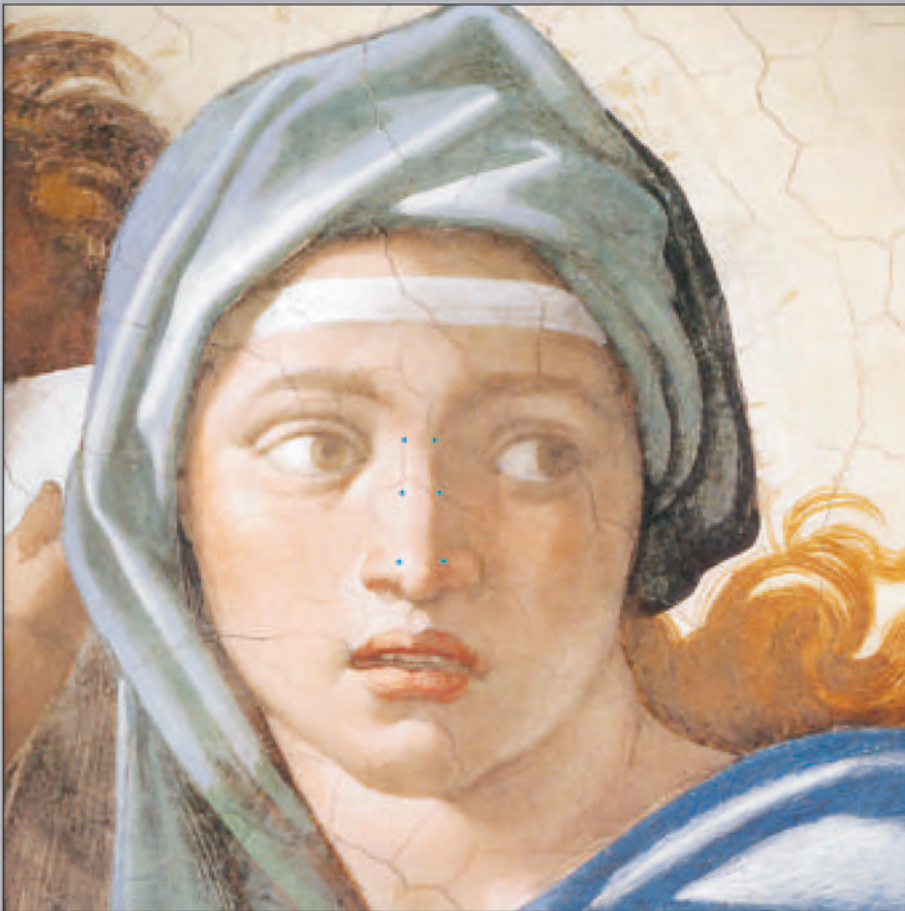


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# AESTHETIC AND RECONSTRUCTIVE FACIAL PLASTIC SURGERY

Selected Aspects and Novel Instruments



Hans BEHRBOHM



# AESTHETIC AND RECONSTRUCTIVE FACIAL PLASTIC SURGERY

Selected Aspects and Novel Instruments

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## **Aesthetic and Reconstructive Facial Plastic Surgery Selected Aspects and Novel Instruments**

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Detail from "Delphic Sibyl" by Michelangelo Buonarroti (1475–1565);  
Rome, Vatican, Sistine Chapel.

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## Introduction

Meticulous pre- and postoperative planning are essential for any type of facial plastic surgery, regardless of whether it is done for an aesthetic, reconstructive, or functional indication. Just a few millimeters will often make the difference between the success or failure of an operation. For this reason, it is helpful and necessary in many situations to have a precision instrument for measuring and marking distances, reference points, and areas. Especially in the harvesting and tailoring

of autologous cartilage grafts, the size of the grafts and recipient beds must be precisely matched in order to prevent buckling, displacement, and extrusion of the graft. This led to the development of a surgical caliper for facial plastic surgery with a millimeter scale to aid both the novice and the experienced surgeon in planning various phases of the operation.

One purpose of this brochure is to illustrate the various applications of this instrument. Another is to

present a new line of osteotomes that are designed to make the osteotomies in rhinoplasties and septorhinoplasties safer, more precise, and less traumatic.

Fractures of the bony nasal pyramid and zygomatic arch are a frequent indication for elevating, reducing, and immobilizing depressed fragments. A special elevator was developed for this purpose that has proven its effectiveness in clinical use.

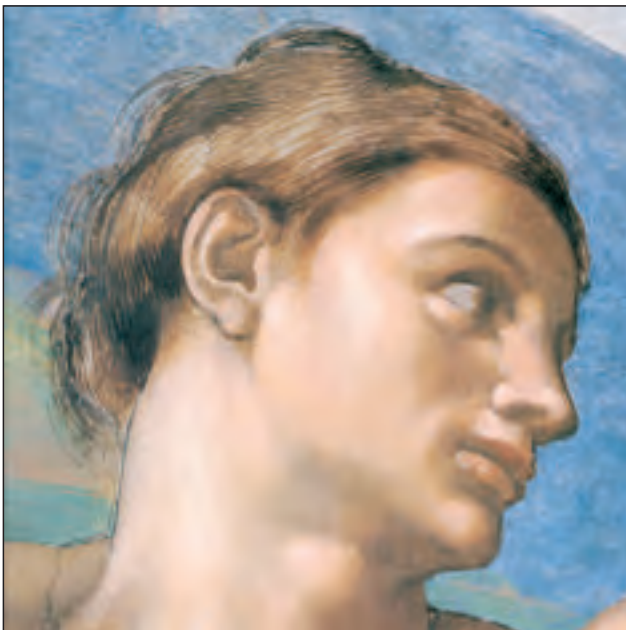
## 1.0 Plastic Surgery of the Forehead and Chin – The Profile Plasty

### 1.1 Aesthetic Reference Points

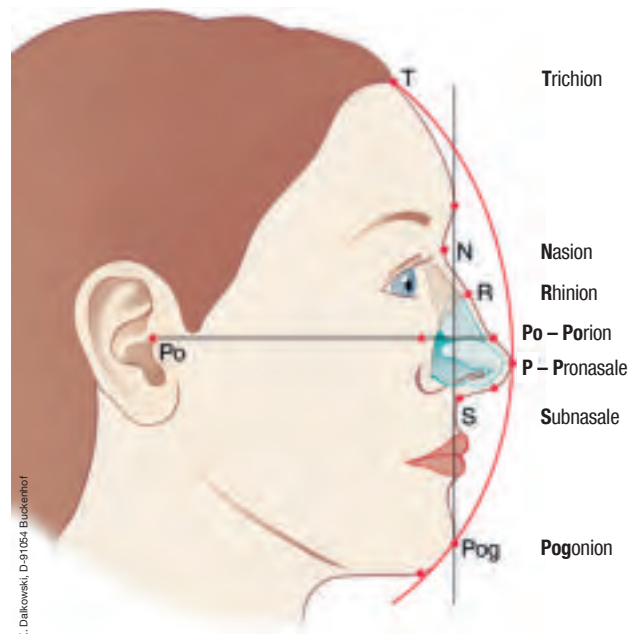
The facial profile illustrates why the function of a septorhinoplasty is not merely to alter the nose but rather to balance the nose with the neighboring aesthetic units, particularly the chin and forehead, to obtain

an harmonious profile line. To a degree, altering the nose alone can favorably influence a sloped forehead, for example, or a receding chin. We use our own modification of the profile circle described by

Charles BAUD (1982) to represent the three key points for evaluating the facial profile and to analyze their relationship to one another.



**Fig. 1**  
Detail from "The Creation of Adam" by Michelangelo Buonarroti (1475-1565); Rome, Vatican, Sistine Chapel.



**Fig. 2**  
Geometric points and lines used in profile analysis.  
T – trichion, N – nasion, R – rhinion, P – tip defining point, S – subnasale, Pog – pogonion, Po – porion

**Modification:** Instead of the external auditory canal, we use the superior border of the tragus (corresponds to the porion) for drawing a radius to the tip defining point of the nose. It is also the reference point for drawing the canthomeatal plane (Frankfurt horizontal).

The line from the porion to the tip defining point is used as a radius for drawing a circle around the face. Ideally, the trichion and pogonion should lie on the periphery of this circle. Overprojection of the nose is characterized by a recessed position of the chin (soft-tissue pogonion) and of the midsagittal frontal hairline (trichion). A relative retrusion of the chin or forehead may also be recognized. This type of analysis provides concrete guidelines for harmonizing the facial profile.

Besides the nasal shape, the profile is critically influenced by the position of the maxilla and mandible and by the typical deviations that occur with gnathic anomalies.

For simplicity, two lines are drawn on the face to differentiate among a straight, convex, or concave profile:

- From the forehead to the upper lip margin
- From the upper lip margin to the soft-tissue pogonion

A convex soft-tissue profile signifies an ANGLE Class II relationship, while a concave profile signifies an ANGLE Class III relationship.



**Fig. 3a**  
Patient with a functional tension nose, elongated infratip triangle, and an imprecise *aesthetic eyebrow line*.



**Fig. 3b**  
Appearance 3 years after septorhinoplasty. Note the equilateral rhomboid tip shape and harmonious *aesthetic eyebrow line*.



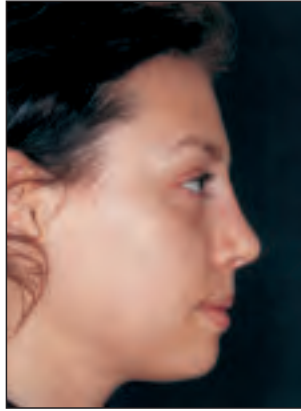
**Fig. 3c**  
Recessed chin with an overprojected nose.



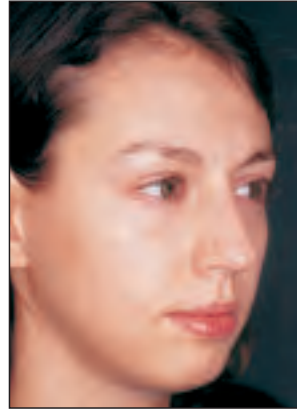
**Fig. 3d**  
Appearance after septorhinoplasty and mentoplasty.



**Fig. 4a**  
Patient with a recessed chin and overprojected nasal tip.



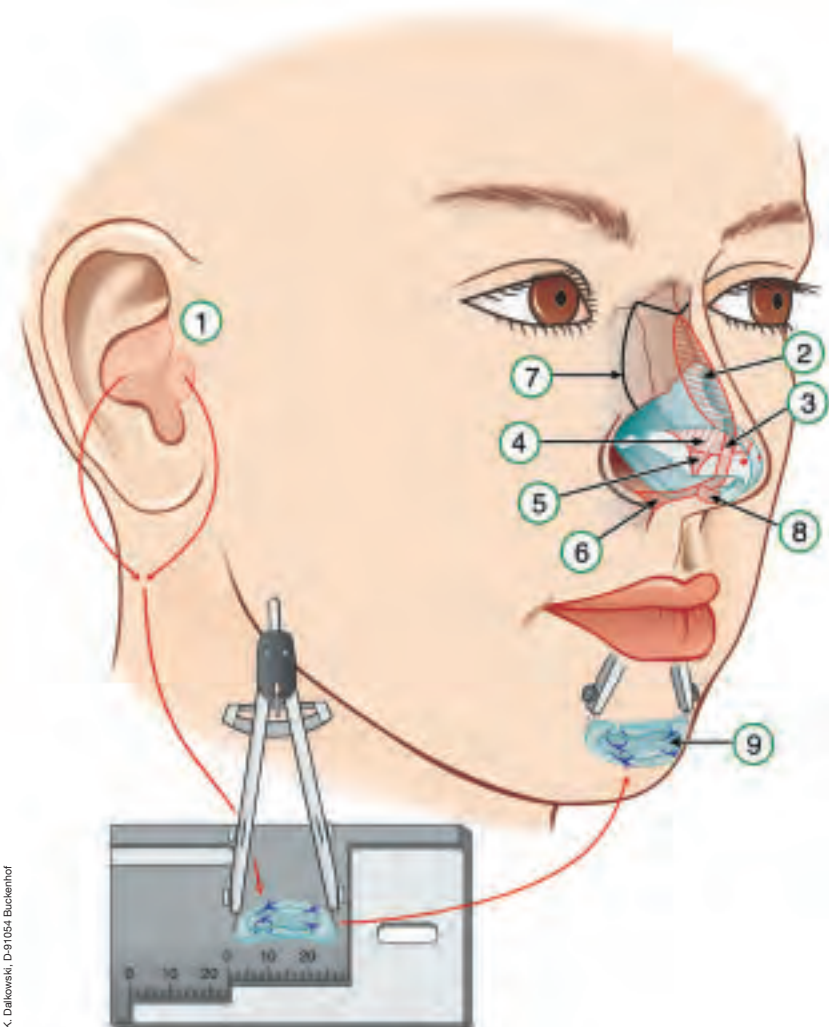
**Fig. 4b**  
Altered profile line 4 years after septorhinoplasty and chin augmentation with autologous cartilage (nose and concha).



**Fig. 4c**  
Semiprofile before surgery.



**Fig. 4d**  
Semiprofile 4 years after septorhinoplasty and chin augmentation with autologous cartilage (nose and concha).



◀ **Fig. 4e**

Schematic diagram of the steps in the operation.

- ① Cartilage is harvested from the conchal cavity and tragus
- ② The bony and cartilaginous dorsal hump is removed
- ③ The anterior caudal septal margin is trimmed (for cranial tip rotation)
- ④ The upper lateral alar cartilages are trimmed (to narrow the tip, augment cranial rotation, and decrease projection)
- ⑤ Projection is markedly decreased by the interrupted strip technique
- ⑥ The anterior nasal spine is shortened (to decrease projection)
- ⑦ Osteotomy
- ⑧ Modification of the medial crura and footplates
- ⑨ A chin implant is fashioned from the autologous cartilage





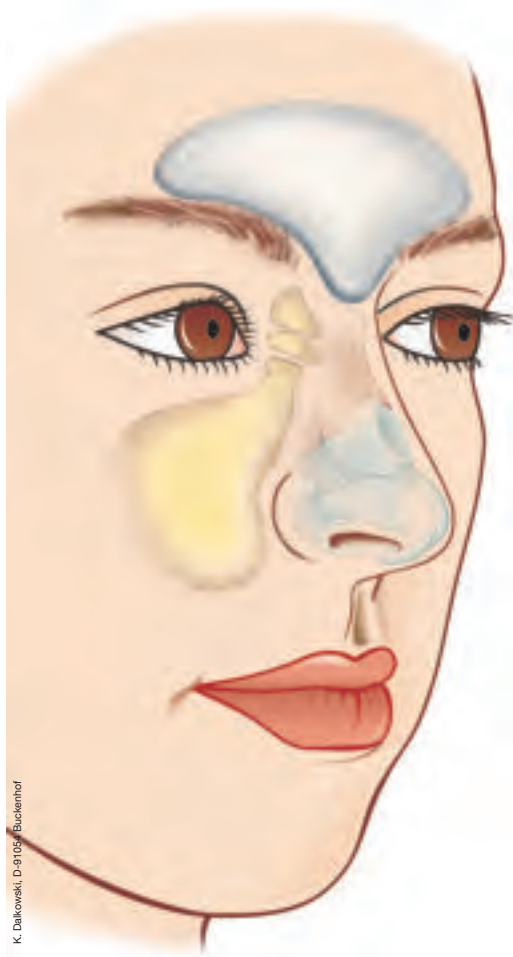
**Fig. 5a, b**

Young woman with outer-table bone loss over both frontal sinuses following a comminuted frontobasal fracture. She has a posttraumatic broad nose with an open roof.



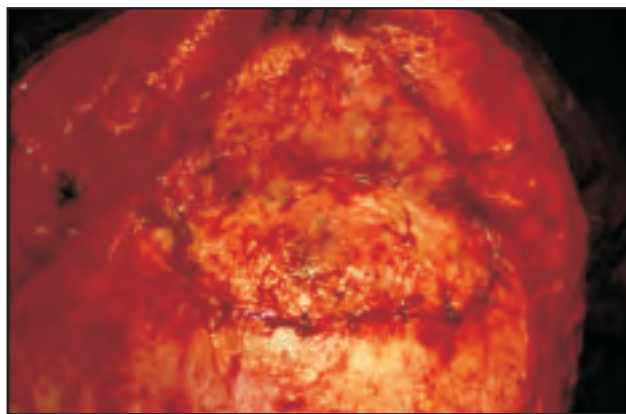
**Fig. 5c, d**

Appearance after reconstruction of the forehead contour with a 3D bio cement implant and septorhinoplasty.



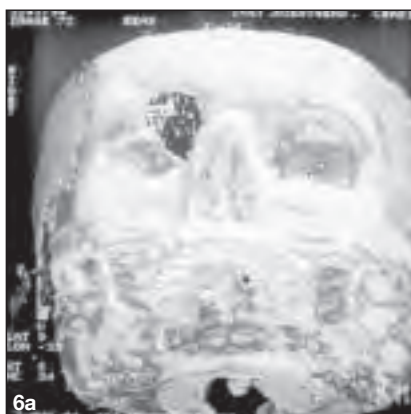
**◀ Fig. 5e**

Schematic diagram of forehead contour reconstruction with a 3D implant.



**Fig. 5f**

The implant is covered and secured with a periosteal flap.



**Fig. 6a**  
Patient with a posttraumatic defect in the right anterior skull base.



**Fig. 6b**  
Marked swelling of the upper eyelid due to a meningoencephalocele.



**Fig. 6c, d**  
This type of defect can be repaired with autologous conchal or septal cartilage and fascia lata. The graft dimensions can be accurately determined with the caliper for facial plastic surgery.



**Fig. 6e**  
The anterior skull base is patched with fascia lata.

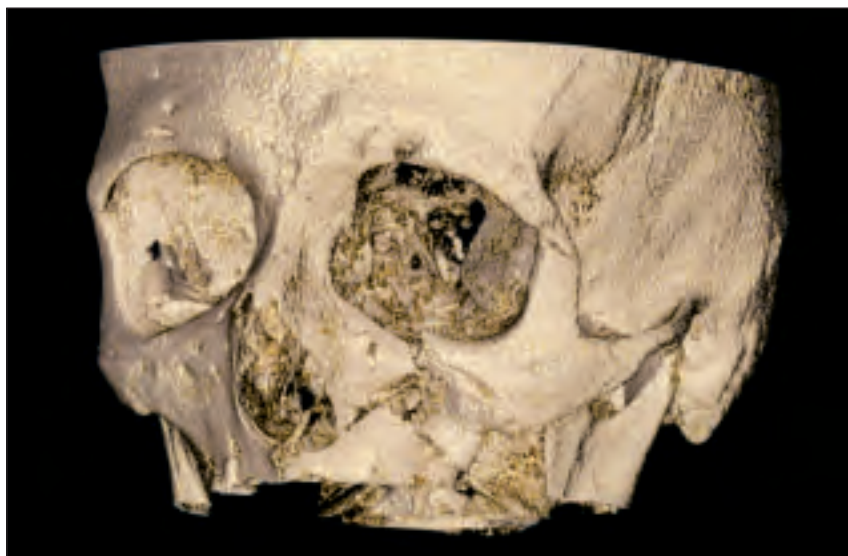
## 1.2 Reconstruction of the Forehead Contour

### 1.2.1 Frontal Trauma

Frontobasal skull fractures often lead to bone loss from the outer table and deformity of the forehead contour. Modern biocements have proven effective for reconstructing the bone of the forehead or glabella. While it is always best to use autologous grafts in the nose, cements show good biocompatibility when used in the inflexible forehead. The cement should not come into contact with the brain, and therefore this treatment requires an intact inner table. Guided by 3D reconstructions of CT scans, frontobasal defects can be repaired with implants designed with the aid of CAD/CAM technology.



**Fig. 7a**  
Patient with a left zygomatic fracture and depression of the zygomatic body. The flattened lateral facial contour and laterally based, wedge-shaped hematoma are typical findings.



**Fig. 7b**  
3D reconstruction of the zygomatic fracture (Prof. Klingebiel, Department of Neuroradiology, Berlin Humboldt University).



**Fig. 7d**  
Use of the elevator for reducing zygomatic and nasal fractures.

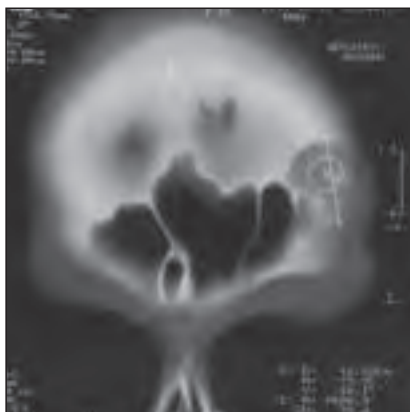


**Fig. 7c**  
Appearance after fracture reduction.

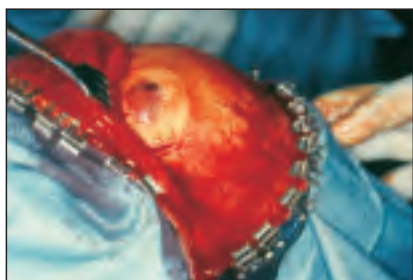




**Fig. 8a**  
Young woman with a slowly enlarging mass in the left side of the forehead.



**Fig. 8b**  
The precise location and extent of the mass are determined by coronal CT.



**Fig. 8c**  
Intraoperative appearance of an intraosseous hemangioma in the frontal bone.



**Fig. 8d**  
Defect following tumor resection.



**Fig. 8e**  
The defect is repaired with bone cement.



**Fig. 8f, g**  
The patient at 2 days and 6 months after the operation.



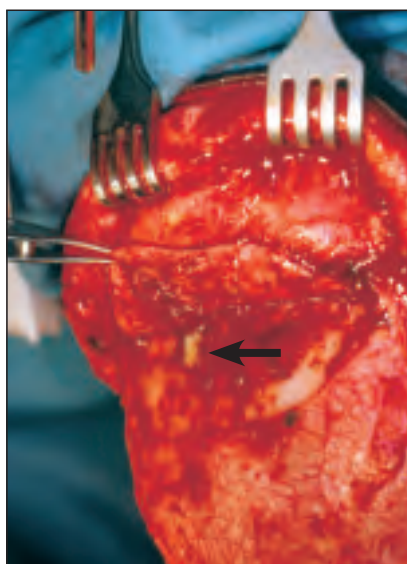
### 1.2.3 Inflammation

Frontal sinusitis may be complicated by osteomyelitis of the frontal bone with the development of a subperiosteal abscess. This condition is called Pott's puffy tumor after Sir Percival Pott, who first described it in 1760.

Pott's puffy tumors most commonly result from trauma, sinusitis, or surgery. A suppurative frontal sinusitis develops, leading to osteomyelitic foci that erode the frontal sinus walls. The diploic, dural, and meningeal veins may provide routes for intracranial spread. In some cases this can lead to epidural, subdural, or intracerebral abscesses, venous sinus thrombosis, meningoenophalitis, or sepsis.

The treatment of choice is complete removal of osteomyelitic frontal bone into healthy tissue and drainage of the frontal sinus abscess through the ethmoid cells to the nose. Portions of the outer and inner tables and calvarium may have to be burred away, depending on the extent of disease. Reconstruction of the forehead contour is indicated on aesthetic grounds, and this requires complete removal of the osteomyelitic bone.

Surgical treatment should always be accompanied by specific antibiotic therapy using an agent that penetrates into bone (e.g., fosfomycin). This therapy should be continued for 2–6 months.



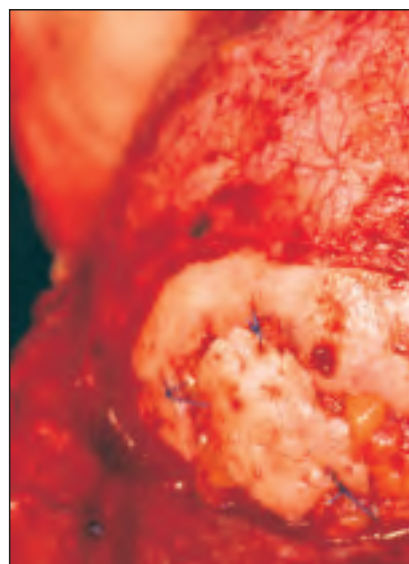
**Fig. 9a**  
Acute ablative surgery for recurrent frontal bone osteomyelitis that developed as a complication of bilateral frontal sinusitis. The involved bone is exposed through a bicoronal incision. When the periosteal flap is raised, pus (arrow) exudes from a Pott's puffy tumor.



**Fig. 9b**  
The outer table of the frontal bone is removed, exposing the osteomyelitic bone.



**Fig. 9c**  
The involved bone is removed into healthy tissue.



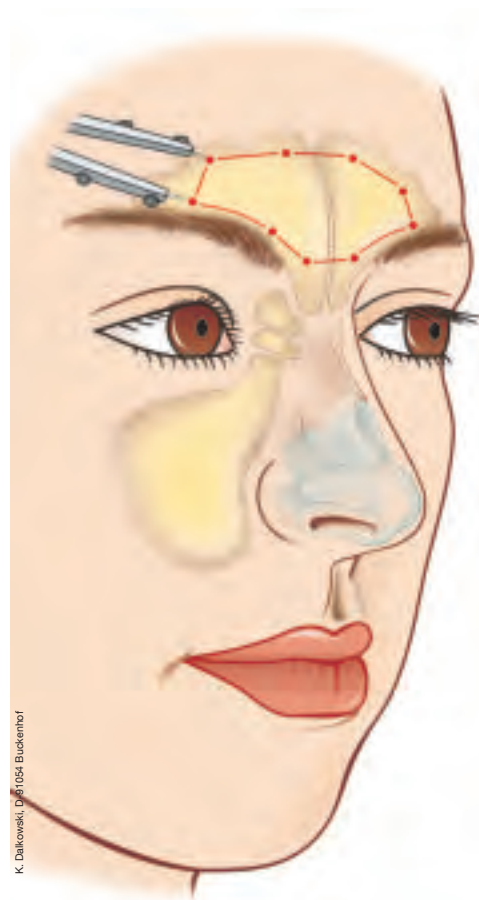
**Fig. 9d**  
The forehead contour is reconstructed with calvarial bone.

### 1.2.4 Frontal Sinus Mucocèles and Osteomas

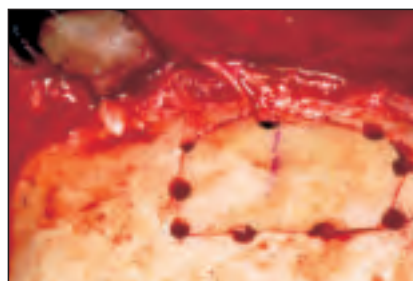
The advantage of performing frontal sinus surgery through a craniotomy is that the bony walls of the drainage tract from the frontal sinus to the nose are preserved and remain stable. The main drawback of the Jansen-Ritter approach to the frontal sinuses was that it sacrificed portions of the frontal sinus floor and frontal infundibulum, often obliterating the drainage tract to the nose. This led to mucocèle formation, which in many cases did not occur until decades after the initial operation. That is why the Jansen-Ritter approach should no longer be used today. To access the frontal sinuses through a craniotomy, the boundaries of the frontal sinuses and the bur hole sites are marked intraoperatively, and the bone flap is outlined and raised.

Either a frontal sinus template is made and sterilized before the operation, or the frontal sinus is measured from an AP skull radiograph. The caliper for facial plastic surgery can then be used to mark the precise bur hole sites.

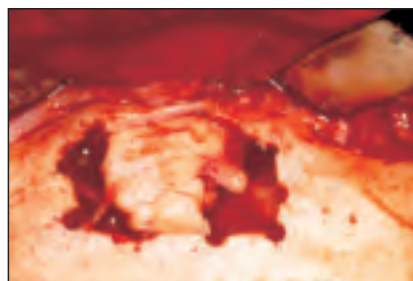
**Caution:** A paranasal sinus radiograph in the occipitomeatal projection does not portray the true size of the frontal sinus. An AP skull film should be used.



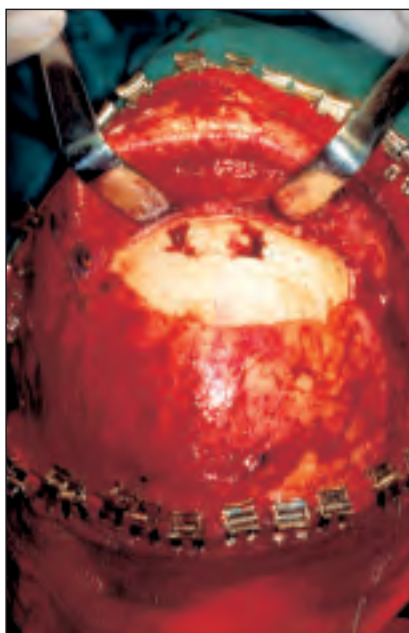
**Fig. 10a**  
Diagram showing the bur hole placement for a craniotomy to expose the frontal sinuses.



