CLOSURE OF NASOSEPTAL DEFECTS:
THE ENDONASAL EXTENDED BRIDGE-FLAP CONCEPT

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Thoralf STANGE, M.D.¹
Hans-Jürgen SCHULTZ-COULON, M.D.²

¹) Center for Conservative and Operative Otorhinolaryngology – Inpatient and Outpatient Treatments, Neuss, Germany

²) Department of Otorhinolaryngology – Head and Neck Surgery, Plastic and Aesthetic Operations, Lukaskrankenhaus GmbH Neuss, Germany
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¹) Center for Conservative and Operative Otorhinolaryngology – Inpatient and Outpatient Treatments, Neuss, Germany
²) Department of Otorhinolaryngology – Head and Neck Surgery, Plastic and Aesthetic Operations, Lukaskrankenhaus GmbH Neuss, Germany

Address for correspondence:
Dr. med. Thoralf STANGE
HNO-Gemeinschaftspraxis Neuss
Zentrum für konservative und operative Behandlungen im Kopf-, Hals- und Gesichtsbereich
Ambulante und Stationäre Operationen
Krämerstrasse 1-3, 41460 Neuss, Germany
Telephone: 02131-28383, 25323
Fax: 02131-23050
E-mail: stange@hno-neuss.de

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Introduction

Since it was first described 20 years ago (Schultz-Coulon 1989), the bridge-flap technique has become the most successful method by far for the closure of nasoseptal defects (Schultz-Coulon 1994, 2005). Nevertheless, it is still widely believed that the surgical repair of nasoseptal defects should not be attempted because of its relatively low success rate. This view is supported by the fact that many different methods have been (and still are!) described for the repair of nasoseptal defects. Most of these publications have involved small numbers of patients, and their overall success rates have been low.

We feel that it is necessary, then, to revisit the bridge-flap technique and its modifications, drawing upon the experience gained in our annual courses at the German Academy for Otorhinolaryngology - Head and Neck Surgery.

1.0 Etiology and Clinical Manifestations

Most of the nasoseptal defects that we treated surgically from 1988 to 2007 (n = 622) had an iatrogenic cause. Fifty-six percent (n = 345) of the patients with nasoseptal defects had undergone at least one previous nasal operation (septoplasty or septorhinoplasty). Four percent (n = 27) had undergone surgical control of epistaxis, 6% (n = 37) complained of previous nasal trauma, and 34% (n = 213) of the patients had a spontaneous nasoseptal defect (Diagram 1).

![Diagram 1](image)

- Previous septoplasty or septorhinoplasty, n = 345 (56%)
- Spontaneous defects, n = 213 (34%)
- Trauma, n = 37 (6%)
- Previous hemostasis for epistaxis, n = 27 (4%)

Diagram 1
Etiology of nasoseptal defects.
Most defects are located in the central part of the nasal septum, designated as region 3 in our surgical anatomic classification (Fig. 1). Patients with large or medium-sized defects in this region (Fig. 2) very often complain of nasal obstructions, nasal dryness and crusting, and recurrent epistaxis. The most likely cause is a turbulent breakdown of nasal airflow at the posterior margin of the septal defect (Grützenmacher et al. 2002). Small defects in the anterior part of the septum often cause inspiratory whistling sounds that may cause considerable subjective discomfort (Fig. 3). Defects located in the superior or inferior portion of the septum, corresponding to regions 4 and 5, often produce no symptoms at all (Fig. 4).
2.0 Methods for the Surgical Closure of Nasoseptal Defect

We prefer to speak of a “defect” in the nasal septum rather than the widely used term “perforation,” because a nasoseptal defect involves the destruction of all three tissue layers – both of the mucosal layers plus the intervening cartilage. The surgical closure of this kind of defect is far more challenging than, say, the suture repair of an intraoperative perforation of the septal mucosa, because the deficient septal layers can be restored only by suitable tissue replacement.

