Endoscopic Sinus Surgery (ESS)

Zoltan Fent

Semmelweis University Faculty of Medicine
Dept. of Otorhinolaryngology, Head and Neck Surgery

Sinusitis classification

• acute – not longer than 6 weeks
• subacute - 6-12 weeks
• chronic – more than 12 weeks (CRS)
• recurrent, acute – more than 4 times/year
Ostiomeatal unit – mucus transport (normal status)

Symptoms of CRS, conservative treatment

- purulent discharge
- nasal blockage
- permanent coughing (sinobronchitis)

- nasal steroids
- systemic steroid treatment
  - high dose for 2 weeks
  - low dose for months
Predisposing factors

- deviation of the nasal septum
- hypertrophy of the lower turbinates, concha bullosa
- adenoid vegetation
- anatomic variations of the ostiomeatal unit
- foreign body
- choanal atresia
- cystic fibrosis, primary ciliary dyskinesia, infection
- allergy, (aspirin-sensitive) asthma bronchiale

Diagnosis

- Anamnestic factors
- Nasal endoscopy
- CT scan of the paranasal sinuses – NOT MRI!
- Allergy test
- Pulmonology
- Gastroenterology (GERD)
Endoscopic examination

• Features of the endoscopes
  – diameter
  – length
  – viewing angle
  – viewing field

Surgery

• Operative techniques with skin or oral mucosal incisions – seldom indicated
  – maxillary sinus
    • Lothrop operation
    • Luc-Caldwell’s procedure
  – frontal sinus
    • Jansen-Ritter
    • Killian
    • Riedel

• Endonasal techniques
  – Polypectomy-ethmoidectomy
  – Microscopic ethmoidectomy
  – FESS

• Appropriate indication!!!
FESS

• The aim of the surgery is to restore the ventilation of the paranasal sinuses with widening the ostia and preserve the function (key point: the ostiomeatal unit)

• The most up-to-date solution of the CRS

• Ónodi Adolf (Budapest)
• E.Zuckerkandl (Utrecht, Graz)
• E.Wigand (Erlangen)
• W.Messerklinger (Graz)
• H.Stammberger (Graz)
Indications – preparation for surgery

- thorough anamnestic data
- Physical examination
  - diagnostic endoscopy
- Allergology – if necessary
- Pulmonology – unified airway
- Gastroenterology (GERD)
- Radiology
  - CT scan of the paranasal sinuses without contrast material
    - in coronal plane
    - in axial plane with sagittal reconstruction
    - cone-beam CT
  - MRI with enhancement – if complication or tumor is suspected

Analysis of the CT scans
• The radiologist often describes temporary or harmless disorders as pathologic
  – moderate swelling of the mucosa
  – cysts, etc.

• These must be evaluated only with the patient’s
  – anamnestic data
  – complains and
  – endoscopic findings.

Septum nasi

• Could it be difficulty during FESS due to septal deformity?
• Septal operation is necessary?
Middle turbinate

- symmetric?
- is there a bony defect?

Ethmoid roof

- symmetric?
- is there a bony defect?
internal carotid artery

- Intersphenoidal septum originates from the bony wall of the ICA
- Bony dehiscency among the ICA

optic nerve
Instrumentation

Instrumentation - Shaver
Instrumentation - Shaver

- easy-to-use
- injury to the healthy mucosa can be avoided
- less bleeding and scar tissue formation
- precise removal of the disease
- less complications
- shorter healing period and surgery

The operation – first steps
Local anaesthesia

Removal of the uncinate process
Opening of the ethmoidal bulla

Maxillary sinus opening
Frontal recess

Pyokele in the left frontal sinus
Dentogen sin. max. – MR T2w

FESS in childhood
Specific features

- development of the paranasal sinuses

- No negative CT’s under the age of 8
  - lot of false pos. CT scans
  - CT scan must be done only under strict indications
    - suspicion of complication (orbital involvement or intracranial spreading of the inflammation)
    - Fever that is not responding for ATB

Before deciding to do FESS...

- Diseases leading to CRS in children
  - adenoid hyperplasia!!!
  - choanal atresia
  - allergy
  - immundeficiency
  - asthma bronchiale
  - GERD
  - cystic fibrosis
  - primary ciliary dyskinesia
  - smoking environment
Navigation system in ENT

• We must know the exact position of the instruments during the whole surgery because of the proximity of the skull base and the orbit.

GE IntraTrak 3500 plus

electromagnetic instrument
suction tubes

- in different shapes, angles and lengths
- the tip of the suction tube can be seen during the operation

Ónodi-cell
Sphenoid sinus -pyokele I.

Sphenoid sinus -pyokele II.
Sphenoid sinus -pyokele III.

Advantages of the NS:

– during revision surgery (missing landmarks),
– in anatomic variations of the frontal- or sphenoid sinus,
– in hereditary maxillafacial disorders
– in documentation, education.
Complications

- **Minor**
  - synechiae
  - mild or moderate bleeding
  - injury to nasolacrimal duct
  - injury to m.rectus med. – temporary diplopia
  - injury to lamina papyracea – orbita emphysema
  - loss of smelling

- **Major**
  - bleeding
    - anterior or posterior ethmoidal artery
    - sphenopalatine artery
    - internal carotid artery
    - (maxillary artery)
  - injury to dura mater – CSF leak
  - optic nerve injury
  - injury to orbital content, retrobulbar hematoma
sphenopalatine artery

Dura injury – the most frequent places
How to prove CSF leak?

- at least 0.5ml fluid
- increased level of transferrin beta-2 (88%spec.)
- beta trace protein test (in liquor 35x higher than in blood)
- intrathecal fluorescein + endoscopy
- MR or CT-cysternography

- HRCT
- MRI (meningo- encephalocele)

Endoscopic closure

- Most of the iatrogenic injuries can be solved with endoscopic technique (>90%)
- Intraoperative primary closure, finishing the FESS
- Materials (fibrin glue)
  - mucoperichondrium
  - middle turbinate
  - mucosa
  - m. temporalis fascia-muscle
  - tragus cartilage
  - fat...

- Techniques
  - overlay
  - underlay
  - obliteration
Postoperative care

- surgery is only the half of the treatment
- the healing period after FESS is 3-8 weeks

Nasal package

- Not always necessary – if yes, only loose
  - vioform-soaked gauze strips – damages the cilia
  - PVA (Merocel)
  - hyaluronic acid (Merogel)
  - carboxymethyl-cellulose (Sinu-Foam)
  - HA+CMC (Seprapack)
  - Thrombin gel (SurgiFlo)
- less chance to synechia using modern materials
Intranasal steroids

- part of preop. treatment
- after removal of recurrent or extended polyps
- only after re-epithelisation of the nasal cavity
- can be quit after 3-4 months in case there is no recurrent disease

Extended applications

- closure of the CSF leak
- surgical treatment of the choanal atresia
- DCR
- orbital decompression
- optic nerve decompression
- tumors
- maxillofacial trauma
- hypophysis surgery
Choanal atresia

Paranasal sinus tumors

- Epidemiology: in certain malignancies: wood dust, nickel, industrial gas – no connection with smoking
- Multimodal therapy
- Minimalinvasive surgery, preserving the content of the orbit
- Radiology
  - CT: bony destruction
  - MRI (Gadolinium)
    - the correlation with the intraop. findings is about 94%-98%
Paranasal sinus tumors

- Benign
  - haemangioma
  - papillomae
  - vestibular
    - Schneider (one of the subgroup is the inverted papilloma in 10% of the cases becomes malignant)
  - osteoma
  - fibrous dysplasy
  - neurogen tumors
  - ...

- Malignant
  - SCC
  - adenoid cysticus carcinoma
  - mucoepidermoid carcinoma
  - adenocarcinoma
  - hemangiopericytoma
  - melanoma
  - olf. neuroblastoma
  - sarcoma, fibrosarcoma, chondrosarcoma, rhabdomyosarcoma
  - lymphoma
  - metastases
  - sinonasal undiff. carcinoma
  - ...

adenoid cystic cc. of the nasopharynx – after irradiation

35 yo female
preop. endoscopy

1 year after surgery and gamma stereotactic surgery
MR – 1 year after surgery

fentzoltan@gmail.com