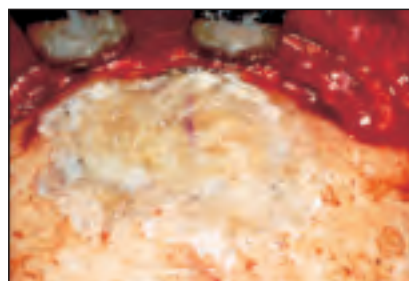
**Fig. 10b**  
Drilling the bur holes.



**Fig. 10d**  
Close-up view.



**Fig. 10c**  
Large frontal sinus osteoma.



**Fig. 10e**  
The defect is closed after replacing the bone flap and obliterating the bur holes with bone cement.



## 2.0 The Face from the Front – Proportions and Lines



**Fig. 11**  
Detail from “The Delphic Sibyl” by Michelangelo Buonarroti (1475–1565); Rome, Vatican, Sistine Chapel.

### The Nose as the Central Facial Feature

The nose occupies a special place among the aesthetic units of the face. As a solitary, unpaired anatomical unit at the center of the face, it functions aesthetically to unite the horizontal thirds and vertical fifths of the face in an harmonious way. This is one reason why even subtle changes in the shape of the nose can have a major impact on the overall appearance of the face.

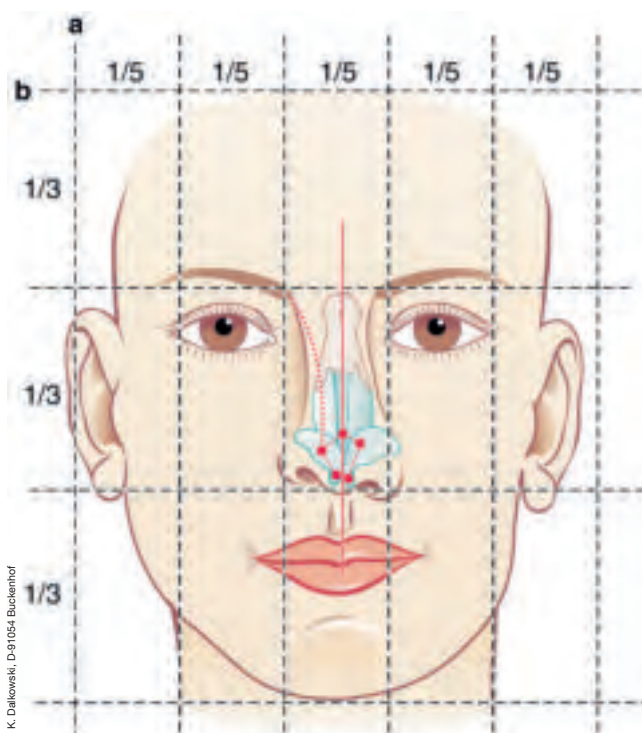
The nose is comprised of subunits that are important to consider in aesthetic and reconstructive operations.

The following subunits are distinguished:

- **Nasal dorsum**
- **Sidewalls**
- **Nasal tip**
- **Nasal alae**
- **Columella**
- **Soft-tissue triangles**

There is a certain hierarchy of facial features. The personality radiates chiefly from the eyes. The nose should be “subordinate” to the eyes, i.e., it should form a gently curved line from the medial point of the eyebrow to the tip defining point. This line should highlight the eyes and not distract from them.

The nasal tip is defined by an equilateral rhomboid. It is formed by the tip defining points and by the supratip and infratip areas. The basal contour of the alae should form a sweeping line that has been likened to a “gull in flight” (**Fig. 3**).



◀ **Fig. 12**

Facial proportions and symmetry.

**a axis:** lines dividing the face into horizontal thirds (Leonardo da Vinci).

**b axis:** lines dividing the face into vertical fifths (Powell and Humphreys).

*Right half of face*

Features of symmetry: aesthetic eyebrow-tip line, facial midline, nasal tip rhomboid

*Left half of face*

Major causes of asymmetry: asymmetrical eyebrow-tip line (pseudo-deviated nose); hypoplasia of the maxilla, midface, or mandible (usually with a crooked mouth); a slanted nasal base (left lip and palate, asymmetry of specific structural elements such as the upper lateral cartilages or alar cartilages).



**Fig. 13a**  
Woman with a broad midnasal vault.  
The nose is broader centrally than at the tip.



**Fig. 13b**  
Curved medial and lateral infracture  
osteotomies were performed to narrow  
the midnasal vault and bony nose.  
Note the "gull-in-flight" line.



**Fig. 14a**  
Typical posttraumatic broad nose with an  
open roof.



**Fig. 14b**  
Appearance 3 years after narrowing the  
nose by osteotomies and augmenting the  
nasal dorsum with autologous conchal  
cartilage.

Every face has two slightly different halves and shows some degree of physiologic asymmetry. This becomes clear when photos of the right and left halves of the same face are assembled in a montage. Marked facial asymmetry, facial scoliosis, or unilateral hypoplasia may affect isolated or multiple areas of the midface, for example, or may affect the maxilla or mandible.

Midfacial asymmetries frequently result in dysgnathia and are associated with axial deformity of the nose. The correction of these combined facial deformities requires particularly careful planning.

The width of the nose varies from above downward. This is essential for an harmonious aesthetic eyebrow line extending from the medial point of the eyebrow to the tip defining point. The nose is narrowest at the nasion and broadens across the rhinion to the nasal base (**Fig. 11**).

More detailed information can be found in:

BEHRBOHM, H; TARDY, M Jr:  
ISBN 3-13-131911-9 (GTV)  
ISBN 1-58890-208-0 (TNY)  
Essentials of Septorhinoplasty,  
© Thieme Medical Publishers, 2004.



**Fig. 15a**  
Patient with a bulbous nasal tip and moderately thick skin.



**Abb. 15b**  
Appearance 2 years after the nasal tip was narrowed by the cartilage delivery technique using intra- and interdomal sutures.



**Fig. 16a**  
The midnasal vault and nasal tip are too narrow, and the infratip triangle is elongated.



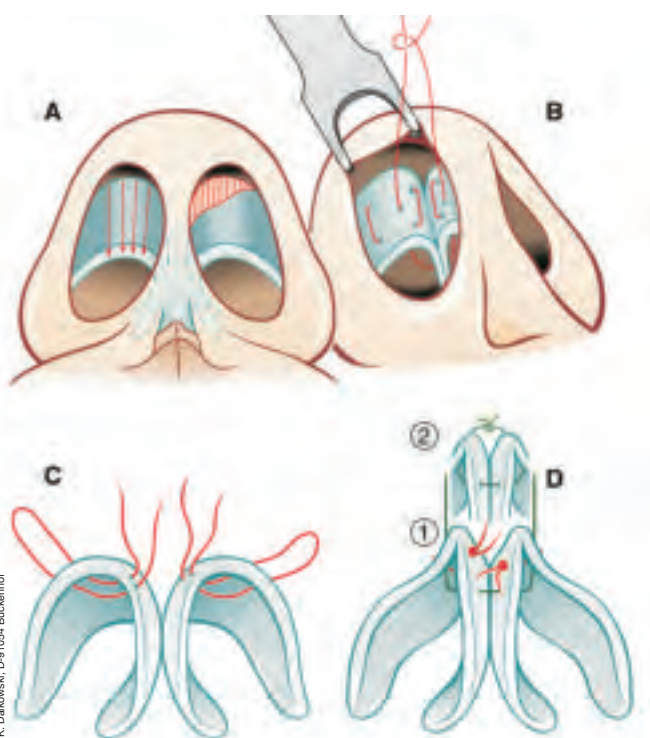
**Fig. 16b**  
Long, overprojected nose.



**Fig. 16c**  
Appearance 2 years after the tip and midnasal vault were widened by outfracture osteotomies. Nasal proportions are normal.



**Fig. 16d**  
Projection is decreased. The nose has been shortened and the tip rotated upward.



**Fig. 15c**

Schematic diagram of the cartilage delivery technique.

- a** Both alar cartilages are delivered intranasally. The cartilage in the left dome area is scored, and a cranial margin resection is performed on the right.
- b** Placement of intra- and interdomal sutures.
- c, d** Details of the suture technique.





**Fig. 17a**  
Preoperatively, the nasal base shows severe tension deformity with slitlike nares.



**Fig. 17b**  
The shape of the nasal base is markedly altered following septorhinoplasty. The nasal base is broadened, tip projection is decreased, and the nares are expanded and rounded

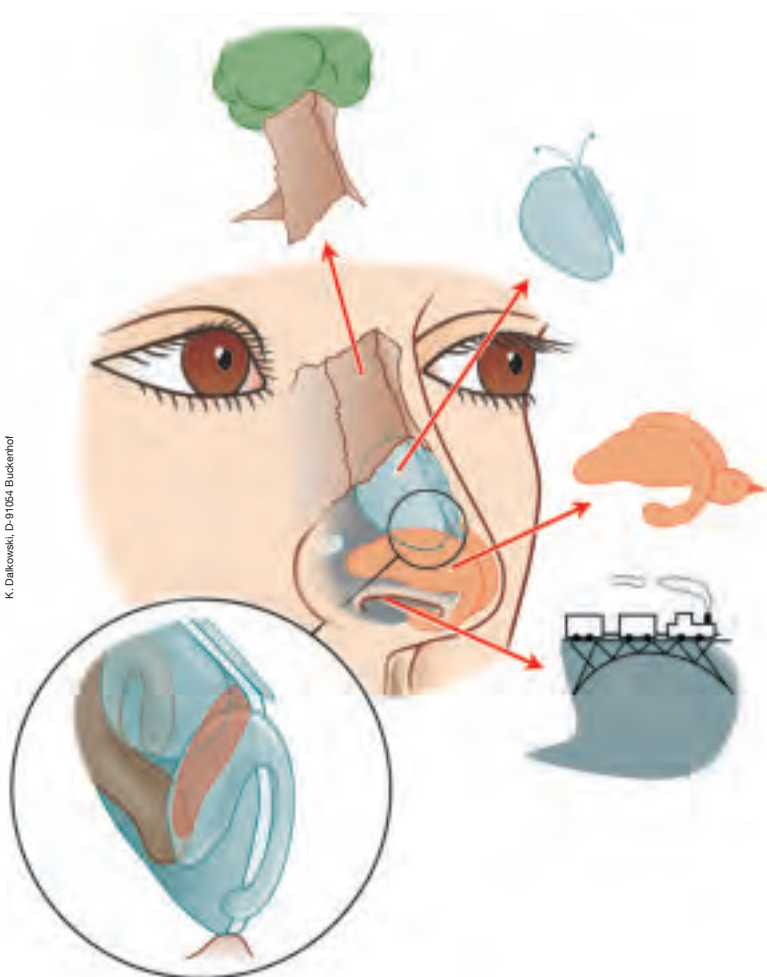
The external morphology of the nose may reflect specific abnormalities of nasal function. We shall look at two examples of this: nasal valve stenosis and alar collapse during inspiration.

## 2.1 The Nasal Valve

“The fold of the upper lateral cartilage and the wall of the nasal septum form a space leading into the nasal cavity that is much narrower than the external naris.”  
E. ZUCKERKANDL (1849–1921)

MINK (1903) called this area the nasal valve because of its dynamic function in regulating the cross-sectional area of the nasal airway. The resistance to nasal airflow is determined to a large degree by the nasal valve.

A morphologically tight nasal valve can restrict nasal breathing even when there is no obvious collapse of the nasal sidewall during forced inspiration. A tight nasal valve is often present in the functional tension nose and is an indication for treatment with spreader grafts. When placed on the extramucous plane between the upper lateral cartilages and the dorsal septal cartilage, these grafts produce effective widening of the nasal valve.



◀ **Fig. 18**

The nose is a respiratory and sensory organ. It consists of a rigid bony part and flexible cartilaginous part. Functional aesthetic surgery alters the external shape of the nose while preserving the flexibility of the cartilaginous elements, which is important for respiratory and olfactory function. The movements of the nasal cartilages during respiration are comparable to the wings of a butterfly (upper lateral cartilages) and the wings of a bird (alar cartilages). The nose is most flexible at the site where the lateral and alar cartilages meet – the nasal valve. The static connecting and supporting element between the external and internal nose is the septum.





**Fig. 19a**  
Young woman with a narrow bony nasal vault and inspiratory collapse of both alae, which have soft lateral crura.



**Fig. 19b**  
The portion of the lateral crura requiring correction is precisely marked.



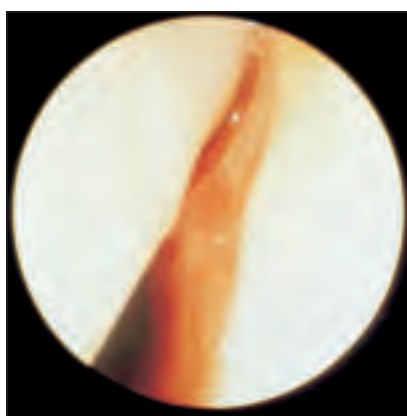
**Fig. 19c**  
Autologous cartilage is harvested from the conchal cavity.



**Fig. 19d, e**  
The graft dimensions are precisely determined with the surgical caliper.



**Fig. 19f**  
Result 1 year after surgery. The bony nose has been widened, and the lateral crura have been stabilized.



**Fig. 19g, h**  
Preoperative (g) and postoperative (h) photographs of the right nasal valve. The postoperative valve is stable during inspiration.

If forced inspiration leads to aspiration and collapse of the lateral alar cartilages, this indicates deficient stability and resiliency of these cartilages. This situation often results from a rhinoplasty in which too much material was resected from the lateral alar cartilages,

causing a pinching of the alae. It may also occur in the tension nose, and it can occur habitually in noses with soft cartilaginous tissue. Treatment consists of reinforcing the lateral nasal wall in the area of the nasal valve with autologous cartilage implants, preferably harvested from

the auricular concha. These implants should be fitted into suitable, slightly narrow recipient beds to preserve their natural curvature and reinforce the alar convexity. The caliper described here is an essential tool for determining the dimensions of the graft and recipient bed.

When placed, the implants should be braced against the piriform aperture and attached with sutures.

Any scar-tissue bands in the area of the nasal valve should be resected and the wound epithelialized with skin grafts.

If nasal valve stenosis is the result of a combined cartilage and skin defect, tissue should be added to this region to open up the valve. An auricular composite graft is excellent for this purpose.

*"Replace what is missing with like material."*

R. GOODE

Curling of the caudal end of the upper lateral cartilage can cause nasal valve stenosis. This can be corrected by carefully shortening the anterior cartilage margin.

## 2.2 The Deviated Nose

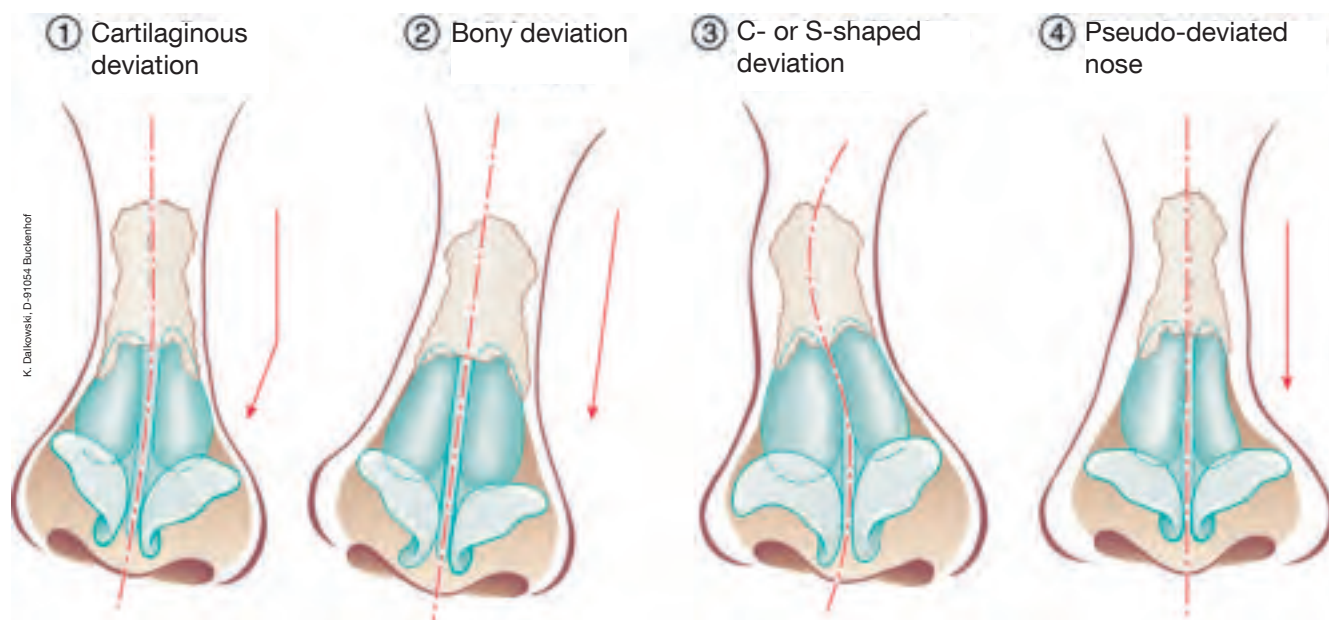
The aesthetics of different nasal shapes are a highly subjective matter, but there is one point of agreement that transcends ethnic and cultural differences: the aesthetic ideal of a straight nose.

Several basic types of nasal deviation are distinguished:

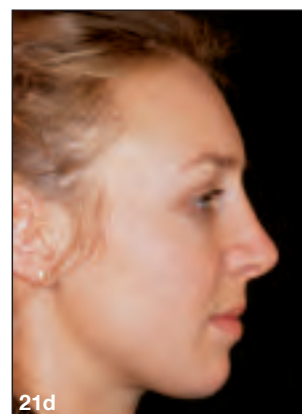
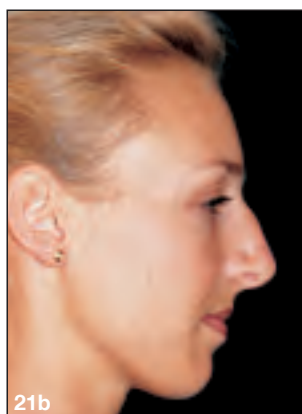
- Bony deviation
- Cartilaginous deviation
- Bony and cartilaginous deviation
- C- or S-shaped deviation
- Pseudo-deviation

Surgical planning depends critically upon whether axial correction of the nose is to be combined with hump removal.

Differences in the side heights of the bony nasal pyramid can be equalized at the time of hump removal.



**Fig. 20**  
Types of nasal deviation.



**Fig. 21a, b**

Woman with a predominantly bony nasal deviation to the left and a dorsal hump. The tip is overprojected, and the chin appears recessed. The nasolabial angle is effaced.

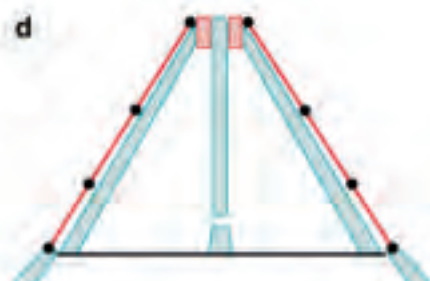
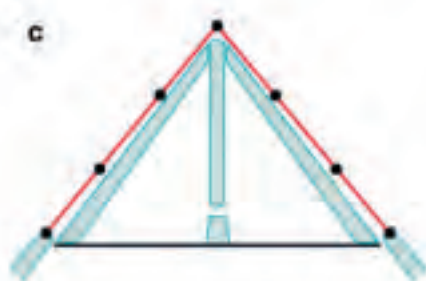
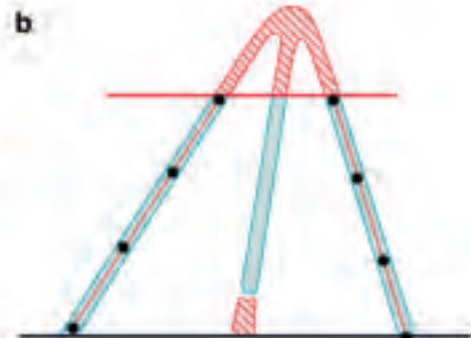
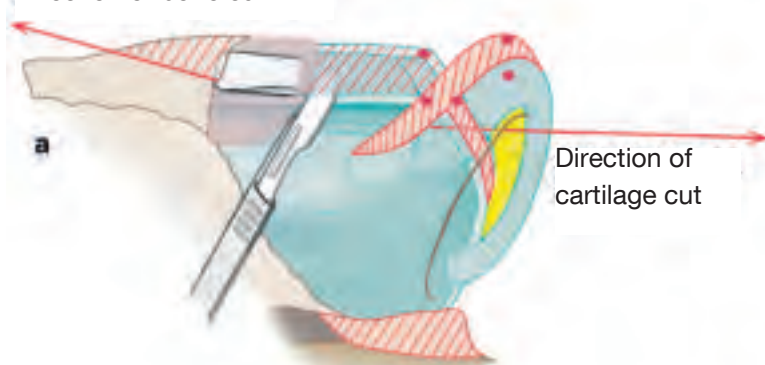
**Fig. 21c, d**

Appearance 3 years after axial correction and profile correction, achieved entirely by septorhinoplasty.

**c** – Besides axial correction, the elongated infratip triangle has been shortened.

**d** – The dorsum has been lowered and projection decreased. The tip has been rotated upward. The upper lip and nasolabial angle are more relaxed.

**Direction of bone cut**



**Fig. 22a – d**

Schematic diagrams showing the surgical correction of a bony deviated nose with a dorsal hump.

**a** – The first step is reduction of the cartilaginous nasal dorsum. The Rubens osteotome should then be applied at an acute angle to the plane of the cartilaginous resection.

**b** – Unequal sides of the bony nasal pyramid are equalized by removing the nasal hump.

**c** – After the osteotomies, the walls of the pyramid are medialized and repositioned.

**d** – When a large hump has been removed, the nasal dorsum should be stabilized and expanded with spreader grafts both for aesthetic reasons (too-narrow dorsum, supratip pinching) and for functional reasons (nasal valve stenosis).





**Fig. 23a**  
Woman with a bony nasal deviation to the left. The bony nasal flank is markedly flatter and longer on the right side than on the left.



**Fig. 23b**  
The same patient 2 years after rhinoplasty with axial correction.

Although the correction of a deviated nose is generally considered a less complicated form of rhinoplasty, experience shows that the optimum alignment of a crooked nose is not an easy task and requires a precise analysis of the anatomical problem.

The role of the septum was aptly stated by AUFRICHT: *"Where the septum goes, there goes the nose."* Septal deviations should always be included in the surgical plan.



**Fig. 24a**  
Patient with cartilaginous nasal deviation to the left.



**Fig. 24b**  
Overprojection ...



**Fig. 24c**  
... and tension deformity of the nasal inlet, manifested by the narrow, slitlike nares.

### Bony Nasal Deviation

Usually the nasal pyramid has one longer side and one shorter side. This discrepancy must be appreciated by inspection and palpation in order to determine the type of osteotomy required. With a straight deviation of the nasal axis toward one side, the surgical options consist of asymmetrical osteotomies, a wedge excision on the longer side, or multiple osteotomies.

### Cartilaginous Nasal Deviation

The critical axial correction of the nose is generally achieved when the septum is corrected. It must be determined on a case-by-case basis whether the upper lateral cartilages are symmetrical or there are disparities between the sides leading to tension deformity or

overlaps with the alar cartilages. Individual findings will decide the need to detach the upper lateral cartilages from the septum, shorten the cartilages, stabilize them with spreader grafts, or use positioning sutures.

We know from experience that if there is the least residual tension at the chondro-osseous junction, an osteotomy should probably be performed.

The above statements also apply in principle to combined bony and cartilaginous deviations of the nose.

### C- and S-Shaped Deviations

In these cases it should be decided preoperatively whether an axial correction can actually be achieved by straightening the septum and bony nasal pyramid, or whether the pyramid should be augmented on the concave side with septal or conchal cartilage (**Fig. 35**).

### Pseudo-Deviated Nose

These cases do not involve a true axial deformity of the nose or an S- or C-shaped deviation. Instead, a disparity of the aesthetic eyebrow lines creates the impression of a deviated nose. Surgical treatment consists of a series of corrective measures. At each step in the operation, the effect produced by a given maneuver is assessed to determine what the next step should be. Most cases require augmentations, which may be combined with unilateral osteotomies as required.

### Surgical Technique

As a general guideline, the technique used to correct a deviated nose should be as atraumatic as possible since postoperative wound healing and long-term contracture of the soft tissues can easily lead to distortions. This can occur even if every effort was made at operation to relieve or equalize tensions and discrepancies between the sides.

Postoperative swelling may also show right-left disparities that signal asymmetrical wound healing processes. In extreme cases, asymmetries can result from an overly aggressive approach.



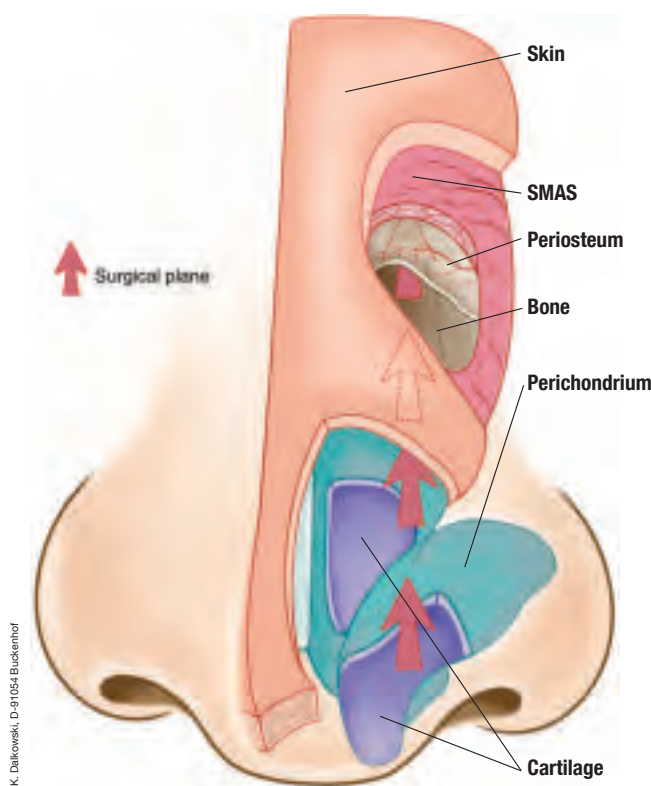
**Fig. 24d**  
Postoperative photographs 1 year after septorhinoplasty with axial correction.



**Fig. 24e**  
Decreased projection ...



**Fig. 24f**  
... and relaxation of the nasal inlet.



**Fig. 25**

Diagram showing the planes of surgical dissection in the nose. Dissection along the cartilaginous nasal dorsum should proceed strictly in the supraparichondrial plane, while dissection along the bony nose should follow the subperiosteal plane. Keeping to these planes helps reduce bleeding from the richly vascularized SMAS, postoperative hematomas, and lid edema. An atraumatic operating technique also contributes to rapid, uncomplicated, symmetrical wound healing.

## 2.3 Osteotomy

Osteotomies are the most traumatic step in any rhinoplasty. On the one hand, it is important to perform a smooth, clean osteotomy that will create the conditions necessary for proper wound healing and a good result. At the same time, trauma-reducing measures can minimize unwanted side effects of osteotomies such as ecchymosis, lid edema, and hematomas. Today this purpose is served by the use of mini-osteotomes (Tardy). These instruments are considerably thinner than traditional osteotomes and cut only the bone while sparing the periosteum and the SMAS (superficial musculo-aponeurotic system).

Mini-osteotomes belong in the hands of experienced surgeons. Their advantages can be fully realized only when they are advanced with precision in the bone. Broader osteotomes can be controlled with good tactile feedback by placing the finger directly over the site where the blade is cutting. This is extremely difficult to do with thinner osteotomes.

Whenever possible, osteotomies should be done at the conclusion of the rhinoplasty. By applying pressure with the finger and thumb immediately after the osteotomy, the surgeon can minimize the tissue reaction and control bleeding within the tissue. The same purpose is served by splinting the nasal dorsum (e.g., with a plaster cast) immediately after the osteotomy.

### Chisels and Osteotomes

Chisels differ from osteotomes in that they have a single oblique bevel, allowing the instrument to move in the opposite direction. Osteotomes have two equal bevels and always cut straight ahead.

### The Directional-Bevel Osteotome

The idea for this new osteotome design was suggested by the runner of an ice speed skate. The runner is not completely flat but has a specific radius of curvature ground into the blade. The skater glides on the inside edge of the runner when cornering.

The “runner osteotome” has one short and one long bevel at the working end. The shaft of the instrument is slightly curved and ultrahard. This enables the osteotome to advance along a designated line without further repositioning or realigning. The hardness of the shaft prevents bowing and energy loss.

### The Double Hollow-Ground Osteotome

No skater would go to a competition without sharpened skates. Proper grinding and sharpening of the runner lets it “grip” the ice while also allowing it to glide. The surgeon should always use osteotomes that are optimally ground and sharpened. A sharp osteotome will securely grip the bone while providing a good cutting action.

To produce an osteotome with an improved gripping and cutting action, a Walter chisel was modified by adding a second hollow bevel. This transformed the chisel into a double hollow-ground osteotome with optimum gripping and cutting properties.





**Fig. 26**  
Principle of the directional-bevel osteotome.  
The runner of an ice speed skate is not straight but has a slight radius of curvature ground into the blade. When the runner is tilted to one side, the skate glides on a predetermined path.



**Fig. 27**  
The principle of the directional-bevel osteotome is illustrated by an example from speed skating. The photo shows the cornering technique used in the final lap of the women's world single-distance speed skating championship (Claudia Pechstein leading Clara Hughes) on March 16, 2003, in Berlin.



28a



28b

◀ **Fig. 28 a, b**  
Use of the directional-bevel osteotome for a curved lateral osteotomy.  
With its cutting-edge design (short bevel on the inside, long bevel on the outside) and gently curved shaft, the osteotome can be advanced along the premarked osteotomy line without repositioning the instrument.



29a

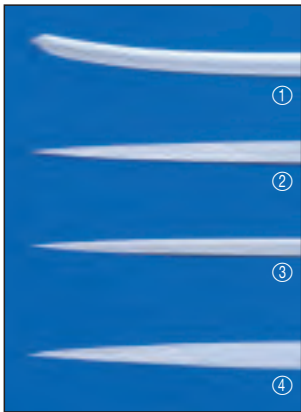


29b



29c

**Fig. 29a – c**  
The cutting properties of the osteotome make it easier to perform multiple lateral osteotomies and wedge excisions.

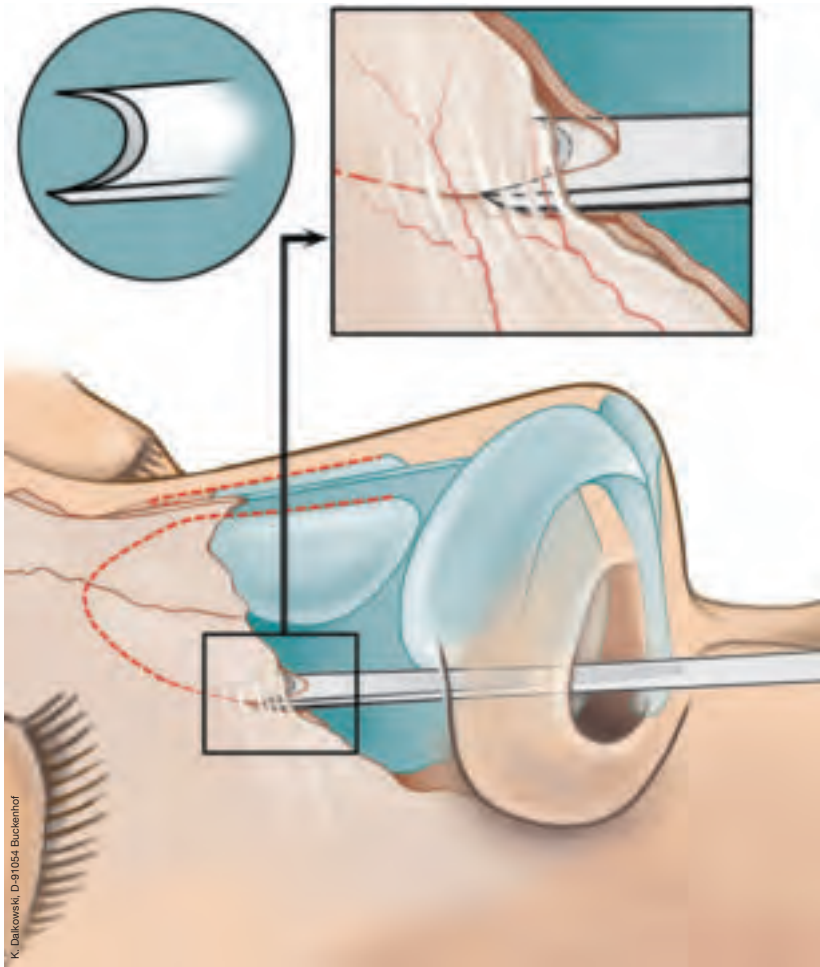


**Fig. 29d**  
Working ends of the BEHRBOHM-WALTER micro-osteotomes. ① Curved, with special two-sided directional bevel. ②–④ Straight with a long, flat bevel on both sides.

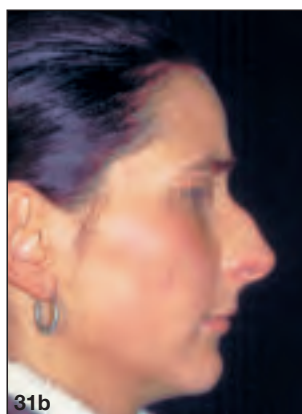




**Fig. 30b ►**  
The BEHRBOHM-WALTER double hollow-ground osteotome in 3 mm and 4.5 mm widths, with a special two-sided hollow bevel and dual guide prongs.



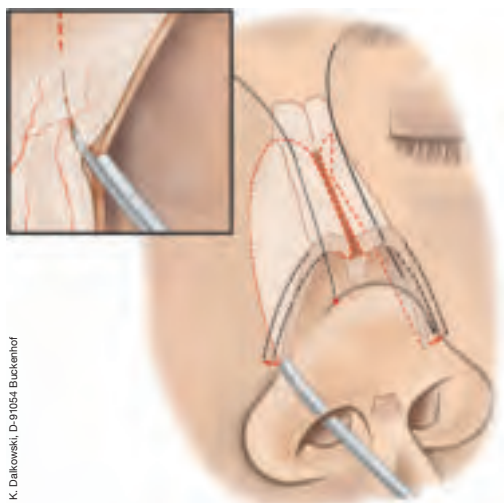
**Fig. 30a**  
The double hollow ground gives the mini-osteotome a secure grip on the bone margin and allows it to cut smoothly without slipping.

**Fig. 31a, b**

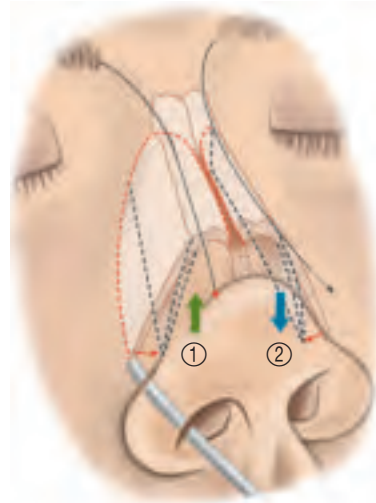
Woman with very thin bone and a filigree nasal pyramid. Combined bony and cartilaginous nasal deviation to the left with a dorsal hump.

**Fig. 31c, d**

Axial and profile correction were performed using the double hollow-ground osteotomes.

**Fig. 32a**

Outracture technique. Curved lateral osteotomies are performed, and the mobilized fragments are outractured to broaden the nose.

**◀ Fig. 32b**

Infracture technique. Curved lateral osteotomies are performed, and the mobilized fragments are infractured to narrow the nose. Both techniques can be combined as needed.

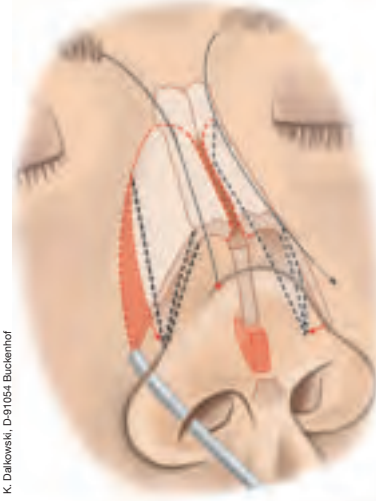
- ① Push up Osteotomy
- ② Let down Osteotomy

**Fig. 33a**

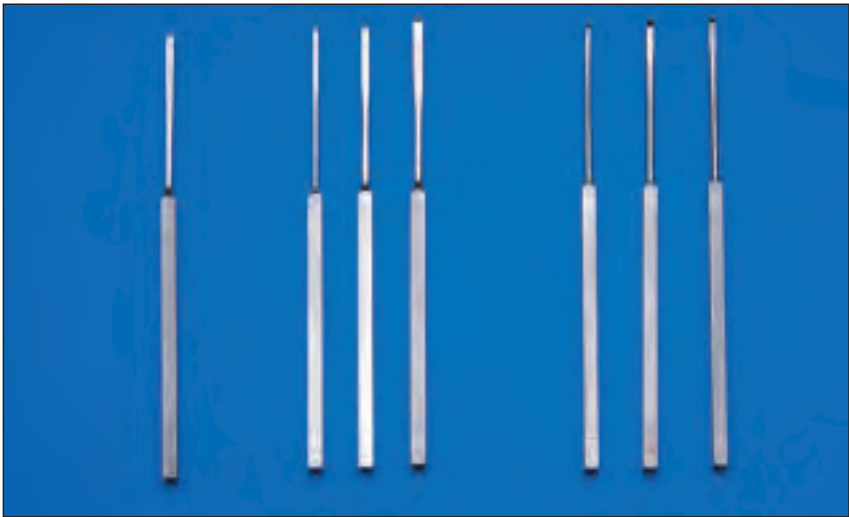
Man with a bony nasal deviation to the left. The bony flank of the nose is longer on the right side than on the left.

**Fig. 33b**

Result following wedge excision with a double curved lateral osteotomy on the right side and a single lateral osteotomy on the left side using the directional-bevel osteotome.

**◀ Fig. 33c**

Bilateral osteotomies with a wedge excision on the right side using the directional-bevel osteotome.



**Fig. 34**  
The three generations of micro-osteotomes that evolved during development of the instruments.

**Cutting Edge Design**

The new osteotomes underwent prolonged testing to determine the optimum cutting edge design. The photograph shows the three principal generations of osteotomes that have evolved (**Fig. 34**).

The instruments are designed for bone dissection. They should cut the bone as smoothly as possible without splintering it. They should slice through the bone without becoming wedged. These properties and hazards dictate the optimum cutting edge design.

**Fig. 35a, b ▶**  
Large nose with bony deviation.



**Fig. 35c, d ▶**  
Result 2 years after septorhinoplasty with osteotomies and infracture of the lateral wall.





**Fig. 36a**  
Woman with a C-shaped nasal deviation and asymmetrical aesthetic eyebrow lines.



**Fig. 36b**  
The nasal tip is slightly ptotic in the profile view.



**Fig. 36c**  
Procedure for a curved lateral osteotomy on the right side using the 3-mm mini-osteotome (smooth bevels). Marking the desired osteotomy lines on the skin facilitates precise infracturing and helps to avoid errors.



**Fig. 36d**  
The mini-osteotome is positioned for a transnasal medial osteotomy.



**Fig. 36e**  
First the mini-osteotome is advanced in a paramedian plane to the marked point.



**Fig. 36f**  
The osteotome is angled laterally approximately 30 degrees.



**Fig. 36g**  
The osteotome is positioned over the head of the inferior turbinate. The mucosa can be directly perforated with the ultrathin osteotomes, without extra incisions.





**Fig. 36h – j**

The osteotome is advanced in three successive directions when performing the curved lateral osteotomy.

- 1) Directed toward the medial canthus.
- 2) Advanced straight along the nose.
- 3) Angled medially to unite the bone cut with the medial osteotomy.



**Fig. 36k, l**

Appearance 3 years after an infrafracture osteotomy on the right side, an outfracture osteotomy on the left side, and augmentation of the nose on the left side with thin cartilage from the conchal cavity.



**Fig. 37a**  
Woman with facial asymmetry/scoliosis and nasal deviation toward the larger side.



**Fig. 37b**  
Appearance following careful axial correction of the nose. Straightening a crooked nose in an asymmetrical face requires a careful touch, because straightening the nose too much can destroy facial harmony. In this case, less is more.



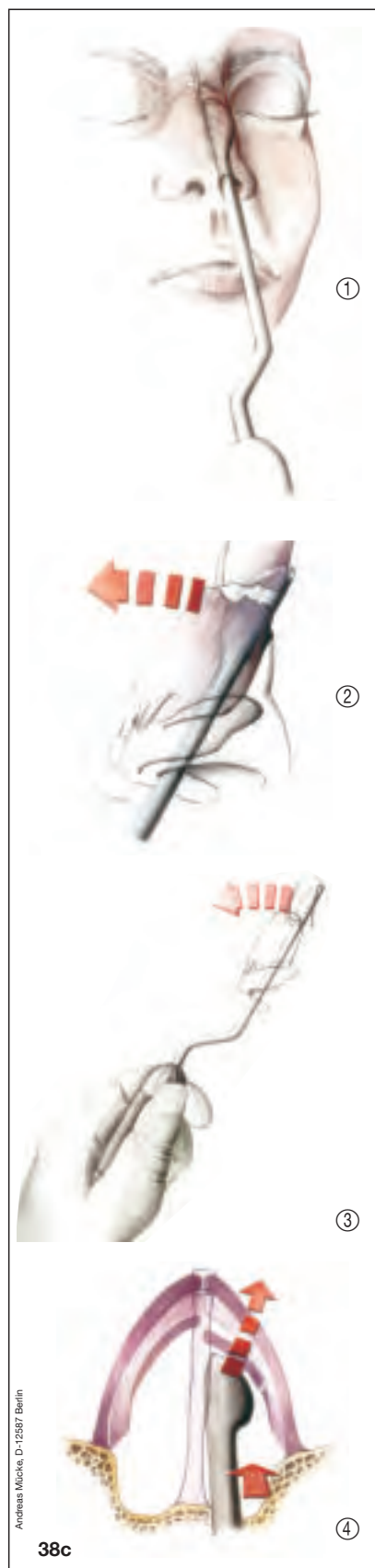
**Fig. 38a**  
Severe nasal deviation in a 12-year-old girl who sustained a nasal fracture 5 days before.

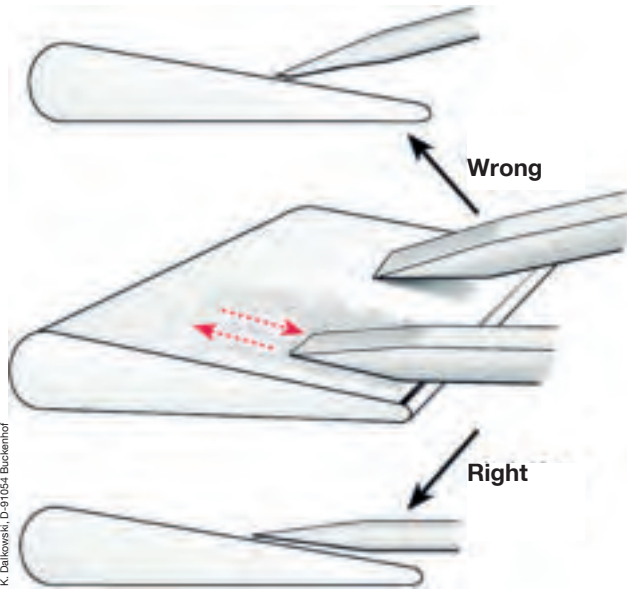


**Fig. 38b**  
Greenstick nasal fractures in children can still be reduced with the elevator for nasal and zygomatic fractures up to 10 days after the injury.

**Fig. 38c▶**

Use of the elevator in reducing nasal fractures. The relatively large instrument prevents injuries to the nasal mucosa and is less traumatizing than smaller, usually sharp-edged instruments. The shape of the blade conforms to the nasal domes. This permits the gentle elevation of depressed fragments and avoids the trauma that can result from prying.





**Fig. 39**  
Position of the grindstone and osteotome during sharpening.



**Fig. 40**  
The last step in a rhinoplasty is applying the nasal cast. "Feel" is required as the surgeon makes a final adjustment of the mobilized fragments and fixes them in place.

### Assorted Osteotomes

There is no such thing as an all-purpose osteotome. The size and bevel of the osteotome should be selected according to individual bone thickness and strength, the goal of the osteotomy, and the technique that will be used.

Osteotomies may be performed by the transnasal, transcutaneous, or transoral route.

Infractures, outfractures, wedge excisions, or combinations may be used, depending on the desired effect.

More detailed information can be found in HUIZING and De GROOT, *Functional Reconstructive Nasal Surgery*, © Thieme Medical Publishers, 2003.

### The Osteotomy Technique

Besides the instrument itself, the osteotomy technique critically influences the effect of the osteotome. A good result requires close teamwork between the surgeon who positions the osteotome and the assistant who wields the mallet. In the standard "double-click" technique, a less forceful trial tap is made initially. This is done to test the correct placement of the instrument and optimize it as needed.

At the same time, the assistant can judge the consistency of the tissue by the frequency of the tone produced (the higher the tone, the harder the bone). He receives similar feedback when using the mallet. After the trial tap has been delivered, the surgeon gives the go-ahead for the harder, definitive tap.

The energy of the blow comes from the wrist and not from the elbow. A certain "feel" is required.

### Sharpening

A sharp osteotome or chisel is essential for performing an accurate, atraumatic osteotomy. For this reason, osteotomes should be machine-sharpened at regular intervals and also sharpened on a stone (honed) before each use.

The following rules should be kept in mind:

- The cutting edge of the osteotome or chisel should be held up to the light to check for bends, burs, cracks, or nicks.
- The honing stone (Arkansas stone) on the operating table is used to hone fine burs and pits from the cutting edge.



The stone **cannot** be used to grind a new bevel.

- For sharpening, the bevel of the osteotome is placed on the sloped surface of the honing stone, wetted with sterile water, and is gently (without much force or pressure) moved up and down. The metal worn from the osteotome produces a gray film, which is wiped away.
- The bevel of the osteotome or chisel should be placed flat against the stone. Otherwise, honing will produce a short pseudo-bevel that will compromise the cutting action of the instrument

The last step in a rhinoplasty is applying a nasal cast or thermoplastic splint. This gives the surgeon an opportunity to make a final check of the mobilized portions of the nasal pyramid and adjust their position as needed. The plaster cast is malleable and can be precisely molded to the individual nasal shape.

The water used for the cast should be cold, while the water used for thermoplastic materials should be adequately warmed.

## 3.0 Augmentation of the Nasal Dorsum

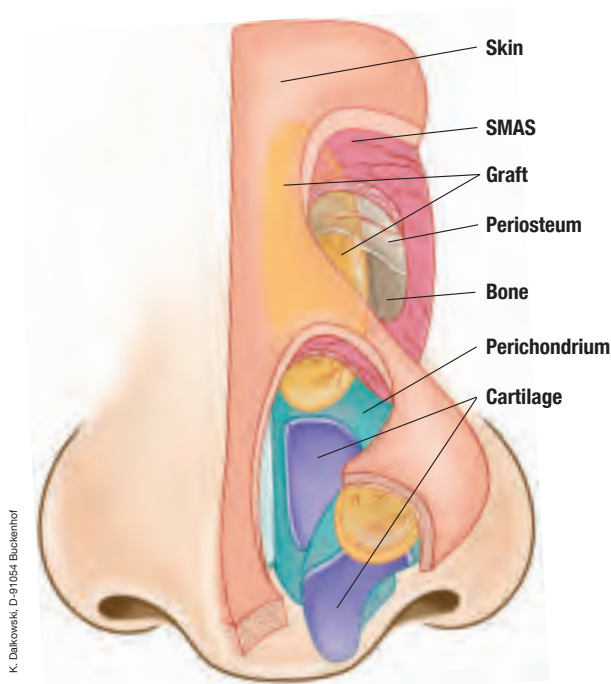
### The Semiprofile

Evaluation of the nasal contour in semiprofile has special significance because it is the view that is seen most frequently in daily life. While the face is viewed in the frontal plane by looking in a mirror, the face is rarely seen strictly in profile.

Michelangelo accentuated the eyebrow-nasal contour line in faces painted on the ceiling of the Sistine Chapel.

Various abnormalities of nasal shape can distort this ideal line or cause a break in its continuity. They include the following:

- Saddle nose
- Pollybeak deformity
- Deviated nose
- Functional tension nose
- Humped nose or long humped nose



**Fig. 42**

Only autologous cartilage grafts should be used for augmentation, structuring, or contouring of the nasal dorsum and tip. Deep grafts for replacing lost structure are implanted beneath the vascularized SMAS. Superficial implants for contouring are placed beneath the skin.

Generally the recipient bed should be only slightly larger than the implant. The caliper for plastic surgery has proved very useful for accurately planning the sizes of implants used on the nasal dorsum and tip.



**Fig. 41**

Detail from "The Naked Man" in "The Sacrifice of Noah" by Michelangelo Buonarroti (1475-1565); Rome, Vatican, Sistine Chapel.

The central problem in the saddle nose is loss of stability in the anterior part of the septum. This results in a caudal drift of the upper lateral cartilages and cranial tip rotation with fullness of the tip and loss of projection. Thus, the primary goal of correcting a saddle nose for a functional and aesthetic indication is to reconstruct the septum while also repositioning the upper lateral and alar cartilages. It may be necessary to augment the nasal dorsum with autologous cartilage grafts from the auricle or rib, depending on the degree of nasal instability. Success requires a step-by-step approach based on a precise anatomical analysis of the constituent elements.

Further details can be found in: BEHRBOHM,H; TARDY, M Jr: ISBN 3-13-131911-9 (GTV) ISBN 1-58890-208-0 (TNY) Essentials of Septorhinoplasty, © Thieme Medical Publishers, 2003.

Selected examples are given below illustrating the reconstruction of the nasal contour with autologous cartilage implants. Autologous cartilage grafts are always the material of first choice in the nose.

3.1 Skin and Connective-Tissue Type

The skin and connective-tissue type has an important bearing on the anticipated tissue reaction, wound healing, and surgical outcome, making it an important factor in preoperative planning.

Thick, seborrheic skin is advantageous in that it can cover small irregularities in the bony and cartilaginous supporting structures of the nose. In principle, onlay grafts, tip grafts, and shield grafts can be used. Suture techniques are also available.

Thick skin is more susceptible to wound healing problems than thin skin. An example is the postoperative pollybeak, which is most common in patients with a thick skin type.

Thick skin and thin cartilage are an unfavorable combination for rhinoplasty. Thin skin is advantageous for wound healing. Graft techniques should not be used on the nasal tip. In cases where a bifid tip is present due to prominent alar cartilages, perichondrium or small fascial flaps can be placed beneath the skin of the nasal tip. The ideal skin type for septorhinoplasty is moderately thick skin.

Besides interindividual differences, the thickness of the nasal skin normally varies from the glabella to the tip. It measures 2–5 mm at the level of the paranasion, approximately 3.2 mm over the bony dorsum, and 2–2.2 mm over the rhinion. LANG (1988) reports a thickness of 7 mm over the alae and 5 mm over the tip. The skin is thinnest over the rhinion. It is thickest and most glandular over the nasal tip, especially in patients with a seborrheic skin type.

The connective-tissue type is indicated by skin wrinkling, tissue tension, and the elasticity and mobility of the skin. A less firm connective-tissue type is often associated with an increased tendency for hematoma formation. The skin is loose and mobile.

Any cutaneous scars from previous operations (e.g., goiter surgery) should be inspected to gain information on individual scar formation and possible keloid formation. Preexisting scars would be one reason to avoid an open surgical approach.

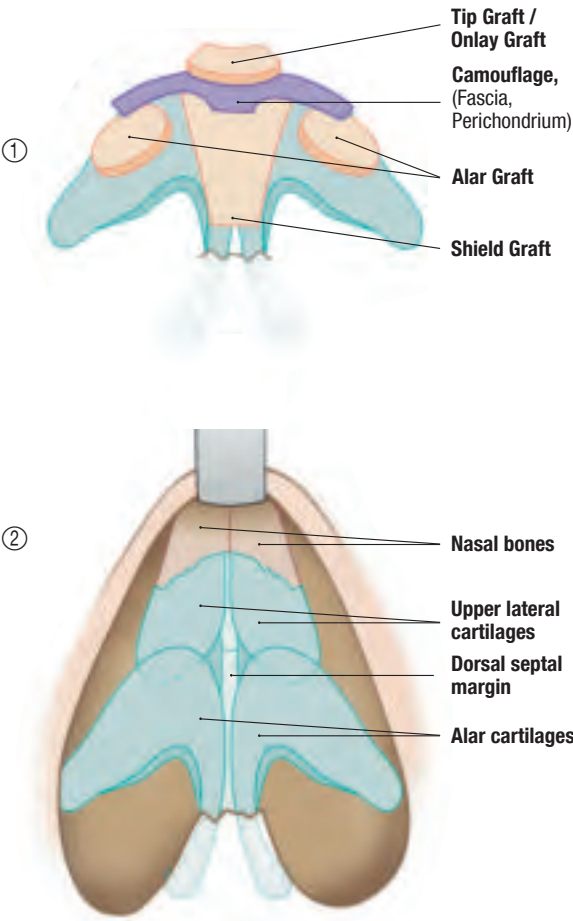


Fig. 45c  
Options available with an open surgical approach.



**Fig. 43a**  
Previously operated patient with pollybeak deformity caused by a prominent dorsal septal margin combined with thin, partially teleangiectatic skin.



**Fig. 43b**  
Inverted-V deformity caused by incomplete osteotomies and an unharmonious junction between the bony and cartilaginous nose.



**43c**



**43d**

**Fig. 43c, d**  
The nasal dorsum was corrected by shortening the dorsal septum, performing a complete infracture osteotomy, and augmenting the nasal dorsum, especially the keystone area, with temporalis fascia.



**44a**



**44b**



**44c**



**44d**

**Fig. 44a, b**  
Patient with a severe saddle nose deformity.

**Fig. 44c, d**  
Result 1 year after augmentation of the nasal dorsum with a large conchal-cartilage and connective-tissue implant.



**Fig. 45a**  
Severe deviation of the entire cartilaginous nose with bilateral asymmetry of the upper lateral and alar cartilages in a woman with moderately thick skin.



**Fig. 45b**  
Appearance 2 years after surgery.





**Fig. 46**  
Detail from "The Original Sin" by Michelangelo Buonarroti (1475-1565); Rome, Vatican, Sistine Chapel.

## 4.0 The Nasal Tip and Nasal Base

The shape of the nasal base is determined by the height ratio of the lobule to the columella, which is normally 1:3.

The nasal base ideally has the shape of an equilateral triangle. Various causes lead to asymmetries, defects, deformities, and abnormal tensions, which are always challenging from a functional and aesthetic standpoint.

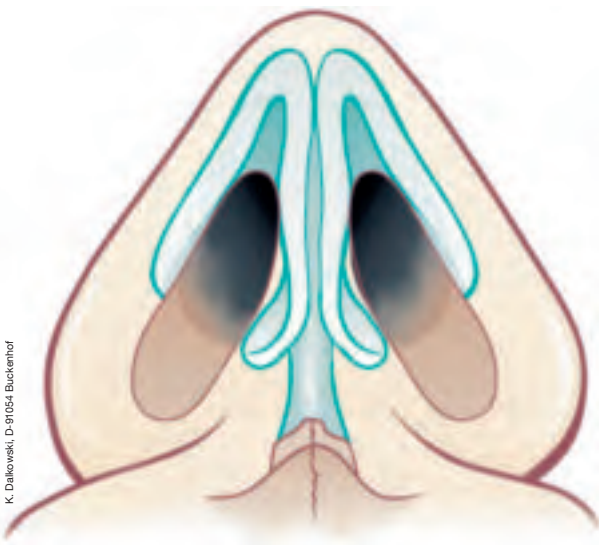
The nares should have an elliptical shape. The shape of the tip can be accurately assessed by viewing the nose from below. A boxy tip has a squared-off shape (**Fig. 52 c**). A long-presumed interdomal ligament does not exist. The width of the nasal tip is determined by the shape of the alar cartilage, the alar skin, and the interdomal fat. The anatomic structures that critically determine the shape of the nasal base are the lateral and medial crura and footplates of the alar cartilages and also the nasal septum.

Bossing occurs when the transition from the dome area to the lateral alar cartilages is not harmonious. Often it takes several years for bossing to develop following a rhinoplasty.

According to TARDY, the position of the nasal tip is the result of support mechanisms that are of varying prominence in different individuals. They are called the major and minor tip support mechanisms. Weakening of these mechanisms leads to a change in the nasal tip position. The shape and elasticity of the alar cartilages also play a crucial role.

### Major Tip Support Mechanism

- Shape, size, and thickness of the lateral alar cartilages
- Attachment of the medial crural footplates to the caudal septum
- Size and thickness of the medial crura
- The connective-tissue attachment between the caudal margin of the upper lateral cartilages and the cranial margin of the alar cartilages



**Fig. 47**  
The normal nasal base has the shape of an equilateral triangle.

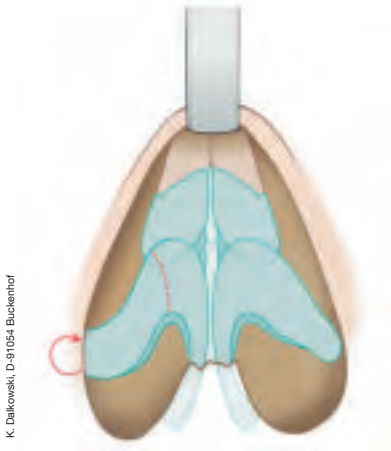




**Fig. 48a – c**  
Woman with paradoxical curvature of the alar cartilages and a bifid, overprojected nasal tip.



**Fig. 48d – f**  
Appearance 2 years after a swinging flap transfer using open technique.



◀ **Fig. 48g**  
Diagram of the surgical technique. The lateral alar cartilage is completely mobilized, rotated, and repositioned.



