Endoscopic Transcanal Ear Anatomy and Dissection Manual

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Endoscopic Dissection of the Middle Ear

Objectives

a) Develop an understanding of the endoscopic anatomy of the middle and inner ear as viewed through a transcanal access.

b) Develop the necessary hand-eye coordination and manual skills to perform endoscopic ear surgery.

c) Perform in the lab the specific steps involved in tympanoplasty.

d) Understand the anatomy of those areas of the middle ear prone to harbor cholesteatoma.

e) Perform in the lab the exploration of all areas of the middle ear frequently involved in cholesteatoma growth.

Working Place Set Up

The head/temporal bone holder should be positioned such that the axis of the external auditory canal (EAC) is aligned on-axis with the surgeon's line of vision. In view of the upsloping orientation of the EAC (Fig. 1), the surgeon's field of view should be centered on the lateral short process of the malleus rather than the umbo of the tympanic membrane. The anatomic specimen should be positioned between the video monitor and the surgeon. When using a 0°-endoscope, and for most of the dissection course, the specimen's top should be to your right for the right ear and to your left for the left ear. When using scopes with viewing angles other than 0°, you should always be able to rotate the anatomic specimen around as you explore the various spaces of the middle ear. The orientation of the scope's angled view should always face away from the surgeon and directed toward the monitor.

Instrumentation

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>228825</td>
<td>Round Knife 45°, 16 cm, diameter: 2.5 mm.</td>
</tr>
<tr>
<td>223100</td>
<td>PLESTER Knife, round, vertical, 16 cm, standard size 3.5 x 2.5 mm</td>
</tr>
<tr>
<td>224303</td>
<td>WULLSTEIN Needle, 16.5 cm, light curve.</td>
</tr>
<tr>
<td>222604 R</td>
<td>BELLUCI Scissors, working length 8 cm, delicate, curved right</td>
</tr>
<tr>
<td>222605 L</td>
<td>BELLUCI Scissors, working length 8 cm, delicate, curved left</td>
</tr>
<tr>
<td>222800</td>
<td>HOUSE-DIETER Malleus Nipper, working length 8 cm, upbiting.</td>
</tr>
<tr>
<td>224001</td>
<td>HOUSE Curette, 15 cm, large size.</td>
</tr>
<tr>
<td>204000</td>
<td>FISCH Adaptor, with cut-out hole, Luer cone 5.5 cm.</td>
</tr>
<tr>
<td>204015</td>
<td>Suction Cannula, angular, Luer Lock, working length 6 cm, O.D.: 1.5 mm</td>
</tr>
<tr>
<td>7220 AA</td>
<td>0° Straight Forward Telescope, diameter 3 mm, length 14 cm.</td>
</tr>
<tr>
<td>7220 BA</td>
<td>90° Forward-Oblique Telescope, diameter 3 mm, length 14 cm.</td>
</tr>
</tbody>
</table>

Dissection Tasks

- Endoscopic inspection of the EAC: It is important to take a few minutes to inspect the anatomy of the EAC, the tympanic membrane (TM) and whatever is visible through the transparent TM.

Observe

1. Vary the vessels of the TM emanate from the EAC. They supply the TM in a lateral-to-medial direction; this is very distinct under in-vivo conditions and might not be noticeable in an anatomic specimen. So, by removing the skin of the EAC and the epithelial layer of the TM, you have largely eliminated the bleeding elements of the external ear and TM. (Fig. 2)

2. The axis of the EAC is angled superiorly and the scutum (rather than the mesotympanum) forms the medial end of the ear canal. (Fig. 1)

3. The location and extent of any anterior overhang. Please note, that in many anatomical specimens an inferior overhang may also be found (Fig. 3).
Outline the vascular strip: Use the round knife to place the medial cut 2–3 mm away, and in parallel with the annulus, and then use the Fliester flap knife to extend the cuts laterally, and in parallel with the axis of the ear canal.

**Observe**

1. The fibrous annulus of the TM almost disappears in the upper posterior part of the TM. (Figs. 2, 4)
2. You need to palpate the bony edge of the middle ear before making your deep cut at the distal end of the vascular strip. It is usually the fibrous annulus that is visible. Even though the fibrous annulus, visible inferi ory, serves as a good landmark for placing the cut, be aware that incompleteness of the fibrous annulus at its upper and superior margins, along with engorgement of the vascular strip after injection of xylocaine and epinephrine, can cause lack of definition of the bony annulus rim separating the ear canal from the middle ear.

Removal of canal skin along with the epithelial layer of TM. Using the round knife, a circular lateral incision is made that connects the two limbs of the vascular strip incision across the anterior canal in preparation for removal of the ear canal skin. Please note, that the incision needs to be made lateral enough to any anterior bony overhang. Next, the skin of the ear canal should be elevated under direct vision. All overhanging bone is curetted away as we proceed medially in the canal. Care should be taken to preserve integrity of the temporomandibular joint. As the annulus is reached, it should not be elevated; the skin of the canal should be elevated in contiguity with the epithelial layer of the TM. This can be accomplished either by use of the round knife which is carried over and then moved in the same direction of the annulus, or with a cuffed forceps by peeling off the epithelial layer covering the lateral short process of the malleus superiorly. Attention should be paid that the fibrous annulus remains anchored in its bony groove.

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Endoscopic view of the tympanic membrane (TM) in a right ear with cholesteatoma showing through. Note the blood vessels arising from the EAC and supplying the TM.

Left ear: Endoscopic view of an anatomic specimen with a small perforation. Note the size and location of the considerable anterior bony overhang in the external auditory canal.

Left ear: The skin of the canal has been removed along with the epithelial layer of the TM. The EAC has been enlarged. Note the boundaries of the fibrous annulus (white spots); Chorda tympani (Ch); Posterior malleus ligament (Pml).

Right ear: The canal wall is curetted to obtain a panoramic view of the tympanic ring using the 0° endoscope. Vascular strip (VS); Fibrous layer of tympanic membrane (FLTM); Cholesteatoma (CH).
Observe
1. The glistening white annulus and fibrous layer of the TM (Fig. 4).
2. The friable skin and epithelial layer of the TM. Compare Figs. 3 and 4.

- Enlargement of the ear canal. The EAT should be curetted out in all directions to achieve a panoramic view of both the annulus and the EAT using the 0"-scope. Given the fact that the bony annulus separating the middle ear from the EAT is very variable in relationship to other structures, always consider the possibility of a low dura, anterior sigmoid, facial nerve, and a high jugular bulb as you enlarge the ear canal. (Figs. 5, 6)
- Elevation of the annulus up to 3 and 9 o'clock; Using the cuffed forceps, the fibrous layer of the TM is detached from the upper part of the malleus handle, mobilized from the bony sulcus, and the elevated TM is deflected inferiorly.

Schematic anatomical representation of the left EAT with surrounding structures that need to be considered when enlarging the ear canal.

Right ear: Fibrous layer of the TM is pulled down off the malleus handle revealing the posterior malleal ligament (Pml) and the chorda tympani (Ct).

Left ear: The fibrous layer of the TM along with the fibrous annulus have been removed and separated from the malleus handle. The tendon of the tensor tympani (TT).

Left ear: Endoscopic view of the retro-tympanum. Incudostapedial joint (IS); pyramidal eminence (PE); ponticulus (PO); sinus tympani (ST); subiculum (SU); round window (RW).

Left ear: Endoscopic view through a transcannal endoscopic access after minor removal of bone; the ‘facial recess (FR)’ is very shallow and more of a flat depression, superficial to the pyramidal eminence (PE) and the vertical segment of facial nerve (FN). Also note the horizontal segment of the facial nerve.
Observe

1. The posterior malleal ligament overlying the chorda tympani and almost parallel to it. (Fig. 7)
2. The undersurface of the TM and the malleal handle.

Next, the Wallstein needle is used to separate the remnant of the TM from the malleal handle, starting from the lateral short process of the malleus and extending downward toward the umbo. Subsequently, an angled Bellucci scissors is used to separate the TM remnant from the umbo. (Fig. 8)

Take down the bony annulus posteriorly to gain full access to the facial recess and sinus tympani. Make sure, that the posterior canal wall is almost flush with the pyramidal eminence (Fig. 9), which marks very accurately the level of the vertical segment of the facial nerve and allows for safe curetting of bone superficial to that level. This, however, is not the case more inferiorly in the EAC and the horizontal segment of the facial nerve can have a variable course that appears to run laterally in the posterior canal wall.