Given the variety of methods described in the literature for the surgical closure of nasoseptal defects, together with the small case numbers and low success rates, it is reasonable to conclude that the closure of septal defects is among the most challenging rhinosurgical procedures. This relates to the technical difficulties of the operation as well as the diminished blood flow in the scarred area surrounding the septal defect. Moreover, the rest of the nasal mucosa is often very atrophic, delicate, and chronically inflamed, thus compounding the difficulty of surgery in this region (Figs. 2, 5). Because of these challenges, we feel that the surgical closure of nasoseptal defects is indicated only if the patient is experiencing significant complaints (recurrent bleeding, crusting, nasal obstruction, objectionable whistling sounds) and if there is a reasonable prospect of closing the defect without iatrogenic side effects such as endonasal stenosis or external scars.

Since the publication of Seiffert’s textbook in 1936, more than 40 different methods have been described for the surgical closure of nasoseptal defects. They are based on the following methodologic strategies (detailed review in Schultz-Coulon 2005):

- Septal transposition and rotation flaps (Seiffert 1936)
- Free tissue grafts (Heermann 1974, Fairbanks 1980)
- Inferior turbinate flaps (Seiffert 1936)
- Oral vestibular flaps
- Extensive elevation and advancement of the endonasal mucosa
  (Seeley 1949)
- Extensive procedures for very large septal defects:
  Frontotemporal flap (Hertig and Meyer 1969),
  Supraorbital flap (Kastenbauer and Masing 1985),
  Pericranial flap (Paloma et al. 2000),
  Radial forearm flap (Mobley et al. 2001),
  Galea-periosteum flap (Matthias 2007)

Most of these methods are complicated, however, and they often include a two-stage operation. A third problem is that none of these methods can ensure the definitive closure of nasoseptal defects because in most cases the septal mucosa is completely restored on only one side. The opposite side is either left to undergo protracted, spontaneous epithelialization or is covered precariously with a free graft. Postoperative suture dehiscence in these cases will inevitably lead to recurrent defects.

By contrast, our bridge-flap technique is designed to achieve the bilateral, tension-free closure of nasoseptal defects while replacing the missing septal cartilage with an autologous cartilage graft. This concept basically combines Seiffert’s idea of the bridge-flap with Seeley’s (1949) principle of extensive, bilateral endonasal elevation and advancement of the mucosa, resulting in an extended bridge-flap technique.
3.0 Technique of the Endonasal Extended Bridge-Flap Concept

3.1 Instrumentation

Successful reconstruction of the nasal septum requires an optimum dissection technique. In our experience, this can be achieved only by using optical magnification combined with excellent illumination of the operative site. We feel that it is essential to use a binocular operating microscope, which is generally available in every ENT operating suite.

The following instruments, which basically correspond to the standard instrument set used for septoplasty and septorhinoplasty, have proven very helpful in the closure of septal defects:

- Slender nasal specula
  (Fig. 6, top to bottom: Killian 90 mm, Killian 65 mm, Cottle)
- Curved Cottle double-ended elevator (Fig. 7, top)
- Masing double-ended elevator (Fig. 7, bottom)
- Mini-scalpel and Beaver knife with straight or angled blade (Fig. 8)
- Masing scoring knife (Fig. 9)
- Extra-long, slender needle holder (165 or 170 mm, Fig. 10)
- Angled needle holder (Fig. 11)
- Blakesley nasal forceps (Fig. 12, left)
- Craig septum forceps (Fig. 12, right)
- Straight, curved, and angled pointed scissors (Fig. 13)
Closure of Nasoseptal Defects: The Endonasal Extended Bridge-Flap Concept

- Mini-scalpel and Beaver knife with straight or angled blade.
- Masing scoring knife.
- Extra-long, slender needle holder (165 or 170 mm).
- Angled needle holder.
- Blakesley nasal forceps (left), Craig septum forceps (right).
- Straight, curved (left) and angled (right) pointed scissors.
3.2 Procedure

The extended bridge-flap technique for the closure of nasoseptal defects is a purely endonasal procedure that eliminates the need for an external skin incision, which may leave a visible scar. A columellar incision may be necessary only if there are additional indications for an external approach, such as a severe nasal tip deformity due to asymmetry of the alar cartilages.