**Fig. 49a**  
Patient who underwent repair of bilateral cleft lip and palate.



**Fig. 49b**  
Appearance 2 years after repositioning the left ala, expanding the nostril, and stabilizing the nasal tip.

**Minor Tip Support Mechanism**

- The cartilaginous nasal dorsum
- The anterior nasal spine
- Thickness and texture of the skin and subcutaneous connective tissue over the tip
- Thickness of the alae

The basic goal of surgery, depending on the indication, is either to restore the tip support mechanisms (e.g., in a saddle nose) or weaken them in a controlled way (e.g., in a functional tension nose). Techniques of shaping the alar cartilages (e.g., suture, grafting, or incision techniques) also play a major role.

Several examples are presented to demonstrate the procedure, with special reference to the caliper for plastic surgery.



**Fig. 50a**  
Woman 76 years of age with a carcinoma on the inner surface of the left ala.



**Fig. 50b**  
Ulcerated alar tumor.



**Fig. 50c**  
The tumor was resected with a margin of healthy tissue.



**Fig. 50d**  
A composite graft was harvested from the auricle.



**Fig. 50e**  
The ala was reconstructed with the composite graft.



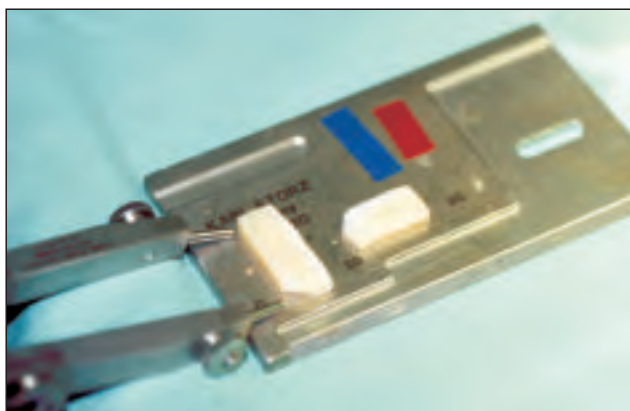
**Fig. 50f**  
Appearance 2 years after the operation.



**Fig. 51d**  
Open approach. A V-Y advancement was done to lengthen the columella.



**Fig. 51e**  
The caliper is used to determine the dimensions for a columella strut made of costal cartilage.



**Fig. 51f**  
The implants are cut to the proper size.



**Fig. 51g, h**  
The columella strut and dorsal support implant are fitted into place.

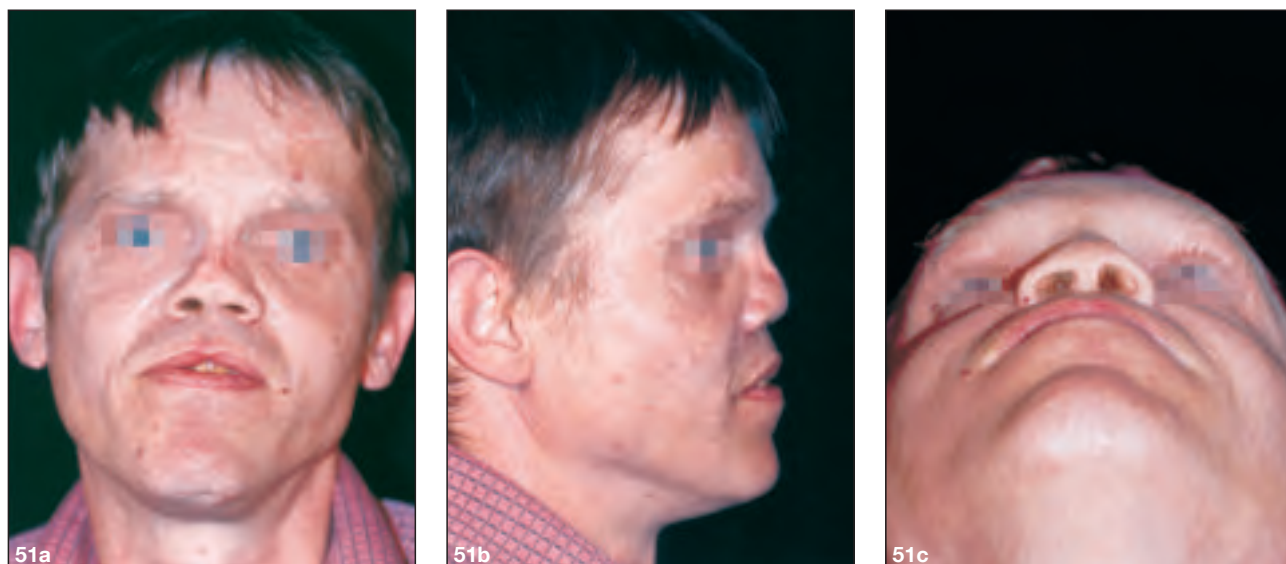


**Fig. 51g, h**  
The columella strut and dorsal support implant are fitted into place.



**Fig. 51i**  
Nasal base following wound closure.





**Fig. 51a - c**

Patient with Binder syndrome (nasomaxillary dysplasia) had undergone several previous operations, presented with severe nasal obstruction and loss of tip projection and support.



**Fig. 51j, k**

Patient 8 months after the operation.





52a



52b



52c

**Fig. 52a – c**  
Woman with an overprojected, boxy tip and narrow nasal base.



**Fig. 52d**  
The outer width of the nasal base is determined.



**Fig. 52e**  
The basal width of the columella is determined.



**Fig. 52f**  
The nasal tip is exposed through an open approach.



**Fig. 52g**  
The volume of the alar cartilages is reduced by cranial resections.  
The residual strip is precisely determined.



**Fig. 52h**  
Equal wedge excisions are performed on both sides.



**Fig. 52i**  
The nasal base is marked and measured for repositioning the alae.



**Fig. 52j**  
The columellar base is narrowed with all-layer mattress sutures, and the alae are moved laterally.



**Fig. 52k**  
The caliper for plastic, reconstructive and aesthetic surgery, developed by the author in collaboration with KARL STORZ. Removable attachments on the caliper arms are equipped with atraumatic point markers, and a special holder can be attached for sterile skin marking pens.

## 5.0 The Auricle

### 5.1 Prominent Ears

The angle between the auricle and skull (petrous squama) normally ranges from 15 to 30 degrees. If the angle is larger, the ears appear to stick out. Prominent ears most commonly result from a poorly developed anthelix or a conchal cavity that is too deep. The two forms are easy to differentiate before surgery.

Often the two ears show different degrees of protrusion, making it necessary to correct one more than the other. It is helpful, therefore, to objectify the auricular deformity at the start and end of the operation in order to achieve a symmetrical result.



**Fig. 53**  
Detail from "The Erythrean Sibyl" by Michelangelo Buonarroti (1475-1565); Rome, Vatican, Sistine Chapel.



**Fig. 54a**  
Women with bilateral prominent ears.



**Fig. 54b**  
The auricular deformity is caused by a virtual absence of the anthelical fold.



**Fig. 54c**  
The patient 1 year after anthelix plasty.



**Fig. 54d**  
An anthelix was constructed using the Stenström technique.



#### ◀ Fig. 54e, f

Generally the distance from the helical rim to the mastoid should be measured intraoperatively and the sides compared in order to achieve the most symmetrical results. This is particularly advantageous in patients with subtle differences between the sides and in problems involving only the cranial portions of the auricle.





**Fig. 55a**  
Woman with a lop ear deformity on the left side (following previous surgery).



**Fig. 55b**  
Deficient contour of the anthelix with scattered breaks in the cartilage.



**Fig. 55c**  
Appearance 6 months after surgical correction.



**Fig. 55d**  
The anthelix was reshaped by smoothing and weakening the cartilage with a diamond bur.



**56a**



**56b**



**56c**



**56d**

**Fig. 56a – d**  
Important guides for surgical planning are obtained by differentiating between an absent (a) or deficient anthelical fold (a, b) and a too-deep or projecting conchal cavity (c, d).



Four classic surgical techniques are available:

- Scoring the anterior side of the cartilage (STENSTRÖM)
- Suture technique (MUSTARDÉ)
- Incision technique (CONVERSE) or incision-and-suture technique
- Conchal rotation

These basic techniques can also be combined or supplemented (e.g., by Walter's technique of weakening the posterior cartilage), depending on individual findings.

Cartilage-sparing and -reorienting surgery is preferred over extensive cartilage resections. The more cartilage is resected, the greater the risk of undesired post-operative deformity and the poorer the prospects for successful revision surgery.

We know from experience that the outcome of an otoplasty is measured less by the newly formed contours of the auricle than by the symmetry of the correction. In ear acupuncture, on the other hand, each contour point on the auricular surface is thought to have special significance and is related to a specific body region (**Fig. 57**).



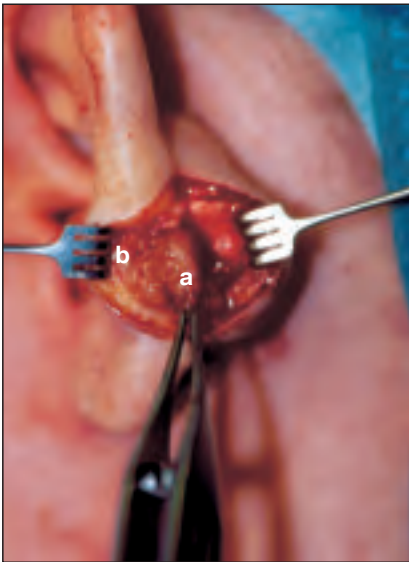
**Fig. 57**  
Ear acupuncture points related to specific body regions.



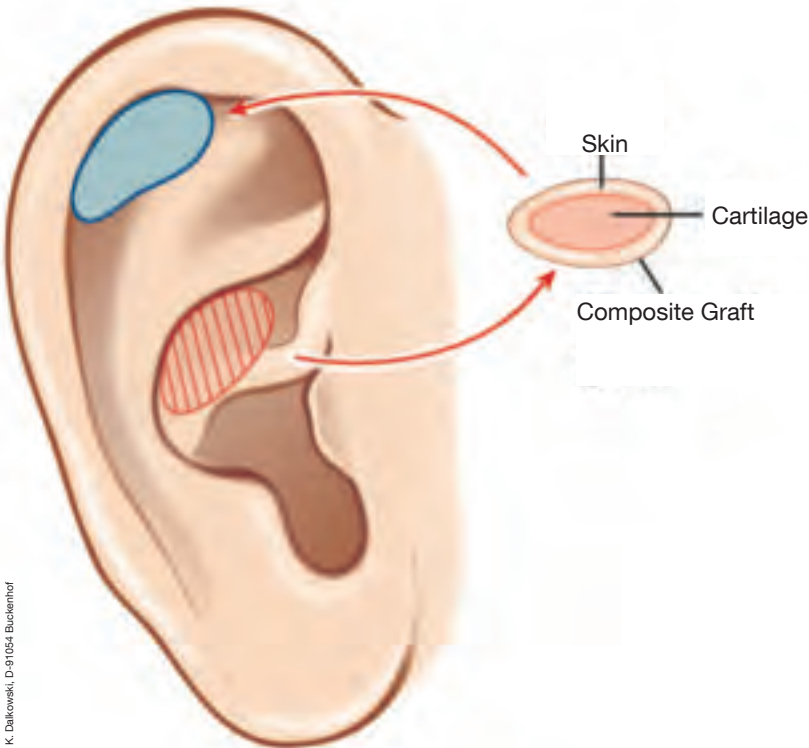
**Fig. 58a**  
High ear piercings with perforation of the auricular cartilage.



**Fig. 58b**  
Granulating cartilage necrosis is a frequent complication following the use of an ear piercing gun.



**Fig. 58c**  
Intraoperative view of the ear in **Fig. 58 b**.  
**a** – Granulation tissue  
**b** – Cartilage necrosis



**Fig. 58d**  
The defects are best reconstructed with composite grafts.

### 5.2 Complications of Piercing

While piercing the earlobe for the insertion of pierced earrings rarely leads to complications (e.g., keloids) when proper precautions are taken (sterility, noble metals, etc.), we are increasingly seeing complications of high ear piercings in which portions of the cartilage are perforated. The use of an ear piercing gun is particularly destructive and carries a substantial risk of cartilage necrosis, granulations, and deformity.

It may be necessary in some cases to reconstruct the necrotic cartilage with grafts taken from the conchal cavity. Composite grafts can be precision-fitted with the measuring and marking caliper.

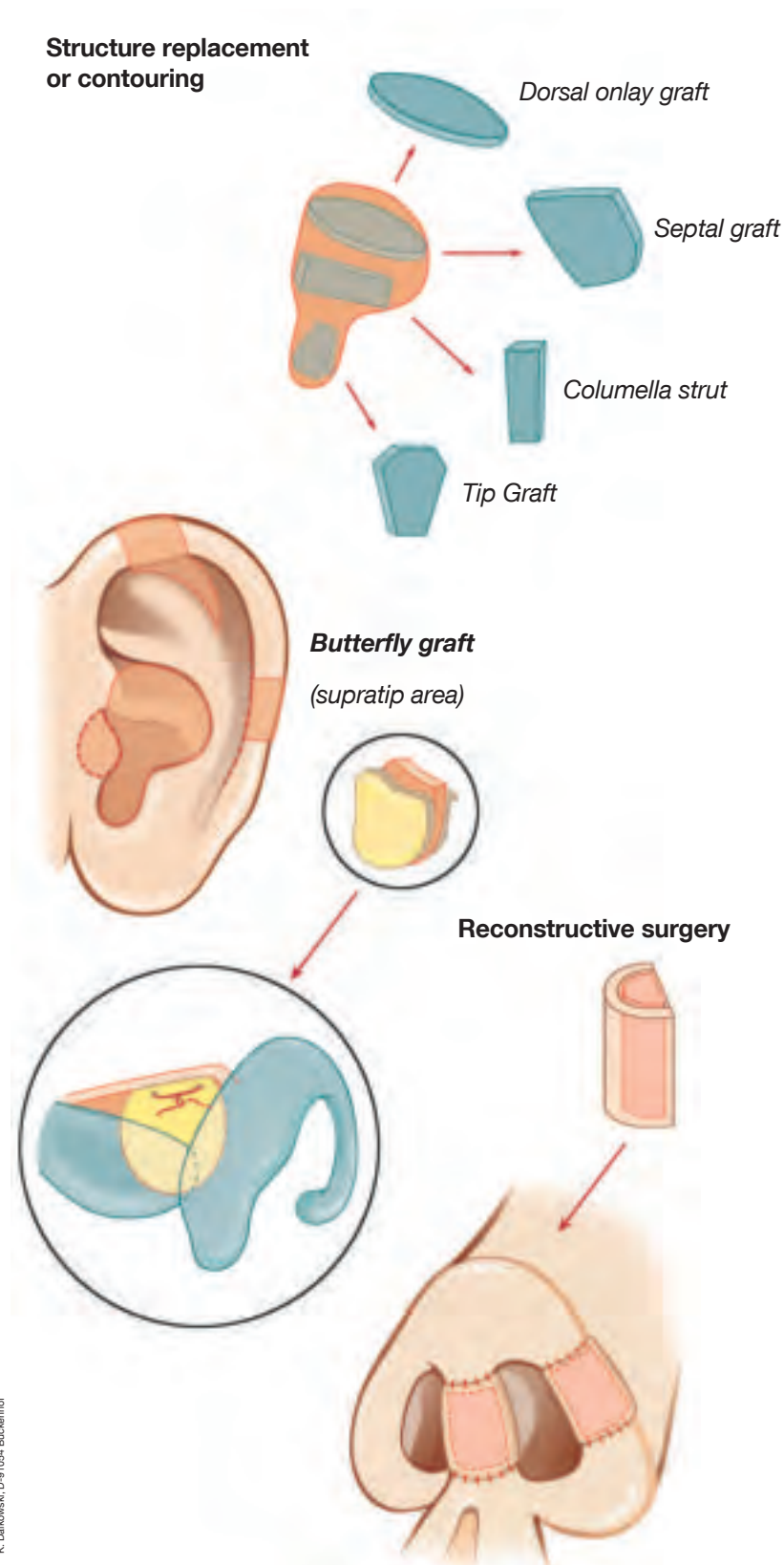
### 5.3 The Auricle as a Cartilage Bank

The auricle is an ideal donor site for the reconstruction of cartilage defects in the nose. The auricular cartilage is sturdy and easy to shape but has a greater tendency to fray than septal cartilage. As a rule, the perichondrium should always be removed prior to implantation. In children, however, the chondroplastic activity of the perichondrium can be utilized to good advantage, and so the perichondrium should be left on the cartilage.

Another advantage of conchal cartilage is its many natural curves (see diagram), which are advantageous for reconstructing specific portions of the nose (nasal dorsum, alar cartilage, nasal tip).



**Fig. 60**  
Cartilage is harvested from the conchal cavity through a posterior auricular incision.



K. Dalkowski, D-91054 Buckenhof

**Fig. 59**  
The auricle is an ideal donor site for autologous cartilage. The diagram shows the harvesting options for the cartilage grafts most commonly used in the nose.





◀ Fig. 61

Detail from "The Sibyl Deiphobe of Cumae" by Michelangelo Buonarroti (1475-1565); Rome, Vatican, Sistine Chapel.

The face of the Sibyl displays the following signs of aging:

- Mimetic wrinkles, e.g.:
  - Worry lines in the forehead
  - Frown lines between the eyebrows
  - Crows' feet, laugh lines (radial orbital lines)
- Blepharochalasis, sagging eyebrows
- Dermal elastosis of the cheek
- Deep nasolabial fold
- Radial perioral wrinkles
- Marionette lines (sagging of the Bichat fat pad)
- Drooping of the nasal tip
- Thinning of the lips

## 6.0 Adjunctive Measures in Aesthetic Medicine

### 6.1 Analysis of the Aging Face, Contouring

The face betrays a person's age through the sum total of various individual features.

The intrinsic aging process of the skin, plus a number of physical, chemical, and irritative factors (heat, cold, wind, UV radiation), lead to elastosis with a loss of dermal connective tissue.

The extracellular matrix and collagen fibers change during the aging process. A decline in the number and activity of fibroblasts in the epidermis, combined with a decreased capacity for tissue water storage, leads to drying. The corium becomes thinner, and elastic fibers become less numerous.

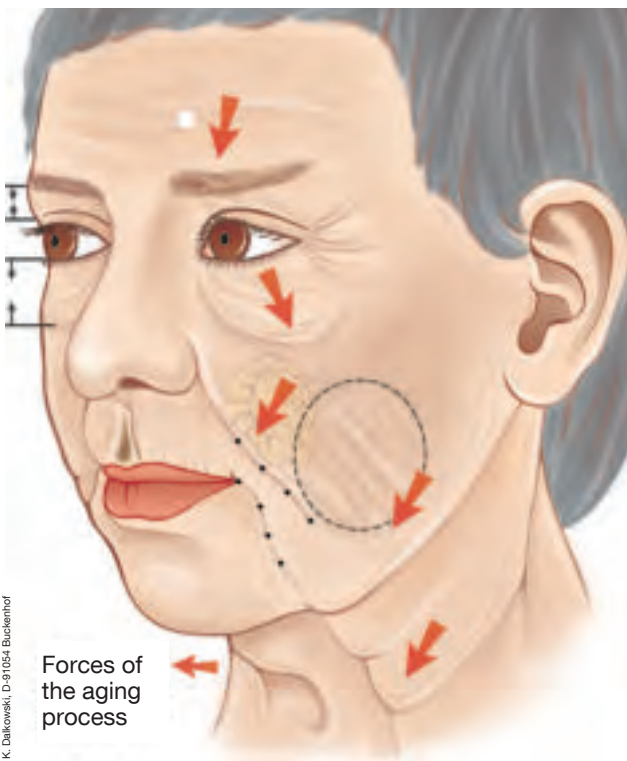
The principal forces that act on the facial skin are the mimetic muscles and the force of gravity.

Dynamic facial lines result from the expressive activity of the mimetic muscles. Dynamic lines progress to permanent wrinkles that can give the patient a tired, sad, or angry look.

Typical changes in the skin and facial soft tissues should be systematically analyzed.

#### Analysis:

Skin type, thickness, texture, elasticity



K. Dalkowski, D-91054 Buchenhof

Fig. 62

Forces of aging in the face. Measuring distances with the caliper for plastic surgery.



**Caution:** Different skin thicknesses and textures may coexist in the same face.

Ptosis: eyebrows, eyelids, cheek

- Skin lines: location, course, depth
- Origin: mimetic, superficial, gravity-induced
- Dermal elastosis: location, degree
- Junction of chin and neck

Often the patient is not concerned with eliminating signs of the aging process per se, but wishes to alter facial features that are associated with traits such as apathy (bags) and fatigue (blepharoptosis). The motivation for facial contouring derives from a conflicted feeling that the patient's activity and creativity are at odds with his or her aging face. The nasolabial fold and other lines play a special role in this regard. Not all lines are of equal importance, and certain areas and "problem spots" have a particularly strong impact on facial appearance. This is usually the case with multiple parallel, vertical lines (nasolabial fold and marionette lines at the oral commissures). An analysis of the length, direction, and depth of the lines provides the indication for treatment (e.g., lipofilling, collagen). A distinction should be made between discrete lines and hollow areas in the face.

A sad facial expression can often be remedied by treating typical, early problem spots without having the inject along the full length of a facial line.

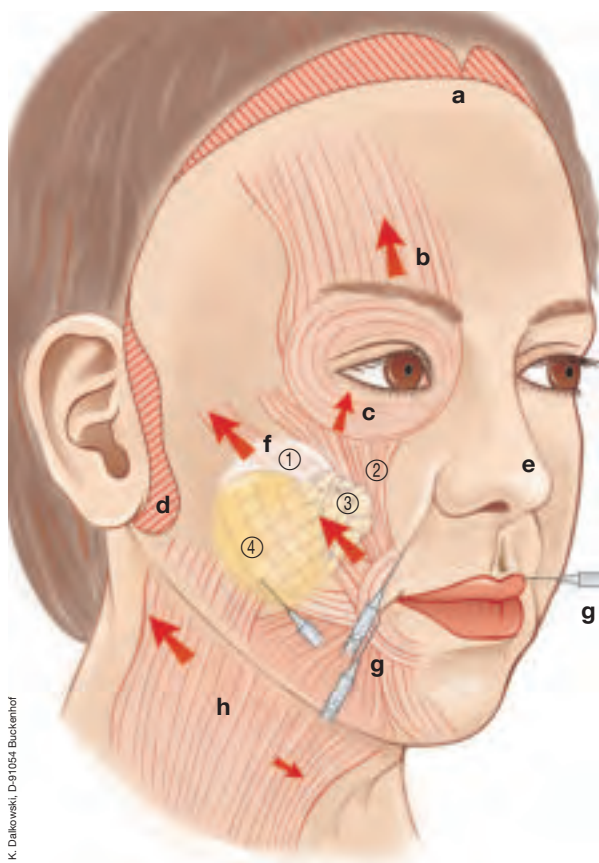
The motivation for facial contouring with the goal of eliminating age-related features is based on the inherent conflict between a high functional capacity in the middle and senior years of life in a society geared toward success, mobility, and activity and the physiologic aging process, which is plainly reflected in the face. The concept of "age" is relative, of course, and has changed over time. Several decades ago, a woman over 50 was already considered old. Today, active women over 50 are often at the zenith of their personal and professional lives. This contradiction between mental youthfulness, ambition, and zest for living on the one hand and aging facial features on the other is responsible for the current high demand in this field of aesthetic medicine.



**Fig. 63a**  
Woman with ptotic cheeks and a saddle nose.



**Fig. 63b**  
The patient 1 year after undergoing rhinoplasty and a cheek and neck lift.

**Fig. 64**

The principal options for facial recontouring.

➔ Vectors of rejuvenation

**a** – Forehead lift

**b** – Endoscopic brow lift

**c** – Lower and upper eyelid corrections

**d** – Cheek lift

**e** – Rhinoplasty

**f** – Face lift

**g** – Injectable, absorbable substances (e.g., autologous fat transfer, collagen, hyaluronic acid)

**h** – Neck lift

④ – Skin (elastosis)

③ – Bichat fat pad

① – SMAS (superficial musculo-aponeurotic system)

② – Musculature

Based on the preoperative analysis, a plan can be formulated for facial recontouring and rejuvenation. From the range of options that are available, the techniques that are most suitable for the targeted facial areas are selected in accordance with the patient's wishes, e.g.:

- Autologous fat transfer – lipostructure, lipofilling (cheek)
- Botulinum toxin (forehead, glabella, periorbital area)
- Skin resurfacing (combined with augmentation)
- Deep peeling (face)
- Dermabrasion (perioral area)
- Implants, filler materials (hyaluronic acid, collagen, polylactic acid)
- Forehead lift, neck lift, face lift, space lift

Other medical indications:

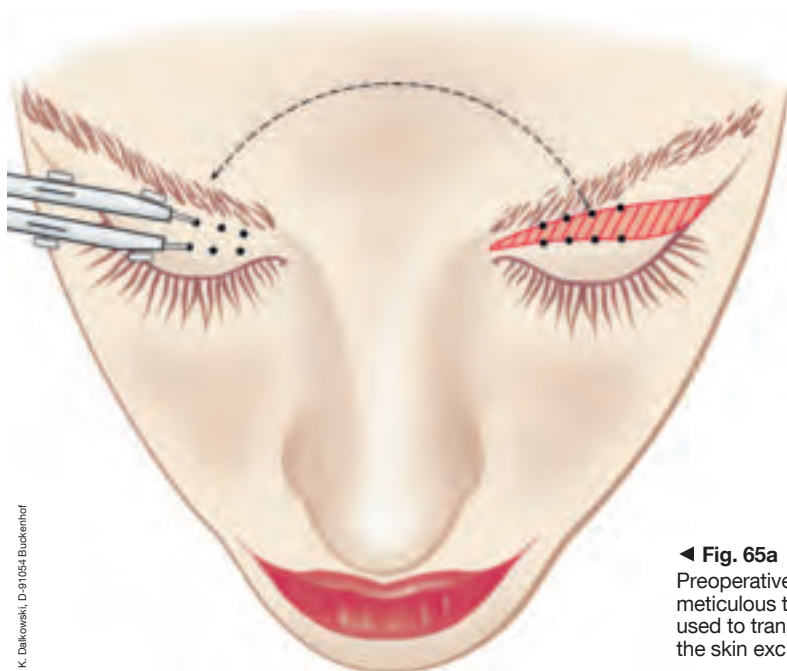
- Scar contractures (trauma, acne, burns)
- Midfacial fractures, midfacial hypoplasia, hemifacial atrophy

**Caution:** The surgeon should have an aesthetic eye for what is reasonable and appropriate for any given patient. The overcorrection of certain regions (e.g., smooth forehead, furrowed lower half) may be contraindicated.

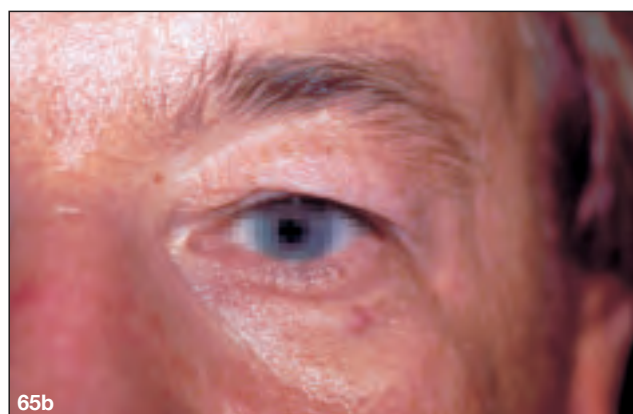
The goal is to obtain an harmonious balance of adjacent regions (without overcorrection!) and achieve aesthetically pleasing, symmetrical facial features. This requires the precise preoperative marking of selected areas and reference points. The caliper can be a valuable tool for this purpose. The selection and particularly the combination of various methods, such as combining botulinum toxin with fillers, blepharoplasty with wrinkle correction, and fat injection (lipostructure) with a forehead lift, will be guided by the facial analysis, the desires of the patient, and the experience and repertoire of the surgeon.

Every surgical procedure done for aesthetic reasons must be medically appropriate and indicated. The responsibility for this lies with the physician, who should decline unreasonable or unrealistic requests.

**Caution:** These guidelines pertain exclusively to the analysis and planning of procedures in aesthetic surgery and medicine. For information on the use of implants, etc., we refer the reader to the corresponding approval regulations and to the literature.

**◀ Fig. 65a**

Preoperative planning (e.g., for a blepharoplasty) must be meticulous to achieve symmetrical results. The caliper is used to transfer measured points and distances for marking the skin excisions.