Observe

1. Using a 0°-scope, the facial recess is readily accessible presenting as a small depression on the posterior wall of the tympanic cavity. (Fig. 9)
2. Using the 30°-scope, the anatomical specimen should be placed in a position so that its posterior aspect faces away from you, and also make sure, that the axis of the scope’s direction of view points away from you. Inspect the retrotympalic anatomy. (Fig. 10)
3. Observe the pyramidal eminence and look for the presence of a subpyramidal space. (Fig. 11)
4. Identify the entry point of any subpyramidal space. Study the various possible variations (Fig. 12). Continued overleaf.
Continued from page 3. Inspect your specimen and compare it with other specimens being dissected. Note, that in the specimen shown here, there is an extension of both sinus tympani and posterior tympanic sinus (Fig. 13).

5. Study the variable anatomical morphology of the sinus tympani. (Fig. 14)

Le't ear. The entry points of the subpyramidal space of this specimen are a specific feature of type A, connecting both the sinus tympani (ST) and posterior tympanic sinus (PTS). Pyramidal eminence (PE).

The variable morphological appearance of the sinus tympani.
Facial nerve (fn); posterior sinus tympani (pts); pyramidal eminence (pe); stapes (st); round window (rw); subiculum (su); jugular bulb (jb); sinus sublymphaticus (ss); sinus tympani (st); ridge separating the sinus tympani into two parts (r); superior part of sinus tympani (sts); inferior part of sinus tympani (sti).
6. Study the classification of depth and extension of the sinus tympani. [Fig. 15, 16]
7. Study the shape and depth of the sinus tympani in your specimen. Try to classify (palpate, if necessary) the type of sinus tympani of your specimen as well as the one shown in this manual. [Fig. 10]
8. Observe the ponticulus promontorii and its possible variations. [Fig. 17]

The various types of sinus tympani classified according to depth and extension in relation to the facial nerve. Cochlear promontory (pr); facial nerve (fn); sinus tympani (st).

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16 Schematic drawing of a 'Type C' sinus tympani. The → indicates the posterior extension of the sinus tympani with respect to the third portion of the facial nerve (fn). Chordal ridge (cr); chorda tympani nerve (ctn); lateral tympanic sinus (lt); facial sinus (fs); incus (in); malleus (ma); ponticulus (p); pyramidal eminence (pe); cochlear promontory (pr); posterior sinus tympani (pts); stapedial tendon (st); stapes (st); subiculum (su); round window (rw).

17 The variable morphological appearance of the ponticulus promontorii (p). Ridge ponticulus (Type A); incomplete ponticulus (Type B); bridge ponticulus (Type C). Facial nerve (fn); incus (in); ponticulus (p); pyramidal eminence (pe); posterior sinus tympani (pts); cochlear promontory (pr); stapedial tendon (st); stapes (s); subiculum (su); sinus subtympanicus (ss).
9. Try to inspect the round window membrane and niche. Identify the tegmen of the round window niche and the anterior and posterior pillars. (Fig. 18)

Take down any "inferior overhang" and enlarge the access to the inferior retrotympanum and hypotympanum. Next inspect the hypotympanum. This should be done with a 30°-scope, with the line of vision and the posterior-inferior part of the specimen facing straight ahead, away from the surgeon. (Fig. 19)

Right ear, Endoscopic view of the round window niche. Tegmen of the round window niche (TE); anterior pillar (AP); posterior pillar (PP); round window membrane (→).

Right side. Facial nerve (fn); pyramidal eminence (pe); oval window (ow); cochleariform process (cp); sinus tympani (st); ponticus (p); subiculum (su); posterior pillar (pp); tegmen of round window niche (te); cochlear promontory (pr); Eustachian tube (et); round window (rw); styloid eminence (sty); sinus sub tympanicus (ss); anterior pillar (ap); finculus (fl); jugular bulb (jb).
Observe

1. Study the anatomy of the subiculum and its variations. (Fig. 20)
2. Observe the subiculum, the inferior border of the sinus tympani and the superior border of the sinus sub tympanicus. Identify the type of subiculum in your specimen. (Fig. 21)

Key to abbreviations: Facial nerve (fn); pyramidal eminence (pe); oval window (ow); cochlear'arm process (cp); sinus tympani (st); ponticus (p); subiculum (su); cochlear

Bridge subiculum (Type B), promontory (pr); sinus sub tympanicus (sst); round window (rw); Eustachian tube (et); styloid eminence (sty); ponticus (p).

Absent subiculum (Type C), in which the sinus sub tympanicus is confluent with the sinus tympani.

Left ear: Endoscopic panoramic view of the tympanic cavity with special focus on the retrotympanum. Facial nerve (FN); subiculum (SU); sinus sub tympanicus (SS); styloid eminence (SE); round window (RW); finicus (FIN); carotid artery (CA); hypotympanic air cell (HC).
3. Identify the finiculus, delineating the inferior border of the sinus subtypanicus. Determine the type of finiculus in your specimen. (Fig. 22)

4. Trace the styloid eminence, basically delineating the vertical segment of the facial nerve. (Fig. 21)

5. Try to determine the height and size of the jugular bulb.

6. Take a panoramic view and inspect the infracocheal space. If this area is well pneumatized, you should be able to visualize the curvature of the basal turn of the cochlea. (Fig. 21)

Next, limited atticotomy is performed with meticulous care. Make sure that you stop at the insertion point of the lateral incudomallear ligament and the lateral malleolar ligament on the medial aspect of the scutum. Exercise due restraint and caution while performing this step to preserve integrity of these friable ligaments.

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Left ear: Endoscopic panoramic view of the tympanic cavity with special focus on the retrotymp-panum. Facial nerve (FN); subiculum (SU); sinus subtypanicus (SS); styloid eminence (SE); round window (RW); finiculus (FIN); carotid artery (CA); hypotympanic air cell (HC).

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Key to abbreviations: facial nerve (fn); pyramidal eminence (pe); oval window (ow); cochleariform process (cp); sinus tympani.

Type A: Anatomical variations of the finiculus (fi). Right side, Ridge finiculus (Type A).

Type B: Bridge finiculus (Type B).

Type C: Absent finiculus (Type C).

(st); ponticus (p); subiculum (su); round window (rw); cochlear promontory (pr); Eustachian tube (et); styloid eminence (st); sinus subtypanicus (sst); finiculus (fi); jugular bulb (jb); styloid eminence (sty); ponticus (p); hypotympanic air cell (hc).
Observe

1. The shape of the lateral ligaments and how they are made up, along with the
   neck of malleus, the roof and medial aspect of Prussak's space. (Fig. 23)

2. Notice, that these suspensory ligaments form the lateral part of the epitympanic
   diaphragm separating the area between scutum and ossicles, and preventing
   any ventilation of the attic via this lateral route. Take note of the straight insertion
   points on the ossicles of the lateral incudomalleal ligament and the curvilinear
   insertion of the lateral malleal ligament. These are key landmarks because they
   act as gateways for the spread of attic cholesteatoma. (Fig. 24)

Left ear: Prussak's space (PR); posterior malleal ligament (PML).

Left ear: The relatively straight insertion line of the lateral incudo-malleal
ligament (LIML) and the downward sloping insertion line of the lateral
malleal ligament (LML).
Proceed with extending the atticotomy, but leave untouched the lateral malleal fold, saucerize the anterior part of the scutum, and expose the malleus while preserving the incudal part of the lateral incudo-malleal folds. (Fig. 25)

**Observe**

1. Anterior to the malleus head, look for the anterior epitympanic space (Fig. 25). Note, how in most specimens, this space is separated from the supratubal recess by the cog and the tensor folds bridging the gap between tensor tympani tendon and the cog.

2. Look for the presence of Sheehy’s cog and confirm integrity of the tensor folds, separating this space from the supratubal recess. (Fig. 26)

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Left ear: Anterior epitympanic space (AES); Sheehy’s cog (COG), separating the supratubal recess from the anterior epitympanic space; tensor tympani folds (TF), partially visible and closing off the attic from direct ventilation of the supratubal recess and the Eustachian tube.