The ventral septal margin and anterior nasal spine are exposed through a hemitransfixion incision, as in a classic septoplasty. The hemitransfixion incision should be extended slightly laterally to facilitate further dissection, especially on the nasal floor. The remaining cartilaginous septum is undermined in the subperichondrial plane to the anterior margin of the septal defect on both sides, as in the Cottle technique (Fig. 14). The tunnels are then extended upward above the septal defect to the nasal roof, past the attachment of the lateral cartilages (Fig. 15). Next, starting at the piriform aperture, the mucoperiosteum on both sides is elevated from the nasal floor to the lateral wall of the inferior meatus (Fig. 16).
Aided by the operating microscope, the surgeon now separates the very thin and usually heavily scarred mucosa from the alae of the premaxilla without perforating the mucosa, so that the mucoperiosteum below the septal defect can also be dissected from the septum (Figs. 17a, b). Once the anterior, superior and inferior margins of the defect have been completely dissected free, the entire mucosal defect is divided in the midline with a round mini-scalpel, starting at the anterior margin (Fig. 18a). After the posterior edge of the septal defect has also been divided (Fig. 18b), the septal mucosa is completely undermined back to the posterior septal margin (Fig. 19).
After completion of this extensive endonasal elevation of the mucosa, the remaining chondro-osseous septum is straightened. This is followed by a tangential conchotomy and lateralization of the inferior turbinates. The purpose of this step is two-fold: (1) to prevent postoperative nasal airway obstruction due to slight widening of the reconstructed nasal septum and (2) to create additional space for microsurgical suturing of the margins of the mucosal defect.

Bilateral longitudinal relaxing incisions are made along the lateral wall of the inferior meatus and along the nasal roof so that bilateral bridge-flaps can be dissected and mobilized above and below the septal defect (Fig. 20). The exposed areas of cartilage and bone will be subject to spontaneous epithelialization during subsequent weeks (Fig. 30).

The bridge-flaps can now be advanced over the mucosal defects, and the defect margins are approximated on both sides with rapidly dissolving suture material. Mattress sutures are placed because they create less tension than simple interrupted sutures (Figs. 21a, b).
The cartilaginous septum is reconstructed by fitting a tailored autologous cartilage graft into the cartilage defect (Fig. 22). The graft is fixed with sutures to prevent postoperative displacement (Fig. 23).

In patients with spontaneous septal defects, the cartilaginous defect can be reconstructed with septal cartilage harvested posterior to the defect. In patients who have had prior septal surgery, on the other hand, we are consistently unable to find a suitable piece of septal cartilage, and so we usually reconstruct the septum with auricular cartilage harvested from the cavum conchae (Fig. 24a). In cases where it is also necessary to reconstruct a structurally competent anterior septum, as in patients with a large septal defect combined with saddle nose deformity, it is almost always necessary to use strips of autologous costal cartilage (Fig. 24b).

The layers of septal mucosa are fixed to the reconstructed cartilaginous septum with fibrin glue, and sutures are then placed to close the hemitransfixion incision. We prefer rapidly dissolving transseptal mattress sutures to stabilize the anterior septum and prevent graft displacement. At the end of the operation, silastic splints are placed into each side of the nasal cavity to support the reconstructed septum (Fig. 25) and are secured with transseptal sutures. Finally the nose is loosely packed with ointment-impregnated gauze strips (Fig. 26).
3.3 Postoperative Care

The nasal packing is removed on the fourth postoperative day, followed by nasal irrigations with physiologic saline solution and the local application of a mild nasal ointment. Broad-spectrum prophylactic antibiotics are continued for a total of six days. Of course, the patient is cautioned strongly against any manipulations on the nose. The septal splints are removed after six days, while irrigations and ointment treatments are continued on an ambulatory basis until the nose has completely healed. No further manipulations are necessary other than careful suctioning of the nose under microscopic or endoscopic control. All sutures, especially those above the septal mucosal defects, should be left alone.