**Fig. 65b – e**  
Analysis of blepharoptosis and symmetrical marking of the incisions.





**Fig. 66**  
Detail from "The Prophet Isaiah" by Michelangelo Buonarroti (1475-1565); Rome, Vatican, Sistine Chapel.

## 7.0 Botulinum Toxin

When Jean CARRUTHERS, professor of ophthalmology at the University of Vancouver, used botulinum toxin A to treat blepharospasm in 1982 as part of a study on the treatment of strabismus, she observed a decrease in glabellar lines. This prompted Alistair CARRUTHERS, a dermatologist at the same university, to test the efficacy of botulinum toxin first on glabellar lines and subsequently at other sites in cosmetic dermatology.

The products Botox® and Dysport® are approved in Germany only for the treatment of spastic torticollis and blepharospasm. Botox® is additionally approved for use in dynamic equinus deformities of the foot.

Numerous studies have been published on successful wrinkle treatment with botulinum toxin, but the drug has not yet been approved internationally. At present, botulinum toxin A is approved for the cosmetic treatment of facial wrinkles on a trial basis using an approved drug for a nonapproved indication (off-label use).

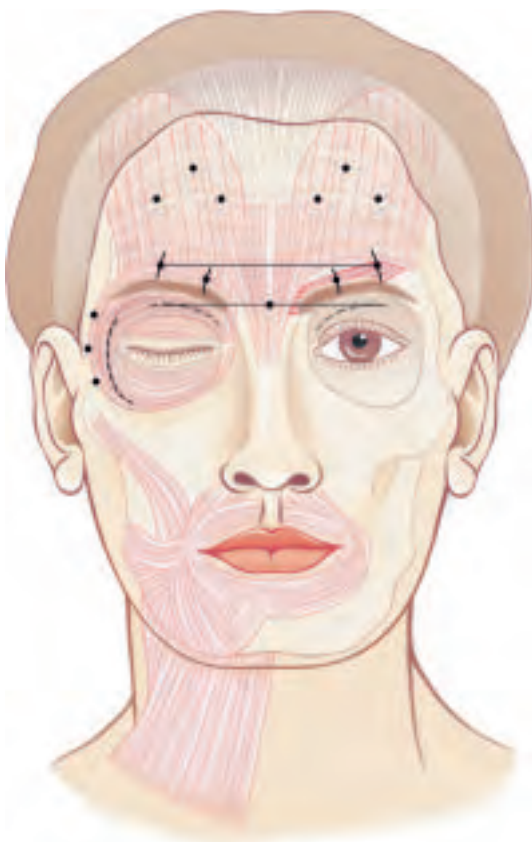
The successful use of botulinum toxin has been reported for various indications in otorhinolaryngology, including:

- Spastic dystonia
- Hemifacial spasm
- Blepharospasm
- Spastic torticollis
- Oromandibular dystonia
- Cricopharyngeal achalasia
- Gustatory sweating (Frey's syndrome)
- Hyperhidrosis

Mimetic forehead, glabellar and periorbital lines are at present considered a primary aesthetic indication for the use of the botulinum toxin.

Besides analyzing the depth and course of the lines, the surgeon should become familiar with the patient's activity type and expression type and with the muscle mass in the various facial regions.

Botulinum toxin works by causing a reversible denervation of specific mimetic muscles, inducing a flaccid palsy and atony in the treated muscles.



**Fig. 67**  
Anatomy of the facial muscles. The caliper is used to mark the injection points.

Even aesthetic indications must be justified from a medical-ethical standpoint, since the treatment involves the injection of a highly potent neurotoxin.

To avoid various complications and asymmetries, the injection points should be precisely marked with the caliper for plastic surgery.

## 7.1 Glabellar Lines (Frown Lines)

These vertical creases between the eyebrows are associated with anger, fearfulness, or an “evil look.” Actually, they are more aptly described as “concentration lines” that occur when the eyebrow is tensed to protect the eye (e.g., while working at a computer monitor).

Frown lines are produced by the following muscular actions:

- Corrugator muscle: pulls the eyebrow medially downward
- Orbicularis oculi muscle: medial pull
- Procerus muscles: downward pull
- Depressor supercilli muscles: downward pull

### Note:

- Eyebrow type:
  - Curved line (feminine type)
  - Straight line (masculine type)
  - Eyebrow below the bony orbital rim: brow ptosis

### Injection points:

- Procerus muscle: above the nasion and below the horizontal line joining the medial points of the eyebrows
- Orbicularis oculi muscle (superomedial portion), corrugator supercilli muscle (medial portion)

Position the caliper on the procerus point, determine the distance to the bony orbital rim, and open the caliper by 1–1.5 cm. Mark the point.

- Corrugator muscle (lateral portion): open the caliper by an additional 1 cm.
- With a straight eyebrow line in men or women, an additional injection can be made lateral to the corrugator point in the midpupillary line.

**Caution:** Always place injection points at least 1 cm above the bony orbital rim to avoid drooping of the eyebrow. Injection below the orbital septum can cause levator ptosis.

Due to interindividual differences in cranial anatomy and facial features, the distances indicated are for orientation purposes only.

## 7.2 Forehead Lines (Worry Lines)

Forehead lines are a reflection of mimetic activity, since the forehead muscles are involved in expressions of surprise, interest, astonishment, and joy. Forehead lines become more numerous with aging. Botulinum toxin should be used with particular care in the forehead region, and in low doses, to avoid overcorrection with brow ptosis.

Worry lines result from the action of the paired frontal bellies of the occipitofrontal muscle. Both muscle bellies are attached to the galea aponeurotica and skin of the eyebrow. Some fibers also insert on the corrugator, depressor supercilli, and procerus muscles.

Individual characteristics can be analyzed by observing the mimetic activity of these muscles.

### Note:

Also treat the brow depressors in older patients and patients with brow ptosis.

### Injection points:

One or two rows of injections are placed midway between the hairline and eyebrows on both sides, lateral to the galea aponeurosis.

**Caution:** Overcorrection will cause brow ptosis. Asymmetrical or uneven injections can cause lateral distortion of the eyebrow.

### 7.3 Periorbital Lines (Crows' Feet, Laugh Lines)

Laugh lines are based on an elastosis of the corium. Whereas frown lines and worry lines are considered undesirable features, periorbital lines help give the face a sympathetic look.

Laugh lines radiate from the lateral epicanthus in response to the pull of the orbicularis oculi muscle.

**Note:**

Only the small lines lateral to the orbital rim should be treated. The goal of treatment is to selectively weaken the motor activity of the muscle, not paralyze it.

**Injection points:**

The first injection is placed at the center of the lines during maximal contraction (squinting), keeping at least 1 cm from the lateral orbital rim.

Two additional injections are made – one 1 cm above the first point and another 1 cm below it.

**Caution:** The injections should always be made outside the orbit and above the zygomatic arch. If this rule is violated, drooping of the lower eyelid and diplopia could result.

**Combination treatments:**

When treating older patients, it may be beneficial to combine botulinum injections with augmentation materials (collagen or autologous fat) in the glabellar region and forehead. This is not necessary in younger patients being treated for periorbital lines.

Botulinum injections can also be combined with skin resurfacing.



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208215	<b>Blade</b> , Fig. 15, sterile, package of 100	486253	BEHRBOHM-WALTER <b>Double Concave Hollow Osteotome</b> , extra delicate, with special double-edged grinding, doubleguarded, with round ergonomic handle and finger grip plate, width 3 mm, length 19 cm
208211	<b>Same</b> , Fig. 11, package of 100	486254	<b>Same</b> , width 4.5 mm
208000	<b>Surgical Handle</b> , Fig. 3, length 12.5 cm, for Blades 208010 – 15, 208210 – 15	487010	RUBIN <b>Osteotome</b> , flat, straight, double-edged grinding, rounded corners, with finger grip stabilizer, width 10 mm, length 16.5 cm
496500	<b>Surgical Handle</b> , for miniature blades, round, length 15.5 cm, for Blades 496764 – 70	487016	<b>Same</b> , 16 mm
496764	<b>Miniature Blade</b> , Fig. 64, round, sterile, package of 25	174200	COTTLE <b>Mallet</b> , length 18 cm
525520	BEHRBOHM <b>Caliper</b> , for plastic surgery, otoplasty, rhinoplasty, reconstructive and aesthetic surgery, with wheel to set and hold the span, as well as a scale for reading the opening interval, measurement range from 5 – 130 mm, caliper arms have 2 removeable attachments with atraumatic measurement points 525523 and 1 holder 525525 for disposable skin marker, <b>autoclavable</b> , length 18.5 cm	488060	<b>Ala Double Hook</b> , with octagonal handle, with 2 sharp points, strongly curved, special matt finish, width 2 mm, length 16.5 cm
468500	BECKER-CAPLAN <b>Septum Scissors</b> , double action jaws, serrated, working length 9.5 cm	506400	AUFRICHT <b>Nasal Retractor</b> , width of retractor blade 8 mm, length of retractor blade 40 mm, length 16.5 cm
496900	MASING <b>Nasal Knife</b> , curved, roundly tipped blade, length 14 cm	505700	COTTLE <b>Knife Guide and Retractor</b> , one side with two-pronged nostril retractor, other side with flat retractor, with duct for guide of cut, length 19 cm
493000	COTTLE <b>Nasal Knife</b> , rounded edge, length 14 cm	505000	COTTLE <b>Retractor</b> , two prongs, sharp prong on left, blunt prong on right, width 10 mm, length 14.5 cm
417013	<b>Cotton Applicator</b> , standard model, triangular, serrated, diameter 1.3 mm, length 15 cm	505100	<b>Same</b> , sharp prong on right, blunt prong on left
489091	COTTLE <b>Dorsal Scissors</b> , tungsten carbide inserts, heavy, working length 7.5 cm	499101	<b>Hook</b> , one prong, large curve, length 16.5 cm
511010 DS	<b>Scissors</b> , extra delicate, straight, sharp/sharp, length 10.5 cm, color code: one gold-plated handle ring	479800	<b>Suction Raspatory</b> , with stylet, length 19.5 cm
511210 DS	<b>Scissors</b> , extra delicate, curved, sharp/sharp, length 10.5 cm, color code: one gold-plated handle ring	479000	MASING <b>Elevator</b> , double-ended, graduated, sharp and blunt, length 22.5 cm
513410 DS	COTTLE <b>Scissors</b> , curved, length 10.5 cm, color code: one gold-plated handle ring	488074	FREER <b>Elevator</b> , double-ended, sharp and blunt, special matt finish, length 20 cm
511414 DS	JOSEPH <b>Scissors</b> , curved, length 14 cm, color code: one gold-plated handle ring	478304	McKENTY <b>Raspatory</b> , width 4 mm, length 14.5 cm
513200	WALTER <b>Scissors</b> , angled, length 10 cm	478305	<b>Same</b> , width 5 mm
513700 DS	FOMON <b>Scissors</b> , curved surface, slender, working length 6.5 cm, color code: one gold-plated handle ring	533022	ADSON <b>Dressing Forceps</b> , serrated, tungsten carbide inserts, length 12 cm
484004	COTTLE <b>Chisel</b> , flat, graduated, straight, width 4 mm, length 18.5 cm	533112	ADSON <b>Tissue Forceps</b> , 1 x 2 teeth, length 12 cm
484007	<b>Same</b> , width 7 mm	533212	ADSON-BROWN <b>Tissue Forceps</b> , atraumatic, fine side grasping teeth, length 12 cm
484009	<b>Same</b> , width 9 mm	523600	<b>Nasal Rasp</b> , double-ended, fine, length 21.5 cm
484106	<b>Same</b> , curved, width 6 mm	523700	<b>Same</b> , coarse (rasp)
484206	COTTLE <b>Crossbar Osteotome</b> , graduated, double-edged grinding, straight, width 6 mm, length 18.5 cm	523812	<b>Nasal Rasp</b> , tungsten carbide, double-ended, rasp blades Fig. 1 and 2, coarse, length 20.5 cm
484406	<b>Same</b> , curved	403240	KILLIAN-STRUYCKEN <b>Nasal Speculum</b> , with set rack, blade length 40 mm, length 15 cm
486107	WALTER <b>Osteotome</b> , flat, double-edged grinding, width 7 mm, length 19 cm	403275	<b>Same</b> , blade length 75 mm
486222	BEHRBOHM-WALTER <b>Micro Osteotome</b> , extra delicate, long flat blade, double-edged grinding, with round ergonomic handle and finger grip plate, width 2 mm, length 19 cm	403655	COTTLE <b>Nasal Speculum</b> , blade length 55 mm, length 13 cm
486223	<b>Same</b> , width 3 mm	456001	BLAKESLEY <b>Nasal Forceps</b> , straight, size 1, working length 11 cm
486224	<b>Same</b> , width 4 mm	456003	<b>Same</b> , size 3
		466000	CRAIG <b>Septum Forceps</b> , straight, working length 9 cm
		516513	NEIVERT-MASING <b>Needle Holder</b> , thumb ring upturned, one jaw with groove, length 13 cm
		515515	CRILE-WOOD <b>Needle Holder</b> , length 15 cm
		515017	<b>Needle Holder</b> , extra delicate, slight spring action, length 17 cm

It is recommended to check the suitability of the product for the intended procedure prior to use.

- 529307 FRAZIER **Suction Tube**, with mandrel and cut-off hole, with distance marking at 5 – 9 cm, 7 Fr., working length 10 cm
- 529309 **Same**, 9 Fr.
- 534500 COTTLE **Columella Clamp**, length 11 cm
- 498820 AIACH **Grid**, for preparation of cartilage and bone grafts, graduated, size 90 x 50 mm
- 523913 **Metal Tray**, for preparing cartilage and bone, with hole for towel forceps, size 10 x 15 cm
- 529105 **Suction Tube**, curved, outer diameter 5 mm, length 16.5 cm
- 534015 COTTLE **Lower Lateral Forceps**, bayonet-shaped, with set screw, serrated tips and teeth on the inside, length 15 cm

### Instrument Set for Adjunctive Endoscopic Correction of the Nasal Septum and Perpendicular Plate

- 7229 AA HOPKINS® **Straight Forward Telescope 0°**, enlarged view, diameter 2.7 mm, length 18 cm, **autoclavable**, fiber optic light transmission incorporated, color code: green
- or:
- 7230 AA HOPKINS® **Straight Forward Telescope 0°**, enlarged view, diameter 4 mm, length 18 cm, **autoclavable**, fiber optic light transmission incorporated, color code: green
- 426516 JANSEN **Nasal Dressing Forceps**, bayonet-shaped, length 16.5 cm
- 449002 HEYMANN **Nasal Scissors**, medium, (standard model), working length 9.5 cm
- 449003 **Same**, large, working length 11 cm
- 449201 RHINOFORCE® **II Nasal Scissors**, straight, with cleaning connector, working length 13 cm
- 449202 **Same**, curved to right
- 449203 **Same**, curved left
- 456003 BLAKESLEY **Nasal Forceps**, straight, size 3, working length 11 cm
- 474000 FREER **Elevator**, double-ended, semisharp and blunt, length 20 cm
- 488038 RUBIN **Septum Morcelizer**, with double joint, straight, special matt finish, length 20 cm
- 529305 FRAZIER **Suction Tube**, with mandrel and cut-off hole, with distance marking at 5 – 9 cm, 5 Fr., working length 10 cm
- 629825 KUHN **Frontal Ostium Seeker**, no. 6, both sides curved 77°, one tip straight, other tip reverse angle, length 22 cm
- 208000 **Surgical Handle**, Fig. 3, length 12.5 cm, for Blades 208010 – 15, 208210 – 15
- 748000 **Surgical Handle**, Fig. 7, length 16.5 cm, for Blades 208010 – 15, 208210 – 15
- 208210 **Blade**, Fig. 10, sterile, package of 100

### Instrument Set for Reducing Nasal Fractures

- 525870 BEHRBOHM-KASCHKE **Elevator**, double-ended, for repositioning fractures of the nasal bone and zygomatic arch, bayonet-shaped, length 27 cm, set of 1 piece each, right and left
- 7230 AA HOPKINS® **Straight Forward Telescope 0°**, enlarged view, diameter 4 mm, length 18 cm, **autoclavable**, fiber optic light transmission incorporated, color code: green
- 403240 KILLIAN-STRUYCKEN **Nasal Speculum**, with set rack, blade length 40 mm, length 15 cm
- 403265 **Same**, blade length 65 mm
- 426516 JANSEN **Nasal Dressing Forceps**, bayonet-shaped, length 16.5 cm
- 529305 FRAZIER **Suction Tube**, with mandrel and cut-off hole, with distance marking at 5 – 9 cm, 5 Fr., working length 10 cm
- 474000 FREER **Elevator**, double-ended, semisharp and blunt, length 20 cm

### KARL STORZ UNIDRIVE® S III ENT Paranasal Sinus Shaver System for Olfactory Cleft Surgery:

- 407016 01-1 UNIDRIVE® **S III ENT SCB**, motor control unit with color display, touch screen, two motor outputs, integrated irrigation pump and SCB module, power supply 100 – 240 VAC, 50/60 Hz including:
- Mains Cord**
- Irrigator Rod**
- Two-Pedal Footswitch**, two-stage, with proportional function
- Silicone Tubing Set**, for irrigation, sterilizable
- Clip Set**, for use with silicone tubing set
- SCB Connecting Cable**, length 100 cm
- Single Use Tubing Set\***, sterile, package of 3

### Accessories on request:

- 40712050 **DrillCut-X® II Shaver Handpiece**, for use with UNIDRIVE® S III ECO/ENT/NEURO/OMFS
- 40712090 **Handle**, adjustable, for use with DrillCut-X® II 40712050 and DrillCut-X® II N 40712055
- 20711033 **High-Performance EC Micro Motor II**, for use with motor control units UNIDRIVE® II/ UNIDRIVE® ENT/OMFS/NEURO/ECO and Connecting Cable 20711073 or for use with motor control units UNIDRIVE® S III ENT/ECO/NEURO and Connecting Cable 20711173
- 20711173 **Connecting Cable**, to connect High-Performance EC Micro Motor II 20711033 to UNIDRIVE® S III ENT/ECO/NEURO
- 280053 B **Universal Spray**, 500 ml bottle, – HAZARDOUS GOODS – UN 1950, for use with Spray Nozzle 280053 C for INTRA drill handpieces
- 280053 C **Spray Nozzle**, for the reprocessing of INTRA burr handpieces, for use with Universal Spray 280053 B
- mtp\* **Set of Tubes**, for single patient use

**Reusable and Disposable Shaver Blades**, see pages 80 – 87

\* This product is marketed by mtp.  
For additional information, please apply to:



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



## LED Headlight KS70 <sup>NEW</sup>



094220

094220 **LED Headlight KS70**, white light, lightweight model, control unit and rechargeable battery box on headband, charging unit, illumination area adjustable from 30–150 mm in diameter with 40 cm working distance

including:

**LED Headlight KS70**

**Control Unit**

**Battery Box**

**2x Battery Pack**

**Charger USB**

**Headband**

094230 **Same**, yellowish light

## Headlight KS60 with Cold Light Illumination



310060

310060 **Headlight KS60**, with double lens system and Y-fiber optic light cable, >175,000 lux, illuminated area adjustable from 20 – 80 mm in diameter with 40 cm working distance

including:

**Headlight KS60**, with removeable and sterilizable Focus Handle 310065

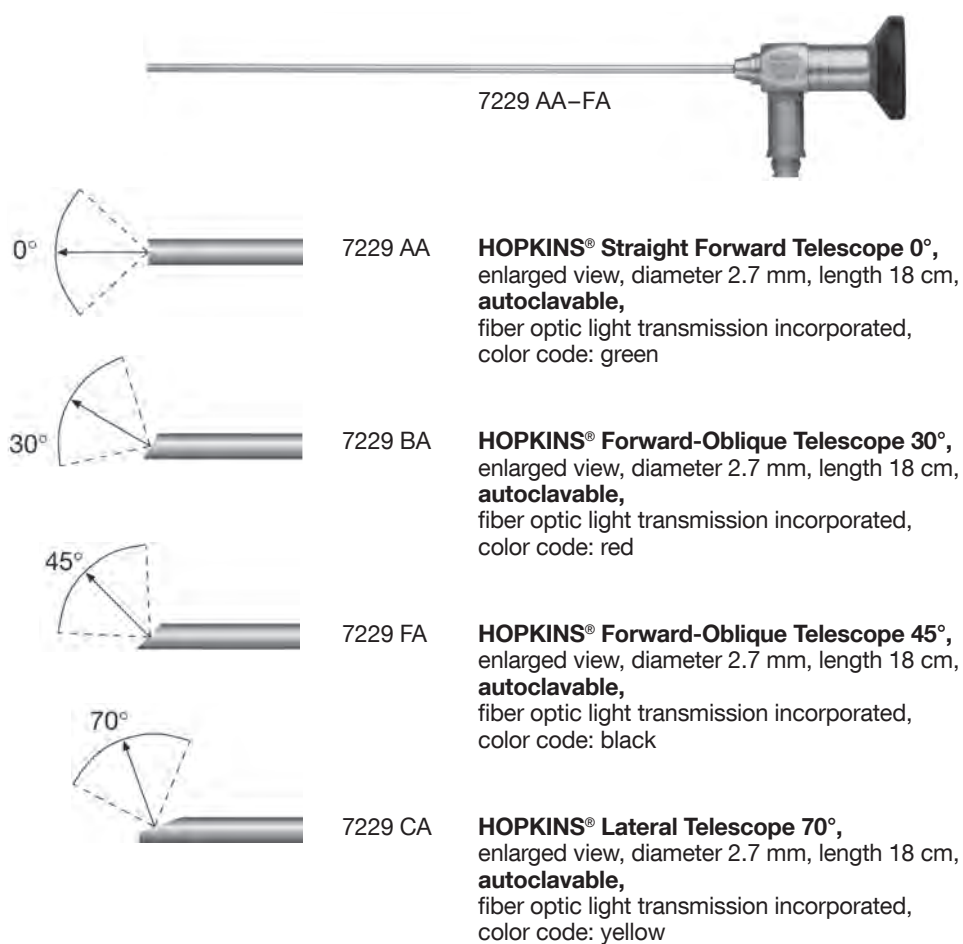
**Headband**, fully adjustable, with Forehead Cushion 078511, with cross band, including holder for Headlight 310060/310063

**Y-Fiber Optic Light Cable**, with special protective casing for Headlight 310063, length 290 cm

**Clip with Band**, for attaching the fiber optic light cable to OR clothing


**HOPKINS® Telescope – autoclavable**

Diameter 2.7 mm, length 18 cm

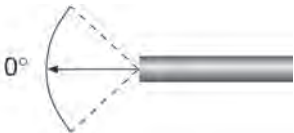


HOPKINS® Telescopes – autoclavable

Diameter 4 mm, length 18 cm



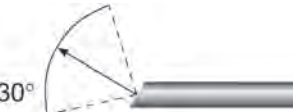
7230 AA-FA



0°

7230 AA


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



30°

7230 BA


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



45°

7230 FA

**HOPKINS® Forward-Oblique Telescope 45°**, 4 mm Ø, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: black




70°

7230 CA

**HOPKINS® Lateral Telescope 70°**, diameter 4 mm, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: yellow


Accessories

for use with HOPKINS® Telescopes



723770

**STAMMBERGER Telescope Handle**, flat, standard model, length 11 cm, for use with HOPKINS® straight forward telescopes 0° with diameter 4 mm and length 18 cm




723772

**STAMMBERGER Telescope Handle**, round, standard model, length 11 cm, for use with HOPKINS® telescopes 30° – 120° with diameter 4 mm and length 18 cm

723774

**Same**, round, length 11 cm, for use with HOPKINS® telescopes with diameter 1.9/2.7 mm and length 18 cm



723750 B

**Protection Tube**, working length 19.7 cm, for use with HOPKINS® telescopes with length 18 cm



## KILLIAN-STRUYCKEN and COTTLE Nasal Specula BLAKESLEY Nasal Forceps



403240–  
403275



403655



456001  
Size 1

456003  
Size 3

456001–  
456003

- 403240 KILLIAN-STRUYCKEN **Nasal Speculum**,  
with set rack, blade length 40 mm,  
length 15 cm
- 403265 **Same**, blade length 65 mm
- 403275 **Same**, blade length 75 mm
- 403655 COTTLE **Nasal Speculum**,  
blade length 55 mm, length 13 cm
- 456001 BLAKESLEY **Nasal Forceps**, straight,  
size 1, working length 11 cm
- 456003 **Same**, size 3

## RUBIN Septum Morcelizer CRAIG Septum Forceps



488038



466000

- 488038 RUBIN **Septum Morcelizer**,  
with double joint, straight,  
special matt finish, length 20 cm
- 466000 CRAIG **Septum Forceps**, straight,  
working length 9 cm

Nasal Forceps and Scissors



449002–  
449003



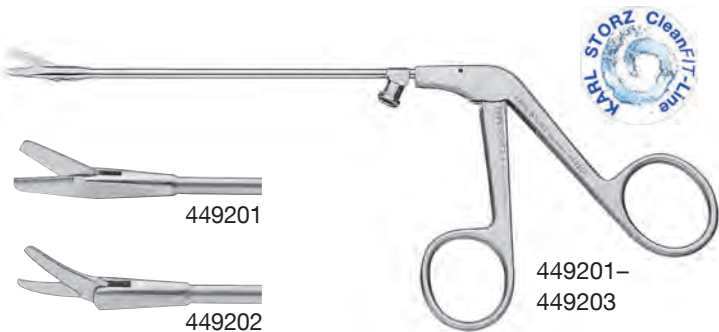
468500



489091



513200



449201–  
449203



449201



449202



449203

- 449002 HEYMANN **Nasal Scissors**, medium, (standard model), working length 9.5 cm
- 449003 **Same**, large, working length 11 cm
- 449201 **RHINOFORCE® II Nasal Scissors**, straight, with cleaning connector, working length 13 cm
- 449202 **Same**, curved to right
- 449203 **Same**, curved left
- 468500 BECKER-CAPLAN **Septum Scissors**, double action jaws, serrated, working length 9.5 cm
- 489091 COTTLE **Dorsal Scissors**, tungsten carbide inserts, heavy, working length 7.5 cm
- 513200 WALTER **Scissors**, angled, length 10 cm

“The Diamond Standard”

– Scissors with ultimate cutting properties –



511210 DS



511414 DS



513410 DS



513700 DS

- 511010 DS **Scissors**, extra delicate, straight, sharp/sharp, length 10.5 cm, color code: one gold-plated handle ring
- 511210 DS **Scissors**, extra delicate, curved, sharp/sharp, length 10.5 cm, color code: one gold-plated handle ring

- 511414 DS **JOSEPH Scissors**, curved, length 14 cm, color code: one gold-plated handle ring
- 513410 DS **COTTLE Scissors**, curved, length 10.5 cm, color code: one gold-plated handle ring
- 513700 DS **FOMON Scissors**, curved surface, slender, working length 6.5 cm, color code: one gold-plated handle ring

Retractors



488060



505000



505100



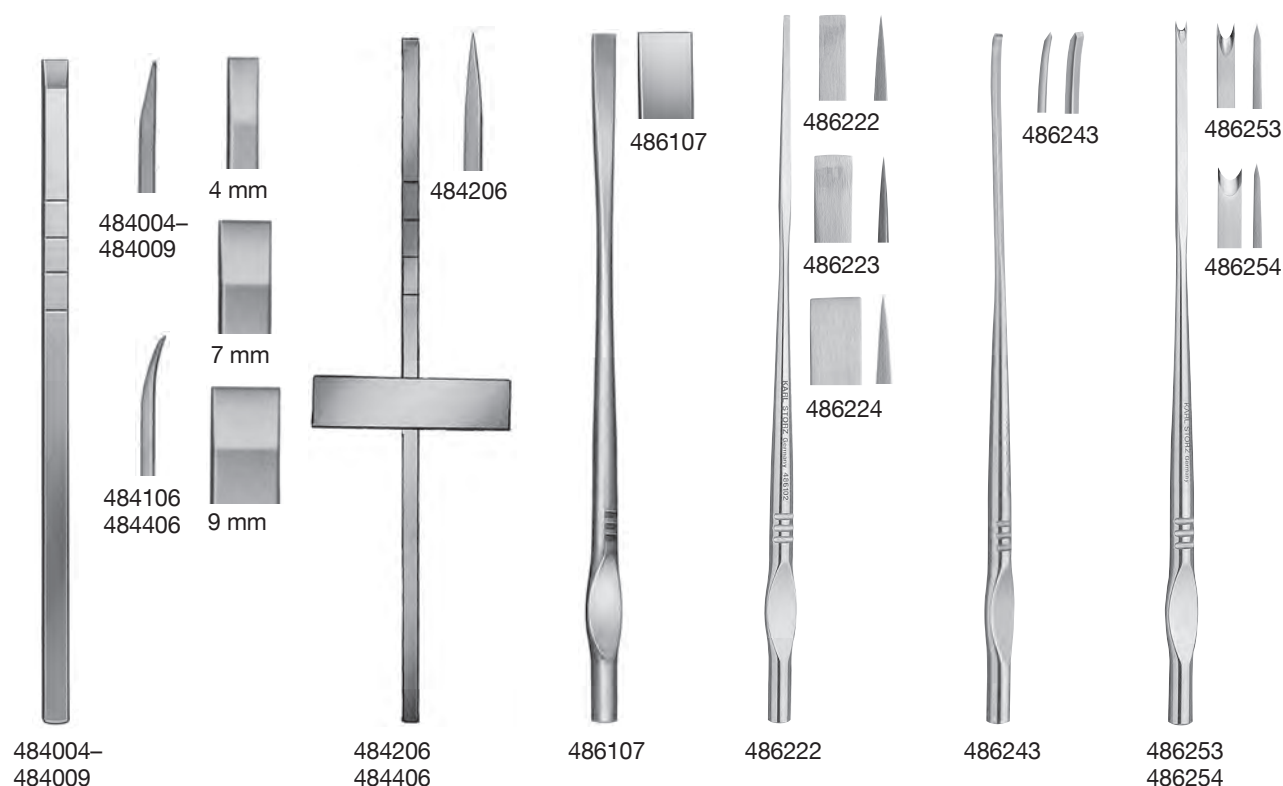
499101



506400

- 488060 **Ala Double Hook**, with octagonal handle, with 2 sharp points, strongly curved, special matt finish, width 2 mm, length 16.5 cm
- 505000 **COTTLE Retractor**, two prongs, sharp prong on left, blunt prong on right, width 10 mm, length 14.5 cm
- 505100 **Same**, sharp prong on right, blunt prong on left
- 499101 **Hook**, one prong, large curve, length 16.5 cm
- 506400 **AUFRICHT Nasal Retractor**, width of retractor blade 8 mm, length of retractor blade 40 mm, length 16.5 cm

