The authors would like to thank Whitney Pafford, M.D., for her efforts in achieving this booklet.

Endoscopic Midface Lift – Endoscopic Approach to Middle Third Facial Rejuvenation

Thomas ROMO III, M.D., F.A.C.S.
Homere AL MOUTRAN, M.D.

New York Head and Neck Institute
Northshore – LIJ Health System / Lenox Hill Hospital
New York, NY, USA

Address for correspondence:
Thomas ROMO III, M.D., F.A.C.S.
Homere AL MOUTRAN, M.D.
135 East 74th street,
New York, NY 10021, USA
Phone: 001 212-288-1500
Fax: 001 212-288-3746
E-mail: docromo@romoplasticsurgery.com
dr.hmoutran@gmail.com
website: www.drthomasromo.com/home

© 2014 Endo:Press® Tuttlingen, Germany
ISBN 978-3-89756-571-5, Printed in Germany
P.O. Box, D-78503 Tuttlingen
Phone: +49 74 61/1 45 90
Fax: +49 74 61/708-529
E-mail: Endopress@t-online.de

Editions in languages other than English and German are in preparation.
For up-to-date information, please contact Endo:Press® publisher,
Tuttlingen, Germany, at the address shown above.

Typesetting and image processing:
Endo:Press® Tuttlingen, Germany

Printed by:
Straub Druck + Medien AG
D-78713 Schramberg, Germany

11.14-0.3

All rights reserved. No part of this publication may be translated, reprinted or reproduced, transmitted in any form or by any means, electronic or mechanical, now known or hereafter invented, including photocopying and recording, or utilized in any information storage or retrieval system without the prior written permission of the copyright holder.

Please note:
Medical knowledge is constantly changing. As new research and clinical experience broaden our knowledge, changes in treatment and therapy may be required. The authors and editors of the material herein have consulted sources believed to be reliable in their efforts to provide information that is complete and in accordance with the standards accepted at the time of publication. However, in view of the possibility of human error by the authors, editors, or publisher of the work herein, or changes in medical knowledge, neither the authors, editors, publisher, nor any other party who has been involved in the preparation of this work, can guarantee that the information contained herein is in every respect accurate or complete, and they cannot be held responsible for any errors or omissions or for the results obtained from use of such information. The information contained within this brochure is intended for use by doctors and other health care professionals, but is not meant to be used as a basis for treatment decisions, and is not a substitute for professional consultation and/or use of peer-reviewed medical literature.

Some of the product names, patents, and registered designs referred to in this booklet are in fact registered trademarks or proprietary names even though specific reference to this fact is not always made in the text. Therefore, the appearance of a name without designation as proprietary is not to be construed as a representation by the publisher that it is in the public domain.
Table of Contents

1.0 Introduction ......................................................... 6

2.0 Aesthetic Proportions and the Aging Process of the Middle Third of the Face ......................................................... 7

3.0 Anatomy of the Midface ........................................... 9
   Periosteum, Fascia and Ligaments, Muscles ......................... 9
   Nerves, Fat Pads, Danger Zones .................................. 10

4.0 Approaches to Surgical Treatment of the Middle Third of the Face ......................................................... 11
   Transtemporal ......................................................... 11
   Transoral ............................................................. 11
   Transpalpebral ....................................................... 12
   Transnasal ............................................................ 12

5.0 Patient Interview and Consultation ............................... 13

6.0 Endoscopic Midface Rejuvenation ................................. 14
   Indications ............................................................ 14
   Relative Contraindications ......................................... 14
   Advantages ........................................................... 15

7.0 Short-term Versus Long-term Fixation ........................... 15

8.0 Surgical Technique .................................................. 16
   Preoperative Markings ............................................. 16
   Dissection ............................................................ 16

9.0 Clinical Cases ......................................................... 24
   Case 1 ................................................................. 24
   Case 2 ................................................................. 25
   Case 3 ................................................................. 26
   Case 4 ................................................................. 27

Recommended Reading ................................................. 28

Instrument Set for Endoscopic Midface Lift ....................... 29
1.0 Introduction

The key qualities of a beautiful face are symmetry and balance. The aging process causes gradual loss of these important features resulting in disharmony of the face. Flattening of the malar eminence, exposure of the orbital rims, and increased prominence of the nasolabial fold are visual sequelae of the aging midface. This is due to inferomedial descent of the suborbicularis oculi, malar and buccal fat pads, in addition to age related lipoatrophy and facial ptosis. Restoring equilibrium to this area has become a significant goal of facial rejuvenation surgery.