It takes approximately six weeks for the septal mucosa to heal completely in most patients (Figs. 27, 28). Often the mucosal suture site can still be identified when the reconstructed septum is examined during the initial postoperative weeks (Fig. 29). The bony and cartilaginous areas along the attachment of the inferior turbinate and on the nasal roof that were initially exposed by the relaxing incisions should become epithelialized during this time (Fig. 30).

Appearance of the nasal septum 12 weeks after bilateral bridge-flap reconstruction of the septal defect.

Reconstructed nasal septum. Appearance of the suture site 6 weeks postoperatively.

Complete epithelialization of the nasal floor and inferior meatus 6 weeks after the advancement of inferior bridge-flaps.
3.4 Modifications

In patients with small septal defects, it may be sufficient to elevate the mucosa and then dissect only inferior bridge-flaps on both sides, or to develop an inferior bridge-flap on one side and a superior bridge-flap on the other side (Figs. 31, 32). The lateral cartilages on both sides can also be mobilized downward in patients with very large nasoseptal defects. This is done by undermining and elevating the cartilaginous nasal dorsum and separating the lateral cartilages from the superior septal margin (Fig. 33). Following tension-free suture closure of the septal mucosal defects, the lateral cartilages are returned to their original position (Fig. 34). In our experience, this maneuver is very rarely followed by saddling of the external nose.
3.5 Combination with Other Rhinosurgical Procedures

3.5.1 Extended Bridge-Flap Technique Plus Rhinoplasty

The extended bridge-flap technique can be combined with rhinoplasty, keeping in mind that any and all manipulations on the nasal skeleton (osteotomies) should be completed before the mucosal defects are sutured in order to avoid excessive tension on the suture sites (Figs. 35, 36).

In patients with large defects of the cartilaginous nasal skeleton and associated saddle nose deformity, closure of the septal defect should be combined with the reconstruction of a structurally competent anterior septum. After suture of the mucosal defects, the anterior septum is reconstructed by implanting an autologous rib graft between the nasal dorsum and anterior nasal spine. Avoid making any mucosal incisions along the nasal dome in this case, as they could compromise the postoperative nutrition of the cartilage graft. Also avoid making the cartilage graft too large, as this might place undue tension on the sutured septal mucosa (Figs. 37, 38).

Preoperative appearance: humped nose (a) with a septal defect (b).

Postoperative appearance after rhinoplasty (a) and closure of the septal defect (b).

Preoperative appearance: saddle nose (a) with a septal defect (b).

Postoperative appearance (a) after closure of the septal defect with autologous rib cartilage (b).
A two-stage procedure is generally necessary for the repair of large or medium-sized nasoseptal defects accompanied by saddle nose deformity. In these cases the mucosal defects can be adequately closed only by using bilateral superior bridge-flaps with corresponding relaxing incisions placed along the nasal roof. First the nasoseptal defect is closed using the bilateral double bridge-flap technique (Figs. 39, 40). No earlier than six months post-surgery the saddle nose is corrected by straightening the nasal dorsum and nasal tip with costal cartilage grafts. We have had very good results with a sublabial approach through a tunnel in the columella, as this avoids incising and dissecting the mucosa on the reconstructed nasal septum (Figs. 41–43).
3.5.2 Extended Bridge-Flap Technique Plus Sinus Surgery

Paranasal sinus operations can also be combined with the bridge-flap closure of nasoseptal defects. Once again, the sinus surgery should be completed before the septum is reconstructed so to allow tension-free suturing of the septal mucosa (Figs. 44a, b).