## Chisels and Osteotomes



- 484004 COTTLE **Chisel**, flat, graduated, straight, width 4 mm, length 18.5 cm
- 484007 **Same**, width 7 mm
- 484009 **Same**, width 9 mm
- 484106 **Same**, curved, width 6 mm
- 484206 COTTLE **Crossbar Osteotome**, graduated, double-edged grinding, straight, width 6 mm, length 18.5 cm
- 484406 **Same**, curved
- 486107 WALTER **Osteotome**, flat, double-edged grinding, width 7 mm, length 19 cm
- 486222 BEHRBOHM-WALTER **Micro Osteotome**, extra delicate, long flat blade, double-edged grinding, with round ergonomic handle and finger grip plate, width 2 mm, length 19 cm
- 486223 **Same**, width 3 mm
- 486224 **Same**, width 4 mm
- 486243 BEHRBOHM-WALTER **Micro Osteotome**, curved, extra delicate, with special double cut, with round ergonomic handle and finger grip plate, width 3 mm, length 19 cm
- 486253 BEHRBOHM-WALTER **Double Concave Hollow Osteotome**, extra delicate, with special double-edged grinding, double-guarded, with round ergonomic handle and finger grip plate, width 3 mm, length 19 cm
- 486254 **Same**, width 4.5 mm



## RUBIN Osteotomes, Mallet and BEHRBOHM Lock-Joint Caliper



231000

487010 RUBIN **Osteotome**, flat, straight, double-edged grinding, rounded corners, with finger grip stabilizer, width 10 mm, length 16.5 cm

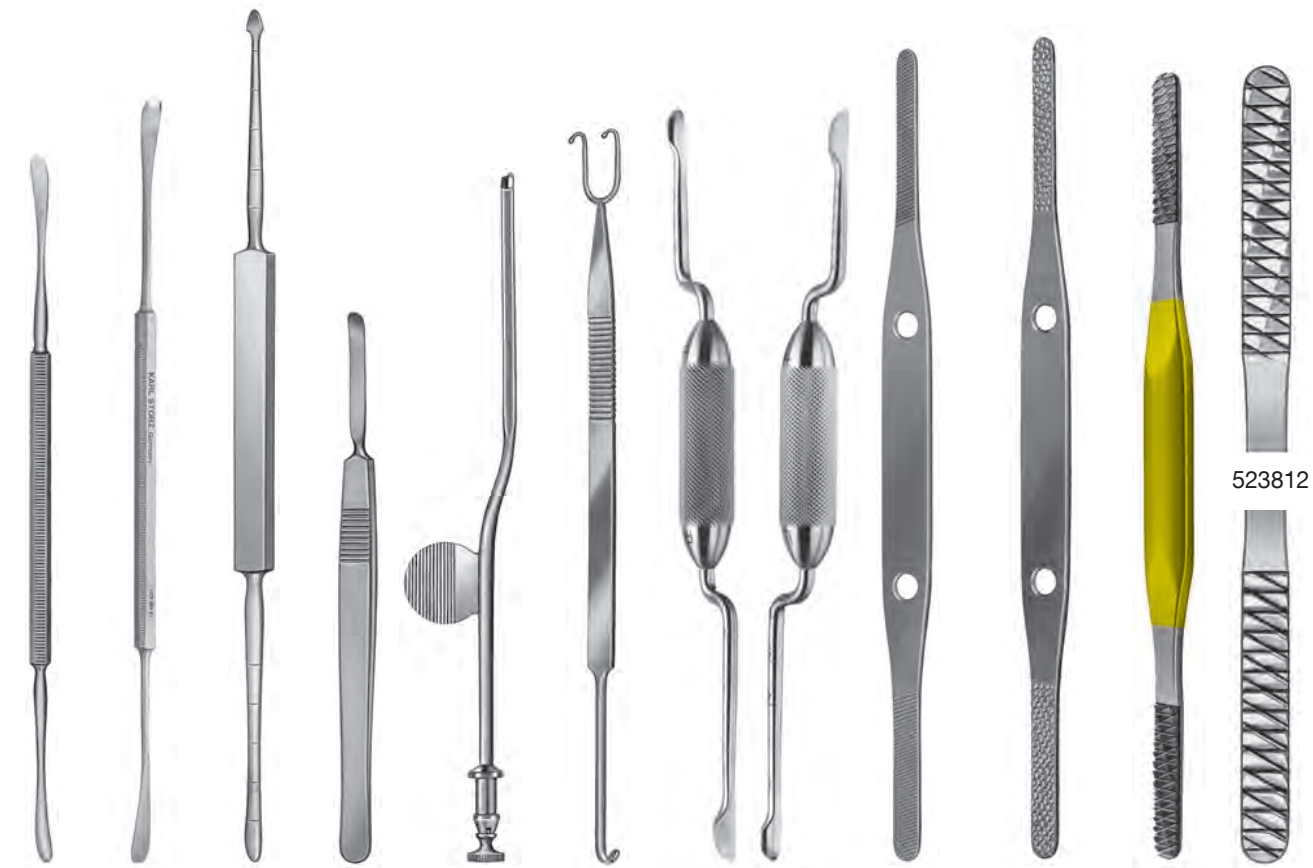
487016 **Same**, 16 mm

174200 COTTLE **Metal Mallet**, length 18 cm

231000 **Hone**, "ARKANSAS" oil stone, wedge-shaped, size 10 x 4 cm

525520 BEHRBOHM **Caliper**, for plastic surgery, otoplasty, rhinoplasty, reconstructive and aesthetic surgery, with wheel to set and hold the span, as well as a scale for reading the opening interval, measurement range from 5 – 130 mm, caliper arms have 2 removeable attachments with atraumatic measurement points 525523 and 1 holder 525525 for disposable skin marker, **autoclavable**, length 18.5 cm

Elevators, Suction Elevator, Double Hooks, Nasal Rasps



474000 488074 479000 478304–478305 479800 505700 525870 523600 523700 523812 523812

- 474000

FREER **Elevator**, double-ended, semisharp and blunt, length 20 cm
- 488074

FREER **Elevator**, double-ended, sharp and blunt, special matt finish, length 20 cm
- 478304

McKENTY **Raspatory**, width 4 mm, length 14.5 cm
- 478305

**Same**, width 5 mm
- 479000

MASING **Elevator**, double-ended, graduated, sharp and blunt, length 22.5 cm
- 479800

**Suction Raspatory**, with stylet, length 19.5 cm
- 505700

COTTLE **Knife Guide and Retractor**, one side with two-pronged nostril retractor, other side with flat retractor, with duct for guide of cut, length 19 cm
- 525870

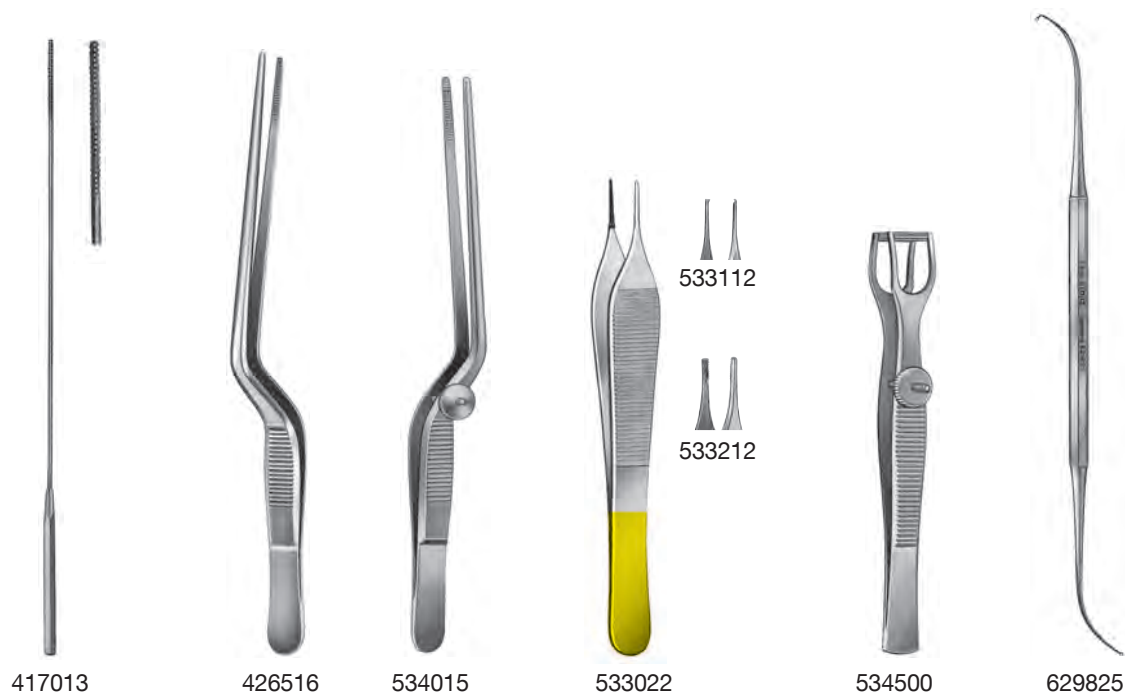
BEHRBOHM-KASCHKE **Elevator**, double-ended, for repositioning fractures of the nasal bone and zygomatic arch, bayonet-shaped, length 27 cm, set of 1 piece each, right and left
- 523600

**Nasal Rasp**, double-ended, fine, length 21.5 cm
- 523700

**Same**, coarse (rasp)
- 523812

**Nasal Rasp**, tungsten carbide, double-ended, rasp blades Fig. 1 and 2, coarse, length 20.5 cm

## Nasal Dressing Forceps, Cotton Applicator, Columella Clamp, KUHN Frontal Ostium Seeker



417013	<b>Cotton Applicator</b> , standard model, triangular, serrated, diameter 1.3 mm, length 15 cm	533112	<b>ADSON Tissue Forceps</b> , 1 x 2 teeth, length 12 cm
426516	<b>JANSEN Nasal Dressing Forceps</b> , bayonet-shaped, length 16.5 cm	533212	<b>ADSON-BROWN Tissue Forceps</b> , atraumatic, fine side grasping teeth, length 12 cm
534015	<b>COTTLE Lower Lateral Forceps</b> , bayonet-shaped, with set screw, serrated tips and teeth on the inside, length 15 cm	534500	<b>COTTLE Columella Clamp</b> , length 11 cm
533022	<b>ADSON Dressing Forceps</b> , serrated, tungsten carbide inserts, length 12 cm	629825	<b>KUHN Frontal Ostium Seeker</b> , no. 6, both sides curved 77°, one tip straight, other tip reverse angle, length 22 cm

Needle Holders and Suction Tubes



515017



515515



516513



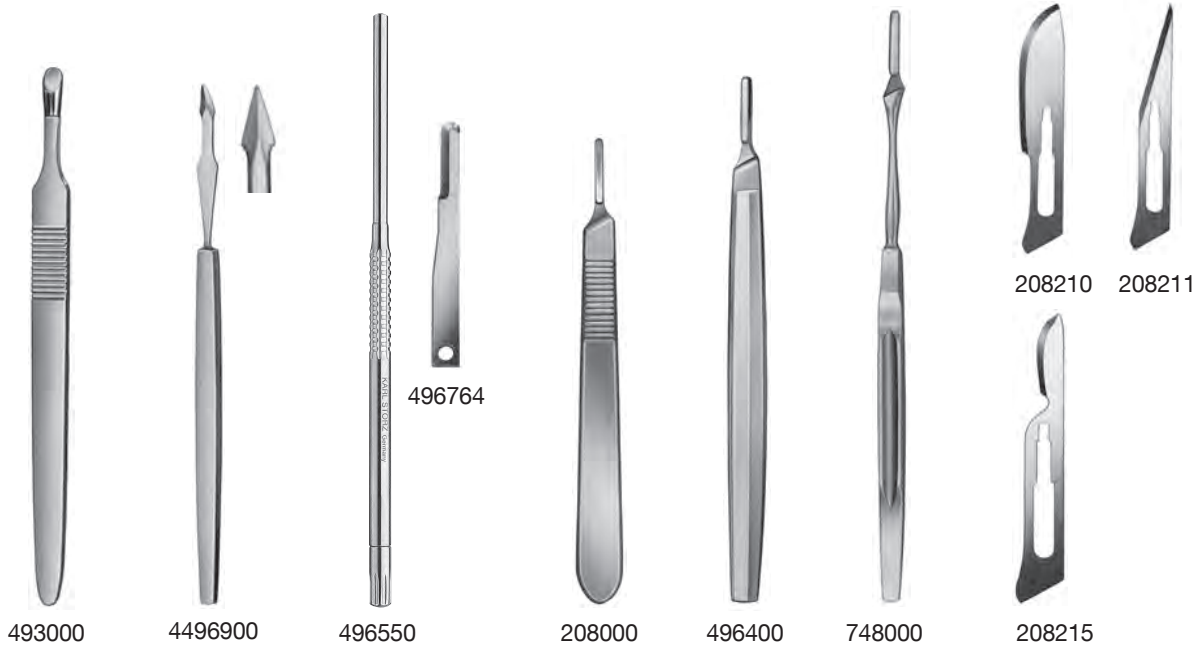
529305-  
529309

529105

- 515017 **Needle Holder**, extra delicate, slight spring action, length 17 cm
- 515515 **CRILE-WOOD Needle Holder**, length 15 cm
- 516513 **NEIVERT-MASING Needle Holder**, thumb ring upturned, one jaw with groove, length 13 cm
- 529305 **FRAZIER Suction Tube**, with mandrel and cut-off hole, with distance marking at 5 – 9 cm, 5 Fr., working length 10 cm
- 529307 **Same**, 7 Fr.
- 529309 **Same**, 9 Fr.
- 529105 **Suction Tube**, curved, outer diameter 5 mm, length 16.5 cm



# Knives and Surgical Blades



523913



498820

- 493000 COTTLE **Nasal Knife**, rounded edge, length 14 cm
- 4496900 MASING **Nasal Knife**, curved, roundly tipped blade, length 14 cm
- 496550 **Surgical Handle**, for miniature blades, round, length 16.5 cm, for Blades 496764 - 70
- 496764 **Miniature Blade**, Fig. 64, round, sterile, package of 25
- 208000 **Surgical Handle**, Fig. 3, length 12.5 cm, for Blades 208010 - 15, 208210 - 15
- 496400 MASING **Surgical Handle**, length 14 cm, for Blades 208010 - 15, 208210 - 15
- 748000 **Surgical Handle**, Fig. 7, length 16.5 cm, for Blades 208010 - 15, 208210 - 15
- 208210 **Blade**, Fig. 10, sterile, package of 100
- 208211 **Same**, Fig. 11, package of 100
- 208215 **Blade**, Fig. 15, sterile, package of 100
- 523913 **Metal Tray**, for preparing cartilage and bone, with hole for towel forceps, size 10 x 15 cm
- 498820 **AIACH Grid**, for preparation of cartilage and bone grafts, graduated, size 90 x 50 mm

UNIDRIVE® S III ENT SCB/UNIDRIVE® S III ECO

The multifunctional unit for ENT



UNIDRIVE® S III ENT SCB



UNIDRIVE® S III ECO

Special Features:

	UNIDRIVE® S III ENT SCB	UNIDRIVE® S III ECO
Touch Screen: Straightforward function selection via touch screen	●	–
Set values of the last session are stored	●	●
Optimized user control due to touch screen	●	–
Choice of user languages	●	–
Operating elements are single and clear to read due to color display	●	–
One unit – multifunctional: <ul style="list-style-type: none"><li>– Shaver system for surgery of the paranasal sinuses and anterior skull base</li><li>– INTRA Drill Handpieces (40,000 rpm and 80,000 rpm)</li><li>– Sinus Shaver</li><li>– Micro Saw</li><li>– STAMMBERGER-SACHSE Intranasal Drill</li><li>– Dermatome</li><li>– High-Speed Handpieces (60,000 rpm and 100,000 rpm)</li></ul>	●	●
Two motor outputs: Two motor outputs for simultaneous connection of two motors: For example, a shaver and micro motor	●	●
Soft start function	●	–
Textual error messages	●	–
Integrated irrigation and coolant pump: <ul style="list-style-type: none"><li>– Absolutely homogeneous, micro-processor controlled irrigation rate throughout the entire irrigation range</li><li>– Quick and easy connection of the tubing set</li></ul>	●	●
Easy program selection via automated motor recognition	●	●
Continuously adjustable revolution range	●	●
Maximum number of revolutions and motor torque: Microprocessor-controlled motor rotation speed. Therefore the preselected parameters are maintained throughout the drilling procedure	●	●
Maximum number of revolutions can be preset	●	●
SCB model with connections to the KARL STORZ Communication Bus (KARL STORZ-SCB)	●	–
Irrigator rod included	●	–

## Motor Systems

### Specifications

#### System specifications

Mode		Order No.	rpm
<b>Shaver mode</b> Operation mode: Max. rev. (rpm):	oscillating in conjunction with Handpiece: DrillCut-X® II Shaver Handpiece DrillCut-X® II N Shaver Handpiece	<b>40 7120 50</b> <b>40 7120 55</b>	10,000* 10,000*
<b>Sinus burr mode</b> Operation mode: Max. rev. (rpm):	rotating in conjunction with Handpiece: DrillCut-X® II Shaver Handpiece DrillCut-X® II N Shaver Handpiece	<b>40 7120 50</b> <b>40 7120 55</b>	12,000 12,000
<b>High-speed drilling mode</b> Operation mode: Max. rev. (rpm):	counterclockwise or clockwise in conjunction with: High-Speed Micro Motor	<b>20 7120 33</b>	60,000/100,000
<b>Drilling mode</b> Operation mode: Max. rev. (rpm):	counterclockwise or clockwise in conjunction with: micro motor and connecting cable	<b>[ 20 7110 33 ]</b> <b>[ 20 7111 73 ]</b>	40,000/80,000
<b>Micro saw mode</b> Max. rev. (rpm):	in conjunction with: micro motor and connecting cable	<b>[ 20 7110 33 ]</b> <b>[ 20 7111 73 ]</b>	15,000/20,000
<b>Intranasal drill mode</b> Max. rev. (rpm):	in conjunction with: micro motor and connecting cable	<b>[ 20 7110 33 ]</b> <b>[ 20 7111 73 ]</b>	60,000
<b>Dermatome mode</b> Max. rev. (rpm):	in conjunction with: micro motor and connecting cable	<b>[ 20 7110 33 ]</b> <b>[ 20 7111 73 ]</b>	8,000
<b>Power supply:</b>	100 – 240 VAC, 50/60 Hz		
<b>Dimensions:</b> (w x h x d)	300 x 165 x 265 mm		
<b>Two outputs for parallel connection of two motors</b>			
<b>Integrated irrigation pump:</b>			
Flow:	adjustable in 9 steps		
* Approx. 4,000 rpm is recommended as this is the most efficient suction/performance ratio.			

	UNIDRIVE® S III ENT SCB	UNIDRIVE® S III ECO
<b>Touch Screen:</b>	6,4" / 300 cd/m <sup>2</sup>	
<b>Weight:</b>	5.2 kg	4.7 kg
<b>Certified to:</b>	IEC 601-1 CE acc. to MDD	IEC 60601-1
<b>Available languages:</b>	English, French, German, Spanish, Italian, Portuguese, Greek, Turkish, Polish, Russian	numerical codes

## Motor Systems

### Special features of high-performance EC micro motor II and of the high-speed micro motor

#### Special features of high-performance EC micro motor II:

- Self-cooling, brushless high-performance EC micro motor
- Smallest possible dimensions
- Autoclavable
- Reprocessable in a cleaning machine
- Detachable connecting cable
- INTRA coupling for a wide variety of applications
- Maximum torque 4 Ncm
- Number of revolutions continuously adjustable up to 40.000 rpm
- Provided a suitable handle is used, the number of revolutions is continuously adjustable up to 80,000 rpm



20711033

**20711033 High-Performance EC Micro Motor II**, for use with UNIDRIVE® II/UNIDRIVE® ENT/OMFS/NEURO/ECO and Connecting Cable **20711073**, or for use with UNIDRIVE® S III ENT/ECO/NEURO and Connecting Cable **20711173**



**20711173 Connecting Cable**, to connect High-Performance EC Micro Motor **20711033** to UNIDRIVE® S III ENT/ECO/NEURO

#### Special Features of the high-speed micro motor:

- Brushless high-speed micro motor
- Smallest possible dimensions
- Autoclavable
- Reprocessable in a cleaning machine
- Maximum torque 6 Ncm
- Maximum torque 6 Ncm
- Number of revolutions continuously adjustable up to 60.000 rpm
- Provided a suitable handle is used, the number of revolutions is continuously adjustable up to 100,000 rpm



20712033

**20712033 High-Speed Micro-Motor**, max. speed 60,000 rpm, including connecting cable, for use with UNIDRIVE® S III ENT/NEURO



UNIDRIVE® S III ENT SCB  
UNIDRIVE® S III ECO  
Recommended System Configuration

UNIDRIVE® S III ENT SCB



40 7016 20-1

UNIDRIVE® S III ECO



40 7014 20


- 40 7016 01-1 **UNIDRIVE® S III ENT SCB**, motor control unit with color display, touch screen, two motor outputs, integrated irrigation pump and SCB module, power supply 100 – 240 VAC, 50/60 Hz including:
- Mains Cord**
  - Irrigator Rod**
  - Two-Pedal Footswitch**, two-stage, with proportional function
  - Silicone Tubing Set**, for irrigation, sterilizable
  - Clip Set**, for use with silicone tubing set
  - SCB Connecting Cable**, length 100 cm
  - Single Use Tubing Set\***, sterile, package of 3

- 40 7014 01 **UNIDRIVE® S III ECO**, motor control unit with two motor outputs and integrated irrigation pump, power supply 100 – 240 VAC, 50/60 Hz including:
- Mains Cord**
  - Two-Pedal Footswitch**, two-stage, with proportional function
  - Silicone Tubing Set**, for irrigation, sterilizable
  - Clip Set**, for use with silicone tubing set

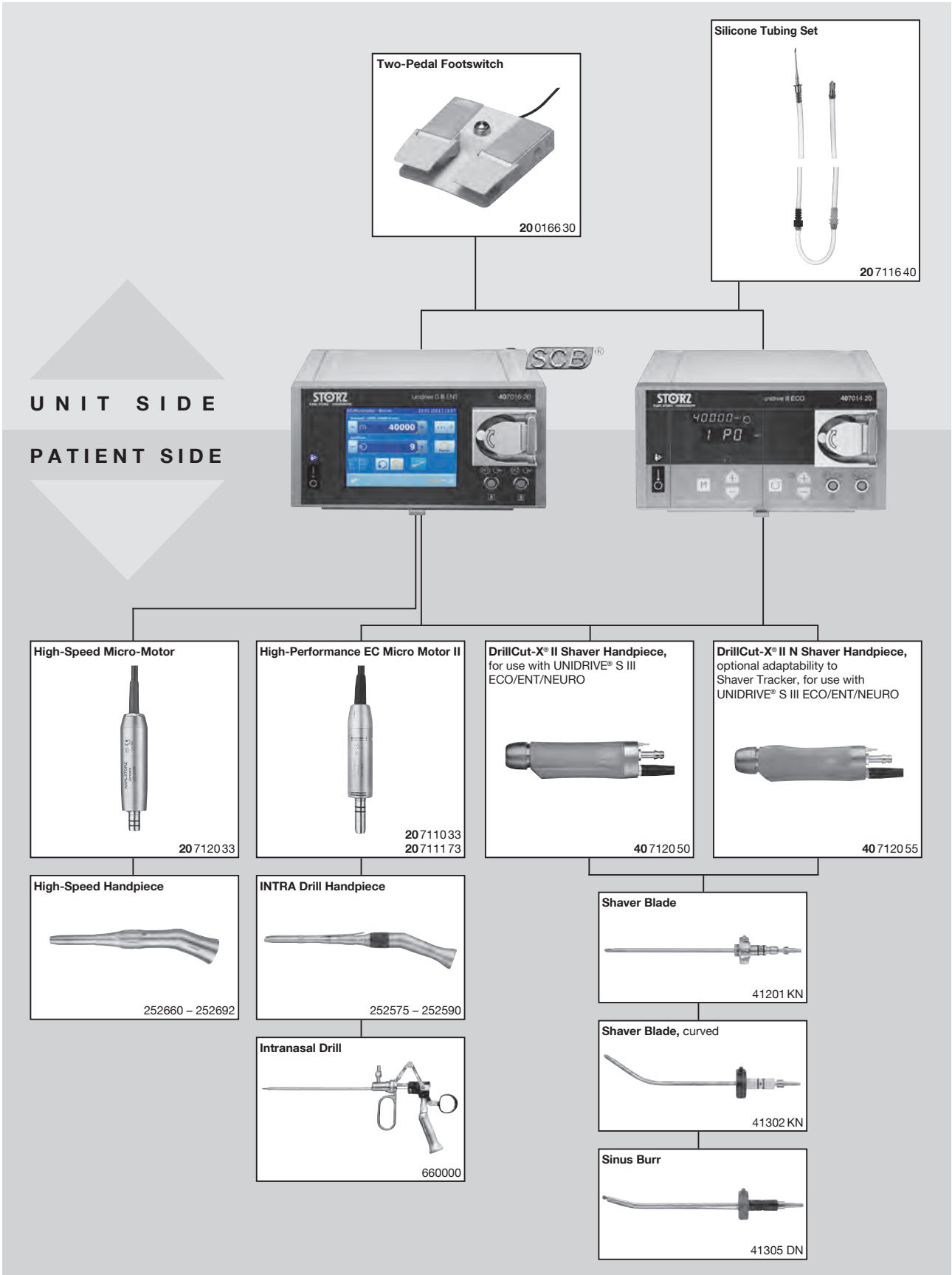
Specifications:

Touch Screen	UNIDRIVE® S III ENT SCB: 6,4"/300 cd/m²
Flow	9 steps
Power supply	100–240 VAC, 50/60 Hz

Dimensions w x h x d	300 x 165 x 265 mm
Weight	5.2 kg
Certified to	EC 601-1, CE acc. to MDD



\*  mtp medical technical promotion gmbh,  
Take-Off GewerbePark 46, D-78579 Neuhausen ob Eck, Germany

UNIDRIVE® S III ENT SCB  
UNIDRIVE® S III ECO  
System Components



## Optional Accessories

for UNIDRIVE® S III ENT SCB and UNIDRIVE® S III ECO

	280053	<b>Universal Spray</b> , 6x 500 ml bottles – HAZARDOUS GOODS – UN 1950 including: <b>Spray Nozzle</b>
	280053 C	<b>Spray Nozzle</b> , for the reprocessing of INTRA burr handpieces, for use with Universal Spray 280053 B
	031131-10*	<b>Tubing Set</b> , for irrigation, for single use, sterile, package of 10

\*



mtp medical technical promotion gmbh,  
Take-Off GewerbePark 46, D-78579 Neuhausen ob Eck, Germany

DrillCut-X® Shaver Handpieces

Special Features

Special Features:	DrillCut-X® II 40 7120 50	DrillCut-X® II N 40 7120 55
Max. 10,000 rpm for shaver blades, max. 12,000 rpm for sinus shaver	●	●
Straight suction channel	●	●
Integrated irrigation channel	●	●
Powerful motor, also suitable for harder materials	●	●
Absolutely silent running, no vibration	●	●
Completely immersible and machine-washable	●	●
LOCK allows fixation of shaver blades and sinus shavers	●	●
Extremely lightweight design	●	●
Optional, ergonomic handle, detachable	●	●
Can be adapted to navigation tracker	–	●



40 7120 50

40 7120 50     **DrillCut-X® II Shaver Handpiece,**  
for use with UNIDRIVE® S III ECO/ENT/NEURO/OMFS