The use of endoscopes has revolutionized how facial plastic surgeons approach rejuvenating the middle third of the face. Within the past decade, endoscopic elevation of the face and brow has gained significant popularity and replaced traditional surgical approaches in browlifting. This surgical philosophy has now extended into management of the aging midface. The primary advantages of endoscopic midface rejuvenation, or endoscopic midface lift, are the limited incisions needed for visualization and dissection of this large subunit with better visualization and control of structures in the plane of dissection. Therefore, the postoperative recovery period is shortened and less painful.
The many advantages of this new and exciting technology are best suited for patients with mild to moderate ptosis of the midface. Endoscopic midface rejuvenation relies on four key steps:

- transtemporal elevation of the lateral and inferior premaxillary soft tissue;
- elevation of the midface soft tissue medial to the infraorbital nerve through a pyriform aperture incision;
- elevation of the malar and medial zygoma soft tissues in the subperiosteal plane and
- long term fixation of the midface soft tissues to the deep temporal fascia.

In this monograph, we review the traditional techniques of midface rejuvenation and elaborate on the advantages of utilizing the endoscope. We then present our approach to endoscopic rejuvenation of the middle third of the face using specially designed KARL STORZ instruments.

### 2.0 Aesthetic Proportions and the Aging Process of the Middle Third of the Face

Cephalometrics of the middle third of the face are the determining factors to the balance and symmetry that define facial beauty. Traditionally, the length of the face has been divided into three equally sized parts. Measurements are made down the midline of the face, from the trichion to the glabella, glabella to the subnasale and the subnasale to the menton. In surgical practice, the midface is bordered superiorly by the inferior orbital rim, medially by the nasofacial angle, laterally by the pretragal area, and inferiorly by the nasolabial groove.
While defining the ideal midface proportions is much less mathematical, the aesthetically favorable midface has prominence of volume at the malar eminence, more defined in women. Signs of the aging midface begin to manifest in a patient’s late twenties. Patients begin to notice fine rhytids around the eyes and increased prominence of the nasojugal groove. As patient’s progress into their thirties the tear trough becomes more prominent with age due to loss of volume at the malar eminence and midfacial structures as they descend away from the lower eyelid. Some patients develop a ‘malar bag’ or ‘festoon’ due to inferior descent of the suborbicularis oculi fat pad (SOOF) with subsequent exposure of the orbital rim, causing a tired appearance despite adequate rest. This cutaneous and ligamentous laxity progresses throughout the midface with continued age, allowing inferomedial ptosis of the midface soft tissue. The subsequent result is loss of volume in key regions and an overall fatigued/tired look. Descent of the malar and buccal fat pads in the thirties and fourties results in loss of volume at the malar eminence and contributes to deepening nasolabial grooves. Maxillary reabsorption in one’s fifties and sixties further contributes to loss of the malar eminence escalating the already deflated and ptotic appearance of the midface.

Patient in her early 30s (a); Patient in her 40s (b); Patient in her 50s (c); Patient in her 60s (d).
3.0 Anatomy of the Midface

Successful cosmetic surgery starts with a thorough understanding of basic facial anatomy.

Detailed knowledge of anatomic layers is a prerequisite for successful and safe aesthetic surgery. It is important to note individual anatomic variations and how previous surgery has changed expected anatomy. Here we discuss the important anatomic relationships of the middle third of the face.

**Periosteum, Fascia and Ligaments**

The periosteum of the midface is dense and easily elevated with the exception of a few key areas:

- periosteum at the zygomatic-frontal suture
- periosteum of the inferior orbital rim with release of the arcus marginalis
- periosteum of the zygoma and maxilla is connected to the fascia of the masseter
- osteocutaneous attachments of the midface to the body of the zygoma

Once all of the above have been released, the full midface may be fully mobilized and positioned.

**Muscles**

Although there are many muscles in the face, the orbicularis oculi, zygomaticus major, zygomaticus minor, levator labii superioris, orbicularis oris, and masseter muscles are those most pertinent to the midfacial expression (Fig. 5).
Nerves
Sensory innervation to the midface is from the second branch of the trigeminal nerve as the zygomaticofacial nerve, infraorbital nerve, and posterior maxillary nerve. The trigeminal nerve also provides sympathetic and parasympathetic innervation to the skin. Motor innervation of the midface muscles is from the facial nerve. The frontal, zygomatic, and buccal branches all cross the surgical field (Fig. 6).