3.6 Limits of Indications

Because defects in the septal mucosa are closed by endonasal mobilization and advancement of the mucosa, the extended bridge-flap technique is naturally subject to certain technical limitations. The vertical dimension of the nasoseptal defect is a key concern. The height of the septal defect should not exceed approximately one-half the total septum height at the site of the defect. Otherwise, insufficient mucosa would be available for mobilization, advancement, and a tension-free closure. Thus, the essential criterion is not the absolute size of the septal defect but its relationship to the total height of the septum at that location (Fig. 45).
4.0 Results

The extended bridge-flap concept for the closure of nasoseptal defects was performed 622 times at our institution between 1988 and 2007. The age and sex distributions of the patients are shown graphically in Diagram 2. The absolute dimensions of the septal defects are shown in Diagrams 3 and 4, although, as noted above, these dimensions themselves are not the essential criteria for patient selection.

Closure of the septal defect was successfully accomplished in the initial operation in 92.8% of the patients. Six patients developed a recurrent defect, which could be definitively closed by revision surgery using the same technique. The percentage of patients reporting an improvement in their subjective complaints was 97.7%. This is because the few postoperative recurrent defects were almost always smaller than 5 mm, which very rarely caused significant subjective distress (Table 1).

Diagram 2
Age and sex distribution of 622 surgically treated nasoseptal defects.

Diagram 3
Horizontal diameter of 622 nasoseptal defects.
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Diagram 4
Vertical diameter of 622 nasoseptal defects.

**Table 1: Results of septal defect closure with the endonasal bridge-flap technique**

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Primary closures:</td>
<td>577</td>
<td>92.8%</td>
</tr>
<tr>
<td>Closures after revision surgery:</td>
<td>6</td>
<td>0.9%</td>
</tr>
<tr>
<td>Total closures:</td>
<td>583</td>
<td>93.7%</td>
</tr>
<tr>
<td>Postoperative residual defects: &lt; 5 mm:</td>
<td>43</td>
<td>6.9%</td>
</tr>
<tr>
<td></td>
<td>&gt; 5 mm:</td>
<td>2</td>
</tr>
<tr>
<td>No or virtually no postoperative complaints:</td>
<td>608</td>
<td>97.7%</td>
</tr>
</tbody>
</table>

5.0 Summary

The extended bridge-flap concept offers several advantages compared to other reported methods for the repair of nasoseptal defects: It requires only one operation, which can always be performed endonasally and therefore does not leave visible scars. The procedure has a very high success rate and an extremely low complication rate. Recurrent defects are very rare; they are always much smaller than the preoperative defects and, if objectionable, can be closed using the same technique.
References

7. JESCHEK J.: Methoden zur Verhütung und Behebung von postoperativen Septumperforationen. Österr Oto-Rhinol 1969; 103: 504-508
15. SEELEY RC.: Repair of septal perforations. Laryngoscope 1949; 59: 130-146
Recommended Instruments for the Closure of Nasoseptal Defects
Instruments for Plastic Surgery

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

456000  BLAKESLEY Nasal Forceps, straight, size 0, working length 11 cm
456001  Same, size 1
456001 L  Same, size 1, working length 15 cm
456002  Same, size 2
456003  Same, size 3
456004  Same, size 4