40 7120 55

40 7120 55     **DrillCut-X® II N Shaver Handpiece,**  
optional adaptability to Shaver Tracker 40 8001 22,  
for use with UNIDRIVE® S III ECO/ENT/NEURO/OMFS



## DrillCut-X® II Shaver Handpiece

### Special Features:

- Powerful motor
- Absolutely silent running
- Enhanced ergonomics
- Lightweight design
- Oscillation mode for shaver blades, max. 10,000 rpm
- Rotation mode for sinus shavers, max. 12,000 rpm
- Straight suction channel and integrated irrigation
- The versatile DrillCut-X® II Shaver Handpiece can be adapted to individual needs of the user
- Easy hygienic processing, suitable for use in washer and autoclavable at 134° C
- Quick coupling mechanism facilitates more rapid exchange of work inserts
- Proven DrillCut-X® blade portfolios can be used



40 7120 50

40 7120 50 **DrillCut-X® II Shaver Handpiece,**  
for use with UNIDRIVE® S III ECO/ENT/NEURO/OMFS



40 7120 90

40 7120 90 **Handle,** adjustable, for use with DrillCut-X® II 40 7120 50  
and DrillCut-X® II N 40 7120 55

### Optional Accessory:



41250 RA

41250 RA **Cleaning Adaptor,** LUER-Lock,  
for cleaning DrillCut-X® shaver handpieces

## DrillCut-X® II Shaver N Handpiece

### Special Features:

- Powerful motor
- Absolutely silent running
- Enhanced ergonomics
- Lightweight design
- Oscillation mode for shaver blades, max. 10,000 rpm
- Rotation mode for sinus shavers, max. 12,000 rpm
- Straight suction channel and integrated irrigation
- The versatile DrillCut®-X II Shaver N Shaver Handpiece can be adapted to the individual needs of the user
- Easy hygienic processing, suitable for use in washer and autoclavable at 134° C
- Quick coupling mechanism facilitates more rapid exchange of working inserts
- Proven DrillCut-X® blade portfolios can be used
- Optional adaptability to Shaver Tracker 40 8001 22
- Allows shaver navigation when used with NPU 40 8000 01



40 7120 55

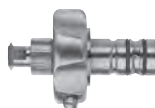
- 40 7120 55 DrillCut-X® II N Shaver Handpiece,** optional adaptability to Shaver Tracker **40 8001 22**, for use with UNIDRIVE® S III ECO/ENT/NEURO/OMFS



40 7120 90

- 40 7120 90 Handle,** adjustable, for use with DrillCut-X® II **40 7120 50** and DrillCut-X® II N **40 7120 55**

### Optional Accessory:



41250 RA

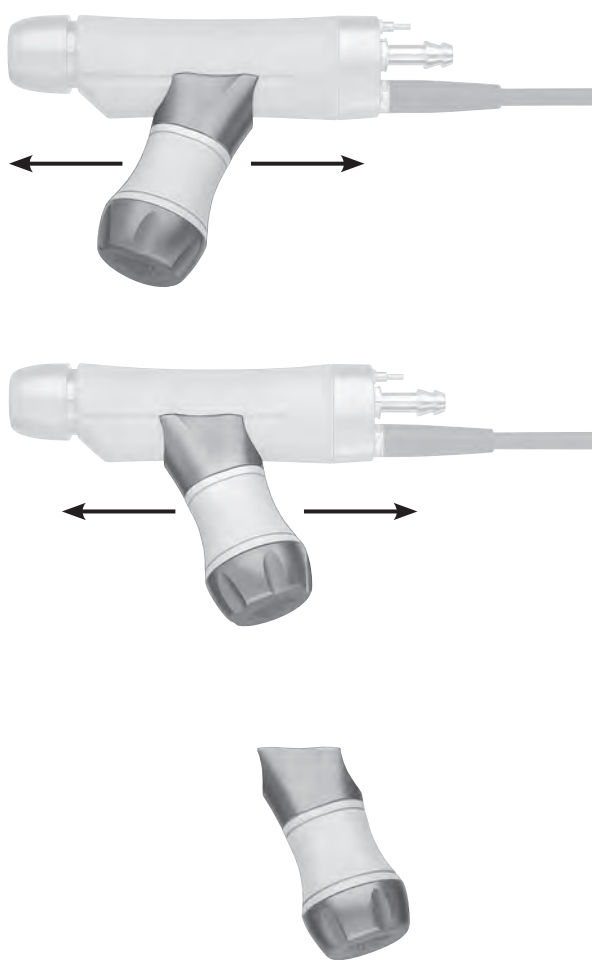
- 41250 RA Cleaning Adaptor,** LUER-Lock, for cleaning DrillCut-X® shaver handpieces

## Handle for DrillCut-X® II Shaver Handpiece

for use with DrillCut-X® II 40 7120 50 and DrillCut-X® II N 40 7120 55

### Special Features:

- Ergonomic design
- Ultralight construction
- Easy handle control allows individual adjustment
- The adjustable handle can be mounted to DrillCut®-X II or -X II N Shaver Handpiece
- Easy fixation via rotary lock
- Sterilizable



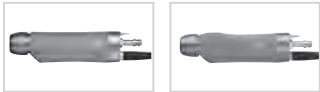
40 7120 90

40 7120 90



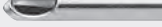

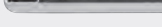
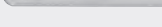
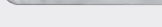
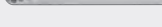
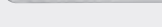
**Handle**, adjustable, for use with DrillCut-X® II 40 7120 50 and DrillCut-X® II N 40 7120 55

Shaver Blades, straight  
for Nasal Sinuses and Skull Base Surgery

For use with DrillCut-X® II and DrillCut-X® II N



Shaver Blades, straight, sterilizable

Detail	for use with	Shaver Blade length 12 cm
	40 7120 50 DrillCut-X® II Handpiece 40 7120 55 DrillCut-X® II N Handpiece	
	41201 KN	serrated cutting edge, diameter 4 mm, color code: blue-red
	41201 KK	double serrated cutting edge, diameter 4 mm, color code: blue-yellow
	41201 GN	concave cutting edge, oval cutting window, diameter 4 mm, color code: blue-green
	41201 LN	concave cutting edge, oblique cutting window, diameter 4 mm, color code: blue-black
	41201 SN	straight cutting edge, diameter 4 mm, color code: blue-blue
	41201 KSA	serrated cutting edge, diameter 3 mm, color code: blue-red
	41201 KKSA	double serrated cutting edge, diameter 3 mm, color code: blue-yellow
	41201 KKSBB	double serrated cutting edge, diameter 2 mm, color code: blue-yellow
	41201 LSA	concave cutting edge, oblique cutting window, diameter 3 mm, color code: blue-black

Optional Accessory:



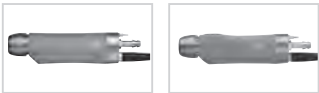
41200 RA

**Cleaning Adaptor**, LUER-Lock, for cleaning the inner  
and outer blades of reusable Shaver Blades 412xx

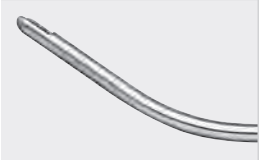






Shaver Blades, curved  
for Nasal Sinuses and Skull Base Surgery

For use with DrillCut-X® II and DrillCut-X® II N



Shaver Blades, curved 35°/40°, sterilizable

Detail	for use with	Shaver Blade length 12 cm
	40 7120 50 DrillCut-X® II Handpiece 40 7120 55 DrillCut-X® II N Handpiece	
	41202 KN	curved 35°, cutting edge serrated backwards, diameter 4 mm, color code: blue-red
	41204 KKF	curved 40°, cutting edge serrated forwards, double serrated, diameter 4 mm, color code: blue-yellow
	41204 KKB	curved 40°, cutting edge serrated backwards, double serrated, diameter 4 mm, color code: blue-yellow
	41204 KKFA	curved 40°, cutting edge serrated forwards, double serrated, diameter 3 mm, color code: blue-yellow
	41204 KKBA	curved 40°, cutting edge serrated backwards, double serrated, diameter 3 mm, color code: blue-yellow

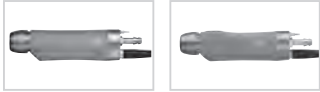
Optional Accessory:



41200 RA      **Cleaning Adaptor**, LUER-Lock, for cleaning the inner and outer blades of reusable Shaver Blades 412xx

Shaver Blades, curved  
for Nasal Sinuses and Skull Base Surgery

For use with DrillCut-X® II and DrillCut-X® II N



Shaver Blades, curved 65°, sterilizable

Detail	for use with	Shaver Blade length 12 cm
	40 7120 50 DrillCut-X® II Handpiece 40 7120 55 DrillCut-X® II N Handpiece	
	41203 KNF	curved 65°, cutting edge serrated forwards, diameter 4 mm, color code: blue-red
	41203 KNB	curved 65°, cutting edge serrated backwards, diameter 4 mm, color code: blue-red
	41203 KKF	curved 65°, cutting edge serrated forwards, double serrated, diameter 4 mm, color code: blue-yellow
	41203 KKB	curved 65°, cutting edge serrated backwards, double serrated, diameter 4 mm, color code: blue-yellow
	41203 KKFA	curved 65°, cutting edge serrated forwards, double serrated, diameter 3 mm, color code: blue-yellow
	41203 KKBA	curved 65°, cutting edge serrated backwards, double serrated, diameter 3 mm, color code: blue-yellow
	41203 GNF	curved 65°, concave cutting edge, oval cutting window, forward opening, diameter 4 mm, color code: blue-green
	41203 GNB	curved 65°, concave cutting edge, oval cutting window, backward opening, diameter 4 mm, color code: blue-green

Optional Accessory:



41200 RA





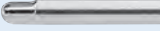
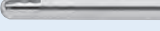
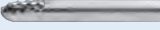
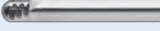
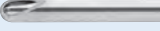
**Cleaning Adaptor**, LUER-Lock, for cleaning the inner and outer blades of reusable Shaver Blades 412xx

# Shaver Blades, straight for Nasal Sinuses and Skull Base Surgery

For use with DrillCut-X® II and DrillCut-X® II N



Shaver Blades, straight, **for single use**, sterile, package of 5

Detail	for use with	Shaver Blade length 12 cm
	40 7120 50 DrillCut-X® II Handpiece 40 7120 55 DrillCut-X® II N Handpiece	
	41301 KN	serrated cutting edge, diameter 4 mm, color code: blue-red
	41301 KK	double serrated cutting edge, diameter 4 mm, color code: blue-yellow
	41301 GN	concave cutting edge, oval cutting window, diameter 4 mm, color code: blue-green
	41301 LN	concave cutting edge, oblique cutting window, diameter 4 mm, color code: blue-black
	41301 SN	straight cutting edge, diameter 4 mm, color code: blue-blue
	41301 KSA	serrated cutting edge, diameter 3 mm, color code: blue-red
	41301 KKSA	double serrated cutting edge, diameter 3 mm, color code: blue-yellow
	41301 KKSB	double serrated cutting edge, diameter 2 mm, color code: blue-yellow
	41301 LSA	concave cutting edge, oblique cutting window, diameter 3 mm, color code: blue-black

Shaver Blades, curved  
for Nasal Sinuses and Skull Base Surgery

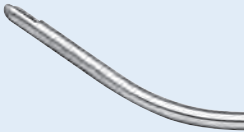
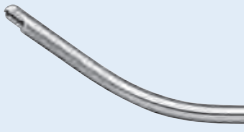
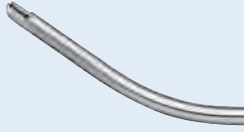
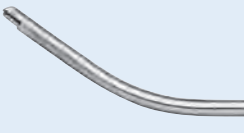
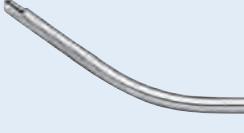
For use with DrillCut-X® II and DrillCut-X® II N



41302 KN



Shaver Blades, curved 35°/40°, **for single use**, sterile, package of 5

Detail	for use with	Shaver Blade length 12 cm
	40 7120 50 DrillCut-X® II Handpiece 40 7120 55 DrillCut-X® II N Handpiece	
	41302 KN	curved 35°, cutting edge serrated backwards, diameter 4 mm, color code: blue-red
	41304 KKF	curved 40°, cutting edge serrated forwards, double serrated, diameter 4 mm, color code: blue-yellow
	41304 KKB	curved 40°, cutting edge serrated backwards, double serrated, diameter 4 mm, color code: blue-yellow
	41304 KKFA	curved 40°, cutting edge serrated forwards, double serrated, diameter 3 mm, color code: blue-yellow
	41304 KKBA	curved 40°, cutting edge serrated backwards, double serrated, diameter 3 mm, color code: blue-yellow



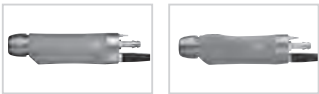
# Shaver Blades, curved

for Nasal Sinuses and Skull Base Surgery









For use with DrillCut-X® II and DrillCut-X® II N



41303 KKB

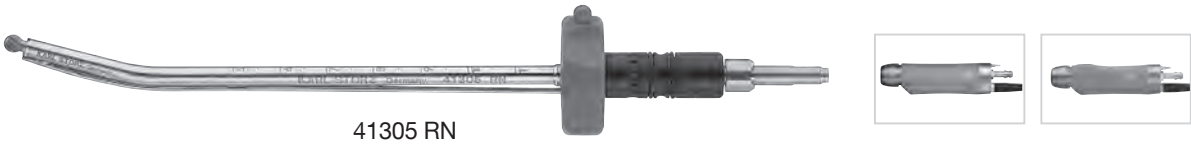


Shaver Blades, curved 65°, **for single use**, sterile, package of 5

Detail	for use with	Shaver Blade length 12 cm
	40 7120 50 DrillCut-X® II Handpiece 40 7120 55 DrillCut-X® II N Handpiece	
	41303 KNF	curved 65°, cutting edge serrated forwards, diameter 4 mm, color code: blue-red
	41303 KNB	curved 65°, cutting edge serrated backwards, diameter 4 mm, color code: blue-red
	41303 KKF	curved 65°, cutting edge serrated forwards, double serrated, diameter 4 mm, color code: blue-yellow
	41303 KKB	curved 65°, cutting edge serrated backwards, double serrated, diameter 4 mm, color code: blue-yellow
	41303 KKFA	curved 65°, cutting edge serrated forwards, double serrated, diameter 3 mm, color code: blue-yellow
	41303 KKBA	curved 65°, cutting edge serrated backwards, double serrated, diameter 3 mm, color code: blue-yellow
	41303 GNF	curved 65°, cutting edge concave forwards, oval cutting window, diameter 4 mm, color code: blue-green
	41303 GNB	curved 65°, cutting edge concave backwards, oval cutting window, diameter 4 mm, color code: blue-green

Sinus Burrs, curved  
for Nasal Sinuses and Skull Base Surgery

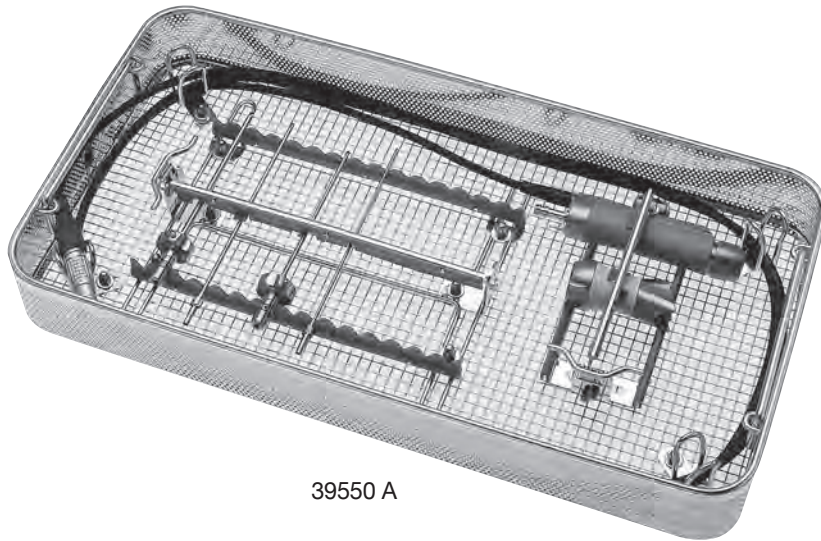
For use with DrillCut-X® II and DrillCut-X® II N



Sinus Burrs, curved 70°/55°/40°/15°, **for single use**, sterile, package of 5

Detail	for use with	Sinus Burr length 12 cm
	40 7120 50 DrillCut-X® II Handpiece 40 7120 55 DrillCut-X® II N Handpiece	
	41304 W	curved 40°, cylindric, drill diameter 3 mm, shaft diameter 4 mm, color code: red-blue
	41303 WN	curved 55°, cylindric, drill diameter 3.6 mm, shaft diameter 4 mm, color code: red-blue
	41305 RN	curved 15°, bud drill, drill diameter 4 mm, shaft diameter 4 mm, color code: red-black
	41305 DN	curved 15°, diamond head, drill diameter 3 mm, shaft diameter 4 mm, color code: red-yellow
	41305 D	curved 15°, diamond head, drill diameter 5 mm, shaft diameter 4 mm, color code: red-yellow
	41305 DW	curved 40°, diamond head, drill diameter 5 mm, shaft diameter 4 mm, color code: red-yellow
	41303 DT	curved 70°, diamond head, drill diameter 3.6 mm, shaft diameter 4 mm, color code: red-yellow

## Accessories for Shaver



39550 A

39550 A

**Wire Tray**, provides safe storage of accessories for KARL STORZ paranasal sinus shaver systems during cleaning and sterilization

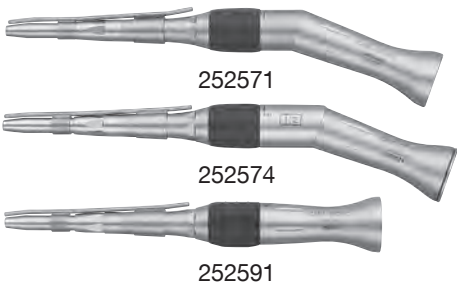
**for storage of:**

- Up to 7 shaver attachments
- Connecting cable

**Please note:** The instruments displayed are not included in the sterilizing and storage tray.

INTRA Drill Handpiece  
for Surgery in Ethmoid and Skull Base Area

- Special Features:
- Tool-free closing and opening of the drill
  - Right/left rotation
  - Max. rotating speed up to 40,000 rpm/80,000 U/min
  - Detachable irrigation channels
  - Lightweight construction
  - Operates with little vibrations
  - Low maintenance
  - Reprocessable in a cleaning machine
  - Safe grip



- 252571
- INTRA Drill Handpiece, angled, length 15 cm, transmission 1:1 (40,000 rpm), for use with KARL STORZ high-performance EC micro motor II and burs
- 252574
- Same, Transmission 1:2 (80.000 rpm)
- 252591
- INTRA Drill Handpiece, straight, length 13 cm, transmission 1:1 (40,000 rpm), for use with KARL STORZ high-performance EC micro motor II and burs



Detail	Size	Dia. mm	Standard	Diamond	Diamond coarse
	014	1.4	649614	649714	–
	018	1.8	649618	649718	–
	023	2.3	649623	649723	649723 G
	027	2.7	649627	649727	649727 G
	031	3.1	649631	649731	649731 G
	035	3.5	649635	649735	649735 G
	040	4	649640	649740	649740 G
	045	4.5	649645	649745	649745 G
	050	5	649650	649750	649750 G
	060	6	649660	649760	649760 G
	070	7	649670	649770	649770 G

- 649600
- Standard Straight Shaft Burr, stainless, size 014 – 070, length 9.5 cm, set of 11
- 649700
- Diamond Straight Shaft Burr, stainless, size 014 – 070, length 9.5 cm, set of 11
- 649700 G
- Rapid Diamond Straight Shaft Burr, stainless, with coarse diamond coating for precise drilling and abrasion without hand pressure and generating minimal heat, size 023 – 070, length 9.5 cm, set of 9, color code: gold
- 280033
- Rack, for 36 straight shaft burs with a length of 9.5 cm, foldable, sterilizable, size 22 x 14 x 2 cm

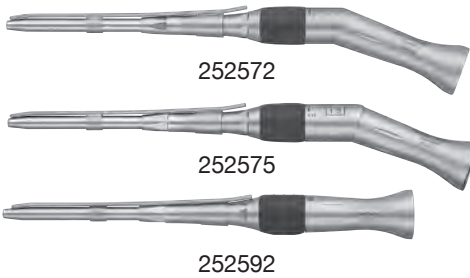


# INTRA Drill Handpiece

for Surgery in Ethmoid and Skull Base Area

## Special Features:

- Tool-free closing and opening of the drill
- Right/left rotation
- Max. rotating speed up to 40,000 rpm/80,000 U/min
- Detachable irrigation channels
- Lightweight construction
- Operates with little vibrations
- Low maintenance
- Reprocessable in a cleaning machine
- Safe grip



252572

**INTRA Drill Handpiece**, angled, length 18 cm, transmission 1:1 (40,000 rpm), for use with KARL STORZ high-performance EC micro motor II and burs

252575

**Same**, transmission 1:2 (80,000 rpm)

252592

**INTRA Drill Handpiece**, straight, length 17 cm, transmission 1:1 (40,000 rpm), for use with KARL STORZ high-performance EC micro motor II and burs



Detail	Size	Dia. mm	Standard	Diamond	Diamond coarse
			sterilizable	sterilizable	sterilizable
	014	1.4	649614 L	649714 L	–
	018	1.8	649618 L	649718 L	–
	023	2.3	649623 L	649723 L	649723 GL
	027	2.7	649627 L	649727 L	649727 GL
	031	3.1	649631 L	649731 L	649731 GL
	035	3.5	649635 L	649735 L	649735 GL
	040	4	649640 L	649740 L	649740 GL
	045	4.5	649645 L	649745 L	649745 GL
	050	5	649650 L	649750 L	649750 GL
	060	6	649660 L	649760 L	649760 GL
	070	7	649670 L	649770 L	649770 GL

649600 L **Standard Straight Shaft Burr**, stainless, size 014 – 070, length 12.5 cm, set of 11

649700 L **Diamond Straight Shaft Burr**, stainless, size 014 – 070, length 12.5 cm, set of 11

649700 GL **Rapid Diamond Straight Shaft Burr**, stainless, with coarse diamond coating for precise drilling and abrasion without hand pressure and generating minimal heat, sizes 023 – 070, length 12.5 cm, set of 9, color code: gold

280034 **Rack**, for 36 straight shaft burs with a length of 12.5 cm, foldable, sterilizable, size 22 x 17 x 2 cm

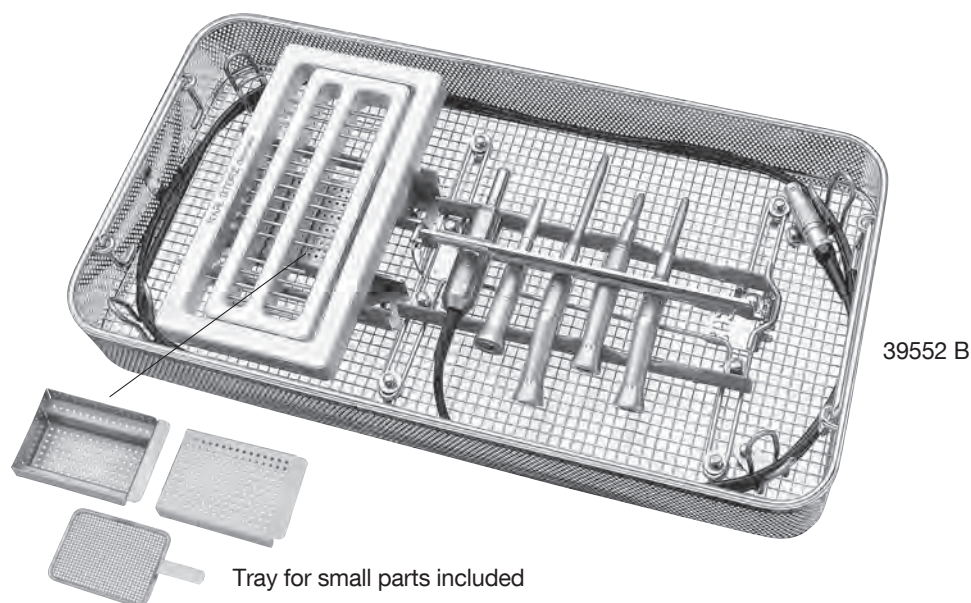
Accessories for Burrs



- 280033      **Rack**, for 36 straight shaft burrs with a length of 9.5 cm, foldable, sterilizable, size 22 x 14 x 2 cm
- 280034      **Rack**, for 36 straight shaft burrs with a length of 12.5 cm, foldable, sterilizable, size 22 x 17 x 2 cm
- NEW** 280043      **Rack**, flat model, to hold 21 straight shaft burrs with a length of 7 cm (6 pcs) and 9.5 cm (15 pcs), folding model, sterilizable, size 17.5 x 11.5 x 1.2 cm

**Please note:** The burrs displayed are not included in the racks.

## Accessories for Burrs



- 39552 A **Wire 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 **Wire 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 6 drill handpieces
  - Connecting cable
  - EC micro motor
  - Up to 36 drill bits and burrs
  - Small parts

**Please note:** The instruments displayed are not included in the sterilizing and storage tray.

UNIDRIVE® S III ENT SCB

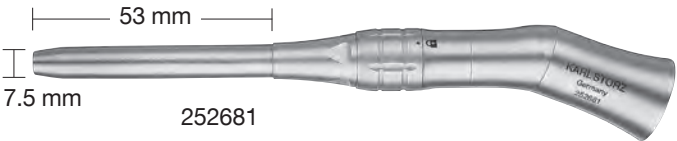
High-Speed Handpieces, angled, 100,000 rpm

For use with High-Speed Drills, shaft diameter 3.17 mm  
and with High-Speed Micro Motor 20 7120 33

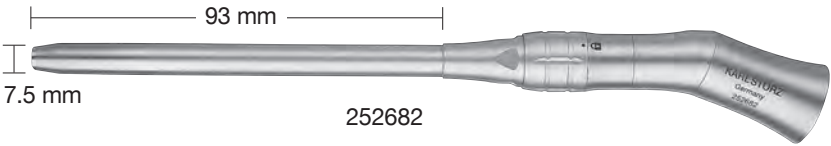
100,000 rpm  
diameter 7.5 mm



20 7120 33



252681



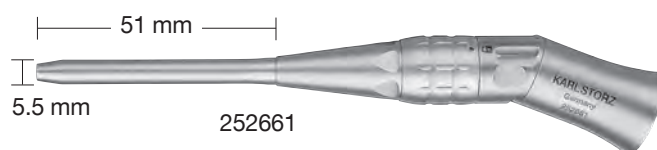
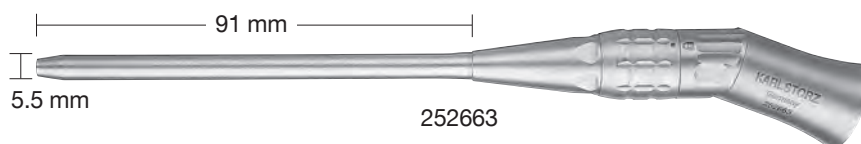
252682

- 252681      **High-Speed Handpiece**, medium, angled, 100,000 rpm,  
for use with High-Speed Micro-Motor **20 7120 33**
- 252682      **High-Speed Handpiece**, long, angled, 100,000 rpm,  
for use with High-Speed Micro-Motor **20 7120 33**

**UNIDRIVE® S III ENT SCB****High-Speed Handpieces, angled, 60,000 rpm**

For use with High-Speed Drills, shaft diameter 2.35 mm  
and with High-Speed Micro Motor 20 7120 33

**60,000 rpm**  
**diameter 5.5 mm**

**20 7120 33****252661****252662****252663**

- |        |                                                                                                                    |
|--------|--------------------------------------------------------------------------------------------------------------------|
| 252661 | <b>High-Speed Handpiece</b> , short, angled, 60,000 rpm,<br>for use with High-Speed Micro-Motor <b>20 7120 33</b>  |
| 252662 | <b>High-Speed Handpiece</b> , medium, angled, 60,000 rpm,<br>for use with High-Speed Micro-Motor <b>20 7120 33</b> |
| 252663 | <b>High-Speed Handpiece</b> , long, angled, 60,000 rpm,<br>for use with High-Speed Micro-Motor <b>20 7120 33</b>   |



UNIDRIVE® S III ENT SCB

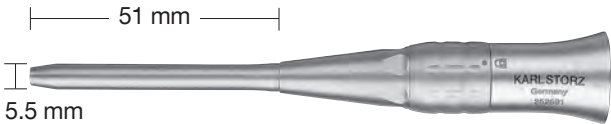
High-Speed Handpieces, straight, 60,000 rpm

For use with High-Speed Drills, shaft diameter 2.35 mm  
and with High-Speed Micro Motor 20 7120 33

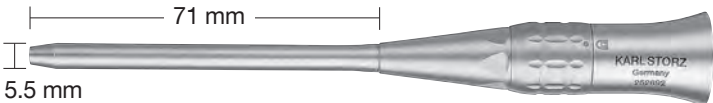
60,000 rpm  
diameter 5.5 mm



20 7120 33



252691



252692

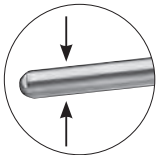
- 252691      **High-Speed Handpiece**, short, straight, 60,000 rpm,  
for use with High-Speed Micro-Motor 20 7120 33
- 252692      **High-Speed Handpiece**, medium, straight, 60,000 rpm,  
for use with High-Speed Micro-Motor 20 7120 33

# UNIDRIVE® S III ENT SCB

High-Speed Handpieces, malleable, slim, angled, 60,000 rpm

For use with High-Speed Drills, shaft diameter 1 mm  
and with High-Speed Micro Motor 20 7120 33

60,000 rpm  
diameter 4.7 mm

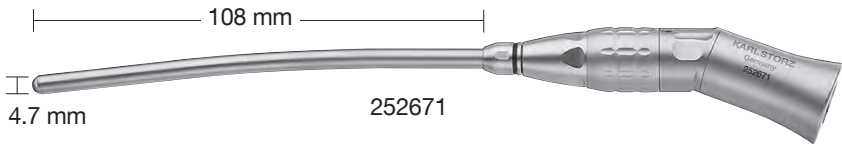


malleable

The handpieces have malleable shafts that can be bent up to 20° according to user requirements.