Left ear: Close up view of the anterior epitympanic space (AES).
Proceed with removing the whole scutum including the lateral incudo-mallear folds, and expose the whole incus along with the malleus head. (Fig. 27)

Bone removal is carried anteriorly along the anterior bony annulus in order to create adequate space for the 3-mm 30°-scope, which is introduced between malleus handle and bony annulus. Subsequently, inspect anteriorly, superiorly and posteriorly. (Fig. 28)

Left ear: The ossicles have been fully exposed within the attic allowing to clearly visualize the incudo-mallear articulation line.
Incudo-malleal joint (IMJ); anterior epitympanic space (AES); Sheehy's Cog (COG); separating the supratubal recess from the anterior epitympanic space; tensor tympani fold (TF), partially visible and preventing the attic from direct ventilation via the supratubal recess and the Eustachian tube.

Left ear: Handle of malleus (HM); supratubal recess (STS); anterior surface of Sheehy's cog (COG); separating the attic from the supratubal recess; vertical segment of the tensor tympani fold (TFV), which – given its entire integrity – closes off the attic from the Eustachian tube; horizontal segment of the tensor tympani fold (TFH) which partially contributes to the floor of the supratubal recess anteriorly; bony encasement of the tensor tympani muscles (TTM); bony annulus (BA); carotic artery (CA).
Observe

1. Look down the Eustachian tube. Examine the relationship between the carotid artery and the bony encasement of the tensor tympani muscle (Fig. 29).
2. You can use a 45°- or 70°-scope to gain a look further down the Eustachian tube, allowing occasional identification of the nasopharyngeal opening. (Fig. 30)
3. On-axis rotation of the angled-view scope allows to view superiorly and examine the size and depth of the supratubal recess which varies considerably in size and degree of development. The size of the supratubal recess does not correlate with the degree of pneumatization of the mastoid cavity and attic. (Fig. 31)
4. Rotate further superiorly and posteriorly to visualize the tensor tympani fold which, when complete, separates the anterior attic from the supratubal recess. The shape and position of the tensor tympani fold seems to be subject to high variability, and is related to the size of the supratubal recess. If the supratubal recess is poorly developed, the tensor tympani fold is almost a horizontal structure that closes up the anterior attic and separates it from the Eustachian tube. It starts with the tendon of the tensor tympani and inserts along a bony ridge formed by the encasement of the tensor tympani muscle, and extends almost into the anterior tympanic spine, as shown in Figs. 32–33. If the supratubal recess is well-developed as in the anatomic specimen shown in this manual, then the tensor tympani fold has two parts. The most vertical part attaches to the area just anterior to the cistern and forms the wall that separates the supratubal recess from the anterior attic. The second part is a horizontal segment that attaches to the tensor tympani tendon and the most anterior part of the bony ridge, which is formed by the bony encasement of the tensor tympani muscle. So, in the presence of a well-developed supratubal recess, the horizontal part of the tensor tympani fold partly contributes to the floor of the supratubal recess. (Fig. 31)

Left ear: Endoscopic view down the Eustachian tube (ET). Bony encasement of the tensor tympani muscle (TTM); bony annulus (BA); carotid artery (CA).

Using a 45°-scope, it is occasionally possible to view the opening of the Eustachian tube to the nasopharynx. Carotid artery (CA); tensor tympani muscle (TTM).
Another way of conceptualizing this, is to think of a well-developed supratubal recess ballooning into the tensor fold and shaping it into these two segments. (Fig. 34)

Left ear: Endoscopic anatomy of the tensor tympani fold in a specimen with a well-developed supratubal recess (STS). The tensor tympani folds are composed of two segments, a vertical part (TFV) that attaches to Sheehy's cog (COG), and a horizontal part (TFH) that partly contributes to the floor of the supratubal recess anteriorly, bony encasement of the tensor tympani muscle (TTM).

Right ear: Unlike the anatomic specimen shown in Fig. 31, this is a poorly-developed supratubal recess in a surgical case. View through a 70°-scope, upward and backward. The tensor tympani fold (TF) here, different from the one shown in Fig. 31, is almost a horizontal structure. Handle of malleus (HM); tensor tympani muscle (TTM), anterior bony annulus (ABA).

Right ear: Endoscopic close-up view of the tensor tympani fold (TF) shown in Fig. 32. Bony encasement of the tensor tympani muscle (TTM); tensor tympani tendon (TTT) inserting on the neck of the malleus. Funnel-shaped entrance to the Eustachian tube (→).
5. Provided the lateral attic space is closed off by the lateral malleal and incudomalleal folds, and in the presence of a complete tensor tympani fold – preventing any direct ventilation through the anterior attic – the only area for egress tympanic ventilation is the tympanic isthmus which is interposed between the incudostapedial joint and the tensor tympani tendon. [Fig. 35]

- Mobilize the incus to expose the articular facet with malleus and stapes. Then, proceed with disarticulating the stapes and malleus from the incus. [Fig. 36]

**Observe**

1. The horizontal segment of the facial nerve and the second genu.
2. The lateral semicircular canal.
3. The remnant of the previously released attachment of the superior incudal ligament to the tegmen tympani. [Fig. 37]

- Using a malleus nipper, transect the neck of the malleus at a relatively superior level in order to preserve the anterior malleal ligament and the tensor tympani tendon which attaches to the handle and neck of the malleus. Remove the head of malleus, taking care that the suspensory ligaments stabilizing the handle are preserved. Mobilize the handle anteriorly [Fig. 38]
Observe

1. The tensor tympani tendon attaching to the neck of the malleus.
2. The broken off vertical segment of the tensor tympani fold.
3. The course of the chorda tympani nerve (Fig. 37).
4. The anterior aperture of the chorda tympani nerve running in its bony canal.
5. The topographical relationship of the chorda tympani nerve to the anterior malleal ligament.
6. The anterior tympanic spine and the attachment of the anterior malleal ligament.

![Image: Endoscopic view of the attic after removal of the incus. Articular surface of the head of malleus (AS); remnant of the superior ligament (SL) of the incus attaching to the tegmen tympani.](image1)

![Image: The handle of malleus has been mobilized anteriorly to expose the tensor tympani 'old' which is released from its attachments; the starting point of the white arrows indicate the original position of the 'old' and the tips show the current point following lateralization of the malleus handle. Tensor tympani tendon (TT); chorda tympani (CT); tensor tympani 'old' (TF) after dislocation from its original position; anterior malleal ligament (AML).](image2)
Transect the tensor tympani tendon and remove the malleus handle. (Fig. 39)

**Observe**

1. You can almost see the fibers of the horizontal segment of the facial nerve, and its first genu as it performs the first turn after arising from the internal auditory canal.
2. The relationship of Sheehy's cog to the geniculate ganglion of the facial nerve.
3. The remnant of the tensor tympani fold.
4. Examine the relationship between the second genu of the facial nerve and the lateral semicircular canal. (Fig. 40)

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Left ear: Endoscopic view after transection of the tensor tympani tendon and removal of the malleus handle, the anterior tympanic spine, anterior malleal ligament and the chorda tympani. Sheehy's cog (COG); remnant of the tensor tympani 'old' (TM); insertion point (→) of the partially removed vertical segment of the tensor tympani 'old'; insertion point (⇒) of the completely removed horizontal segment of the tensor tympani 'old'; supratubal recess (STR); Eustachian tube (ET); cochleariform process (CP); first genu (1G) of the facial nerve and neighbouring geniculate ganglion; lateral semicircular canal (LC).

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Left ear: Endoscopic view of the horizontal segment of the facial nerve demonstrating its topographical relationship to the lateral semicircular canal. First genu (1G); second genu (2G); lateral canal (LC); cochleariform process (CP).
Elective Dissection Tasks

- Using a curette or a drill, if available, attempt to slowly remove the bony encasement of the facial nerve, starting with the horizontal segment and following the nerve proximally and distally into the first and second genu.

**Observe**

1. The acute right angle bend of the first genu and the upward “kink” in that area.
2. The thin wall of bone overlying the facial nerve especially over the geniculate ganglion which forms the medial wall of the attic at the area of the cog.
3. Try to identify the ramification of the facial nerve's first genu, giving off the greater (superficial) petrosal nerve.
4. Remove the bony encasement of the facial nerve along the course of its vertical segment and try to identify the fine ramification of facial nerve, innervating the stapedius muscle.

- Using a curette, remove the round window niche. Remove the round window membrane and enlarge the round window inferiorly and anteriorly to expose the beginning of the scala tympani and the basal turn of the cochlea.

**Observe**

1. The relationship between the round window and the scala tympani and its slightly angulated spatial orientation.
Endoscopic-Guided Middle Ear Diagnosis

Recommended Set according to Dr. M. TARABICHI

HOLOGIPE® Telescopes and Accessories

1215 AA
Tele-Otoscope with HOLOGIPE® Straight Forward Telescope 0°,
diameter 4 mm, length 6 cm,
autoclavable, fiber optic light transmission incorporated,
color code: green

1215 BA
Tele-Otoscope with HOLOGIPE® Forward-Oblique Telescope 30°,
diameter 4 mm, length 6 cm,
autoclavable, fiber optic light transmission incorporated,
color code: red

1230 AA
HOLOGIPE® Straight Forward Telescope 0°,
diameter 2.7 mm, length 11 cm,
autoclavable, fiber optic light transmission incorporated,
color code: green

1230 BA
HOLOGIPE® Forward-Oblique Telescope 30°,
diameter 2.7 mm, length 11 cm,
autoclavable, fiber optic light transmission incorporated,
color code: red

723773
STAMBERGER Telescope Handle, round, length 6.5 cm,
for use with HOLOGIPE® telescopes with diameter 2.7/3 mm
and length 11 cm

1218 S
Stand, for 3 tele-otoscopes 1215, 1216, 1218,
cartridges with color codes green, red and yellow, autoclavable,
dimensions: 180 x 105 x 80 mm (w x h x d)

203705
203707
203710
203715

203710
Suction Tube, cylindrical, LUR,
outer diameter 1 mm, working length 9 cm
LED Battery Light Sources for Endoscopes

11301 D4  LED Battery Light Source for Endoscopes, with fast screw thread, LED technology, can be connected to all KARL STORZ endoscopes, brightness > 50,000 lux, burning time > 120 min, weight approx. 150 g ready for use, suitable for surface disinfection, with 2 Photo Batteries 121306 P

11301 DE  LED Battery Light Source for Endoscopes, rechargeable, with click connection, can be connected to all KARL STORZ endoscopes, brightness > 50,000 lux, color temperature 5500 K, lithium-ion batteries, charging time 60 min, burning time at 100% brightness 40 min, weight approx. 150 g ready for use, suitable for surface disinfection

11301 DF  LED Battery Light Source for Endoscopes, rechargeable, with fast screw thread, can be connected to all KARL STORZ endoscopes, brightness > 50,000 lux, color temperature 5500 K, lithium-ion batteries, charging time 60 min, burning time at 100% brightness 40 min, weight approx. 150 g ready for use, suitable for surface disinfection

11301 DG  Charging Unit, for 11301 DE/11301 DF, for two LED battery light sources, with integrated power supply and adaptor for EU, UK, USA and Australia, power supply 110 – 240 VAC, 50/60 Hz, suitable for surface disinfection

094129 Battery Charger Li-Ion, for charging the rechargeable Battery Box 091424 or Battery Light Source 11301 DE/DF, for use with Mains Cord 094127, power supply 100 – 240 VAC, 50/60 Hz

094127 Mains Cord, for Battery Charger 094129, length 150 cm
Endoscopic-Guided Middle Ear Surgery
Recommended Set according to Dr. M. TARABICHI

**HOPKINS® Telescopes and Accessories**

- **7230 AA**
  - **HOPKINS® Straight Forward Telescope 0°,**
    - enlarged view, diameter 4 mm, length 18 cm, autoclavable,
    - fiber optic light transmission incorporated,
    - color code: green

- **7230 BA**
  - **HOPKINS® Forward-Oblique Telescope 30°,**
    - enlarged view, diameter 4 mm, length 18 cm, autoclavable,
    - fiber optic light transmission incorporated,
    - color code: red

- **7220 AA**
  - **HOPKINS® Straight Forward Telescope 0°,**
    - enlarged view, diameter 3 mm, length 14 cm, autoclavable,
    - fiber optic light transmission incorporated,
    - color code: green

- **7220 BA**
  - **HOPKINS® Forward-Oblique Telescope 30°,**
    - enlarged view, diameter 3 mm, length 14 cm, autoclavable,
    - fiber optic light transmission incorporated,
    - color code: red

152201  **WAGENER Ear Hook,** ball end, size 1, length 15.5 cm
152202  Same, size 2
152203  Same, size 3

152301  **Ear Hook,** without ball end, size 1, length 15.5 cm
152302  Same, size 2

204250  **FISCH Adaptor,** for Suction Tubes 204352 - 204354,
        with long thumb grip, cut-off hole diameter 1 mm,
        inner diameter 1.7 mm, Luer cone, length 5.5 cm

204005  **Suction Cannula,** angular, Luer-Lock,
        outer diameter 0.5 mm, working length 6 cm
204007  Same, outer diameter 0.7 mm
204008  Same, outer diameter 0.8 mm
204010  Same, outer diameter 1 mm
204013  Same, outer diameter 1.3 mm
204015  Same, outer diameter 1.5 mm
204020  Same, outer diameter 2 mm
204025  Same, outer diameter 2.5 mm
221100  HARTMANN Ear Forceps, extra delicate, serrated, 1 x 4.5 mm, working length 8 cm
221150  Same, working length 12.5 cm
221210  FISCH Ear Forceps, extra delicate, pointed, smooth, 1 x 4.5 mm, working length 8 cm
221201  FISCH Ear Forceps, extra delicate, serrated, 0.4 x 3.5 mm, working length 8 cm
221304  Ear Forceps, extra delicate, serrated, curved to right, working length 8 cm
221305  Same, curved to left
221307  Same, curved upwards
221310  THOMAEIN Ear Forceps, very fine, serrated, retrograde backwards curved, working length 8 cm

162500  STRÜMPFL Ear Forceps, working length 6 cm
222800  HOUSE-DIETER Malleus Nipper, upbiting, working length 8 cm

222900  *Same*, downbiting

221450 - 221454

221454  FISCH Ear Forceps, round cupped jaws, working length 12.5 cm, diameter 3 mm

221406 - 221709

221609  WULLSTEIN Ear Forceps, extra delicate, oval cupped jaws, curved to right, oval, 0.9 mm, working length 8 cm

221609  *Same*, curved to left

221709  *Same*, curved upwards
222602  **HOUSE-BELLUCCI Scissors**, extra delicate, working length 8 cm

222604 R  **BELLUCCI Scissors**, delicate, curved to right, working length 8 cm

222605 L  **Same**, curved to left

152301  **Ear Hook**, without ball end, size 1, length 15.5 cm

223100  **PLESTER Knife**, round, vertical, standard size: 3.5 x 2.5 mm, length 16 cm

223101  **Same**, medium size: 4 x 2 mm

223500  **ROSEVI Elevator**, tip angled 15°, 12 mm long, width 1.5 mm, length 16 cm

223890  **Seeker**, extra delicate, angled 25°, with ball end diameter 0.6 mm, length 16 cm
224001  HOUSE Curette, large, spoon sizes 2 x 3.2 mm and 1.6 x 2.6 mm, length 15 cm
224002  Same, small, spoon sizes 1 x 1.6 mm and 1.3 x 2 mm
224003  Same, medium, spoon sizes 1 x 1.8 mm and 2 x 2.8 mm

224005  HOUSE Curette, angular, extra small, spoon sizes 0.8 x 0.9 mm and 0.5 x 1 mm, length 17 cm
224011  HOUSE Curette, straight, extra large, spoon sizes 2.3 x 3.5 mm and 2.7 x 4.3 mm, length 15 cm

224301  WULLSTEIN Needle, strong long curve, length 16.5 cm
224302  Same, medium curve
224303  Same, slight curve

226211  THOMASSIN Dissector, double-ended, distal tips with single curve to right or to left, length 18 cm
226212  Same, distal tips with double curve to right or to left

226815  Round Knife 45°, diameter 1.5 mm, length 16 cm
226825  Same, diameter 2.5 mm
226835  Same, diameter 3.5 mm
UNIDRIVE® ENT SCB® and UNIDRIVE® ECO

One unit – six functions
- Shaver system for surgery of the paranasal sinuses and anterior skull base
- Sinus Burr
- Drill
- STAMMBERGER-SACHSE Intranasal Drill
- Micro Saw
- Dermatome

UNIDRIVE® ENT SCB®
The high-end solution for excellent handling and convenience in the OR

Special features:
- With touch screen
- Color display
- Choice between several display languages
- Functions displayed in words
- Clearly defined operating elements
- Set values of the last session are stored
- Automatic error message via text display

UNIDRIVE® ECO
The functional and cost-effective alternative meeting the same high quality standards

Special features:
- With push-button control panel
- Straightforward function selection via limited menu options
- Encoded function display (numerical code)
- Clearly defined operating elements
- Easy to use due to push-button controls
- Set values of the last session are stored
- Automatic error message via numerical code
UNIDRIVE® ENT SCB® and UNIDRIVE® ECO

Constant motor speed
- Microprocessor-controlled motor speed
- Presелected parameters are maintained during drilling
- Continuously adjustable speed of rotation
- Maximum speed of rotation can be preset

Integrated irrigation pump
- Microprocessor-controlled flow rate
- Preadjustable constant flow rate
- Quick and easy connection of the tubing set
- Flow rate can be controlled from the sterile area via footswitch
- Flow rate adjustable from 6–125 ml/min

2 motor outputs
- Simultaneous connection of 2 motors
- Active output can be selected from the sterile area via footswitch

Arguments in favor of both motor systems

Saves time
- 2 motors can be connected simultaneously
  ▶ no plugging or unplugging during the operation
- Automatic display of error messages
  ▶ no time-consuming error tracing in the operating room
- Exact reading and adjustment of motor speed
- Presелected parameters can be stored
  ▶ set-point values for motor speed and flow rate do not need to be readjusted with each new procedure
- Quick and easy connection of the tubing set to the pump

Relieves OR personnel
- The time for preparation prior to surgery is considerably reduced by standardization
- Irrigation flow rate and motor speed adjustable via footswitch
- Easy to use due to clearly structured design and optimized function selection
- Personnel can use the time saved for other tasks
- User can control multiple functions from the sterile area via footswitch

Saves money
- Only one unit required to perform six functions
- Most of the available shaver blades, burrs and drills are reusable
  ▶ enables perfect hygienic reprocessing
- EC micro motor is compatible with various INTRA drill handpieces
UNIDRIVE® ENT SCB® and UNIDRIVE® ECO

Common technical specifications of both systems:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Handpiece No.</th>
<th>Motor speed (max.) rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shaver mode</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation mode: oscillating</td>
<td>40711035</td>
<td>3,000*</td>
</tr>
<tr>
<td>Max. rev. (rpm): in conjunction with Micro Shaver Handpiece</td>
<td>40711039</td>
<td>7,000*</td>
</tr>
<tr>
<td>in conjunction with Paranasal Sinus Shaver Handpiece</td>
<td>40711040</td>
<td>7,000*</td>
</tr>
<tr>
<td>in conjunction with DrillCut-X Shaver Handpiece</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sinus Burr mode</strong></td>
<td>40711040</td>
<td>12,000</td>
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<tr>
<td>Operation mode: rotating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. rev. (rpm): in conjunction with DrillCut-X Shaver Handpiece</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drilling mode</strong></td>
<td>20711032</td>
<td>40,000</td>
</tr>
<tr>
<td>Operation mode: counter clockwise or clockwise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. rev. (rpm): in conjunction with EC Micro Motor and Connecting Cable</td>
<td>20711072</td>
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<tr>
<td><strong>Micro Saw mode</strong></td>
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<td>20,000</td>
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<tr>
<td>Max. rev. (rpm): in conjunction with EC Micro Motor and Connecting Cable</td>
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<tr>
<td><strong>Intranasal Drill mode</strong></td>
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<td>60,000</td>
</tr>
<tr>
<td>Max. rev. (rpm): in conjunction with EC Micro Motor and Connecting Cable</td>
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</tr>
<tr>
<td><strong>Dermatome mode</strong></td>
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<td>8,000</td>
</tr>
<tr>
<td>Max. rev. (rpm): in conjunction with EC Micro Motor and Connecting Cable</td>
<td>20711072</td>
<td></td>
</tr>
<tr>
<td>Power supply:</td>
<td>100-120, 230-240 VAC, 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>Dimensions:</td>
<td>304 x 164 x 263 mm</td>
<td></td>
</tr>
<tr>
<td>Two outputs for parallel connection of two motors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated irrigation pump</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow rate:</td>
<td>6-126 ml/min, adjustable in 8 steps</td>
<td></td>
</tr>
</tbody>
</table>

* Approx. 3000 rpm is recommended as this is the most efficient suction/performance ratio.

Technical differences between both systems:

<table>
<thead>
<tr>
<th></th>
<th>UNIDRIVE® ENT SCB®</th>
<th>UNIDRIVE® ECO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch Screen:</td>
<td>6.4&quot; / 300 cd/m²</td>
<td></td>
</tr>
<tr>
<td>Weight:</td>
<td>6.1 kg</td>
<td>6.0 kg</td>
</tr>
<tr>
<td>Certified to:</td>
<td>IEC 60-1 CE acc. to MDD</td>
<td>IEC 60601-1</td>
</tr>
<tr>
<td>Selectable display languages:</td>
<td>English, French, German, Spanish, Italian, Portuguese, Greek, Turkish, Russian, Polish</td>
<td>numerical codes</td>
</tr>
</tbody>
</table>
UNIDRIVE® ENT SCB®

40 7116 01-1 UNIDRIVE® ENT SCB® consisting of:

20 7116 20-1 UNIDRIVE® ENT with KARL STORZ Communication Bus System SCB®, power supply: 100 – 40 VAC, 50/60 Hz

400 A Mains Cord

20 0126 30 Two-Pedal Footswitch, two-stage, with proportional function

20 7116 40 Silicone Tubing Set, for irrigation, sterilizable

20 7116 21 Clip-Set, for use with tubing set 20 7116 40

20 0901 70 SCB® Connecting Cable, length 100 cm

031131-01* Disposable tubing set, sterile

UNIDRIVE® ECO

40 711401 UNIDRIVE® ECO consisting of:

20 711420 UNIDRIVE® ECO, power supply: 100 – 240 VAC, 50/60 Hz

400 A Mains Cord

20 0126 30 Two-Pedal Footswitch, two-stage, with proportional function

20 7116 40 Silicone Tubing Set, for irrigation, sterilizable

20 7116 21 Clip-Set, for use with tubing set 20 7116 40

mtp medical technical promotion gmbh,
Take-Off Gewerbepark 46, D-78579 Neuhausen ob Eck, Germany
INTRA Drill Handpiece

Special Features:
- Tool-free closing and opening of the drill
- Right/ left rotation
- Max. rotating speed up to 40,000 min⁻¹
- Detachable irrigation channels

- Light construction
- Operates with little vibrations
- Low maintenance, easy cleaning
- Safe grip

252475  INTRA Drill Handpiece, angled, 12.5 cm, for use with straight shaft burrs, transmission 1:1 (40,000 rpm)

252465  INTRA Drill Handpiece, straight, long shape, 10.4 cm, for use with straight shaft burrs, transmission 1:1 (40,000 rpm)

252490  INTRA Drill Handpiece, straight, 8.7 cm, for use with straight shaft burrs, transmission 1:1 (40,000 rpm)

280052  Universal Spray, combination cleaner and lubricant, for INTRA Drill Handpiece and EC motors, package of 6 sprayers 280052 B and 1 spray diffuser 280052 C – HAZARDOUS GOOD – UN 1850
**Burrs**

*Straight Shaft Burrs, length 7 cm*

<table>
<thead>
<tr>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard</th>
<th>Tungsten Carbide</th>
<th>Transverse Tungst.Carb.</th>
<th>Diamond</th>
<th>Diamond coarse</th>
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<tbody>
<tr>
<td>006</td>
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<td>260010</td>
<td>261010</td>
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<td>070</td>
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<td>261070</td>
<td></td>
<td>262070</td>
<td>262270</td>
</tr>
</tbody>
</table>

260000  *Standard Straight Shaft Burr,*  
stainless, sizes 006 – 070, length 7 cm, set of 15

261000  *Tungsten Carbide Straight Shaft Burr,*  
stainless, sizes 006 – 070, length 7 cm, set of 15

262000  *Diamond Straight Shaft Burr,*  
stainless, sizes 006 – 070, length 7 cm, set of 15

262200  *Rapid Diamond Straight Shaft Burr,* stainless,  
with coarse diamond coating for precise drilling  
and abrasion by light hand pressure and generating  
minimal heat, sizes 023 – 070, length 7 cm, set of 9  
color code: gold

280030  *Rack,* for 36 straight shaft burrs with a length of 7 cm,  
can be folded out, sterilizable, 22 x 11.5 x 2 cm
**Burrs**

*Straight Shaft Burrs, length 5.7 cm*

<table>
<thead>
<tr>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard</th>
<th>Diamond</th>
<th>Diamond coarse</th>
</tr>
</thead>
<tbody>
<tr>
<td>014</td>
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<td>649614 K</td>
<td>649714 K</td>
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<tr>
<td>016</td>
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<td>023</td>
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<td>649723 K</td>
<td>649723 GK</td>
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<td>649670 K</td>
<td>649770 K</td>
<td>649770 GK</td>
</tr>
</tbody>
</table>

649600 K  **Standard Straight Shaft Burr**, stainless, sizes 014 – 070, length 5.7 cm, set of 11

649700 K  **Diamond Straight Shaft Burr**, stainless, sizes 014 – 070, length 5.7 cm, set of 11

649700 GK **Rapid Diamond Straight Shaft Burr**, stainless, with coarse diamond coating for precise drilling and abrasion by light hand pressure and generating minimal heat, sizes 023 – 070, length 5.7 cm, set of 9, color code: gold
**Burrs**

*Straight Shaft Burrs, oblong, length 7 cm*

![Straight Shaft Burrs](image)

<table>
<thead>
<tr>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>050</td>
<td>5.0</td>
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<tr>
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<tr>
<td>070</td>
<td>7.0</td>
<td>265070</td>
</tr>
</tbody>
</table>

*LINDEMANN Conical, stainless, length 7 cm*

![Conical Burrs](image)

<table>
<thead>
<tr>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>018</td>
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</tr>
<tr>
<td>021</td>
<td>2.1</td>
<td>263521</td>
</tr>
<tr>
<td>023</td>
<td>2.3</td>
<td>263523</td>
</tr>
</tbody>
</table>

*280090 Size Template, for drills, stainless steel, sterilizable*
Burrs – Accessories

260030  **Rack**, for 36 straight shaft burrs with a length of 7 cm, can be folded out, sterilizable, 22 x 11.5 x 2 cm

260080  **Brush**, for cleaning atraumatic jaws, sterilizable, package of 5

260120  **Temporal Bone Holder**, bowl-shaped, with 3 fixation screws for tensioning the petrosal bone and with evacuation tube for irrigation liquid
Burrs – Accessories

39552 A  **Sterilizing and Storage Tray**, provides safe storage of accessories for KARL STORZ drilling/grinding systems during cleaning and sterilization, includes tray for small parts, for use with Rack 280030, rack not included

for storage of:
- Up to 6 drill handpieces
- Connecting cable
- EC micro motor
- Small parts

39552 B  **Sterilizing and Storage Tray**, provides safe storage of accessories for KARL STORZ drilling/grinding systems during cleaning and sterilization, includes tray for small parts, for use with Rack 280030, rack included

for storage of:
- Up to 36 drill bits and burrs
- Small parts
Oscillating Micro Saws

254000  Oscillating Micro Saw, inbuilt irrigation tube, max. recommended number of revolutions 15,000 rpm corresponds to 15,000 oscillations/min., without saw blades, with fork wrench

Saw blades, short shaft, for use with 254000

254024  Saw Blade, short shaft, blade thickness 0.3 mm, width of blade 6 mm, working length 11 mm, package of 1, for use with 254000

254026  Same, width of blade 10 mm

254026  Same, width of blade 16 mm

254030  Same, blade thickness 0.15 mm, width of blade 6 mm

Saw blades, long shaft, for use with 254000

254027  Saw Blade, long shaft, blade thickness 0.3 mm, width of blade 6 mm, working length 26 mm, package of 1, for use with 254000

254028  Same, width of blade 10 mm

254029  Same, width of blade 16 mm

254031  Same, blade thickness 0.15 mm, width of blade 6 mm
Micro Compass Saws, Osseo Scalpel

254100
Micro Sagittal Saw, without saw blades, integrated irrigation tube, with fork wrench, recommended maximum speed: 20,000 rpm

Saw blades, for use with 254100

254170 Saw Blade, blade thickness 0.35 mm, width of blade 4 mm, working length 10 mm, package of 12, for use with Micro Sagittal Saw 254100
254171 Same, width of blade 6 mm, working length 10 mm
254172 Same, width of blade 6 mm, working length 15 mm
254173 Same, width of blade 10 mm, working length 15 mm
254174 Same, width of blade 12 mm, working length 27 mm
254175 Same, width of blade 6 mm, working length 10 mm

254200 Osseo Scalpel, Micro Saw, with axial/sagittal channel, pendulum stroke, especially appropriate for 3-dimensional incision guiding, without saw blades, inbuilt irrigation tube, max. recommended number of revolution 20,000 rpm, with fork wrench

Saw blades, for use with 254200

254235 Saw Blade, blade thickness 0.35 mm, working length 12 mm, package of 12, for use with Osseo Scalpel, Micro Saw 254200
254236 Same, working length 18 mm
254237 Same, working length 24 mm
Micro Compass Saws

254300  Micro Compass Saw, without saw blades, detachable irrigation tube, with fork wrench, recommended maximum speed: 15,000 rpm

Saw blades, for use with 254300

254312  Saw Blade, blade thickness 0.25 mm, working length 11 mm, package of 12, for use with 254300

254313  Same, working length 14 mm

254314  Same, working length 18 mm

254315  Same, working length 22 mm

254316  Same, working length 26 mm
Micro Saws – Accessories

39553 A  **Sterilizing and Storage Basket**, provides safe storage of accessories for the KARL STORZ micro saw system during cleaning and sterilization, includes basket for small parts

*for storage of:*
- Up to 6 saw handpieces
- Connecting cable
- EC micro motor
- Saw blades
Dermatomes

Special features:
- For removing skin and mucosa
- Dermplaning for obtaining small pieces of skin from behind the ear
- Can be easily adapted to motor
- Optimal setting of the incision depth
- Lightweight construction

253000  Dermatome, with INTRA coupling, width of incision 12 mm, max. number of rev. 8000 rpm
253001  Replacement Blades, for dermatome 253000, width of incision 12 mm, non-sterile, package of 10

253100  Dermatome, with INTRA coupling, width of incision 25 mm, max. number of rev. 8000 rpm
253101  Replacement Blades, for dermatome 253100, width of incision 25 mm, non-sterile, package of 10

253200  Dermatome, with INTRA coupling, width of incision 50 mm, max. number of rev. 8000 rpm
253201  Replacement Blades, for dermatome 253200, width of cut 50 mm, non-sterile, package of 10

253300  Dermatome, with INTRA coupling, width of incision 75 mm, max. number of rev. 8000 rpm
253301  Replacement Blades, for dermatome 253300, width of incision 75 mm, non-sterile, package of 10
Sterilizing and Storage Basket, provides safe storage of accessories for the KARL STORZ dermatome system during cleaning and sterilization
for storage of:
- Up to 2 dermatomes
- Connecting cable
- EC micro motor with INTA coupling
Genuine FULL HD (High Definition) is guaranteed by a maximum resolution and the consistent use of the native 16:9 aspect ratio throughout the entire image chain, from image capture, signal transmission to display.

