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Recommended procedure for taking an aural impression

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1. Introduction

Aural impressions taken with a syringe or gun and using silicone impression material are required for the manufacture of hearing aids, earmoulds and ear plugs. The purpose of this recommendation is to describe safe and effective techniques for those undertaking the procedure. This document replaces the 1986 BSA Recommended Procedure.

2. Scope

This recommendation deals only with the procedure for taking an aural impression. It does not deal with other associated areas such as disinfection of equipment, training and earmould selection which are covered in other documents, some of which are listed in section 12 below.

3. Subject management

A straightforward explanation should be given to the subject regarding the technique to be employed, along with a warning of the fullness that will be felt in the ear and the possibility of a cough-reflex when the otostop is inserted. Tinnitus sufferers may also notice a temporary enhancement of their tinnitus during the procedure. The subject should be asked about any ear surgery, pain or infection (see section 10). The subject must not speak whilst the impression material is in the ear, but should keep the mouth in the normal, naturally closed relaxed position unless an open jaw impression is to be taken, as described in section 9 below. He/she can indicate any discomfort by raising a hand. The audiologist should wash his/her hands before examining the subject, and ensure all equipment is clean and disinfected where appropriate. Health and safety issues are addressed in section 11.

4. Examination of the ear

The ear should be examined thoroughly using an otoscope. Any unusual features or abnormalities should be noted and, if necessary, referred for medical advice. Possible contraindications to impression taking and special cases are noted in section 10. Otoscopy should be performed seated, not standing, to ensure the ear is viewed properly and to reduce the risk of accidental injury to the subject (see also figure 1).

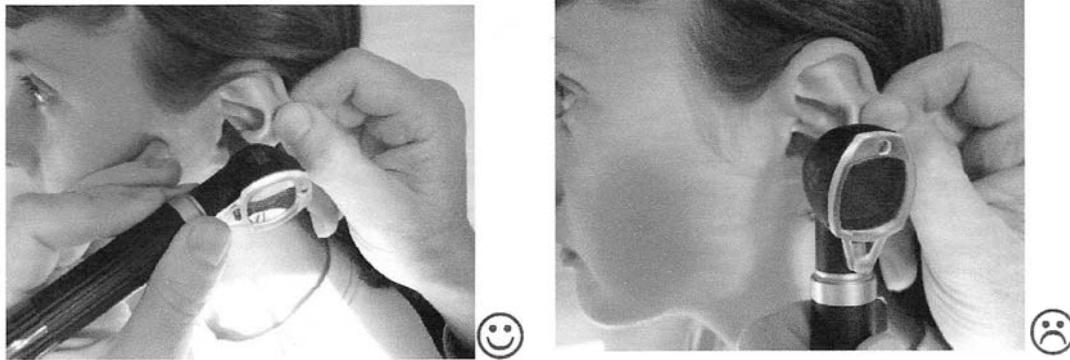


Figure 1. The picture on the left shows safe otoscopy with the audiologist's hand firmly braced against the subject's head, the picture on the right shows dangerous practice with no bracing.

5. Preparation

A towel or tissue may be laid over the subject's shoulder to safeguard against the staining or damage to clothing that can be caused by dropped impression material or hands that are greasy from mixing impression material.

Excess hair may be removed from the outer area of the ear canal, if it is essential and with the subject's permission. A pair of small round-nosed scissors should be used for this. If the stubble is stiff it could be lightly smeared with petroleum jelly or similar to flatten it, however particular care must then be taken when removing the impression as introducing petroleum jelly to the ear canal may result in an air-tight seal leading to an increased risk of barotrauma and damage to the eardrum. If a postaural hearing aid is to be fitted, it should be placed in position over the pinna whilst the impression is being taken. Spectacles and earrings should be worn if they are in everyday use.

6. Otostop insertion

Otostops or otoblocks should be used wherever possible; their main purpose is to protect the eardrum and middle ear during impression taking. Cylindrical foam otostops are widely used and suitable for most cases. The otostop selected should be of a size predicted from otoscopy to be large enough to fill the cross-section of the ear canal, but without causing undue pressure on the ear canal walls. The strings of the otostop should be knotted. It is possible to cut small pieces off an otostop to reduce its size, but this is rarely necessary and should only be undertaken with great care to avoid the risk of cutting the string.

Using a clean self-illuminated pushrod or earlight the otostop should be inserted into the ear canal normally to a point just beyond the second bend, i.e. approximately one-half of the way along the canal, although a shorter impression might be acceptable in some circumstances and it is important not to insert the otostop deeper than required as this can cause unnecessary discomfort and possible

injury. When using the earlight the audiologist's hand must be firmly braced against the subject's head to prevent accidental injury (see figure 2). The position of the otostop must be checked with an otoscope to ensure there are no gaps between it and the canal walls that could allow impression material to pass. The strings of the otostop should be positioned so they can be held during syringing to prevent the otostop moving when the impression material is introduced (see figures 2 and 3).

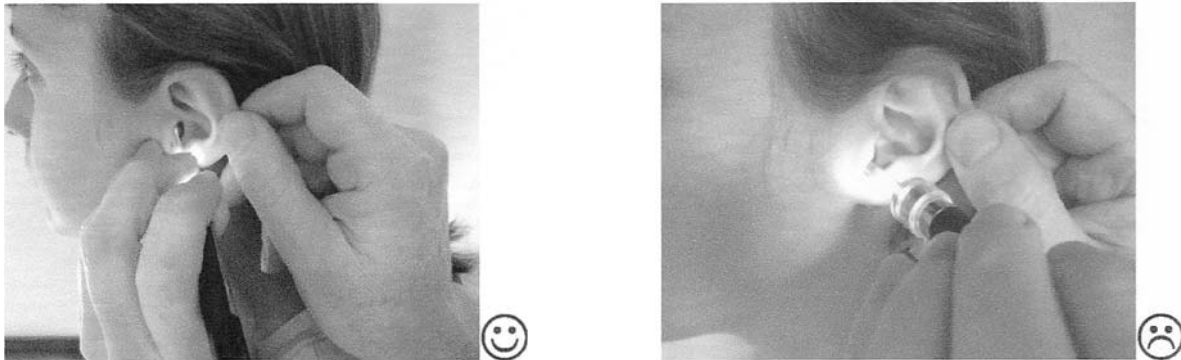


Figure 2. The picture on the left shows safe otostop inserlion, with the audiologist's hand braced firmly against the subject's head. The technique shown on the right is dangerous as there is no such bracing.

7. Taking the impression

There are currently two main types of impression material in common use. Condensation silicon consists of a small amount of hardener added to a larger quantity of putty, addition silicon consists of two component materials mixed in equal parts. Addition silicones are often preferred due to their easier mixing, better flow properties and long-term stability.

7.1. Syringe Technique

Whatever type of impression material is to be used, it should be mixed in accordance with the manufacturer's instructions. The consistency of the material must be such that it will flow out of the syringe without undue pressure on the plunger being required and audiologists should be aware that different materials exhibit different viscosities. The diameter of the syringe nozzle will also affect the ease with which the material can be injected. The material should be placed into the syringe without any trapped air bubbles.

The nozzle should be inserted into the ear canal to a point approaching the otostop, and the plunger then pressed firmly and steadily. Excessive pressure must not be used to inject the material as this may cause discomfort, move the otostop or force material beyond the otostop. As the material flows back around the end of the nozzle the syringe should be slowly withdrawn, care being taken to

maintain steady pressure on the plunger and to keep the end of the nozzle buried in the already expelled material. This prevents bubbles or folds being formed. The concha areas (cavum concha and cymba concha) should be filled but not over-filled as the weight of excess material may distort the shape of the ear. Throughout the syringing process it is essential to brace between the syringe and the subject's head to avoid accidental injury, and to prevent the otostop moving (figure 3). The completed impression must not be touched prior to removal, other than to check if it has set (see section 8).



Figure 3. The picture on the left shows safe syringing technique with thorough bracing against the subject's head and the otostop strings being held. The picture on the right shows unsafe practice with no bracing.

7.2. Gun technique

These devices mix the impression material automatically and allow the use of very low viscosity materials. In most respects the techniques and precautions when using a gun are the same as when using a syringe. It is important to check that the material actually has been mixed before use, perhaps by squirting a short length onto a tissue before introducing it into the ear. Bracing the gun safely against the head can be more difficult than with a conventional syringe due to the length of the device (figure 4) and audiologists who are unable to handle a gun with adequate bracing are advised against its use.

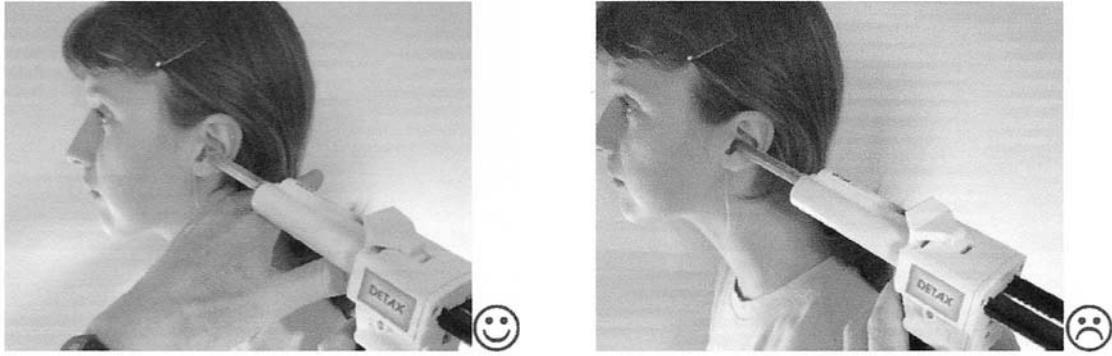


Figure 4. The picture on the left shows firm bracing against the subject's head. The picture on the right shows a lack of bracing, which is potentially dangerous.

8. Removing the impression

After waiting for the impression to set a fingernail should be lightly pressed on it. This action leaves no mark on material that has set satisfactorily. The impression should then be slowly and carefully eased out of the ear, taking care to break the air-tight seal that will have developed around the impression before pulling it from the ear. It may help removal if the subject moves his/her jaw a little from side to side during this process. The impression should be checked for completeness and repeated if it is inadequate. It should not normally be trimmed before dispatch to the manufacturing laboratory, nor should it be replaced in the ear for any reason.

If the material has left a slight film of grease or moisture in the ear, the ear should be dried with a tissue or cloth. The ear should then be examined again with the otoscope in order to ensure that all of the impression material and otostop have been removed. Some redness of the ear canal and drum may be seen after an impression has been taken but any soreness or injury must be referred for medical attention.

9. Open jaw impression technique

In some cases it may be appropriate for an impression to be taken with the jaw open, as this will affect the shape of the ear canal. For this process a dental mouth prop or bite-block should be placed between the patient's side or rear teeth, after the otostop is inserted, as shown in figure 5 below.

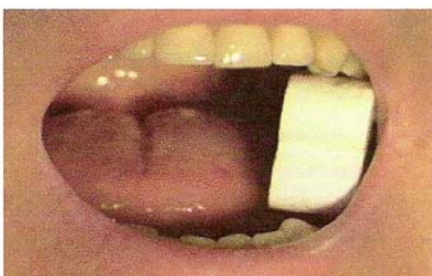


Figure 5.

The correct position of a mouth prop for an open jaw impression.

(Reproduced with permission of Starkey Laboratories.)

A new and clean mouth prop should be used for each subject. The position of the otostop should be checked carefully using an otoscope when the mouth prop is in place to ensure there are no gaps between the otostop and the canal walls.

The subject should be given a tissue to deal with any dribbling when the mouth prop is in place. When the impression is set the mouth prop should be removed first and, as the impression is likely to be a firmer fit than with the standard technique, extra care is required to ensure it is removed safely. With an open jaw impression it is particularly helpful if the subject moves his/her jaw gently from side to side during its removal.

10. Special cases and possible contraindications to impression taking

10.1. Post-operative ears

Impression taking should be avoided in the immediate post-operative period, until the ear and especially the canal and pinna have fully healed. In many post-operative ears the eardrum will be weakened and extra care must be taken when removing the impression to avoid barotrauma. When there is a mastoid cavity it is essential not to allow any impression material to enter this. The cavity can be packed with additional otostops and very careful otoscopy must follow otostop insertion to ensure the cavity is closed to impression material. Extra care must also be taken when injecting the material to hold the strings of the otostops to prevent their movement.

10.2. Perforated eardrums

It is usually safe to take an impression when the drum is perforated, as long as there is no active infection in the outer or middle ear (see section 10.6). Care is required when removing the impression to minimise the risk of injury to the middle ear structures (e.g. the round window) through barotrauma.

10.3. Stenosis

Many ear canals have an abnormally narrow section, called stenosis, usually in the outer part. In these cases there is a potential hazard from the impression material going beyond the stenosis and the impression being difficult to remove, causing discomfort. There is also risk of the impression breaking off in the ear on removal, due to the narrow section. A stenosis may dictate that the impression is not as long as usual. The otostop should be inserted to a position at or just beyond the narrowing to prevent impression material going too deep.

10.4. Impressions for "completely-in-the-canal" hearing aids

There is no real difference between the normal impression taking and that for a "completely-in-the-canal" or C.I.C. aid, although it is essential that impressions for C.I.C. aids reach just beyond the second bend and into the bony part of the canal. Many audiologists routinely use open jaw impressions for C.I.C. aids, as described above. If the canal is very narrow or contains a sharp bend then it may not be possible to take a suitable impression for a C.I.C. aid.

10.5. Impressions on small children

It is strongly recommended that anyone undertaking impressions on small children has received additional training in this area (see BSA guidelines on minimum training standards for otoscopy & impression taking).

10.6. Infections

It is safer not to take an impression if there is an active ear infection in the outer ear, or discharge from the middle ear. If this is unavoidable advice should be sought from an infection control expert on appropriate precautions such as the use of gloves, face masks etc and the correct disposal of equipment afterwards. The impression will need to be disinfected before it is sent to the manufacturer.

10.7. Excessive wax or foreign object on the canal

Excessive wax or foreign objects should be removed from the ear prior to impression taking. If not these may be pushed further into the ear by the otostop, or the impression may not be a true representation of the shape of the canal due to their presence.

10.8. Others

In any unusual situation, where the audiologist has limited experience or concerns about how to proceed safely, it is strongly recommended that advice and supervision are sought from someone suitably competent.

11. Health and safety

Appropriate precautions must be taken throughout to ensure the safety and well-being of the subject, otoscopes must be in good order and equipment clean and suitable for purpose. Otoscopy and impression taking should always be performed seated, as stated above. In some circumstances, for example where space is restricted, it is acceptable to kneel as long as you are stable and able to perform the procedure correctly and without any risk to the subject. The subject should not be left unattended during impression taking, particularly if an open-jaw impression is being taken. It is not usually advisable to take impressions on both ears simultaneously, but this might be acceptable in some circumstances with the subject's full consent.

12. References

British Society of Audiology "*Recommended Minimum Procedure for the Cleaning of Specula etc. and associated Infection Control*" (1998), British Journal of Audiology **32**, 221

British Society of Audiology "*Guidelines on Minimum Training Standards for Otoscopy and Impression Taking*" (2004), www.thebsa.org.uk

British Society of Audiology "*Recommended Procedure for taking an Aural Impression*" (1986), British Journal of Audiology **20**, 315-316

British Society of Audiology "*Hearing Aid Handbook part 2: Earmoulds*" (2002), www.thebsa.org.uk

Hearing Aid Council "*Recommendations for Open Jaw Impressions*" (2004), www.thehearingaidcouncil.org.uk