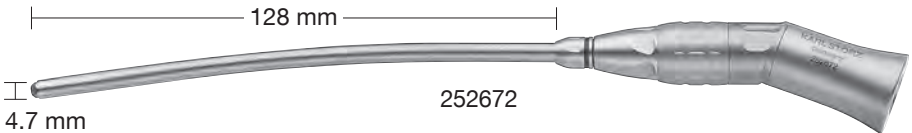


20 7120 33



4.7 mm

252671



4.7 mm

252672

- 252671 **High-Speed Handpiece**, extra long, malleable, slim, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20 7120 33
- 252672 **High-Speed Handpiece**, super long, malleable, slim, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20 7120 33

UNIDRIVE® S III ENT SCB  
High-Speed Standard Burrs, High-Speed Diamond Burrs

For use with High-Speed Handpieces, 100,000 rpm

100,000 rpm  
diameter 7.5 mm




252681



252682



	High-Speed Standard Burrs, 100,000 rpm, for single use , sterile, package of 5	
Diameter in mm	medium	long
1	350110 M	–
2	350120 M	350120 L
3	350130 M	350130 L
4	350140 M	350140 L
5	350150 M	350150 L
6	350160 M	350160 L
7	350170 M	350170 L

	High-Speed Diamond Burrs, 100,000 rpm, for single use , sterile, package of 5	
Diameter in mm	medium	long
1	350210 M	–
2	350220 M	350220 L
3	350230 M	350230 L
4	350240 M	350240 L
5	350250 M	350250 L
6	350260 M	350260 L
7	350270 M	350270 L

UNIDRIVE® S III ENT SCB

High-Speed Diamond Burrs, High-Speed Acorn,  
High-Speed Barrel Burrs, High-Speed Neuro Fluted Burrs

For use with High-Speed Handpieces, 100,000 rpm

100,000 rpm  
diameter 7.5 mm





252681





252682



	High-Speed Coarse Diamond Burrs, 100,000 rpm, for single use , sterile, package of 5	
Diameter in mm	medium	long
3	350330 M	350330 L
4	350340 M	350340 L
5	350350 M	350350 L
6	350360 M	350360 L
7	350370 M	350370 L

	High-Speed Acorn, 100,000 rpm, for single use , sterile, package of 5	
Diameter in mm	medium	
7.5	350675 M	
9	350690 M	

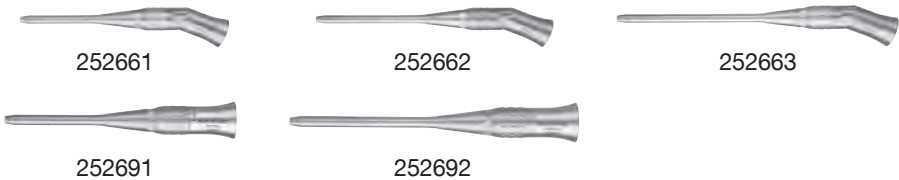
	High-Speed Barrel Burrs, 100,000 rpm, for single use , sterile, package of 5	
Diameter in mm	medium	
6	350960 M	
9.1	350991 M	


	High-Speed Neuro Fluted Burrs, 100,000 rpm, for single use , sterile, package of 5	
Diameter in mm	medium	long
1.8	350718 M	350718 L
3	350730 M	350730 L


UNIDRIVE® S III ENT SCB  
High-Speed Standard Burrs, High-Speed Diamond Burrs

For use with High-Speed Handpieces, 60,000 rpm

60,000 rpm  
diameter 5.5 mm



 High-Speed Standard Burrs, 60,000 rpm, for single use , sterile, package of 5			
Diameter in mm	short	medium	long
1	330110 S	330110 M	–
2	330120 S	330120 M	330120 L
3	330130 S	330130 M	330130 L
4	330140 S	330140 M	330140 L
5	330150 S	330150 M	330150 L
6	330160 S	330160 M	330160 L
7	330170 S	330170 M	330170 L

 High-Speed Diamond Burrs, 60,000 rpm, for single use , sterile, package of 5			
Diameter in mm	short	medium	long
0.6	330206 S	–	–
1	330210 S	330210 M	–
1.5	330215 S	–	–
2	330220 S	330220 M	330220 L
3	330230 S	330230 M	330230 L
4	330240 S	330240 M	330240 L
5	330250 S	330250 M	330250 L
6	330260 S	330260 M	330260 L
7	330270 S	330270 M	330270 L

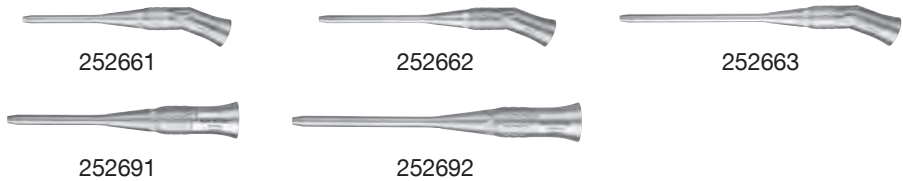



UNIDRIVE® S III ENT SCB


High-Speed Diamond Burrs, High-Speed Cylinder Burrs,  
LINDEMANN High-Speed Fluted Burrs


For use with High-Speed Handpieces, 60,000 rpm

60,000 rpm  
diameter 5.5 mm



	High-Speed Coarse Diamond Burrs, 60,000 rpm, for single use , sterile, package of 5		
Diameter in mm	short	medium	long
3	330330 S	330330 M	330330 L
4	330340 S	330340 M	330340 L
5	330350 S	330350 M	330350 L
6	330360 S	330360 M	330360 L
7	330370 S	330370 M	330370 L

	High-Speed Cylinder Burrs, 60,000 rpm, for single use , sterile, package of 5		
Diameter in mm	short		
4	330440 S		
6	330460 S		

	LINDEMANN High-Speed Fluted Burrs, 60,000 rpm, for single use , sterile, package of 5		
Size in mm (diameter x length)	short		
Diameter 2.1/11	330511 S		
Diameter 2.3/26	330526 S		

UNIDRIVE® S III ENT SCB  
High-Speed Diamond Burrs

For use with High-Speed Handpieces, 60,000 rpm

60,000 rpm  
diameter 4.7 mm





252671



252672



	High-Speed Diamond Burrs, 60,000 rpm, for single use , sterile, package of 5	
Diameter in mm	extra long	super long
2	320220 EL	320220 SL
3	320230 EL	320230 SL
4	320240 EL	320240 SL

	High-Speed Coarse Diamond Burrs, 60,000 rpm, for single use , sterile, package of 5	
Diameter in mm	extra long	super long
2	320320 EL	320320 SL
3	320330 EL	320330 SL
4	320340 EL	320340 SL

## IMAGE1 S Camera System <sup>NEW</sup>

# IMAGE1 S

### Economical and future-proof

- Modular concept for flexible, rigid and 3D endoscopy as well as new technologies
- Forward and backward compatibility with video endoscopes and FULL HD camera heads

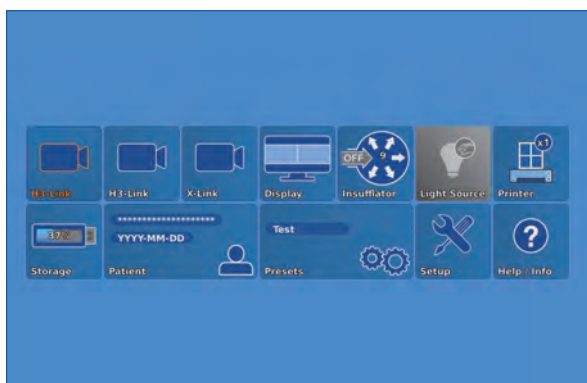


- Sustainable investment
- Compatible with all light sources



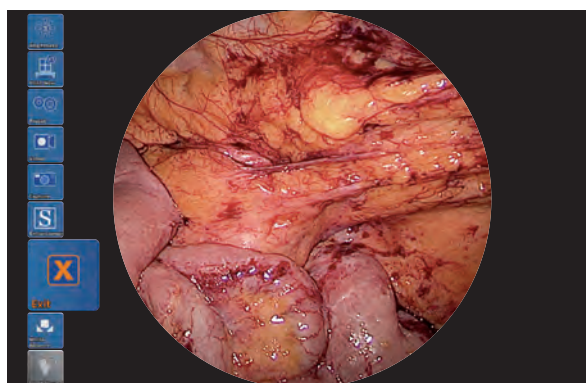
### Innovative Design

- Dashboard: Complete overview with intuitive menu guidance
- Live menu: User-friendly and customizable
- Intelligent icons: Graphic representation changes when settings of connected devices or the entire system are adjusted

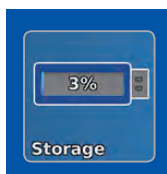
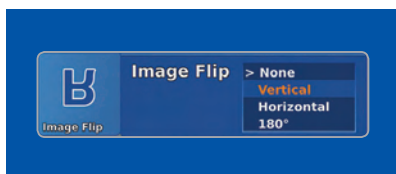


Dashboard

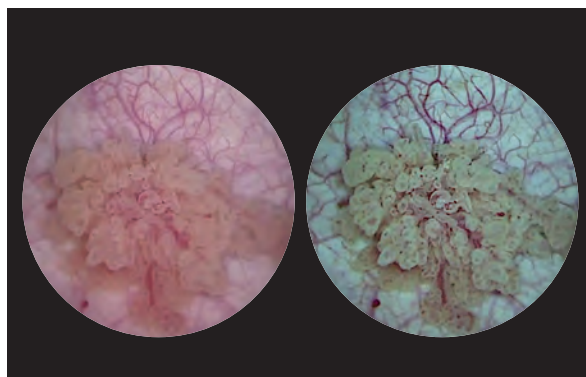
- Automatic light source control
- Side-by-side view: Parallel display of standard image and the Visualization mode
- Multiple source control: IMAGE1 S allows the simultaneous display, processing and documentation of image information from two connected image sources, e.g., for hybrid operations



Live menu



Intelligent icons



Side-by-side view: Parallel display of standard image and Visualization mode

## IMAGE1 S Camera System <sup>NEW</sup>

# IMAGE1 S

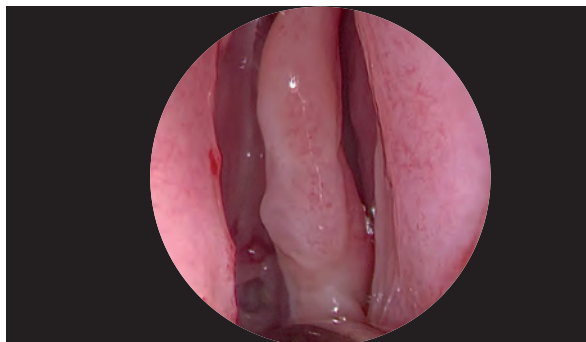
### Brilliant Imaging

- Clear and razor-sharp endoscopic images in FULL HD
- Natural color rendition

- Reflection is minimized
- Multiple IMAGE1 S technologies for homogeneous illumination, contrast enhancement and color shifting



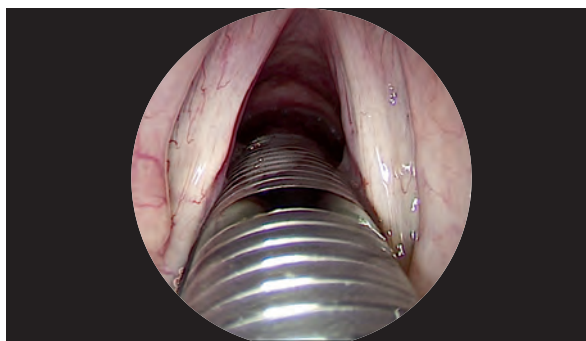
FULL HD image



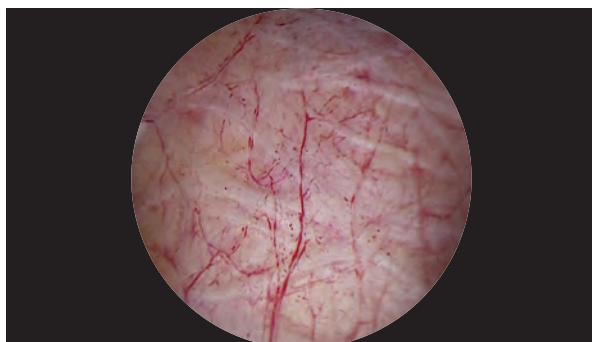
CLARA



FULL HD image



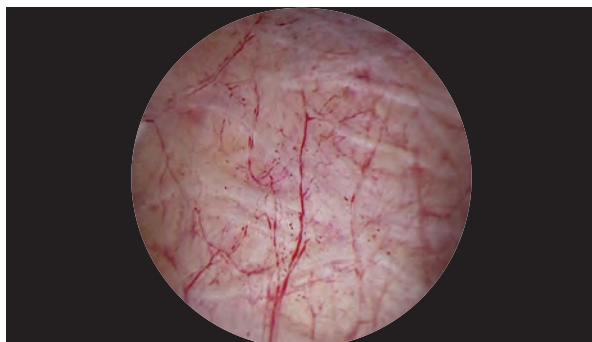
CHROMA



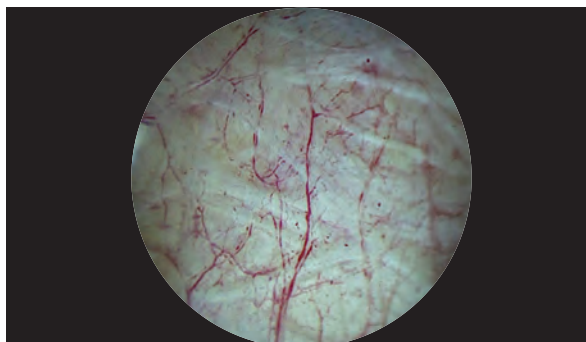
FULL HD image



SPECTRA A\*



FULL HD image



SPECTRA B\*\*

\* SPECTRA A: Not for sale in the U.S.

\*\* SPECTRA B: Not for sale in the U.S.

## IMAGE1 S Camera System <sup>NEW</sup>

# IMAGE1 S



TC 200EN

TC 200EN\*

**IMAGE1 S CONNECT**, connect module, for use with up to 3 link modules, resolution 1920 x 1080 pixels, with integrated KARL STORZ-SCB and digital Image Processing Module, power supply 100–120 VAC/200–240 VAC, 50/60 Hz including:

**Mains Cord**, length 300 cm

**DVI-D Connecting Cable**, length 300 cm

**SCB Connecting Cable**, length 100 cm

**USB Flash Drive**, 32 GB, USB silicone keyboard, with touchpad, US

**\* Available in the following languages:** DE, ES, FR, IT, PT, RU

### Specifications:

HD video outputs	- 2x DVI-D - 1x 3G-SDI
Format signal outputs	1920 x 1080p, 50/60 Hz
LINK video inputs	3x
USB interface	4x USB, (2x front, 2x rear)
SCB interface	2x 6-pin mini-DIN

Power supply	100–120 VAC/200–240 VAC
Power frequency	50/60 Hz
Protection class	I, CF-Defib
Dimensions w x h x d	305 x 54 x 320 mm
Weight	2.1 kg

### For use with IMAGE1 S

### IMAGE1 S CONNECT Module TC 200EN



TC 300

TC 300

**IMAGE1 S H3-LINK**, link module, for use with

IMAGE1 FULL HD three-chip camera heads, power supply 100–120 VAC/200–240 VAC, 50/60 Hz,

**for use with IMAGE1 S CONNECT TC 200EN**

including:

**Mains Cord**, length 300 cm

**Link Cable**, length 20 cm

### Specifications:

Camera System	TC 300 (H3-Link)
Supported camera heads/video endoscopes	TH 100, TH 101, TH 102, TH 103, TH 104, TH 106 (fully compatible with IMAGE1 S) <b>22220055-3, 22220056-3, 22220053-3, 22220060-3, 22220061-3, 22220054-3, 22220085-3</b> (compatible without IMAGE1 S technologies CLARA, CHROMA, SPECTRA*)
LINK video outputs	1x
Power supply	100–120 VAC/200–240 VAC
Power frequency	50/60 Hz
Protection class	I, CF-Defib
Dimensions w x h x d	305 x 54 x 320 mm
Weight	1.86 kg

\* **SPECTRA A: Not for sale in the U.S.**

\*\* **SPECTRA B: Not for sale in the U.S.**



IMAGE1 S Camera Heads <sup>NEW</sup>



For use with IMAGE1 S Camera System  
IMAGE1 S CONNECT Module TC 200EN, IMAGE1 S H3-LINK Module TC 300  
and with all IMAGE1 HUB™ HD Camera Control Units



TH 100

**TH 100**      **IMAGE1 S H3-Z Three-Chip FULL HD Camera Head,**  
50/60 Hz, IMAGE1 S compatible, progressive scan,  
soakable, gas- and plasma-sterilizable, with integrated  
Parfocal Zoom Lens, focal length f = 15–31 mm (2x),  
2 freely programmable camera head buttons,  
for use with IMAGE1 S and IMAGE1 HUB™ HD/HD

Specifications:

IMAGE1 FULL HD Camera Heads	IMAGE1 S H3-Z
Product no.	TH 100
Image sensor	3x 1/8" CCD chip
Dimensions w x h x d	39 x 49 x 114 mm
Weight	270 g
Optical interface	integrated Parfocal Zoom Lens, f = 15–31 mm (2x)
Min. sensitivity	F 1.4/1.17 Lux
Grip mechanism	standard eyepiece adaptor
Cable	non-detachable
Cable length	300 cm



TH 104

**TH 104**      **IMAGE1 S H3-ZA Three-Chip FULL HD Camera Head,**  
50/60 Hz, IMAGE1 S compatible, **autoclavable**,  
progressive scan, soakable, gas- and plasma-sterilizable,  
with integrated Parfocal Zoom Lens, focal length  
f = 15–31 mm (2x), 2 freely programmable camera head  
buttons, for use with IMAGE1 S and IMAGE1 HUB™ HD/HD

Specifications:

IMAGE1 FULL HD Camera Heads	IMAGE1 S H3-ZA
Product no.	TH 104
Image sensor	3x 1/8" CCD chip
Dimensions w x h x d	39 x 49 x 100 mm
Weight	299 g
Optical interface	integrated Parfocal Zoom Lens, f = 15–31 mm (2x)
Min. sensitivity	F 1.4/1.17 Lux
Grip mechanism	standard eyepiece adaptor
Cable	non-detachable
Cable length	300 cm

## Monitors



9619 NB

9619 NB

**19" HD Monitor,**  
color systems **PAL/NTSC**, max. screen  
resolution 1280 x 1024, image format 4:3,  
power supply 100–240 VAC, 50/60 Hz,  
wall-mounted with VESA 100 adaption,  
including:

**External 24 VDC Power Supply**  
**Mains Cord**



9826 NB

9826 NB

**26" FULL HD Monitor,**  
wall-mounted with VESA 100 adaption,  
color systems **PAL/NTSC**,  
max. screen resolution 1920 x 1080,  
image format 16:9,  
power supply 100–240 VAC, 50/60 Hz  
including:

**External 24 VDC Power Supply**  
**Mains Cord**

## Monitors

KARL STORZ HD and FULL HD Monitors	19"	26"
Wall-mounted with VESA 100 adaption	9619 NB	9826 NB
<b>Inputs:</b>		
DVI-D	●	●
Fibre Optic	–	–
3G-SDI	–	●
RGBS (VGA)	●	●
S-Video	●	●
Composite/FBAS	●	●
<b>Outputs:</b>		
DVI-D	●	●
S-Video	●	–
Composite/FBAS	●	●
RGBS (VGA)	●	–
3G-SDI	–	●
<b>Signal Format Display:</b>		
4:3	●	●
5:4	●	●
16:9	●	●
Picture-in-Picture	●	●
PAL/NTSC compatible	●	●

### Optional accessories:

9826 SF      **Pedestal**, for monitor 9826 NB

9626 SF      **Pedestal**, for monitor 9619 NB

### Specifications:

KARL STORZ HD and FULL HD Monitors	19"	26"
Desktop with pedestal	optional	optional
Product no.	9619 NB	9826 NB
Brightness	200 cd/m <sup>2</sup> (typ)	500 cd/m <sup>2</sup> (typ)
Max. viewing angle	178° vertical	178° vertical
Pixel distance	0.29 mm	0.3 mm
Reaction time	5 ms	8 ms
Contrast ratio	700:1	1400:1
Mount	100 mm VESA	100 mm VESA
Weight	7.6 kg	7.7 kg
Rated power	28 W	72 W
Operating conditions	0–40°C	5–35°C
Storage	–20–60°C	–20–60°C
Rel. humidity	max. 85%	max. 85%
Dimensions w x h x d	469.5 x 416 x 75.5 mm	643 x 396 x 87 mm
Power supply	100–240 VAC	100–240 VAC
Certified to	EN 60601-1, protection class IPX0	EN 60601-1, UL 60601-1, MDD93/42/EEC, protection class IPX2

## Accessories for Video Documentation



495 NL

**Fiber Optic Light Cable,**  
with straight connector,  
diameter 3.5 mm, length 180 cm

495 NA

**Same,** length 230 cm

## Cold Light Fountain XENON 300 SCB



20133101-1

**Cold Light Fountain XENON 300 SCB**  
with built-in antifog air-pump, and integrated  
KARL STORZ Communication Bus System SCB  
power supply:  
100–125 VAC/220–240 VAC, 50/60 Hz  
including:

**Mains Cord**

**SCB Connecting Cable,** length 100 cm

20133027

**Spare Lamp Module XENON**  
with heat sink, 300 watt, 15 volt

20133028

**XENON Spare Lamp,** only,  
300 watt, 15 volt

## Cold Light Fountain XENON NOVA® 300



20134001

**Cold Light Fountain XENON NOVA® 300,**  
power supply:  
100–125 VCA/220–240 VAC, 50/60 Hz  
including:

**Mains Cord**

20132028

**XENON Spare Lamp,** only,  
300 watt, 15 volt

## Data Management and Documentation

### KARL STORZ AIDA® – Exceptional documentation



The name AIDA stands for the comprehensive implementation of all documentation requirements arising in surgical procedures: A tailored solution that flexibly adapts to the needs of every specialty and thereby allows for the greatest degree of customization.

This customization is achieved in accordance with existing clinical standards to guarantee a reliable and safe solution. Proven functionalities merge with the latest trends and developments in medicine to create a fully new documentation experience – AIDA.

AIDA seamlessly integrates into existing infrastructures and exchanges data with other systems using common standard interfaces.



**WD 200-XX\* AIDA Documentation System,**  
for recording still images and videos,  
dual channel up to FULL HD, 2D/3D,  
power supply 100-240 VAC, 50/60 Hz

including:

**USB Silicone Keyboard**, with touchpad

**ACC Connecting Cable**

**DVI Connecting Cable**, length 200 cm

**HDMI-DVI Cable**, length 200 cm

**Mains Cord**, length 300 cm



**WD 250-XX\* AIDA Documentation System,**  
for recording still images and videos,  
dual channel up to FULL HD, 2D/3D,  
**including SMARTSCREEN® (touch screen),**  
power supply 100-240 VAC, 50/60 Hz

including:

**USB Silicone Keyboard**, with touchpad

**ACC Connecting Cable**

**DVI Connecting Cable**, length 200 cm

**HDMI-DVI Cable**, length 200 cm

**Mains Cord**, length 300 cm

\*XX Please indicate the relevant country code  
(DE, EN, ES, FR, IT, PT, RU) when placing your order.

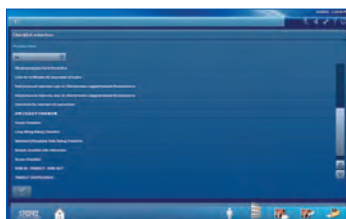


## Workflow-oriented use



### Patient

Entering patient data has never been this easy. AIDA seamlessly integrates into the existing infrastructure such as HIS and PACS. Data can be entered manually or via a DICOM worklist. All important patient information is just a click away.



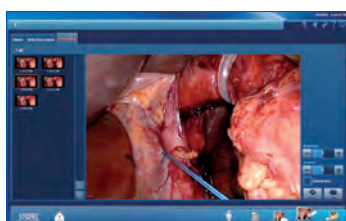
### Checklist

Central administration and documentation of time-out. The checklist simplifies the documentation of all critical steps in accordance with clinical standards. All checklists can be adapted to individual needs for sustainably increasing patient safety.



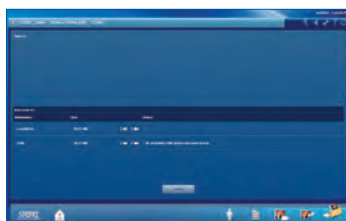
### Record

High-quality documentation, with still images and videos being recorded in FULL HD and 3D. The Dual Capture function allows for the parallel (synchronous or independent) recording of two sources. All recorded media can be marked for further processing with just one click.



### Edit

With the Edit module, simple adjustments to recorded still images and videos can be very rapidly completed. Recordings can be quickly optimized and then directly placed in the report. In addition, freeze frames can be cut out of videos and edited and saved. Existing markings from the Record module can be used for quick selection.



### Complete

Completing a procedure has never been easier. AIDA offers a large selection of storage locations. The data exported to each storage location can be defined. The Intelligent Export Manager (IEM) then carries out the export in the background. To prevent data loss, the system keeps the data until they have been successfully exported.



### Reference

All important patient information is always available and easy to access. Completed procedures including all information, still images, videos, and the checklist report can be easily retrieved from the Reference module.

## Equipment Cart



UG 220

### Equipment Cart

wide, high, rides on 4 antistatic dual wheels equipped with locking brakes 3 shelves, mains switch on top cover, central beam with integrated electrical subdistributors with 12 sockets, holder for power supplies, potential earth connectors and cable winding on the outside,

#### *Dimensions:*

*Equipment cart: 830 x 1474 x 730 mm (w x h x d),*

*shelf: 630 x 510 mm (w x d),*

*caster diameter: 150 mm*

including:

**Base module equipment cart,** wide

**Cover equipment,** equipment cart wide

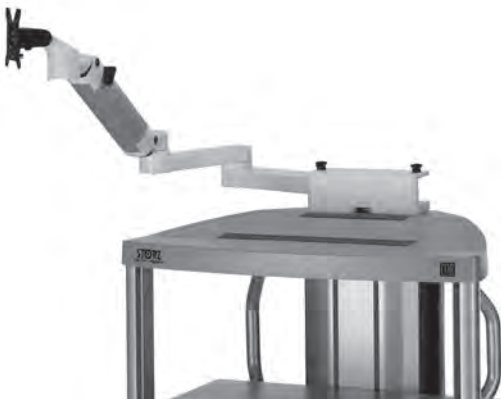
**Beam package equipment,** equipment cart high

3x **Shelf,** wide

**Drawer unit with lock,** wide

2x **Equipment rail,** long

**Camera holder**



UG 540

### Monitor Swivel Arm,

height and side adjustable, can be turned to the left or the right side, swivel range 180°, overhang 780 mm, overhang from centre 1170 mm, load capacity max. 15 kg, with monitor fixation VESA 5/100, for usage with equipment carts UG xxx

UG 540

## Recommended Accessories for Equipment Cart



UG 310

UG 310

**Isolation Transformer,**  
200 V–240 V; 2000 VA with 3 special mains socket,  
expulsion fuses, 3 grounding plugs,  
dimensions: 330 x 90 x 495 mm (w x h x d),  
for usage with equipment carts UG xxx



UG 410

UG 410

**Earth Leakage Monitor,**  
200 V–240 V, for mounting at equipment cart,  
control panel dimensions: 44 x 80 x 29 mm (w x h x d),  
for usage with isolation transformer UG 310



UG 510

UG 510

**Monitor Holding Arm,**  
height adjustable, inclinable,  
mountable on left or right,  
turning radius approx. 320°, overhang 530 mm,  
load capacity max. 15 kg,  
monitor fixation VESA 75/100,  
for usage with equipment carts UG xxx