466000  CRAIG Septum Forceps, straight, working length 9 cm
Instruments for Plastic Surgery

- Surgical Handle, for miniature blades, round, length 15.5 cm, for Blades 496764 – 70
- Miniature Blade, Fig. 64, round, sterile, package of 25
- Same, Fig. 65, pointed
- Masing Nasal Knife, curved, roundly tipped blade, length 14 cm
- Tissue Forceps, delicate, straight, 1x 2 teeth, length 10 cm
- Wullstein Forceps, 1x 2 teeth, length 15 cm
- Jansen Nasal Dressing Forceps, bayonet-shaped, length 16.5 cm
- Adson Dressing Forceps, serrated, tungsten carbide inserts, length 12 cm
- Adson Tissue Forceps, 1x 2 teeth, length 12 cm
- Adson-Brown Tissue Forceps, atraumatic, fine side grasping teeth, length 12 cm
- Same, micro-model
- Adson Tissue Forceps, serrated, 1x 2 teeth, tungsten carbide inserts, length 12 cm
- Cottle Lower Lateral Forceps, bayonet-shaped, with set screw, serrated tips and teeth on the inside, length 15 cm
- Cottle Columella Clamp, length 11 cm
- Dressing Forceps, tungsten carbide inserts, width 1.8 mm, length 14.5 cm
Instruments for Plastic Surgery

629830  KUHN Frontal Sinus Seeker,
double-ended, No. 6, both sides curved 77°,
one tip straight, other tip reverse angle,
length 22 cm

213314  WULLSTEIN Scissors, curved, sharp/sharp,
length 14 cm
Instruments for Plastic Surgery

449002  HEYMANN Nasal Scissors, medium, (standard model), working length 9.5 cm

449003  HEYMANN Nasal Scissors, 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 to left
Instruments for Plastic Surgery

- **BECKER-CAPLAN Septum Scissors**, double action jaws, serrated, working length 9.5 cm
- **COTTLE Dorsal Scissors**, angular, with tungsten carbide inserts, heavy, working length 7.5 cm
- **REYNOLDS Scissors**, curved, delicate tips, length 15 cm
- **METZENBAUM Scissors**, with tungsten carbide inserts, curved, length 14 cm
- **Same**, length 18 cm
- **Scissors**, straight, length 12 cm
- **Scissors**, extra delicate, straight, length 10 cm
- **Same**, curved
- **WALTER Scissors**, angled, length 10 cm
Instruments for Plastic Surgery

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>474000</td>
<td>FREER Elevator, double-ended, semisharp and blunt, length 20 cm</td>
</tr>
<tr>
<td>488074</td>
<td>FREER Elevator, double-ended, sharp and blunt, special matt finish, length 20 cm</td>
</tr>
<tr>
<td>478304</td>
<td>McKENTY Raspatory, width 4 mm, length 14.5 cm</td>
</tr>
<tr>
<td>478305</td>
<td>Same, width 5 mm</td>
</tr>
<tr>
<td>479000</td>
<td>MASING Elevator, double-ended, graduated, sharp and blunt, length 22.5 cm</td>
</tr>
<tr>
<td>479800</td>
<td>Suction Raspatory, with stylet, length 19.5 cm</td>
</tr>
<tr>
<td>525870</td>
<td>BEHRBOHM-KASCHKE Straightening Elevator for fractures of the nasal bone and zygomatic Arc. Set of 2 right and left, double-ended, length 27 cm</td>
</tr>
<tr>
<td>479200</td>
<td>COTTLE Raspatory, double-ended, for tunneling, length 22.5</td>
</tr>
</tbody>
</table>
Instruments for Plastic Surgery

- **Ala Double Hook**, with octagonal handle, with 2 sharp points, strongly curved, special matt finish, width 2 mm, length 16.5 cm
- **Hook**, one prong, large curve, length 16.5 cm
- **JOSEPH Double Hook**, sharp, width 5 mm, length 15 cm
- **COTTLE Retractor**, narrow (standard model), length 14 cm
- **COTTLE Retractor**, two prongs, sharp prong on left, blunt prong on right, width 10 mm, length 14.5 cm
- **Same**, sharp prong on right, blunt prong on left
- **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
- **AUFRICHT Nasal Retractor**, width of retractor blade 8 mm, length of retractor blade 40 mm, length 16.5 cm
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Instruments for Plastic Surgery

