Teaching the Teachers Program

ADVANCES IN OTORHINOLARYNGOLOGY

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PROGRAM SUMMARY CUM STUDY MATERIAL

CONTENTS

A brief summary report on various topics related to ENT. The report summarizes valuable inputs and concepts delivered by the guest speaker Dr Anand K Devaiah, MD, Associate Professor, Otolaryngology-Head and Neck Surgery, Boston University School of Medicine, Boston, MA. at the teaching the teacher program in Hyderabad

Management of rhinosinusitis: Contemporary concepts

The presentation starts with the discussion of the different therapeutic approaches for the treatment of sinusitis. Is the treatment plan same for pediatric patients and adult patients? Does the phrase 'one size fits all' hold good in such a scenario? The presentation also aims at the pre and post operative approach, the intra-operative procedures and when and how to use adjunct therapies in the treatment of sinusitis.

PEDIATRIC SINUSITIS

Pediatric patients with sinusitis are difficult to manage, as the patients are not able to convey the exact problem and are dependent on the parents. In most of the patients the disease is refractory to the medical management and is treated by a conservative surgery that includes adenoidectomy (if applicable). In few cases the inflammation is accompanied with the presence of polyps. The polyp disease may show cystic fibrosis (less common), severe allergy or gastro esophageal reflux disease (GERD). Most of the pediatric patients with this condition show low level of inflammatory markers and high monocyte concentration. It is advisable to go for a thorough examination of the nasal mucosa and polyps. If possible a mucosal biopsy with electron microscopy is advised.

ADULT CHRONIC SINUSITIS

Snot – 22 score sheet although uncommon, is a helpful adjuvant in diagnosing the adult chronic sinusitis. It may help in deciding when and where to give certain medications or the right time for going ahead with the operative procedures. The score sheet includes various aspects of the disease that may help in assessing the problems the patient is facing as a result of the disease.

> In cases of cystic fibrosis, the precise biopsy site is the underlying normal mucosa that should be demonstrated under electron microscope. It shows the underlying derangement and the prognosis is generally based on the extent of the changes in the mucosa.

The medical management of the adult sinusitis is generally taken care by a wide array of options such as nasal steroids, oral antibiotics, antihistamines, systemic steroids, mucolytics, topical decongestants and immunotherapy to name a few. According to a meta-analysis done in a study ranging for five years, the most common agents used in the management for the disease was

- Nasal steroids – 8 weeks
- Oral antibiotics – 3 weeks
- Systemic steroids - 2.5 weeks

Although there has been great variability in the management before surgery, no common consensus has been put forward as to when we should move from medical therapy to functional endoscopic sinus surgery (FESS).

Pre surgical preparation for rhinosinusitis

The debate on the ever standing question still remains as whether to treat a certain case with medical management or go for a surgical intervention. Studies have shown that the patients who undergo medical management have better baseline health as compared to those who decide to undergo FESS. At the same time it has been seen that the patients who are under medical management reach to a plateau stage after a certain period of time i.e, no further improvement is seen. Whereas, patients who undergo FESS show steady improvement that surpass those on medical management.

- If the medical therapy is ineffective even after 3-6 weeks of antibiotics other medications including topical steroids should be considered.
- Operative intervention should be started as early as possible.
  - » Co-morbids like allergy and asthma may delay the surgical interventions.

Other factors that may affect the surgical selection and success are:

- Obesity which is a prevalent comorbidity
- Significant increase in quality of life (QOL) scores across all BMI levels
- Less improvement in QOL scores for obese individuals
- Can influence pre-op counseling and expectations.

Surgical navigation

Surgical navigation is an important part of an intra-operative procedure and may help in cases like

- Revision FESS
- Frontal, posterior ethmoid, sphenoid
- Extensive polyps
- Distorted anatomy
- Skull base defect
- Neoplasms

There is no clear evidence that it improves the surgical outcomes, a thorough knowledge of the anatomy still remains the mainstay during such procedures.

Surgical tips

- Know the orientation of the skull base
- Preservation of mucosa
- Respect natural drainage patterns
- Avoid "stripping" operations
- Gently dissect at the skull base if needed
- Avoid tearing, twisting motion.

Sonopet is an ultrasonic bone aspirator that is used in an early investigative stage that efficiently dissects tissue bone and cartilage with minimum thermal and mechanical collateral damage. It has the utility in septum and turbinate surgery, sinus and skull base.

Microbiological considerations

Antibiotics that are directed against cultured organisms have shown to improve symptom outcomes.

- *S. aureus* (30%)
- *P. aeruginosa* (24%)
- MRSA (11%)
- Normal flora/no growth (19%)

An organism directed antibiotic therapy has been shown to improve Snot - 22 scores and also reduces the risk of purulent rhinorrhea at follow up.

Balloon dilatation

Balloon dilatation is a minimally invasive procedure used to reshape anatomy to expand sinus pathways and restore drainage. It also comes with a promise of mucosal preservation, outflow tract improvement, reduced trauma and faster healing. It has been shown to be beneficial in office settings and has various advantages that include:

- Helpful in treating medically refractory chronic rhino-sinusitis
- Office based dilation
- Local anesthetic required
- SNOT-22 scores improved
- At one year follow-up, improvements were sustained
- Short time frame of follow-up
- No FESS arm to compare

Sinus Packing

Sinus packing can be helpful for hemostasis and it also reduces the risk of adhesion formation and lateralization of turbinates.

Sinus implants

Sinus implants are incorporated for various reasons although there are two schools of thought, one in favor of using the stents and the other against it. The advantages of using the stents include maintenance of pathways, reduce synechiae, reduce crusting and prevent turbinate lateralization. Certain drug eluting stents are also being used that have the mechanical property of stent and also reduce the swelling, inflammation and synechiae.

Post operative care

Frequent debridement may cause unwanted pain, cost and reduce the efficacy of the procedure. Therefore it is advisable to plan a one week post-operative debridement which is equally effective as compared to the frequent clean outs.

Aspirin exacerbated respiratory disease (AERD)

Samter's triad/acetyl salicylic acid (ASA) sensitivity is difficult to treat and does not respond to the conventional chronic rhinosinusitis (CRS) treatment. It is characterized by

- Adult onset asthma
- Nasal polyps
- Chronic rhinosinusitis
- Hypersensitivity to a cyclooxygenase-1 (COX-1) inhibitor (ASA, NSAID).

ASA desensitization seems to be helpful in treating the condition. It reduces polyposis, shows improved respiratory function, reduces the need for medication, SNOT-22 scores show sustained improvement (30 months+), reduces the need of FESS.

Contra-indicated in

- GI bleeding
- Pregnancy
- Bleeding diastheses
- Planned surgery.

CONCLUSION

Understanding the process of sinus disease continues to evolve along with new technologies applied in the field of sinus surgeries. Despite of emerging technologies a more cautious approach is required before taking a decision that should be in the benefit of the patient.

Sensorineural hearing loss: Trends in diagnosis and management

EPIDEMIOLOGY

Approximately 1-2 of every 1000 children suffer from some kind of hearing loss. Almost 48% of adults feel they have some form of hearing loss, and 35% of them are between ages of 18-29. People over 60 years of age are about 30% affected and people over 85 years of age are about 50% affected with some form of hearing loss. There are variable causes of hearing loss.

Case report 1

A 37 year old female came up to the clinic with the chief complaint of sudden right sided hearing loss with no vertigo, no headache, no otorrhea or otalgia. What should be the approach of treatment? Labs, adjunct audiologic testing, imaging, treatment?

- The first step should be to confirm that it is sensorineural hearing loss (SNHL) and whether it is idiopathic sensorineural hearing loss (ISSNHL).
- There has to be 30 decibles hearing loss at 3 frequencies
- Check the underlying cause by taking thorough case history and physical examination
- Educate the patient by telling about what is ISSNHL. The risks, benefits and rationale of treatment should be discussed with the patients
- The natural course of treatment and the risk of persistent hearing loss should be taken into consideration along with the discussion about the same with the patient.

Treatment

- Oral steroids
- Intra-tympanic steroid if incomplete response
- Hyperbaric oxygen within 3 months can be considered.

Follow-up- Audio at 6 months

Although around 40-70% of the patients may spontaneously improve with these therapies, there is a constant debate that arises that whether or not to start the oral steroid therapy aggressively within 72 hrs in critically diabetic patients. The most common way to approach in these patients is to educate about the pros and cons of both oral steroid and intra-tympanic treatments and properly inform the patient to take a decision. A dual therapy may or may not help in ISSNHL patients and thus the treatment option should be individualized.

ABR versus MRI

ABR (Auditory brainstem response)

- Less expensive
- Can detect retrocochlear lesion 1cm or more
- Cannot be done if loss exceeds 80dB from 2-4kHz.

MRI (Magnetic resonance imaging)

- More sensitive and specific than ABR
- Can detect lesions less than 1cm
- Expensive.

Treatments that should be avoided

- Thrombolytics
- Vasodilators and vasoactive medications
- Antioxidants.

Case report 2

A 6 year old male with progressive bilateral hearing loss came up with an uncertain trauma history, with no other symptoms, no other known medical problems and no family history of hearing loss.

Congenital hearing loss

Around 41.5% of the cases with bilateral hearing loss comes with unknown reason. Approximately 27.2% have some

genetic non syndromic association. 11.5% have prenatal cause, 9.7% are due to perinatal cause and 3.2% have some associated genetic syndrome.

A genetic testing for a congenital hearing loss may help in reducing the unnecessary tests.

- Patient ethnicity is important as there are certain conditions which have a predilection for certain races
- CT scan ± CT can help identify enlarged vestibular aqueduct but may not be useful in cases of connexin DFNB1 SNHL.

Management

Early intervention is important for language development and socialization. Also help from the resources for deaf individuals should be looked for.

- Hearing aids
- Cochlear implant
- Bone conduction aid if indicated.

Other options in management are

- Bone anchored hearing implant
- Implantable hearing aids
- Choclear implants
- Auditory brainstem implants
- Gene therapy.

CONCLUSION

The treatment approach of adult and pediatric hearing loss has evolved over time. Not all patients need an exhaustive, expensive and often fruitless therapy. Treatments can be refined based on the cause, and available new treatment modalities that are being developed.

Imaging trends and advances in otolaryngology

The topic elaborates about the different types of imaging modalities and their otolaryngologic applications. It also reviews the relative utility of photo emission tomography (PET) and single photon emission computed tomography (SPECT) imaging in otolaryngologic diseases.

COMPUTERIZED TOMOGRAPHY (CT)

The important consideration that should be taken while going for these imaging techniques is the increasing radiation dose with increasing detail /resolution. Its harmful effects on children and adults and dialing back dosing.

TEMPORAL BONE IMAGING

Superior semicircular canal dehiscence (SSCD)

It requires reconstructed Poschl (transverse) and Stenver's (longitudinal) views via thin cuts. The technique comes with high false positive rate.

Indications for sinonasal CT

- In children treatment failure and complications are common
- In adults surgical planning, treatment of medical /surgical conditions, all aspects of sinonasal /skull base pathology is taken into consideration.

Magnetic resonance imaging (MRI)

The technique comes with certain advantages:

- Increased presence in clinical care
- Increased resolution
- Decreased scan time
- Improved signal-to-noise ratio
- Little evidence to suggest safety difference
- It has been found to be compatible with choclear implants, but has 15% risk of magnet movement even at 1.5T.

PET IMAGING

It has utility in certain settings with risk of regional/ distant spread. Helpful in stage III/IV malignancies like nasopharyngeal carcinoma (NPCA) stage III/IV, non-keratinizing, N2/3 disease. It gives more diagnostic detail than PET/CT.

PET/MRI

Allows for simultaneous metabolic and functional information, better than PET/CT.

Single photon emission computed tomography (SPECT)

- Neuro imaging (NM) modality, it gives 3D information, potential for targeted imaging, technical issues can interfere with utility.
- Can change pre-therapy staging and decision making in differentiated thyroid carcinoma (CA)
  - » Staging - 10%
  - » Risk of recurrence - 13.2%
  - » Management - 31.3%
- Use of SPECT/CT for sentinel node biopsy can be effective
  - » 1.8% recurrence after sentinel node biopsy (SNB)
- SNB in cutaneous malignancy using SPECT
  - » Sensitivity 73%
  - » Specificity 92%

  - » Positive predictive value (PPV) 54%
  - » Negative predictive value (NPV) 96%
- Localization of parathyroid adenomas + US
  - » Sensitivity 95%
  - » Accuracy 91%.

Functional MRI (fMRI)

- It seeks to identify functional areas of the brain. Blood flow is needed as a proxy for activity
- Temporal and spatial variables for imaging
- Limited use in Otolaryngology at present
- Functional areas
  - » Auditory cortex
  - » Vestibular function
- Clinical paradigms
  - » Tinnitus localization
  - » Cochlear implant candidacy (auditory cortex).

Specific applications

- Cholesteatoma
- Thyroid cancer
- Head and neck cancer

Image guidance – anterior skull base/ sinuses

The procedure is well documented in the US and Europe. It is generally used in

- Revision FESS
- Frontal, posterior ethmoid, sphenoid
- Extensive polyps
- Distorted anatomy
- Skull base defect
- Neoplasms.

Intraoperative imaging

Imaging techniques like CT and MRI are specialized equipment that are expensive and requires increased setup time. It may help with surgical resections in pituitary cases. It reduces the need for surgery.

CONCLUSION

Advances in imaging and applied imaging technology hold promise for diagnosis and treatment. New is not always better, efficacy and effect on patients should always be considered when testing new imaging applications.

Anterior and lateral skull base tumors: Updates, advances, and considerations

The objective of the presentation is to discuss anatomy and pathology relevant to anterior skull base malignancies and lateral skull base diseases. Review treatment paradigms and apply knowledge of emerging diagnostic and treatment modalities.

The skull base tumors can be basically divided into three major types on the basis of their histopathology:

- Squamous cell carcinoma (50%)
  - » Maxillary sinus antrum
- Adenocarcinoma (35%)
  - » Ethmoid sinus
- Adenoid cystic (11%)
  - » Minor salivary glands

Local control is a very important step in these tumors and failure to do so will end up in a poor prognosis. Approximate excision is the most difficult part as the skull base is a very sensitive site with sinuses around it. Regional control is equally important but in some cases it may be delayed due to other factors such as presence of esthesioneuroblastoma.

Combination therapy has improved survival (surgery, radiation and chemotherapy), but the therapy varies with tumor histology and extent of the tumor. Generally orbital and intracranial involvement portend poor prognosis. Moreover, internal carotid involvement argues against surgical therapy.

- A 5-year overall survival rate is seen in 50% of the cases. Approximately 80-90% in esthesioneuroblastoma and 50-80% in adenocarcinoma. Squamous cell carcinoma: 30-40%
- Poor prognosis: High grade, sphenoid involvement, skull base erosion

LITERATURE ON ENDOSCOPIC SKULL BASE SURGERY

In cases of malignant disease

- FESS techniques
- Instrumentation improvement
- Expanding exposure
- Surgical principles and challenges
  - » "En bloc" vs "piecemeal"
  - » No benefit to debulking
  - » Intracranial extension
  - » Vascular control
  - » Reconstruction.

Endoscopic surgeries allow further intracranial access, and can have reconstruction advantages along with vascular control advantage.

Advantages of endoscopic surgeries include:

- Decreased blood loss
- Decreased ICU stay
- Decreased hospital stay
- Less complications.

Squamous cell carcinoma (SQCC)

In cases of SQCC endoscopy allows definitive resection, provides good local control (deAlmeida JR et al, 2014).

Complete endoscopic resection is comparable to open surgery (Saedi B et al, 2014). No difference in survival or recurrence has been observed.

It is also helpful in esthesioneuroblastoma, sinonasal undifferentiated carcinoma and mucosal melanomas.

Lateral skull base/cerebellopointangle (CPA) lesions

- Cranial nerve deficits
  - » Larger the tumor, the greater the risk
  - » V (neuralgia, hyperesthesia)
  - » VI (lateral gaze palsy)
  - » VII (paralysis/paresis)
  - » VIII (hearing loss, dizziness)
  - » IX (1/3 taste, tongue/pharynx sensation, palate motion)
  - » X (dysphagia, dysphonia, aspiration.

Approaches

- Transmastoid translabyrinthine
- Suboccipital
- Middle fossa
- Endoscopic keyhole
  - » In case of small tumors – wait and observe
  - » Surgery is more cost effective <45 yrs vs. radiation
  - » Usually 3 cm or less
  - » Larger tumors with mass effect – operate
  - » Combine surgery, radiation

GLOMUS JUGULARE TUMORS

They are benign tumors. They are locally aggressive and infiltrative; the tumor cells infiltrate into the cranial nerves and surrounding structures. The mainstay has been surgery in these tumors.

Radiosurgery becoming first line of treatment

- <3 cm size
- Lower morbidity
- Excellent control
- Local control at 5/10 years: 99/96%
- Radiation toxicity 10%
- Recurrence rate 3.2%

Therapeutic management of skull based tumors includes:

- Radiosurgery
- Tumor biology
- Chemotherapy
- Immunotherapy

CONCLUSION

Anterior and lateral skull base tumors pose anatomic and pathologic challenges. New tools and techniques are helpful in treating such patients. There is still some room for improvement in the "state of the art".

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