Fat Pads
The key to midface rejuvenation procedures is the restoration of volume to the midface. The suborbicularis oculi (SOOF), temporal, buccal and particularly the malar fat pads, all contribute to the normal volume distribution in a youthful face (Figs. 7a, b).

Danger Zones
There are certain ‘danger zones’ where motor branches and sensory nerves are at greatest risk during facial rejuvenation surgery. Care must be taken to avoid injury to these nerves during the various dissection techniques (Fig. 8).

6 Facial nerve (C.N.VII) branches division.
7 Facial fat pads.
8 Danger zone (in red) where the surgeon should be in a deeper plane than the facial nerve branches.
4.0 Approaches to Surgical Treatment of the Middle Third of the Face

Several different approaches have been described for midface rejuvenation surgery. The classic techniques include the transtemporal approach, the transoral approach, and the transpalpebral approach. These three are usually combined in order to fully mobilize this large subunit. A novel approach, described here, involves a transnasal approach to assist in complete elevation and mobility of the midface.

**Transtemporal**

The incision is made two centimeters posterior to the hair line in the temporal region. It is continued through the temporoparietal fascia onto the deep temporal fascia. Smooth dissection is carried through the areolar plane from the superior lateral orbital rim across the malar eminence and along the superior border of the zygomatic arch. The dissection across the medial zygoma onto the midface is carried in a subperiosteal plane to avoid injuring the temporal branch of the facial nerve. Dissection is limited medially due to the infraorbital nerve (Fig. 9).

![Transtemporal approach](image)

**Transoral**

A two centimeter upper gingival buccal incision is made down to the periosteum. The periosteum is elevated off the maxilla ensuring release of the pyriform aperture, nasal sidewall, infraorbital rim, and zygomatic eminence. The dissection is also carried over the anterior masseter for about two centimeters. This approach is generally combined with the transtemporal approach in order to fully mobilize the midface (Fig. 10).

![Transoral approach](image)
Transpalpebral

Several authors have described a direct subperiosteal approach through the lower eyelid thus advocating a vertical vector elevation. It mainly involves a transcutaneous preseptal dissection to the inferior orbital rim, where the subperiosteal plane is penetrated for a dissection and release, followed by full-thickness stitch suspension of the musculo-ligamentous components of the malar tissues. However, one can assume that this technique might increase traction of the lower eyelid after disruption of its support (Fig. 11).

Transnasal

A new approach to mobilize the medial portion of the midface with decreased risk of damage to the infraorbital nerve, decreased risk of infection from a large intraoral incision, as well as a more natural trajectory of elevation is through the pyriform aperture. A small intranasal incision is made and the periosteum is elevated off the maxilla along the lateral nasal wall to the zygoma. Here it is combined with the transtemporal approach to give a natural superior-lateral elevation of the midface soft tissues (Fig. 12).
5.0 Patient Interview and Consultation

Patient selection and evaluation are a critical part of preoperative planning, necessitating careful consideration of factors that determine the clinical appearance of the middle third of the face. An array of factors including age, genetics, environmental exposure history and overall health contribute to the relaxation of the midface and descent of the soft tissues. More importantly, are the various facial features such as the position of the SOOF, malar, and buccal fat pads, atrophy of subcutaneous fat, rhytids, skin quality and ptosis.

The patient’s skin surface quality and mobility should also be evaluated. The patient’s skin redundancy is examined carefully. It is not uncommon for aging patients to have redundant tissue deep in the eyelid complex. This cannot be addressed with a midface lift alone. Such patients with redundant tissue and/or ‘puffy’ lower lids often require blepharoplasty and repositioning or conservative removal of the orbital fat pads in conjunction with a midface rejuvenation procedure.