- HD-compatible endoscopic video camera systems must be equipped with three-CCD chips supporting the 16:9 input format and require that image capture is performed at a resolution of 1920 x 1080 pixels.

The benefits of FULL HD (High Definition) for medical applications are:

- 6 times higher input resolution of the camera delivers more detail and depth of field.
- Using 16:9 format during image acquisition enlarges the field of view.
- The 16:9/16:10 format of the widescreen monitor supports ergonomic viewing.
- Enhanced color brilliance for optimal diagnosis.
- Progressive scan technology provides a steady, flicker-free display and helps eliminate eyestrain and fatigue.

For use with IMAGE1™ HD and standard one- and three-chip camera heads, max. resolution 1920 x 1080 pixels, with integrated KARL STORZ SCB® and integrated digital Image Processing Module, color systems PAL/NTSC, power supply 100 – 240 VAC, 50/60 Hz.

**IMAGE1 HUB™ HD Camera Control Unit SCB®**

**Consisting of:**

- 22 2010 20-1 IMAGE1 HUB™ HD Camera Control Unit SCB®
  - Mains Cord
  - 536 MK BNC/BNC Video Cable, length 180 cm
  - 547 S S-Video (Y/C) Connecting Cable, length 180 cm
  - 20 2032 70 Special RGBS Connecting Cable, length 190 cm
  - 2x 22210 70 Connecting Cable, for controlling peripheral units, length 180 cm
  - 20 0490 89 DVI-D Connecting Cable, length 300 cm
  - 20 0901 70 SCB® Connecting Cable, length 100 cm
  - 20 0202 31 U Keyboard, with US English character set

For use with IMAGE1™ HD and standard one- and three-chip camera heads, max. resolution 1920 x 1080 Pixels, with integrated KARL STORZ-SCB® and integrated digital Image Processing Module, color systems PAL/NTSC, power supply 100 – 240 VAC, 50/60 Hz.

**IMAGE1 HUB™ HD Camera Control Unit SCB®, with SDI module**

**Consisting of:**

- 22 2010 20-102 IMAGE1 HUB™ HD Camera Control Unit SCB®, with SDI module
  - Mains Cord
  - 400 A Mains Cord
  - 400 B Mains Cord, US-version
  - 3 x 536 MK BNC/BNC Video Cable, length 180 cm
  - 547 S S-Video (Y/C) Connecting Cable, length 180 cm
  - 20 2032 70 Special RGBS Connecting Cable, length 190 cm
  - 2x 22210 70 Connecting Cable, for controlling peripheral units, length 180 cm
  - 20 0490 89 DVI-D Connecting Cable, length 300 cm
  - 20 0901 70 SCB® Connecting Cable, length 100 cm
  - 20 0202 31 U Keyboard, with US English character set
**IMAGE 1 HUB™ HD**

**HD Camera Control Unit**

**Specifications:**

<table>
<thead>
<tr>
<th>Signal-to-noise Ratio</th>
<th>A/D</th>
<th>Video Output</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IMAGE 1 HUB™ HD</strong> three-chip camera systems ≥ 60 dB</td>
<td>Microprocessor-controlled</td>
<td>- Composite signal to BNC socket&lt;br&gt; - S-Video signal to 4-pin Mini-DIN socket (DX)&lt;br&gt; - RGB signal to D-Sub socket&lt;br&gt; - SDI signal to BNC socket (only IMAGE 1 HUB™ HD with SDI module) (DX)&lt;br&gt; - HD signal to D-Sub socket (DX)</td>
<td>Keyboard for title generator, 5-pin DIN socket</td>
</tr>
</tbody>
</table>

**Control Output/Input**

- KARL STORZ®-SCB® at 6-pin Mini-DIN socket (DX)
- 2.5 mm stereo jack plug (ACC 1, ACC 2)
- Serial port at RJ-11

<table>
<thead>
<tr>
<th>Dimensions w. h. d (mm)</th>
<th>Weight (kg)</th>
<th>Power supply</th>
<th>Certified to</th>
</tr>
</thead>
<tbody>
<tr>
<td>305 x 15 x 205</td>
<td>2.56</td>
<td>100-240 VAC, 50/60 Hz</td>
<td>IEC 601-1, 601-2-11, CSA 22.2 No. 601, UL 2601-1 and CE acc. to MED, protection class 1/CF</td>
</tr>
</tbody>
</table>
**IMAGE 1 HUB™ HD**

Full HD Camera Head

**Specifications:**

<table>
<thead>
<tr>
<th>IMAGE 1™ HD Camera Heads</th>
<th>H3-Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Hz/60 Hz</td>
<td>22 220055-3 (PAL/NTSC) (50/60 Hz)</td>
</tr>
<tr>
<td>Image Sensor</td>
<td>3x 1/4” CCD chip</td>
</tr>
<tr>
<td>Pixel Output Signal H x V</td>
<td>1920 x 1080</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Diameter 32-44 mm, length 114 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>246 g</td>
</tr>
<tr>
<td>Min. Sensitivity</td>
<td>F 1.4/1.7 Lux</td>
</tr>
<tr>
<td>Lens</td>
<td>Integrated Parfocal Zoom Lens, f = 15-31 mm</td>
</tr>
<tr>
<td>Grip Mechanism</td>
<td>Standard eyepiece adaptor</td>
</tr>
<tr>
<td>Cable</td>
<td>non-detachable</td>
</tr>
<tr>
<td>Cable Length</td>
<td>300 cm</td>
</tr>
</tbody>
</table>

Standard IMAGE 1™ camera heads may also be used with the IMAGE 1 HUB™ HD camera control unit.
# IMAGE 1 HUB™ HD

**Full HD Monitors**

<table>
<thead>
<tr>
<th>KARL STORZ HD Flat Screens</th>
<th>24&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Desktop with pedestal</strong></td>
<td>9524 N</td>
<td>9524 NO</td>
</tr>
<tr>
<td><strong>Wall mounted with VESA 100-adaption</strong></td>
<td>9524 NB</td>
<td>9524 NBO</td>
</tr>
<tr>
<td><strong>Inputs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDI</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>HD-SDI</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>RGBS</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>S-Video</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Composite</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>SDG</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>DVI-D</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Fiber Optic</td>
<td>–</td>
<td>●</td>
</tr>
<tr>
<td>VGA</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

