THE ROLE OF CUSTOM MOLDS IN HEARING AID SELECTION : CASE REPORTS

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Speech intelligibility with a hearing aid is largely dependent on the coupling device used. The following case reports document the importance of using custom molds in hearing aid selection. In most cases a different aid was found suitable on testing with custom molds. In addition, a marked reduction in use gain was noted.

It is well documented that performance with a hearing aid could be considerably affected by the coupling device used. Researchers have therefore suggested that hearing aid selection be carried out using custom molds. However, in India, this is not feasible since instant mold material is not easily available. Further, many centres are not equipped with an ear mold laboratory.

Hence, most audiologists carry out hearing aid evaluation using ear tips or standard molds (factory made). Sometimes unclaimed mold or custom molds of various sizes made for trial purposes are utilized. Of these, the latter are expected to yield the best results. This is attributed to the fact that hearing aid trial here is carried out using a mold that closely approximates his own, rather than a standard mold. However, this assumption may be erroneous as evidenced in the cases described below.

Test Procedure :

All patients were tested in a quiet room. Response were elicited under unaided as well as aided conditions. Stimuli used in the case of adults were questions, common words / spondees and monosyllables presented at a distance of five feet. Testing was carried out in the patient's mother tongue whenever possible. Children were tested using both noise makers of various frequency spectra and speech. Conditioned responses were elicited at 5 ft., 10 ft. and 15 ft. without visual cues. In all cases the aid yielding the best performance was selected. Whereas in the first session stock molds were used, in the subsequent session, testing was carried out using custom molds.

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TABLE 1

Table showing the hearing aid selected, its gain and the speech discrimination scores, with stock: molds (I) and custom molds (II).

SI No.	Age in years	Session No.	Aid Selected	SCORES			Gain at use setting
				Mono-syllables	Spondees	Sentences	
1	58	I	'A'	**10%**	**20%**	45%	**37.6**
		II	'B ' with ' X ' receiver	55%	**60%**	80%	**22.3**
2	74	I	C	0%	0%	40%	58
		II	D	0%	10%	80%	**30.3**
3	75	1	E	70%	80%	40%	51.3
		II	F	60%	60%	60%	45.3
		I	G	70%	100%	60%	36.6
4	59		at ' 3 ' setting				
		II	G	80%	60%	60%	**22**
			at ' 1 ' setting				
5	52	I	H	20%	**60%**	20%	50.6
		II	G	50%	**100%**	80%	36.6
6	68	1	I	90%	80%	80%	**54.6**
		II	J	**40%**	**60%**	**40%**	**37.6**
7	72	I	' B ' with ' Y ' receiver	40%	100%	40%	26
		11	' B ' with ' X ' receiver	50%	80%	60%	22.3

The electro-acoustic characteristics of the hearing aids used were measured as per Indian Standards specifications (IS : 10775 : Part I, 1984). The instrumentation used included an audio test station (B & K 2118), and anechoic test chamber (B & K 4222). a 2 c.c. coupler (B & K DB 0138), an adaptor (B & K DB 0225), a condenser microphone (B & K 4134) and a preamplifier (B & K 2642).

RESULTS:

Adults : The scores obtained by the subjects with stock molds (Session I) and custom molds (session II) are displayed in Table 1. Only performance with the aids yielding the best scores are recorded here.

CHILDREN :

Case 1 : **All** year old child K. was diagnosed as having bilateral sensori neural loss. When tested with non-verbal material the child obtained 100% scores in both sessions at a distance of 10'. When the distance was increased to 15', the scores for non-verbal material remained the same in both the sessions. However, with the verbal stimuli, scores improved from 90 to 100% in the second session. The hearing aid selected was the same in both the sessions (Hearing aid '**G**').

Case 2 : Master M, a 4½ years old child, was found to have bilateral sensori-neural loss. The scores on the non-verbal task improved from 80% to 100% and 70% to 100% at 10' and 15' respectively, with the use of custom molds. The performance of the verbal task remained unchanged at 100%, for both the distances. The hearing aid selected was also the same (Hearing aid 'K'.)

Case 3 : **A** 7 year old girl 'A' was diagnosed as a case of bilateral moderate sensori-neural loss. Hearing aid 'B'with 'Z' receiver yielded 100% scores when common words and questions were presented. The MOP pre-set was set at maximum in this session. On testing again with custom molds, she was found to experience a severe tolerance problem. This problem was overcome by readjusting the pre-set to mid-point. The scores were 100% at this setting.

Discussion :

It may be observed from the above case reports that four out of seven adults demonstrated significant improvement in performance with custom molds, with all the three types of speech materials used. There was a considerable reduction in the performance of case 6. This may be attributed to over-amplifcation with the use of custom molds. It is possible that the case could have benefitted from a hearing aid of lower gain.

The responses of case 3 with or without custom molds appeared to depend on the type of material used. While his scores improved for sentences, there was a reduction in scores for spondees and monosyllables. On the other hand, case 4 showed an improvement in performance when monosyllables were used. While no change was recorded with sentence material, a significant reduction in performance was observed when spondees were used.

It is apparent from table I that in six out of seven cases, the hearing aids yielding the best performance were different in the two sessions. Further, the gain of the aid yielding maximum scores with custom ear mold, was lower than that of the aid selected in the first session. The mean difference in the gain was 14 dB, the range being 4 to 27.7 dB.

The results obtained with childern show a considerable change in performance on the non-verbal task in one child and a small change on the verbal task in the other. However, the data collected is inadequate to arrive at any significant conclusion in the case of children.

It may be inferred that earmold does play an important role in hearing aid selection. A hearing aid prescribed on the basis of the case's performance with any mold other than his own may be harmful in the long run. It is also probable that the type of material used in the evaluation procedure also influences its outcome. A systematic investigation is warranted to assess the effects of the mold and test material used on hearing aid selection.