Careful patient evaluation is fundamental to achieving a good surgical result. Facial aging is nothing more than the clinical manifestation of physiologic alterations of facial anatomy. Because the midface has a direct anatomic relationship with the surrounding facial structures. Endoscopic midface rejuvenation is often combined with other aesthetic facial surgeries such as the endoscopic browlift. Details on this procedure and pertinent instruments can be found in the already available Endo-Press® Brochure on Endoscopic Forehead Lift.*

* ROMO T. 3rd, CHOE KS. Endoscopic Forehead Lift – Endoscopic Approach to Upper-Third Facial Rejuvenation, 2003 © Endo-Press® Tuttlingen, Germany
6.0 Endoscopic Midface Rejuvenation

For more than 50 years, facial aesthetic rejuvenation has focused on the surgical elevation of the ptotic midface. In the past two decades, the development of endoscopic facial aesthetic surgery has revolutionized how aesthetic surgeons approach mild to moderate facial ptosis. The current trend has focused on less invasive incisions, wider undermining and a long-term fixation technique. The endoscopic approach to the midface lift has proven to be as reliable as the traditional open approaches, but with significantly less surgical morbidity and postoperative discomfort. It has therefore become an excellent alternative in aesthetic rejuvenation of the middle third of the aging face.

Indications

It is imperative for the aesthetic facial surgeon to understand the appropriate indications for the endoscopic approach to midface rejuvenation. Not every patient with an aging midface will maximally benefit from endoscopic rejuvenation. Patients with one or more of the following indications would most benefit from the endoscopic approach:

- Midface ptosis
- Loss of volume at the malar eminence
- Prominence of the infraorbital rim
- Ptosis of the lower lid
- Accentuation of the nasolabial groove
- Ptosis of the corner of the mouth
- Ptosis of the lateral corner of the eyelid
- Sliding of the malar fat pad
- Deepening of the orbital rim
- Accentuation of the nasojugal groove
- Ptosis of the tail of the brow
- Dynamic periorbital wrinkles

Relative Contraindications

No absolute contraindications exist for the endoscopic approach to rejuvenation of the middle third of the face as long as suitable modifications are made. Nonetheless, several relative contraindications do exist, and both surgeons and patients should understand that these factors would likely result in a less than ideal outcome. These are listed below:

- Prior midface lift
- High temporal tuft
- Severe lipodystrophy
- Lack of adequate soft tissue volume to restore midface contour
- Other medical contraindications
- Prior cheek implant placement
Advantages

The endoscopic approach to midface rejuvenation offers many advantages over traditional approaches. The main advantages are listed below:

- Restoration along a more natural vector
- Quicker recovery time
- Less postsurgical numbness
- Less postsurgical edema
- More precise dissection under direct visualisation

7.0 Short-term Versus Long-term Fixation

One of the controversies of the endoscopic midface technique is the inexact predictability of the postoperative midface position. Some surgeons have reported a loss of elevation in the early postoperative period and many advocate routine overcorrection to compensate for the loss. The basis for this is unclear. However, as demonstrated in an animal model, significant adherence of the periosteum to bone took at least 6–12 weeks. In the process of re-adherence, fibrous ingrowth into bony microfissures in the outer cortex, bony remodeling, and thickening of the periosteum were noted. Although immediate elevation of the midface relies on barbed fixation device engagement and subsequent elevation of the malar soft tissues, a permanent elevation depends on adherence to the underlying periosteum formed during the first several weeks of the postoperative period.

Various short-term fixation techniques with timing ranging from days to two weeks have been used to achieve a stable and predictive position in facial aesthetic surgery. However, based on animal studies and clinical experience, it is now clear that any type of temporary fixation technique is suboptimal. The barbed fixation device used in this approach lasts 6–12 months. This provides adequate time for the periosteum to re-adhere in the new position, resulting in a maintained elevation of the midface soft tissues.

Histology 1 – Postoperative 1-week. A focal fibroblastic response and inflammation with sites of focal hemorrhage and bony remodeling are noted. The periosteum is thickened, but there is no adherence to bone.

Histology 2 – Postoperative 6-weeks. The periosteum is thinner than at week 1, with approximately 70 percent of the surface examined showing adherent periosteum. More bony remodeling is noted, with minimal to no inflammatory response.

Histology 3 – Postoperative 12-weeks. No acute inflammatory cells are seen. Thinner periosteum with complete adherence to bone and bony remodeling are noted.
8.0 Surgical Technique

Preoperative Markings

All patients are marked pre-operatively in an upright position (Fig. 15). The markings include the infraorbital and lateral orbital rim, superior edge of the zygoma, infraorbital nerve, and temporal branch of the facial nerve. The infraorbital nerve is marked 1 cm below the infraorbital rim in line with the pupil. The approximate course of the frontal branch(es) of the facial nerve is marked out by drawing a line one half distance between the lateral edge of the bushy brow and the hair bearing skin of the temporal tuft. This is carried up onto the lateral forehead and down across the mid zygomatic arch to the pre-auricular region. Last, the planned temporal incision is marked 2 cm posterior to the superior temporal tuft and extends posterior inferior at a 20 degree angle for 3 cm.