- **Nasal Rasp**, double-ended, fine, length 21.5 cm
- **Same**, coarse (rasp)
- **Nasal Rasp**, tungsten carbide, double-ended, rasp blades Fig. 1 and 2, coarse, length 20.5 cm
- **COTTLE Chisel**, flat, graduated, straight, width 4 mm, length 18.5 cm
- **Same**, width 7 mm
- **Same**, width 9 mm
- **COTTLE Crossbar Osteotome**, graduated, double-edged grinding, straight, width 6 mm, length 18.5 cm
- **COTTLE Crossbar Chisel**, graduated, single-edged grinding, curved, width 6 mm, length 18.5 cm
Instruments for Plastic Surgery

486102  WALTER Osteotome, flat, double-edged grinding, width 2 mm, length 19 cm
486103  Same, width 3 mm
486104  Same, width 4 mm
486107  Same, width 7 mm
487010  RUBIN Osteotome, flat, straight, double-edged grinding, rounded corners, with finger grip stabilizer, width of cut 10 mm, length 16.5 cm
487016  Same, width 16 mm
174200  COTTLE Metal Mallet, length 18 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, doubleguarded, with round ergonomic handle and finger grip plate, width 3 mm, length 19 cm
486254  Same, width 4.5 mm
Instruments for Plastic Surgery

- HALSTEAD “Mosquito” Artery Forceps, curved, length 12.5 cm
- ZÖLLNER Suction Tube, Luer-Lock, outer diameter 2.5 mm, length 15 cm
- Suction Tube, curved, outer diameter 5 mm, length 16.5 cm
- FRAZIER Suction Tube, with cut-off hole and stylet, angled, outer diameter 9 Fr./3 mm, working length 10 cm, total length 17.5 cm
- FRAZIER Suction Tube, with mandrel and cut-off hole, with distance marking at 5 – 9 cm, 5 Fr., working length 10 cm
- Same, 7 Fr.
- Same, 9 Fr.
- Needle Holder, tungsten carbide inserts, length 17 cm
- Needle Holder, tungsten carbide inserts, length 15 cm
Instruments for Plastic Surgery

517000  MASING Needle Holder, ear forceps shape, intranasal, smooth jaws, working length 8 cm

517200  Needle Holder, intranasal, angled 30°, tungsten carbide inserts, working length 12.5 cm

214550  CASTROVIEJO Needle Holder, straight, tungsten carbide inserts, with ratchet, length 12 cm

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

810806  Cup Medicine, 60 cm³, diameter 70 mm, height 33 mm
Instruments for Plastic Surgery

842319  **Bipolar Coagulation Forceps**, insulated, angled tip, blunt, tip 1 mm, length 19 cm, for use with Bipolar High Frequency Cords 847000 or 847000 A/E/M/V

842016  **Bipolar Coagulation Forceps**, insulated, angled tip, very delicate, tip 0.5 mm, length 16 cm, for use with Bipolar High Frequency Cords 847000 or 847000 A/E/M/V

847000 E  **Bipolar High Frequency Cord**, length 300 cm, for AUTOCON® II 400 SCB systems (111, 113, 115, 122, 125), AUTOCON® II 200, AUTOCON® II 80, KARL STORZ Coagulator 26021 B/C/D, 860021 B/C/D, 27810 B/C/D, 28810 B/C/D, AUTOCON® systems (50, 200, 350), Erbe-Coagulator, T and ICC series and KARL STORZ bipolar coagulation forceps
Instruments for Plastic Surgery

748220  DUPLAY Dressing and Sponge Holding Forceps, curved, with ratchet, length 21 cm
748221  Same, straight
525510  CASTROVIEJO Skin Measurement Caliper, measurement range 0 – 15 mm, length 8 cm
754350  Wire Cutting Scissors, serrated, length 12.5 cm
525500  Rule, stainless steel, flexible, length 20 cm
Notes: