Septoplasty and Turbinoplasty

Indications - Technique - Follow up - Pitfalls

H.R. Briner
ORL-Zentrum
Klinik Hirslanden
Zürich
Septoplasty and Turbinoplasty

- **Septoplasty**
  - Indications
  - Technique
  - Follow up
  - Complications, Tips and Tricks

- **Turbinoplasty**
  - Basics, Indications
  - Technique
  - Follow up
  - Complications, Tips and Tricks

- Discussion
Septoplasty

*Basics*

- One of the most common rhinosurgical procedures
- **Basic procedure** in rhinosurgery
- Degree of technical difficulty ranges from easy to extremely difficult
Indications for septoplasty

➢ Symptomatic deviation of nasal septum
  ➢ *Breathing difficulties*

➢ Part of the surgical procedure in correction of the external nose («septorhinoplasty»)
  ➢ *Crooked nose*

➢ May be part of the approach to the paranasal sinuses and the anterior skull base

➢ Others (*trauma, epistaxis, tumor surgery, ..*)
Symptomatic deviation of the nasal septum
Congenital deviated nose
Septal spur blocking access to sphenoethmoidectomy
Posttraumatic crooked nose
Fracture of the nasal septum
Recurrent epistaxis at site of septal deviation
(if conservative therapy is insufficient)
Tumors involving the nasal septum
History

➢ Resection of the nasal septum
  ▪ Resection of the whole deviated nasal septum

➢ Submucous resection
  ▪ Resection of the deviated nasal cartilage or bone (Kilian, Freer)

➢ Septoplasty
  ▪ Correction of the deviated nasal septum restoring cartilage and bone (Metzenbaum, Cottle, Fomon)
Septoplasty

Technique

- Anesthesia
- Incision
- Dissection of the septum
- Correction of the deviation
- Refixation of the septum
- How to deal with mucosal tears
- Closure of incision, splints or sutures, packing
- Endoscopic septoplasty
- Extracorporal septoplasty
Septoplasty

Technique

Anesthesia

- Local anesthesia
  - possible

- General anesthesia
  - Orotracheal intubation
Decongesting nasal mucosa

- Preparing surgical field by placing gauze or cotton swabs soaked with local anesthetic and vasoconstricting solution
  - e.g. tetracaine 1%
  - with epinephrine 1:100‘000
Septoplasty

Technique

Local anesthesia

➢ Infiltration of local anesthesia with vasoconstricting agent at site of planned incision for hemitransfixion
  ▪ e.g. lidocaine 1%
    with epinephrine 1:100’000
Septoplasty

Technique

Incision

- Hemitransfixion incision
  - 1-3 mm dorsal of the anterior edge of the cartilaginous septum
  - Right side (or left)
  - Blade 15
Septoplasty

*Technique*

**Incision**

- Exposure of septal cartilage
  - Cave: Right anatomical layer (subperichondral)
  - Scalpel
  - Scissors
  - Raspatory
  - Suction raspatory
Septoplasty

Technique

Exposure of the septal cartilage and bone

- Dissection of the cartilage and bone on the side of the hemitransfixion
  - „Upper“ and „lower“ tunnel
  - Instruments: Raspatory, suction raspatory, scissors, scalpel

From: “Head and Neck Surgery”, H.H. Naumann et al., Thieme
Dissection of the cartilaginous and bony septum

„Upper“ tunnel

„Lower“ tunnel

From: “Head and Neck Surgery”, H.H. Naumann et al., Thieme
Dissection of the septum

- Exposure of the anterior border of the septal cartilage
  - Cutting through the tough fibrous tissue (scalpel)
- Dissection of the cartilage and bone of the other side
  - Gives better exposure for correction
  - Not always necessary

Septoplasty Technique
Septoplasty

Technique

Dissection of the septum

- Mobilisation of the cartilaginous septum for better exposure and ability of correction
  - Release of the quadrangular cartilage from the basal bony ridge
  - Posterior chondrotomy
  - «Pendelseptum»

From: “Head and Neck Surgery”, H.H. Naumann et al., Thieme
Septoplasty

Technique

Correction of the deviated septum

Possibilities for correction

- Mobilisation
- Resection
- Splinting
- Scoring
- Rekonstruktion, if too complex also extracorporal („Austauschplastik“)
Septoplasty

**Technique**

Correction of the deviated septum

- Correction by mobilisation
  - Mobilisation of deviated areas of the septum and reposition at the correct plane
Septoplasty

*Technique*

Correction of the deviated septum

- Correction by resection
  - Resection of deviated parts of the septum

*From: “Head and Neck Surgery”, H.H. Naumann et al., Thieme*
Septoplasty

Technique

Correction of the deviated septum

➢ Correction by resection
  ▪ Replantation of straight septal fragments if possible

From: “Head and Neck Surgery”, H.H. Naumann et al., Thieme
Excision of a convex deviation
Excision of a septal spur
Correction by resection

Correction of a convex deviation by basal resection of the «too long» cartilage
Septoplasty

Technique

Correction of the deviated septum

- Correction by splinting
  - Suturing a straight bony part of the lamina perpendicularis on the deviated cartilaginous septum
  - Also possible: PDS-sheet, *titan-device*
  - Technically difficult
Septoplasty

*Technique*

Correction of the deviated septum

- Correction by scoring
  - Cartilage bends if scored on one side
  - Bending effect difficult to predict

From: “Otoplastik”, Schlegel C, Briner HR, Endo:Press; Tuttlingen
Correction of the «difficult» deviated septum

- Extracorporal correction «Septumaustauschplastik»
  - Taking the septum out of the nose, straighten it by remodeling and splinting and replanting it
  - Usually by an open approach
  - Difficult technique
Septoplasty

**Technique**

Refixation of the septum

- Fixation of the anterior inferior border of the septum at the anterior nasal spine
  - «8» suture
  - Resorbable or non resorbable material
  - Prevents dorsal displacement of cartilaginous septum
What to do with mucosal tears

- Small tears
  - No need to repair

- Suture of mucosal tears
  - Large tears
  - Corresponding mucosal tears of both sides without cartilage in between

- Fascia, Tachosil®
  - Placing under mucoperichondrium, «inner splinting of the tear»
Closure of incision

➢ Suturing of hemitransfixation incision
  ▪ Resorbable suture material
Prophylaxis of septal hematoma

- Silicon sheets
- Sutures
  - «Quilting suture»
- Resorbable
- Probably less pain.. *

Septoplasty

Technique

Prophylaxis of septal hematoma

➢ Packing (Merocel®, Netcel®, etc.), e.g. for 24 hours

➢ Tubes for breathing
  («Breathing straws»*)

Septoplasty

*Technique*

**Endoscopic septoplasty**

- Localised septal deviation
  - Septal spur, «cranial» deviation of area III
  - «Straight forward» technique
  - Incision at site of deviation
  - Mobilisation and excision of deviated septum
  - Usually no need for suturing or packing

- Endoscopic technique can be used also for «conventional» septoplasty
Septoplasty

*Technique*

Correction of complex septal deviations

➢ Extracorporeal septoplasty «Septumaustauschplastik»
  ▪ taking the septum out of the nose, straighten it by remodeling and splinting and replanting it
  ▪ Usually by an open approach
  ▪ Difficult technique
  ▪ Good anatomical results
„Extracorporal septoplasty“

Pronounced posttraumatic septal deviation to the left side
„Extracorporeal septoplasty“

Deviated nasal septum
„Extracorporal septroplasty“

Left nose before

Left nose after correction
Complications

➢ Bleeding, septal hematoma (~1%)
➢ Wound infection (0.4-12%*)
➢ Septal perforation (1.6-6.7%*)
➢ Changement of the external nose (0.4-3.4%*)
➢ Recurrence of the septal deviation (~7%)
➢ Hyposthesia of the incisival nerve
➢ Others (synechiae, anosmia, csf leak, ....)

Septoplasty

Tips and Tricks

“Tips and Tricks“

➢ Antibiotic prophylaxis not necessary in routine septoplasty *

➢ Antibiotics to be considered in complex cases (revision surgery, extracorporal septoplasty, immune deficiency, ..)


(Picture source: Internet Wikipedia)
Posterior chondrotomy not too cranial, otherwise there is a risk of instability of cartilaginous nasal dorsum (saddle nose deformity)

Leave at least 10-12 mm
If there is any instability of the cartilaginous septum (dorsal displacement), fix it at the anterior nasal spine.
Cartilaginous saddle deformity after septoplasty

Status after septoplasty

After correction (augmentation rhinoplasty)
Basics

➢ Reduction surgery of the turbinates - «turbinoplasty»:

➢ Goal: Enlargement of the nasal airways by volume reduction of the turbinates

➢ Most often reduction surgery of the inferior turbinates

➢ Occasionally reduction of the middle turbinate (Concha bullosa)
Turbinoplasty

Indications

- Impaired nasal breathing, not sufficiently responding to medical treatment
- Chronic allergic rhinitis
- Chronic unspecific rhinitis
- Others??
Chronic allergic rhinitis
Chronic unspecific rhinitis

After decongestion
Chronic unspecific rhinitis

Systemic disease?
Turbinoplasty

Technique

- Volume reduction of the inferior turbinate:
  - Location: anterior third
  - full length of the turbinate
- Resection of:
  - mucosa (submucous tissue)
  - bone
  - mucosa and bone
- Lateralisation of inferior turbinate

Turbinoplasty
Technique

Technique

➢ Surgical instruments:
  ➢ Cold steel (Scalpel, scissors, ..)
  ➢ Powered instruments (shaver..)
  ➢ High frequency coagulation/ablation
  ➢ Laser
  ➢ Coblation®, others

Picture source: Internet
**Technique – results**

- Rate of «improvement»
  - Cryotherapy: 38%
  - Submucosal resection cold steel: 52%
  - Electrocautery: 67%
  - Partial turbinectomy: 71%
  - Laser: 74%
  - Total turbinectomy: 79%
  - Radiofrequency ablation: 85%
  - Submucosal resection microdebrider: 91%

**Turbinoplasty**

**Technique**

**Technique - results**

**Table 3. Subjective Data***

<table>
<thead>
<tr>
<th>Subjective</th>
<th>Average Proportion of Patients with Improvement (%)</th>
<th>Average Proportion of Patients with Improvement in VAS Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total turbinectomy</td>
<td>79</td>
<td>39.1</td>
</tr>
<tr>
<td>Partial turbinectomy</td>
<td>71.3</td>
<td>48.5</td>
</tr>
<tr>
<td>SMR manual</td>
<td>52</td>
<td>n/a</td>
</tr>
<tr>
<td>SMR microdebrider</td>
<td>91.2</td>
<td>65.1</td>
</tr>
<tr>
<td>Electrocautery</td>
<td>67.3</td>
<td>54.1</td>
</tr>
<tr>
<td>Laser</td>
<td>74.2</td>
<td>44.6</td>
</tr>
<tr>
<td>Cryotherapy</td>
<td>38.2</td>
<td>60</td>
</tr>
<tr>
<td>Radiofrequency ablation</td>
<td>85.5</td>
<td>48.9</td>
</tr>
<tr>
<td>Turbinate outfracture</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

VAS, visual analogue scale; SMR, submucous resection; n/a, not available.

“Cold steel” - partial resection of inferior turbinate (conchotomy)
“Cold steel” - partial resection of inferior turbinate (conchotomy)
“Cold steel” - partial resection of inferior turbinate (conchotomv)
Pyriform turbinoplasty

- Volume reduction by submucous resection of anterior insertion if inferior turbinate bone
- Most narrow part of the nasal airway
- Area of pyriform aperture

⇒ «pyriform turbinoplasty»
Turbinoplasty
Technique

Pyriform turbinoplasty

- Volume reduction of inferior turbinate:
  - Location: - anterior third
    - full length of the turbinate
  - Resection of
    - mucosa (submucous tissue)
    - bone
    - mucosa and bone
Pyriform turbinoplasty
Pyriform turbinoplasty
Pyriform turbinoplasty
Pyriform turbinoplasty
Pyriform turbinoplasty
Pyriform turbinoplasty

before

after
Turbinoplasty Technique

Pyriform turbinoplasty

- Advantages
  - Preservation of mucosa, fast healing
  - Promotes permanent lateralisation of inferior turbinate
    («lateral nasal wall lateralisation»)
  - Enables a more physiological airflow compared to conventional conchotomy
  - Is part of the anterior approach to the natural maxillary sinus ostium
The effect of “Pyriform Turbinoplasty” on nasal airflow using a virtual model

Daniel Simmen, Fabian Sommer, Hans Rudolf Briner, Nick Jones, Ralf Kröger, Thomas Karl Hoffmann, Jörg Lindemann

Pyriform turbinoplasty
### Turbinoplasty

#### Complications

**Complications depending on technique**

<table>
<thead>
<tr>
<th>Method</th>
<th>Crusting</th>
<th>Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryotherapy</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Submucosal resection cold steel</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Electrocautery</td>
<td>23%</td>
<td>3%</td>
</tr>
<tr>
<td>Partial turbinectomy</td>
<td>20%</td>
<td>8%</td>
</tr>
<tr>
<td>Laser</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Total turbinectomy</td>
<td>21%</td>
<td>7%</td>
</tr>
<tr>
<td>Radiofrequency ablation</td>
<td>2%</td>
<td>7%</td>
</tr>
<tr>
<td>Submucosal resection microdebrider</td>
<td>?%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Technique - complications

Table 4. Complications * 0-25%  0-10%

<table>
<thead>
<tr>
<th>Complication</th>
<th>Crusting</th>
<th>Bleeding</th>
<th>Atrophy</th>
<th>Rhinorrhea</th>
<th>Postnasal Drip</th>
<th>Infection</th>
<th>Synechiae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total turbinectomy</td>
<td>21</td>
<td>7</td>
<td>n/a</td>
<td>1.3</td>
<td>19</td>
<td>n/a</td>
<td>6.25</td>
</tr>
<tr>
<td>Partial turbinectomy</td>
<td>20</td>
<td>8</td>
<td>n/a</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>SMR manual</td>
<td>12.3</td>
<td>10</td>
<td>n/a</td>
<td>n/a</td>
<td>2.9</td>
<td>4</td>
<td>n/a</td>
</tr>
<tr>
<td>SMR microdebrider</td>
<td>n/a</td>
<td>9.7</td>
<td>n/a</td>
<td>0</td>
<td>10</td>
<td>n/a</td>
<td>6.7</td>
</tr>
<tr>
<td>Electrocautery</td>
<td>23.3</td>
<td>3.3</td>
<td>n/a</td>
<td>n/a</td>
<td>33.9</td>
<td>4</td>
<td>n/a</td>
</tr>
<tr>
<td>Laser</td>
<td>1.5</td>
<td>5</td>
<td>n/a</td>
<td>n/a</td>
<td>11.4</td>
<td>n/a</td>
<td>4.4</td>
</tr>
<tr>
<td>Cryotherapy</td>
<td>0</td>
<td>2.6</td>
<td>0</td>
<td>n/a</td>
<td>13.8</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Radiofrequency ablation</td>
<td>2.3</td>
<td>7.2</td>
<td>1.1</td>
<td>n/a</td>
<td>3.3</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Turbinate outfracture</td>
<td>0</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
</tr>
</tbody>
</table>

SMR, submucous resection; n/a, not available.

Turbinoplasty

Follow up

Postoperative Treatment

➢ Crusting
  ➢ Treatment with nasal douching (*NaCl*-Solution) and ointment
  ➢ Endoscopic cleaning  *e.g. postop. day 7, 14*

➢ Bleeding
  ➢ No excessive exercise for 7-14 days

➢ Pain
  ➢ Pain medication rarely necessary
Postoperative crusting
Tips and Tricks

A. sphenopalatina – inferior conchal branch
Turbinoplasty
Tips and Tricks

Cave

- Cave: «ablative surgery»
  - Does not normalize underlying mucosal disease
  - «Normal breathing» not guaranteed
  - Risk of inducing «Empty Nose Syndrome»
Turbinoplasty
Tips and Tricks

Cave

➢ Empty nose syndrome:
  ➢ Rare
  ➢ Correlates with amount of tissue resection*
  ➢ Occurs with all types of turbinate surgery
  ➢ Correlation with psychiatric comorbidities**

*Hong HR et al. Correlation between remnant inferior turbinate volume and symptom severity of empty nose syndrome. Laryngoscope 2016

Turbinoplasty

Take home

- Indications: Impaired nasal breathing, not sufficiently responding to medical treatment
- Multiple technical methods available
- Does not correct underlying mucosal disease
- Does not guarantee «normal nasal breathing»
- Risko of «Empty Nose Syndrome»
- Conservative, mucosal sparing volume reduction
Septoplasty and Turbinoplasty

Indications - Technique - Follow up - Pitfalls

H.R. Briner
ORL-Zentrum
Klinik Hirslanden
Zürich