Dissection

General endotracheal anesthesia or monitored intravenous anesthesia with local anesthetics may be used. Monitored anesthesia with a local anesthesia mixture of xylocaine, marcaine, and epinephrine is preferred in this practice. Local anesthesia is injected into the planned temporal incision, down to the zygoma, malar eminence and lateral orbital rim. A transcutaneous midface injection is carried along the infraorbital rim, pyriform aperture, gingivobuccal sulcus and the inferior and medial malar eminence.

The set of instruments used in this technique is the endoscopic midface lift set by KARL STORZ Tuttlingen, Germany.
Endoscopic Midface Lift – Endoscopic Approach to Middle Third Facial Rejuvenation

The dissection is commenced by incising the planned temporal incision line down through the superficial temporal fascia to the deep temporal fascia. An endoscope with a sheath (Figs. 16, 17) is inserted under the temporal flap. A double-hooked elevator is then used to retract the inferior temporal flap and a broad flat dissector (THOMER-1) is used to elevate these tissues down to the superior edge of the zygomatic arch (Figs. 18, 19). The dissection is then carried posterior to the pre-auricular area and anterior to the lateral malar eminence.
A small cuff of soft tissue along the lateral orbital rim is preserved in order to prevent detachment of the lateral canthal ligament. An assistant may hold the endoscope as the THOMER-1 elevator is used to tease away the soft tissue down to the malar eminence.

The sentinel vein is seen in this soft tissue (Figs. 20, 21).

The endoscope allows for precise dissection in this area to ensure preservation of this vein. Injury to this vein often results in an extensive and observable venous plexus in the non-hair bearing temporal region postoperatively. A sharp double-humped elevator (THOMER-2) is now placed on the superior malar eminence (Figs. 22–25). Firm pressure on the tip of the elevator cuts through the underlying periosteum. The elevator is carried across the malar eminence and down along the lateral pre-maxilla to the lateral gingivobuccal sulcus.

Attention is now turned to the nose. A short nasal speculum is inserted into the nose and the pyriform mucosa is exposed (Fig. 26). A scalpel is used to incise the mucosa and carried down through the periosteum on the pyriform aperture.
A short, sharp, curved periosteal (THOMER-3) elevator is placed through this incision and used to elevate the midface soft tissues. Subperiosteal elevation of the midface soft tissue is continued inferiorly to the medial gingivobuccal sulcus and superiorly to the medial infraorbital rim.
The superior dissection releases the medial arcus marginalis, making sure the complete elevation and release of the medial midface soft tissues and preservation of the infraorbital nerve (Figs. 27–30). A long thin elevator (THOMER-4) is placed through the nasal incision and dissection along the inferior gingivobuccal sulcus connects the medial to the lateral pocket (Fig. 31).

27 The THOMER-3 elevator is used to elevate the soft tissues of the medial maxilla in the subperiosteal plane.

28 Release of the medial arcus marginalis avoiding the infraorbital nerve.

29 Sweeping motion to the gingivo-buccal sulcus.

30

31 The THOMER-4 elevator is used to elevate tissues off the face of the maxilla.
Elevation of the midface soft tissues is accomplished in a medial to lateral direction using a sweeping elevation toward the malar eminence and infraorbital rim. A long curved elevator (THOMER-5) is inserted through the nasal incision. Careful dissection superior to the lateral infraorbital rim and lateral to infraorbital nerve is completed. The prior marked cutaneous position of the infraorbital nerve is used as a reference point during this dissection. The lateral arcus marginalis is released from the lateral infraorbital rim. Lateral and superior dissection over the malar eminence connects the midface pocket to the temporal pocket. The elevator can now extend from the pyriform incision, across the midface and out the temporal incision line (Figs. 32, 33).

Dissection continues subperiosteally in a medial to lateral direction across the medial and mid zygomatic arch. Dissection superiorly from the zygomatic arch to the temporal pocket requires firm sharp dissection with the long curved elevator (THOMER-5). The temporal branch of the facial nerve is now superficial in the overlying temporal soft tissues. Complete elevation of the midface and temporal soft tissue has been accomplished.

Long-term fixation of the midface soft tissue is completed with suture fixation or dissolvable fixation devices. These are placed through the temporal incision, across the malar eminence and inset into the overlying midface soft tissues (Figs. 34, 35).
The fixation device is retractable in a superior posterior direction and sutured into the underlying deep temporal fascia (Fig. 36). The direction of the midface soft tissue elevation can be modified by positioning the fixation device and temporalis sutures in a more anterior or posterior position (Figs. 37–39). Slight over correction and symmetrical placement of the midface soft tissues is the goal. Attention is turned to the temporal incision.
One centimeter of hair-bearing skin along the inferior flap edge is resected and the flap is elevated superiorly (Fig. 40).

The flap is fixated to the deep temporal fascia with 3-0 vicryl sutures (Figs. 41, 42). The scalp incision is closed with stainless steel staples. Finally, light circumferential gauze dressing is placed.
9.0 Clinical Cases

Case 1
Patient presents malar ptosis with inferior orbital rim exposure (Figs. 43a, 44a, 45a), postoperative views (Figs. 43b, 44b, 45b).
Case 2

Patient has malar flattening and infraorbital hollowing (Figs. 46a, 47a, 48a). After Endoscopic midface lift, patient has a more proportionate face (Figs. 46b, 47b, 48b).
Case 3

Patient presents severe infraorbital hollowing and deepening of the nasolabial folds with a pronounced malar ptosis (Figs. 49a, 50a, 51a). After a combination of Endoscopic Midface Lift, Endoscopic Forehead Lift and a Face and Neck Lift, the patient’s basic facial expression is transformed with youthful features (Figs. 49b, 50b, 51b).
Preoperative

Postoperative

Case 4

Pronounced midface ptosis with severe infraorbital rim exposure and malar flattening (Figs. 52a, 53a, 54a), corrected by an Endoscopic Brow and Midface Lift (Figs. 52b, 53b, 54b).
Recommended Reading

Instrument Set for Endoscopic Midface Lift

Extracts from the following catalogs:
ENDOSCOPES and INSTRUMENTS for ENT and TELEPRESENCE,
IMAGING SYSTEMS, DOCUMENTATION and ILLUMINATION
**HOPKINS® Telescopes**

Diameter 4 mm, length 18 cm

50230 BA

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

50230 BA

**Optical Dissector**

Optical Dissector, 
with distal spatula, 
fenestrated, large, sharp, 
for use with HOPKINS® telescopes 30°

50200 ES

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

58210 CA  Raspatory, (THOMER-1)  
straight, spatula 12 x 12 mm,  
working length 15 cm

58210 AGA  Raspatory, (THOMER-4)  
curved, width 9 mm,  
working length 15 cm

58210 GGA  Raspatory, (THOMER-5)  
curved, arc-shaped spatula,  
width 9 mm, working length 15 cm

58210 MGA  Raspatory, (THOMER-2)  
curved, curved upwards,  
upper part sharp, width 9 mm,  
working length 15 cm

58210 TKA  Raspatory, (THOMER-3)  
curved, width 8 mm,  
working length 6 cm
Instruments for Endoscopic Midface Lift

499210  JOSEPH Double Hook,  
        sharp, width 10 mm, length 15 cm

403835  COTTLE Nasal Speculum,  
        with set screw, blade length 35 mm,  
        length 13 cm

496400  MASING Surgical Handle,  
        length 14 cm,  
        for Blades 208010 – 15, 208210 – 15

533112  ADSON Tissue Forceps,  
        1 x 2 teeth, length 12 cm

533212  ADSON-BROWN Tissue Forceps,  
        atraumatic, fine side grasping teeth,  
        length 12 cm

525500  Rule,  
        stainless steel, flexible, length 20 cm
Instruments for Endoscopic Midface Lift

535812  DE BAKEY "Mosquito" Artery Forceps, atraumatic, curved, length 12 cm
506400  AUFRICHT Nasal Retractor, width of retractor blade 8 mm, length of retractor blade 40 mm, length 16.5 cm
512211  Scissors, with tungsten carbide inserts, straight, sharp/sharp, length 11 cm
512411  Scissors, with tungsten carbide inserts, straight, blunt/blunt, length 11 cm
CLICKLINE Dissecting and Grasping Forceps, Scissors
Size 3 mm and 5 mm, length 18 cm

CLICKLINE Dissecting and Grasping Forceps, dismantling, non-rotating, with 4 locking positions, double action jaws, robust, curved sheath, size 3 mm, length 18 cm, including:
- Metal Handle, insulated
- Outer Sheath, with forceps insert

CLICKLINE Scissors, dismantling, non-rotating, with 4 locking positions, double action jaws, serrated, curved, horizontal opening, curved sheath, size 5 mm, length 18 cm, including:
- Metal Handle, insulated
- Outer Sheath, with scissors insert
Endoscopic Midface Lift – Endoscopic Approach to Middle Third Facial Rejuvenation

TELE PACK X LED
Sample Configuration

endoscopic video unit for use with TELECAM onechip camera heads and video endoscopes, incl. 50 W HiLux light source, 15" LCD TFT screen, USB/SD memory module, color systems PAL/NTSC, with integrated Image Processing Module, power supply 100 – 240 VAC, 50/60 Hz

including:

USB Silicone Keyboard, with touchpad, US character set
USB Flash Drive, 4 GB
Mains Cord
Mains Cord, US version

Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power input</td>
<td>100 W</td>
</tr>
<tr>
<td>Power supply</td>
<td>100-240 VAC</td>
</tr>
<tr>
<td>Dimensions (w x h x d)</td>
<td>450 x 350 x 150</td>
</tr>
<tr>
<td>Weight</td>
<td>7 kg</td>
</tr>
<tr>
<td>Interface</td>
<td>video interface: DVI-D (in/out)</td>
</tr>
<tr>
<td></td>
<td>audio: 3.5 mm phonejack (1x lateral, 1x rear), Line in, Line out</td>
</tr>
<tr>
<td></td>
<td>footswitch port: 5-pin socket for two-pedal footswitch</td>
</tr>
<tr>
<td></td>
<td>printer port: USB</td>
</tr>
<tr>
<td></td>
<td>printer language: PostScript</td>
</tr>
<tr>
<td>Light source</td>
<td>lamp: Metal halid 50 W</td>
</tr>
<tr>
<td></td>
<td>color temperature: 5700 K</td>
</tr>
<tr>
<td></td>
<td>average service life: approx. 1000 h</td>
</tr>
<tr>
<td>Image format</td>
<td>JPG</td>
</tr>
<tr>
<td>Video codec</td>
<td>MPEG-4</td>
</tr>
<tr>
<td>Video format</td>
<td>PAL/NTSC</td>
</tr>
<tr>
<td>Memory interface</td>
<td>USB 2.0; SD memory card (SDHC compatible)</td>
</tr>
<tr>
<td>TFT monitor</td>
<td>- screen size: 15&quot;</td>
</tr>
<tr>
<td></td>
<td>- resolution: 1024 x 768</td>
</tr>
<tr>
<td></td>
<td>- contrast: 700:1</td>
</tr>
<tr>
<td>Loudspeaker output</td>
<td>2 W</td>
</tr>
</tbody>
</table>

TELECAM C-MOUNT One-Chip Camera Head

C-MOUNT Lens

color systems PAL/NTSC, soakable, gas-sterilizable, with C-MOUNT thread for coupling to microscopes and C-MOUNT lens, 2 freely programmable camera head buttons
**IMAGE1 S Camera System**

**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
- 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

**Dashboard**

**Live menu**

**Intelligent icons**

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

<table>
<thead>
<tr>
<th>HD video outputs</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 2x DVI-D</td>
<td>100–120 VAC/200–240 VAC</td>
</tr>
<tr>
<td>- 1x 3G-SDI</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Format signal outputs</th>
<th>Power frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920 x 1080p, 50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LINK video inputs</th>
<th>Protection class</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x</td>
<td>I, CF-Defib</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>USB interface</th>
<th>Dimensions w x h x d</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x USB, (2x front, 2x rear)</td>
<td>305 x 54 x 320 mm</td>
</tr>
<tr>
<td>2x 6-pin mini-DIN</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SCB interface</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.1 kg</td>
</tr>
</tbody>
</table>

