Technology of Sialendoscopy

Urban W. Geisthoff, Priv.-Doz. Dr. med.[a,b,*]

KEYWORDS

• Sialendoscopy • Sialoscopy • Technology • Salivary
• Treatment • Salivary

The diameter of salivary ducts sets a limit on the size of the instruments that can be used within them.[1] The miniaturization of endoscopes finally allowed sialendoscopy to begin in 1988 (**Fig. 1**).[2–6] Multiple considerations are needed to adapt endoscopes to the salivary ducts and glands, including compact outer diameter, highest number of pixels, durability, effective cleaning and sterilization, large working channel for various instruments, ergonomic handling, and flexible maneuverability inside the duct system.

TYPES OF ENDOSCOPES AND THEIR PROPERTIES

Different types of endoscopes have emerged to meet the demands listed previously: flexible sialendoscopes, rigid sialendoscopes, and semiflexible sialendoscopes (compact and modular). **Table 1** lists different models of sialendoscopes from the past and present. **Box 1** lists the addresses of different producers and distributors for material usable for sialendoscopy. Each type of endoscope has its own clinical properties.

Flexible Endoscopes

Flexible endoscopes are advantageous as it is possible to move them through ductal kinks and bends. Some of the flexible endoscopes can be steered, which is especially helpful when a certain branch has to be intubated (see **Fig. 1; Figs. 2–5**). Their use is atraumatic; however, a drawback is that only weak forces can be applied (eg, to surmount stenotic areas). Handling is often more difficult than for semirigid or rigid endoscopes. The success rate for normal stones seems to be lower than for semirigid

Urban Geisthoff consulted with Spiggle & Theis, Overath, Germany, and Gyrus ACMI, Tuttlingen, Germany for the development of instruments without any financial benefit, thus far.

[a] University of the Saarland, Medical Faculty, Kirrberger Str, D-66421, Homburg/Saar, Germany
[b] Department of Otorhinolaryngology, Holweide Hospital, Hospitals of the City of Cologne, Neufelder Strasse 32, D-51067 Cologne, Germany
* HNO, KHS Holweide, Neufelder Street 32, D-51067 Koeln, Germany.
E-mail address: http://www.geisthoff.de

Otolaryngol Clin N Am 42 (2009) 1001–1028
doi:10.1016/j.otc.2009.08.008 **oto.theclinics.com**
0030-6665/09/$ – see front matter

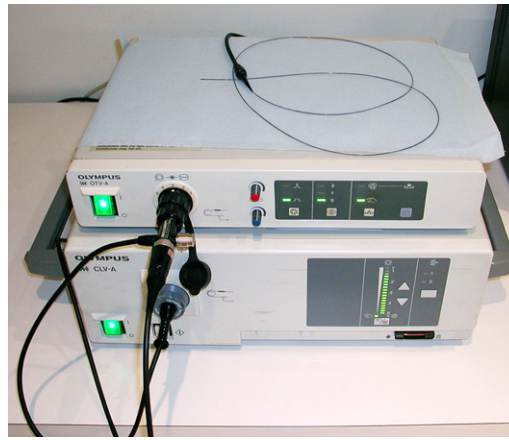

Fig. 1. Flexible endoscope (Olympus, Tokyo, Japan) used by Philippe Katz for the first salivary gland endoscopy in December 1988. (*Courtesy of* Dr Philippe Katz, Paris, France; with permission.)

endoscopes.[7] Flexible endoscopes are fragile and have a short lifespan and it is not possible to autoclave them.[8]

Rigid Endoscopes

Most clinical endoscopes rely on a fiberoptic system for image transmission. Rigid endoscopes, however, use a pure lens system with superb optical qualities and better resolution. These endoscopes have larger diameters but are more stable (**Fig. 6**). They can be autoclaved. The camera is fixed directly onto the ocular attached to the endoscope, resulting in a cumbersome handling.

Semirigid Endoscopes

Semirigid endoscopes are a compromise between flexible and rigid endoscopes. The long, flexible, optical fiber connection for light and image transmission enables the decoupling of the examination probe from the rigid eyepiece. This means that work with semiflexible endoscopes can be performed with great freedom of movement and minimal effort while maintaining excellent precision. A modular and a compact construction type of semirigid endoscopes exist.

Semirigid Compact Endoscopes

A typical therapeutic semirigid compact endoscope combines a fiber light transmission, a fiber image transmission, a working channel and an irrigation channel within one compact instrument (**Fig. 7**). The outer tube covers, stabilizes, and protects all of the components resulting in a minimum outer diameter of the whole system. **Fig. 8** shows the construction principle of the sheath of the examination probe of a semirigid compact endoscope and **Figs. 9–11** show enlarged the tips of such endoscopes.

Semirigid Modular Endoscopes

The optical fibers used for light and image transmission are combined into a single probe-like component (**Fig. 12**A, B). This can be used in combination with different sheaths (see **Fig. 12**C). Using a small single sheath creates a diagnostic endoscope. The gap between optical system and the sheath's outer wall is used as irrigation