A Low Cost—Video Assisted—Pneumatic Oto-Endoscopy System

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Abstract Pneumatic otoscopes do not support video assisted clinical examination, as they are not equipped with built-in cameras, so diagnosis is based on real-time direct observation rather than on video studying. On the other hand, classic rigid endoscopes usually provide otologists with a clear view of the tympanic membrane and its mobility, allowing subsequent video recording. Unfortunately, rigid endoscopes cannot be used for pneumatic otoscopy, unless they are properly fitted for such use. The aim of this paper is to present a low cost—video assisted—pneumatic oto-endoscopy system based on a conventional rigid endoscope.

Keywords Pneumatic otoscopy · Rigid endoscope · Video recording

Pneumatic otoscopy is a valuable diagnostic tool, especially in assessing the presence of middle ear effusion [1]. The diagnostic accuracy in such cases is significantly improved with pneumatic otoscopy, when compared with the conventional static otoscopy [2]. However, commercial pneumatic otoscopes are still quite expensive (average cost of £140). Moreover, pneumatic otoscopes do not support video assisted clinical examination, as they are not equipped with built-in cameras, so diagnosis is based on real-time direct observation rather than on video studying. On

the other hand, classic rigid endoscopes usually provide otologists with a clear view of the tympanic membrane and its mobility, allowing subsequent video recording. Unfortunately, rigid endoscopes cannot be used for pneumatic otoscopy, unless they are properly fitted for such use.

We present a low-cost oto-endoscopy system based on a conventional rigid 0-degree endoscope. All we used was a 0-degree Karl-Storz 2.8 mm rigid endoscope (already available in our department), a conventional tympanometry probe, a short silicon tube and a pneumatic otoscope blower/or a 10 cc syringe. The endoscope is inserted through the opening of the tympanometer probe. The silicon tube is also inserted through the same opening (Fig. 1). We used, a few silicon tubes bought from an e-shop (Lindemannsilicone.co.uk) with a cost of £0.85–2.5 per meter and a 10 cc syringe/or a Heine pneumatic otoscope blower (cost £05.88). A layer of petroleum jelly (Vaseline) was applied on the back side of the ear probe in order to ensure air-sealing. We preferred to insert both the endoscope and the silicon tube through the same opening of the ear probe rather than creating an extra perforation that could put at risk the airtight seal of the created cavity. The use of silicon tubes appeared to have crucial advantages, compared with other materials, as such tubes can be easily cut and tightly adjusted to the syringe or pneumatic otoscope blowers. Moreover, they can easily be fitted to almost every tympanometer probe, as they are available in a variety of inner diameters and wall thickness. The total cost of the proposed system does not exceed £12. Connecting the endoscope to a camera we had a clear view of the tympanic membrane and its mobility under different pressures applied. It was also very easy to record and store high resolution video data for both diagnostic and educational purposes, with the use of any conventional or our low-cost portable recording system [3].

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Fig. 1 All parts used and close view of the probe area

Conflict of interest None.

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