**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:**

<table>
<thead>
<tr>
<th>Camera System</th>
<th>TC 300 (H3-Link)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supported camera heads/video endoscopes</td>
<td>TH 100, TH 101, TH 102, TH 103, TH 104, TH 106 (fully compatible with IMAGE1 S) 22220055-3, 22220056-3, 22220053-3, 22220060-3, 22220061-3, 22220054-3, 22220085-3 (compatible without IMAGE1 S technologies CLARA, CHROMA, SPECTRA*)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LINK video outputs</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x</td>
<td>100–120 VAC/200–240 VAC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power frequency</th>
<th>Protection class</th>
</tr>
</thead>
<tbody>
<tr>
<td>50/60 Hz</td>
<td>I, CF-Defib</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions w x h x d</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>305 x 54 x 320 mm</td>
<td>1.86 kg</td>
</tr>
</tbody>
</table>

* SPECTRA A: Not for sale in the U.S.
** SPECTRA B: Not for sale in the U.S.
## IMAGE1 S Camera Heads

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

**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:

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

#### 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:

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

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

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

<table>
<thead>
<tr>
<th>Wall-mounted with VESA 100 adaption</th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>9619 NB</td>
<td>9826 NB</td>
<td></td>
</tr>
</tbody>
</table>

### Inputs:
- **DVI-D**
- **Fibre Optic**
- **3G-SDI**
- **RGBS (VGA)**
- **S-Video**
- **Composite/FBAS**

### Outputs:
- **DVI-D**
- **S-Video**
- **Composite/FBAS**
- **RGBS (VGA)**
- **3G-SDI**

### Signal Format Display:
- **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:

<table>
<thead>
<tr>
<th>KARL STORZ HD and FULL HD Monitors</th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop with pedestal</td>
<td>optional</td>
<td>optional</td>
</tr>
<tr>
<td>Product no.</td>
<td>9619 NB</td>
<td>9826 NB</td>
</tr>
<tr>
<td>Brightness</td>
<td>200 cd/m² (typ)</td>
<td>500 cd/m² (typ)</td>
</tr>
<tr>
<td>Max. viewing angle</td>
<td>178° vertical</td>
<td>178° vertical</td>
</tr>
<tr>
<td>Pixel distance</td>
<td>0.29 mm</td>
<td>0.3 mm</td>
</tr>
<tr>
<td>Reaction time</td>
<td>5 ms</td>
<td>8 ms</td>
</tr>
<tr>
<td>Contrast ratio</td>
<td>700:1</td>
<td>1400:1</td>
</tr>
<tr>
<td>Mount</td>
<td>100 mm VESA</td>
<td>100 mm VESA</td>
</tr>
<tr>
<td>Weight</td>
<td>7.6 kg</td>
<td>7.7 kg</td>
</tr>
<tr>
<td>Rated power</td>
<td>28 W</td>
<td>72 W</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0–40°C</td>
<td>5–35°C</td>
</tr>
<tr>
<td>Storage</td>
<td>-20–60°C</td>
<td>-20–60°C</td>
</tr>
<tr>
<td>Rel. humidity</td>
<td>max. 85%</td>
<td>max. 85%</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>469.5 x 416 x 75.5 mm</td>
<td>643 x 396 x 87 mm</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–240 VAC</td>
<td>100–240 VAC</td>
</tr>
<tr>
<td>Certified to</td>
<td>EN 60601-1, protection class IPX0</td>
<td>EN 60601-1, UL 60601-1, MDD93/42/EEC, protection class IPX2</td>
</tr>
</tbody>
</table>
Fiber Optic Light Cable

- **495 NCS** Fiber Optic Light Cable, with straight connector, extremely heat-resistant, diameter 4.8 mm, length 250 cm
- **495 NA** Fiber Optic Light Cable, with straight connector, diameter 3.5 mm, 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 Cord, 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 Power LED 175 SCB

- **20161401-1** Cold Light Fountain Power LED 175 SCB with integrated KARL STORZ Communication Bus System SCB, High Performance LED and one KARL STORZ light outlet power supply: 100 – 240 VAC, 50/60 Hz including:
  - Mains Cord
  - SCB Connecting Cord

Cold Light Fountain LED Nova 150 SCB

- **20161201** Cold Light Fountain LED Nova 150 SCB High-Performance LED Cold Light Fountain with one KARL STORZ light outlet, power supply 100 – 240 VAC, 50/60 Hz including:
  - Mains Cord
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 tailor-made 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

**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 distributors 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**

**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
Recommended Accessories for Equipment Cart

**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

**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

**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