Management of Discharging Ear in Children

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Discharging ear [Chronic Suppurative Otitis Media: CSOM] is a massive health problem

- Prevalence [India]: 6% [>4%: Health Problem]¹
- Paediatrics [Northern India]: 4.79%²
- CSOM: 164 million deaf/year [90% in developing world]¹
- CSOM: 28000 deaths¹ /year

NO NATIONAL GUIDELINES/PROGRAMME


CSOM: Classification

**CSOM-Attico Antral**
- **Discharge**: scant, purulent & foul smelling
- **Cholesteatoma**: present
- **Complications**: common
- **Perforation**:

- **Treatment**: Mastoid Surgery

**CSOM-Tubo Tympanic**
- **Discharge**: profuse, mucoid
- **Cholesteatoma**: absent
- **Complications**: rare
- **Perforation**:

- **Treatment**: Tympanoplasty
CSOM: Mucosal Disease

Clinical Course: MORBIDITY

- **DEAFNESS**
  - Adverse speech/language
  - Undermines academics
  - Poor peer acceptance
  - Alters personality

- **OTHER REASONS**
  - Perforation: severe disease
  - Ossicular erosions
  - Epithelial migration: Cholesteatoma
  - Damage to cochlea: Nerve deafness
## COMPLICATIONS

### INTRATEMPORAL
- Mastoiditis
- Petrositis
- Facial Nerve Palsy
- Labyrinthitis

### EXTRATEMPORAL
- Extradural Abscess
- Subdural Abscess
- Meningitis
- Brain Abscess
- Lateral Sinus thrombosis
- Otitic hydrocephalus
MANAGEMENT: Children

- Antibiotics
- Reassurance
- No surgical treatment required
- Delay Tympanoplasty: 16-18yrs

WE ARE NOT HAPPY!
PAEDIATRIC TYMPANOPLASTY: *Controversial*

- When to do?
- What are the influencing factors?
- Success rate?

21ST CENTURY:

- Mention in Standard Text
- Minimum age reported: *8-10 years*
- Success rate:
  - GRAFT UPTAKE: 32% to 92%
  - HEARING IMPROVEMENT: 68% to 100%
Bias: Paediatric Tympanoplasty

- Repeated bouts of URTI
- Eustachian tube dysfunction
- Perforation:
  - Pressure equalizing vent
- Perforations close with age
- Technically difficult operation:
  - Narrow anatomical canal
- Immunological immaturity
- Parents: Lack of confidence
“Believe nothing, no matter where you read it, or who has said it, not even if I have said it. Unless it agrees with your own reason and common sense.”

-LORD BUDDHA

[6th century BC]
RESEARCH


1. Funded by CSIR, Govt of India, New Delhi]
2. Thesis study: LHMC, New Delhi
STUDY I: SYNOPSIS

- **PGIMER & Dr. RML Hospital, NEW DELHI**

- **STUDY DESIGN:** Cohort study with control (prospective)

- **AIMS AND OBJECTIVES:**
  * Evaluate the success rate of tympanoplasty Type 1 in paediatric population
  * Analyse factors responsible for the success rate of tympanoplasty type 1 in children

- **Sample:**
  * CSOM-mucosal disease [6months]
  * Two groups (20 each): A (8-14 years) / B (> 14 years)
STUDY I: SYNOPSIS

- **INTERVENTION:**
  - TYMPANOPLASTY TYPE 1 UNDER GA, (ADULTS-LA)
  - Post auricular-inlay (temporalis fascia)

- **CRITERIA FOR SUCCESS:**
  - INTACT GRAFT: 6th MONTH END
  - HEARING IMPROVEMENT: MINIMUM 10dB IN TWO CONSECUTIVE FREQUENCIES

- **STATISTICAL INTERPRETATION:**
  - CHI SQUARE TEST WITH YATES’ CORRECTION
STUDY I: RESULTS

● OVERALL SUCCESS RATE:

<table>
<thead>
<tr>
<th>GROUP</th>
<th>TOTAL CASES</th>
<th>GRAFT UPTAKE</th>
<th>HEARING IMPROVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP-A [8-14years]</td>
<td>20</td>
<td>16[80%]</td>
<td>11[69%]</td>
</tr>
<tr>
<td>GROUP-B [Adults]</td>
<td>20</td>
<td>17[85%]</td>
<td>13[76%]</td>
</tr>
</tbody>
</table>

● COMPLICATIONS:

Two patients: granulations
One patient: glue ear
STUDY I: RESULTS

- NO SIGNIFICANCE OF CONTRALATERAL EAR PATHOLOGY
  [Measure of Eustachian Tube function]

<table>
<thead>
<tr>
<th></th>
<th>Total Cases</th>
<th>Graft Rejection</th>
<th>Residual Perforation</th>
<th>% Fail Rate</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP-A</td>
<td>08</td>
<td>01</td>
<td>01</td>
<td>25</td>
<td>$\chi^2 = 0.013$</td>
</tr>
<tr>
<td>GROUP-B</td>
<td>12</td>
<td>01</td>
<td>01</td>
<td>16.6</td>
<td>$P &gt; 0.05$</td>
</tr>
</tbody>
</table>

*GROUP-A: CONTRALATERAL EAR DRUM INTACT
*GROUP-B: CONTRALATERAL EAR PATHOLOGY PRESENT
# STUDY I: RESULTS

- **NO SIGNIFICANCE OF SITE & SIZE OF PERFORATION**

<table>
<thead>
<tr>
<th></th>
<th>PAEDIATRIC PATIENTS</th>
<th>ADULT PATIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of cases</td>
<td>Graft uptake</td>
</tr>
<tr>
<td><strong>SITE OF PERFORATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td>Inferior</td>
<td>09</td>
<td>08</td>
</tr>
<tr>
<td>Posterior</td>
<td>07</td>
<td>06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td><strong>SIZE OF PERFORATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small [&lt;25%]</td>
<td>04</td>
<td>03</td>
</tr>
<tr>
<td>Medium [&lt;50%]</td>
<td>08</td>
<td>07</td>
</tr>
<tr>
<td>Large [&gt;50%]</td>
<td>08</td>
<td>06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>
STUDY II: SYNOPSIS

- Lady Hardinge Medical College & Associated Hospitals, NEW DELHI

- **STUDY DESIGN**: Cohort study with control [Prospective]

- **AIMS AND OBJECTIVES:**
  *Evaluate The Success Rate Of Tympanoplasty Type 1 In Paediatric Age Group Of 5-8 Years*
  *Analyse: Factors Responsible For The Success Rate Of Tympanoplasty Type 1 In Children [5-8 Yrs]*

- **SAMPLE:**
  *CSOM-mucosal disease [6months]*
  *Two groups(30 each): A (5-8 years) / B (> 14 years)*
STUDY II: SYNOPSIS

- **INTERVENTION:**
  - *TYMPANOPLASTY TYPE 1 UNDER GA, (ADULTS-LA)*
  - *Post auricular-inlay (temporalis fascia)*

- **CRITERIA FOR SUCCESS:**
  - *INTACT GRAFT: 6th month*
  - *HEARING IMPROVEMENT:*
  - Minimum 10 dB In Two Consecutive Frequencies

- **STATISTICAL INTERPRETATION:**
  - *CHI SQUARE TEST WITH YATES’ CORRECTION*
  - *FISCHER EXACT “P” VALUE TEST*
  - *EPI-INFO VERSION 7*
STUDY II: RESULTS

- **GRAFT UPTAKE & HEARING IMPROVEMENT**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Total Cases</th>
<th>Graft Uptake</th>
<th>Statistical Significance</th>
<th>Hearing Improvement</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>30</td>
<td>26 (87%)</td>
<td>$\chi^2 = 0.159$ P&gt;0.05</td>
<td>18 (69%)</td>
<td>$\chi^2 = 0.488$ P&gt;0.05</td>
</tr>
<tr>
<td>B</td>
<td>30</td>
<td>27 (90%)</td>
<td>[Not Significant]</td>
<td>21 (78%)</td>
<td>[Not Significant]</td>
</tr>
</tbody>
</table>

- In children, **Graft uptake/ Audiological results** are comparable to adults for Tympanoplasty Type I
- **FAILURE**: Faulty Surgical Technique
- **COMPLICATIONS**: Nil
STUDY II: RESULTS

SIGNIFICANCE OF CONTRALATERAL EAR PATHOLOGY:

*Measure of “Eustachian Tube Function”
*No Significance Observed: ET has no impact on Paed Tymp

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Total Cases</th>
<th>Success</th>
<th>Failure</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP-A</td>
<td>17</td>
<td>16(94%)</td>
<td>01(6%)</td>
<td>$\chi^2 = 1.822$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P&gt;0.05</td>
</tr>
<tr>
<td>GROUP-B</td>
<td>13</td>
<td>10(77%)</td>
<td>03(23%)</td>
<td>[Not Significant]</td>
</tr>
</tbody>
</table>

KEY: GROUP-A: Contralateral ear drum intact
GROUP-B: Contralateral ear pathology present
**STUDY II: RESULTS**

- **SIGNIFICANCE OF SIZE & SITE OF PERFORATION**

**SURGICAL SUCCESS:**

*Anterior Perforations Poor Graft Uptake:*
- *Poor perfusion of anterior half of tympanic membrane*
- *Faulty technique*

*Independent of the size of Perforation*

<table>
<thead>
<tr>
<th>SITE OF PERFORATION</th>
<th>No of cases</th>
<th>Graft uptake</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior</td>
<td>01</td>
<td>nil</td>
<td></td>
</tr>
<tr>
<td>Inferior</td>
<td>25</td>
<td>22</td>
<td>( \chi^2 = 7.1538 ) ( P &lt; 0.05 ) [Significant]</td>
</tr>
<tr>
<td>Posterior</td>
<td>04</td>
<td>04</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>26</td>
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<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small [&lt;25%]</td>
<td>nil</td>
<td>nil</td>
<td>( \chi^2 = 0.0647 ) ( P &gt; 0.05 ) [Not Significant]</td>
</tr>
<tr>
<td>Medium [&lt;50%]</td>
<td>13</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Large [&gt;50%]</td>
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<td>13</td>
<td></td>
</tr>
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<td>Total</td>
<td>30</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSIONS

- Children have graft uptake & audiological results comparable to adults.

- Paediatric age for tympanoplasty: 5 years.

- Paediatric tympanoplasty: No significance of eustachian tube.

- No impact of size or site of perforation on paediatric tympanoplasty.
MINIMUM AGE FOR PAEDIATRIC TYMPANOPLASTY?

# Medical text: 8-10 Years

[Anatomical maturity of ET: increase in cartilaginous portion and tensor palati mass]

# Study: 5-8 years

[No role of Eustachian tube]

# Medical literature: 2 to 3 years of age
REVIEW OF LITERATURE

- CONCEPT OF SAFE EAR: CHALLENGED?

Complications of CSOM are seen equally in both CSOM-Tubotympanic/Attico antral

All Perforations: Warrant Immediate Closure
REVIEW OF LITERATURE

- EUSTACHIAN TUBE: DISPUTED ROLE?

  #No Consistent Clinical Method For Evaluation

#GAS DIFFUSION THEORY:
[Plausible Pathophysiological Explanation For Middle Ear Diseases]
REVIEW OF LITERATURE

CHILDREN - ideal candidates for tympanoplasty:

- OSSICULAR EROSIONS ARE LESS
- GOOD COCHLEAR RESERVES
- QUALITY OF LIFE IMPROVED:
  # Physical activity: *water sports*
  # Reduced emotional stress
  # Decreased parent concern

- POTENTIAL RISK: CHOLESTEATOMA

- PREVENTION: DEAFNESS [repeated bouts of CSOM]
PREVENTION [WHO Guidelines]:

- ASOM: proper management
- Minimize Risk factors:
  - Good ear hygiene
  - Avoid Dirty water
  - Proper posture during breast feeding
- Immunization: Measles/H Influenzae/ Pneumococcal
- Preschool/School Screening for CSOM
  
  [Patients can be recruited for tympanoplasty]
TAKE HOME MESSAGE

- Discharging ear in children: **Tympanoplasty** is the treatment of choice

- Discharging ear: [morbidity-**DEAFNESS**]
- No role of Eustachian tube
- No concept of safe/unsafe ear

Please do paed tympanoplasty
DAEFNESS: Dreadfull
MAGIC OF SOUND
If you can’t explain it *simply*, you don’t understand it well enough.

– Albert Einstein