**Specifications:**

<table>
<thead>
<tr>
<th>KARL STORZ HD Flat Screens</th>
<th>24&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Desktop with pedestal</strong></td>
<td>9524 N/NO</td>
<td>9526 N/NO</td>
</tr>
<tr>
<td><strong>Wall mounted with VESA 100-adaption</strong></td>
<td>9524 NB/NBO</td>
<td>9526 NB/NBO</td>
</tr>
<tr>
<td><strong>Brightness</strong></td>
<td>400 cd/m²</td>
<td>500 cd/m²</td>
</tr>
<tr>
<td><strong>Max. Viewing Angle</strong></td>
<td>178° vertical</td>
<td>178° vertical</td>
</tr>
<tr>
<td><strong>Pixel Distance</strong></td>
<td>0.270 mm</td>
<td>0.287 mm</td>
</tr>
<tr>
<td><strong>Reaction Time</strong></td>
<td>5-12 ms</td>
<td>5-12 ms</td>
</tr>
<tr>
<td><strong>Contrast Ratio</strong></td>
<td>1000:1</td>
<td>800:1</td>
</tr>
<tr>
<td><strong>Adaption</strong></td>
<td>100 mm VESA</td>
<td>100 mm VESA</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>7.2 kg</td>
<td>8.2 kg</td>
</tr>
<tr>
<td><strong>Rated Power</strong></td>
<td>115 Watt</td>
<td>115 Watt</td>
</tr>
<tr>
<td><strong>Operating Conditions</strong></td>
<td>0-40 °C</td>
<td>0-40 °C</td>
</tr>
<tr>
<td><strong>Storages</strong></td>
<td>-20-60 °C</td>
<td>-20-60 °C</td>
</tr>
<tr>
<td><strong>Rel. Humidity</strong></td>
<td>20-85%, non-condensing</td>
<td>20-85%, non-condensing</td>
</tr>
<tr>
<td><strong>Dimensions in w x h x d</strong></td>
<td>597 x 401 x 100 mm</td>
<td>627 x 427 x 100 mm</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>100-240 VAC</td>
<td>100-240 VAC</td>
</tr>
<tr>
<td><strong>Certified to</strong></td>
<td>EN 60601-1, protection class IPX1</td>
<td>EN 60601-1, protection class IPX1</td>
</tr>
<tr>
<td>Model</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td></td>
</tr>
</tbody>
</table>
| 9524 DISC | 24" KARL STORZ HD Flat Screen  
Desktop with pedestal, color systems PAL/NTSC, max. screen resolution 1920 x 1200, image format 16:10, power supply 100 – 240 VAC, 50/60 Hz  
consisting of:  
9524 VNO  24" HD Flat Screen  
9419 VSEF Pedestal |
| 9524 YB | 24" KARL STORZ HD Flat Screen  
Wall mounted with VESA 100-adaption, color systems PAL/NTSC, max. screen resolution 1920 x 1200, image format 16:10, power supply 100 – 240 VAC, 50/60 Hz  
consisting of:  
9524 YG  24" HD Flat Screen  
9523 PS  External 24VDC Power Supply  
400 A Mains Cord  
Signal cables: 2-Video, BNC, SXGA, DVI-D |
| 9526 DISC | 26" KARL STORZ HD Flat Screen  
Desktop with pedestal, color systems PAL/NTSC, max. screen resolution 1920 x 1200, image format 16:10, power supply 100 – 240 VAC, 50/60 Hz  
consisting of:  
9526 VNO  26" HD Flat Screen  
9526 SEF Pedestal |
| 9526 YB | 26" KARL STORZ HD Flat Screen  
Wall mounted with VESA 100-adaption, color systems PAL/NTSC, max. screen resolution 1920 x 1200, image format 16:10, power supply 100 – 240 VAC, 50/60 Hz  
consisting of:  
9526 YG  26" HD Flat Screen  
9523 PS  External 24VDC Power Supply  
400 A Mains Cord  
Signal cables: 2-Video, BNC, SXGA, DVI-D |
Cold Light Fountains and Accessories

485 NT  Fiber Optic Light Cable, diameter 2.5 mm, length 180 cm
485 NTW Fiber Optic Light Cable, diameter 2.5 mm, length 180 cm with 90° deflection to the light source
485 NTX Same, length 230 cm

Cold Light Fountain XENON NOVA® 175

20 131501 Cold Light Fountain XENON NOVA® 175, power supply:
100–125 VAC/220–240 VAC, 50/60 Hz
including:
400 A Mains Cord
20 132026 XENON Spare Lamp, 175 watt, 15 volt

Cold Light Fountain XENON 300 sce®

20 133101-1 Cold Light Fountain XENON 300 sce®, with built-in antitfog air-pump, and integrated KARL STORZ Communication Bus System sce®, power supply:
100–125 VAC/220–240 VAC, 50/60 Hz
including:
400 A Mains Cord
610 AFT Silicone Tubing Set, autoclavable, length 250 cm
20 090170 Connecting Cord, length 100 cm
20 133027 Spare Lamp Module XENON
with heat sink, 300 watt, 15 volt
20 133028 XENON Spare Lamp, only, 300 watt, 15 volt
Data Management and Documentation
KARL STORZ AIDA® compact NEO (HD/SD)
Brilliance in documentation continues!

AIDA compact NEO from KARL STORZ combines all the required functions for integrated and precise documentation of endoscopic procedures and open surgeries in a single system.

**Data Acquisition**
Still images, video sequences and audio comments can be recorded easily during an examination or intervention by command by either pressing the on screen button, voice control, foot switch or pressing the camera head button. All captured images will be displayed on the right hand side as a “thumbnail” preview to ensure the still image has been generated.

The patient data can be entered by the on-screen keyboard or by a standard keyboard.

**Flexible post editing and data storage**
Captured still images or video files can be previewed before final storage or can be edited and deleted easily in the edit screen.

**Reliable storage of data**
- Digital saving of all image, video and audio files on DVD, CD-ROM, USB stick, external/internal hard-drive or to the central hospital storage possibilities over DICOM/HL7
- Buffering ensures data backup if saving is temporarily not possible
- Continuous availability of created image, video and sound material for procedure documentation and for research and teaching purposes.

**Efficient data archiving**
After a procedure has been completed, KARL STORZ AIDA® compact HD/SD saves all captured data efficiently on DVD, CD-ROM, USB stick, external hard-drive, internal hard-drive and/or the respective network on the FTP server. Furthermore the possibility exists to store the data directly on the PACS respective HIS server, over the interface package AIDA communication HL7/DICO-V.

Data that could not be archived successfully remains in a special buffered procedure until it is finally saved. A two-line report header and a logo can be used by the user to meet his or her needs.

**Multisession and Multipatient**
Efficient data archiving is assured as several treatments can be saved on a DVD, CD-ROM or a USB stick.
Features and Benefits

- Digital storage of still images with a resolution of 1920 x 1080 pixels, video sequences in 720p and audio files with AIDA compact VEO HD
- Optional interface package DICO/M/HL7
- Sterile, ergonomic operation via touch screen, voice control, camera head buttons and/or foot switches
- Auto detection of the connected camera system on HD-SDI/SDI input
- Efficient archiving on DVD, CD-ROM or USB stick, multi-session and multi-patient
- Network saving
- Automatic generation of standard reports
- Approved use of computers and monitors in the OR environment as per EN 60601-1
- Compatibility with the KARL STORZ Communication Bus (SCB®) and with the KARL STORZ OR1™ AV VEO
- KARL STORZ AIDA® compact VEO HD/SD is an attractive, digital alternative to video printers, video recorders and dictaphones.

20040910  KARL STORZ AIDA® compact NEO SD Communication, documentation system for digital storage of still images, video sequences and audio files, power supply 115/230 VAC, 50/60 Hz

20040911  KARL STORZ AIDA® compact NEO HD Communication, documentation system for digital storage of still images, video sequences and audio files, power supply 115/230 VAC, 50/60 Hz

20040610  KARL STORZ AIDA® compact NEO SD, documentation system for digital storage of still images, video sequences and audio files, power supply 115/230 VAC, 50/60 Hz

20040611  KARL STORZ AIDA® compact NEO HD, documentation system for digital storage of still images, video sequences and audio files, power supply 115/230 VAC, 50/60 Hz

Specifications:

<table>
<thead>
<tr>
<th>Video Systems</th>
<th>PAL, NTSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Inputs</td>
<td>- E-Video (Y/C) - Component - RGBs - SDI - HD-SDI - DVI</td>
</tr>
<tr>
<td>Image Formats</td>
<td>- JPG - BMP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Video Formats</th>
<th>MPEG2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio Formats</td>
<td>WAV</td>
</tr>
<tr>
<td>Storage Media</td>
<td>- DVD+R - DVD+RW - DVD-R - DVD-RW - CD-R - CD-RW - USB stick</td>
</tr>
</tbody>
</table>
Equipment Cart

Equipment Cart,
rides on 4 antistatic dual wheels,
2 equipped with locking brakes,
3 fixed shelves, one with handles,
main switch at vertical beam,
integrated cable conduits in vertical beams,
drawer unit with lock,
3 horizontal cable conduits,
one with cable winding,
two with 4- times electrical sub-distributor,
1 set of non- sliding stands for units,
1 TFT- Monitor arm (VESA 75/100),
1 camera holder,
8 power cords (50 cm), 2 power cords (2 m),
2 equipment rails,
1 CO₂- bottle holder, max. diameter 155 mm,
Isolation transformer 230 VAC (50/60 Hz)
with 8 sockets and earth potential and earth leakage monitor (2000 VA).

Dimensions: Videocart
730 x 1470 x 716 mm (w x h x d),
shelf: 630 x 460 mm (w x d),
caster diameter: 150 mm

TFT- Monitor arm,
height and side adjustable,
can be positioned at left/right side,
rotatable and inclinable,
turning radius approx. 180°,
load capacity max. 14 kg, swivel length 600 mm,
VESA 75/100- adaption, for mobile videocart,
model 28005 LAP/GU and 28003 VE/NA
Notes: