range: 15 to 45 minutes). The mean cost of preparing a cortical bone graft was £29.10 (range: £14.55 to £43.65). The prices for different types of prosthesis are presented in Table I.

Discussion

The method we have used to calculate surgical costs is, we believe, the most accurate so far devised for the purpose. There are, however, many variables to be taken account of, some of which will vary between hospitals.

Analysis of the costs of either purchasing a prosthesis or harvesting a cortical bone graft indicates that in general a prosthesis is more expensive. Some of the prostheses

TABLE I
PRICES OF PROSTHESES FOR OSSICULAR RECONSTRUCTION

Prosthesis type	Prices	
	Mean	Range
Incus	£75.23	£62.70– 88.30
Incus/Stapes	£41.10	£10.00– 89.10
Malleus/Incus	£65.14	£35.00–155.90
TORP	£70.30	£35.00–209.00
Overall	£65.01	£10.00–209.00

TORP = Total ossicular replacement prosthesis.

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used in our calculations could be rejected for reasons other than cost (e.g. unacceptable extrusion rate). The use of an expensive prosthesis makes this option more costly than harvesting a bone graft, while taking longer to sculpt the graft makes this choice more expensive.

Many cheaper prostheses have proved to be unsatisfactory (Smith, 1983). The most promising artificial material currently available is hydroxylapatite (Grote, 1986; Nikolaou *et al.*, 1992). Unfortunately this is one of the more expensive materials, with prostheses costing between £62.70 and £167.50. The choice between cortical bone and hydroxylapatite is at present a matter of individual preference. However, long-term studies may eventually demonstrate a significant difference between them.

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