Otoendoscopic Tympanoscopy – Digital, Microscopic, Sialendoscopic and Rod Lens Endoscopic Visualization Compared

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Background:
In the last two decades, endoscopy established itself as an alternative to traditional 1-3 (often indirect mirror based 4-6) microscopic tympanoscopy and became strongly promoted for various endoscopic middle ear procedures 7-12. This study evaluates the diagnostic potential of today’s available endoscopic systems.

Materials and Methods:
Seven otologists rated the degree of visualization (in % of visible area of interest) and the digital image quality on visual analogue scale (VAS). Tympanoscopy (Fig 1) of eight middle ear landmarks 16,17 was systematically performed 13-15 in a human formalin fixed temporal bone. In addition to a microscope (OPMI 8SS™ ZEISS), a 1.3mm sialendoscope (KARL STORZ) , a 45° endoscope with or without digital image processing (SPIES™ KARL STORZ) and a chip on tip camera have been used for transcanal middle ear inspection.

Results:
For middle ear landmarks with a straight line of sight along the external ear canal axis, most complete visualization was achieved by 45, 45S and Mic systems. In hidden areas of the SF, ST, FR, EP and ET, endoscopes with 45° angled visual axis were superior to the microscope and even microscope in combination with indirect mirror inspection (Figure 2A).

Discussion:
Endoscopes offer a portable and low cost alternative for transcanal diagnostic and therapeutic procedures compared with the classic microscope. Best picture quality was achieved by digital rod lens and the microscope. Some surgeons noted a better focus depth by COT and appreciated correction of adverse light effects by electronic picture processing (Fig 4). This study confirms favorable endoscopic visualization 13-15 and sufficient picture quality of target structures for potential middle ear surgery 19 (CI electrode insertion, drug injection, second look). However, lack of 3D perception and the need of a third hand are unfamiliar for surgeons untrained in otoendoscopic surgery.

References: