Pediatric Seminar

Management of serous otitis media in children

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Clinical Practice Guideline: Otitis Media with Effusion (Update)

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Otolaryngology–
Head and Neck Surgery
2016, Vol. 154(1S) S1–S41
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Otolaryngology—Head and Neck
Surgery Foundation 2016
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DOI: 10.1177/0194599815623467
http://otojournal.org
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NICE guideline

Otitis media with effusion in under 12s

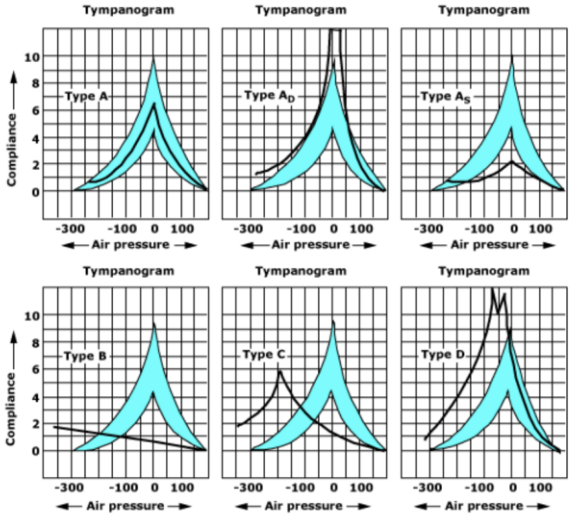
NICE guideline
Published: 30 August 2023

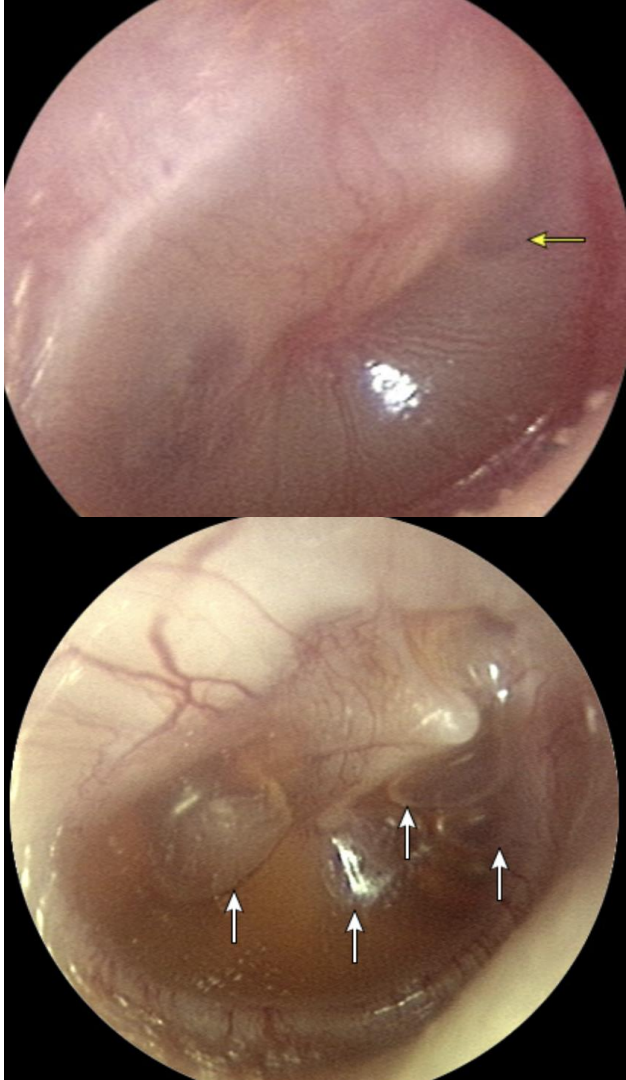
Introduction to OME

- Otitis media with effusion (OME) = middle ear fluid without acute infection
- Often follows acute otitis media (AOM) or Eustachian tube dysfunction
- Usually self-resolving; observation preferred
- Surgery indicated for persistent cases or special populations
- Distinct from AOM; different diagnosis & management

Definitions

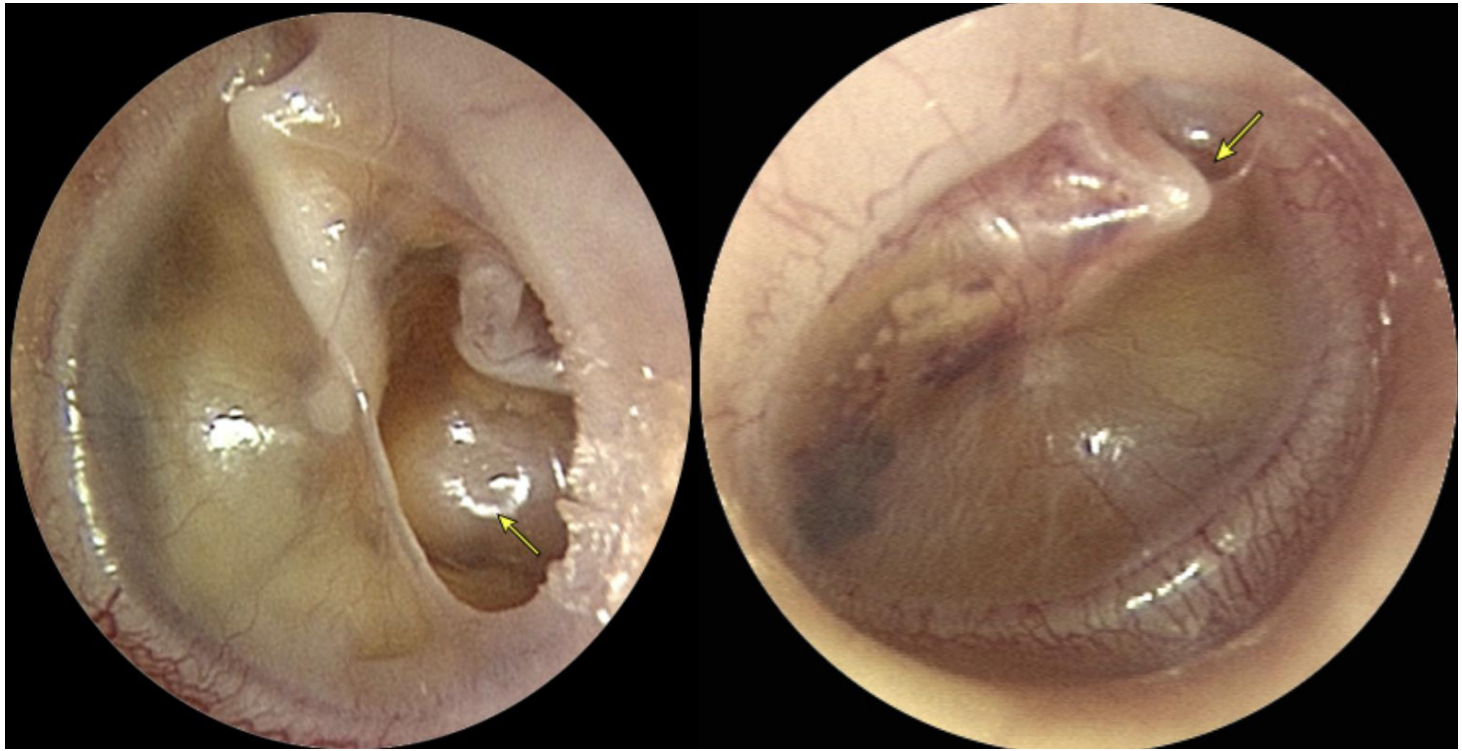
- OME: middle ear fluid, no infection
- Chronic OME: **≥3 months** duration
- Glue ear: **thick, sticky** middle ear fluid
- Tympanometry: diagnostic tool (**Type B**)

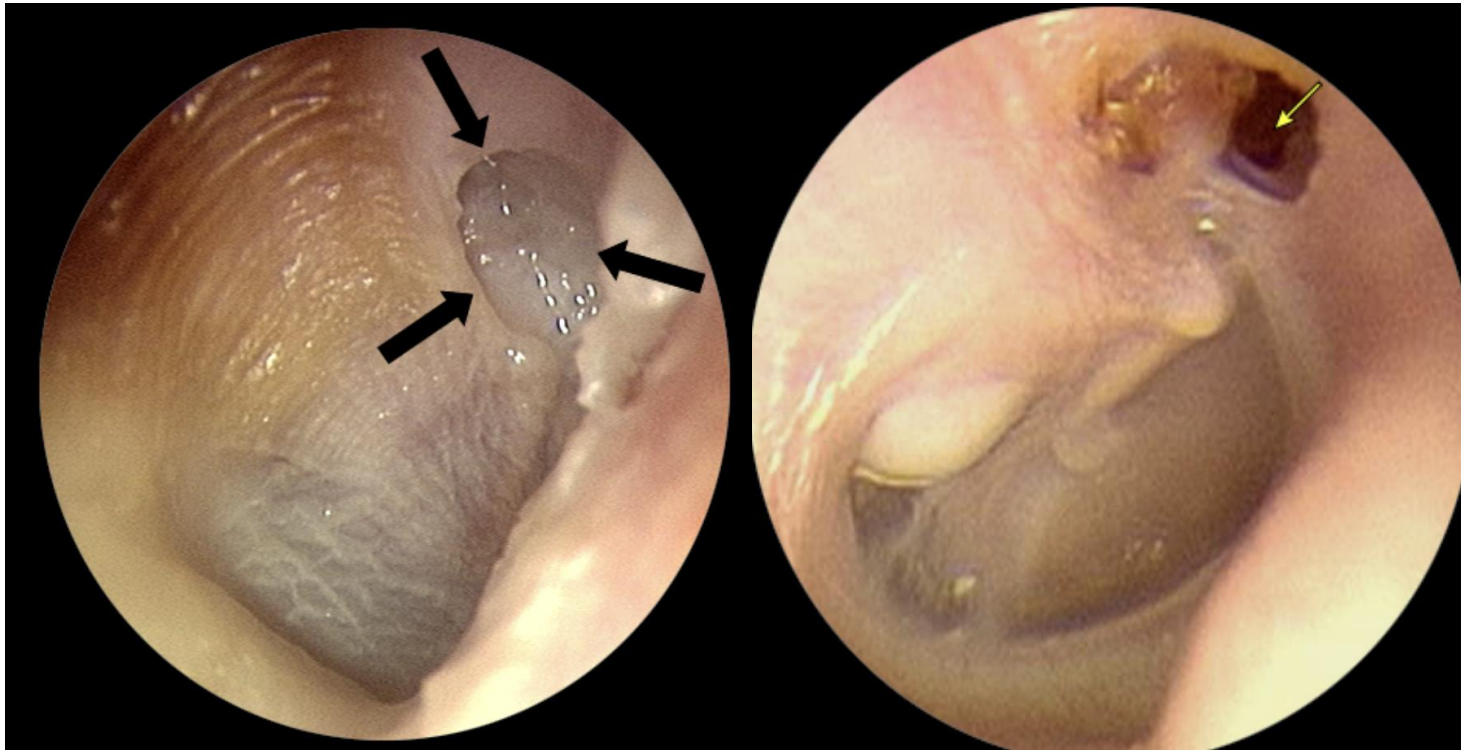




Natural History & Complications

- OME usually resolves within 4–6 weeks
- 30–40% experience recurrence
- Chronic OME can cause conductive hearing loss
- Rare sequelae: tympanic membrane retraction, ossicular erosion, cholesteatoma
- Close monitoring essential for persistent cases





Hearing Loss in OME

- Average hearing loss: 20–28 dB
- 20% have >35 dB loss
- Rarely >50 dB
- Significant impact on speech/language in at-risk children

Management Overview

- Options: watchful waiting vs. tympanostomy tubes
- Myringotomy alone ineffective
- Balloon dilation under investigation
- Hearing aids reserved for special cases
- Unproven: antibiotics, steroids, antihistamines

At-Risk Children

- At risk for speech, language, or learning problems.
- Includes Down syndrome, cleft palate, autism, vision loss
- Early audiology evaluation (>4 weeks OME)
- Surgery if hearing loss significant
- Speech/language therapy as needed

Non–At-Risk Children

- Audiology after 3 months of OME
- Most resolve spontaneously
- Tympanostomy tubes for ≥41 dB hearing loss
- Case-by-case for 16–40 dB loss
- Watchful waiting generally sufficient

Watchful Waiting Strategy

- First-line for normal hearing or mild loss (16–40 dB)
- Reassess every 3–6 months
- Home/school accommodations advised(seat/frequency modulated system)
- High rate of spontaneous resolution

Watchful Waiting Strategy

- No proven benefit of early tubes in mild cases
  - Systematic reviews: Children with tubes 32% less time with effusion(~128 days) in the first year
  - declining after 6–9 months
  - No proven short-term benefits in language/cognition development
- Watchful Waiting vs. Early Tubes: Trial (NEJM. 2007)
  - <3 y/o with effusion randomized: prompt vs. delayed tubes
  - Delayed insertion: up to 9 months if effusion persisted
  - By 9–11 years follow-up: 55% never received tubes
  - Developmental outcomes (speech, language, cognition, psychosocial) assessed at 3, 4, 6, and 9–11 years, no differences

Surgery Indications

- Tympanic membrane damage (retraction, perforation)
- OME with ≥41 dB hearing loss
- Bilateral OME ≥3 months / unilateral ≥6 months
- Recurrent AOM with persistent fluid
- Consider adenoidectomy (≥4 years) if recurrent tympanostomy

Tympanostomy Tubes

- Effective for short-term hearing improvement
- 50% may require repeat surgery
- Modest benefit: 9 dB improvement (1–3 months)
- No proven long-term gains in language/cognition
- Risks: perforation, otorrhea, cholesteatoma

Adenoidectomy

- Consider in ≥4-year-olds needing repeat tubes
- Not first-line in <4 years unless indicated
- Benefits: improved resolution, reduced repeat surgery
- Limited hearing improvement (<5 dB)
- Weigh risks: bleeding, anesthesia, velopharyngeal insufficiency

UNPROVEN OR INEFFECTIVE

- Antibiotics:
  - benefits: resolution of OME within 2-3 months
  - harms: diarrhea, vomiting, skin rash
  - did not reduce rate of tube insertion, TM sequelae
- Steroids:
  - 2023 meta-analysis(n=7), oral glucocorticoids →10 % fewer patients OME at 1-6 weeks of follow-up
  - intranasal glucocorticoids: not helpful
- Antihistamines, autoinflation, decongestants

Other Interventions

- Balloon dilation: promising but needs more study
- Hearing aids: option if surgery contraindicated
- Myringotomy alone: ineffective
- Close follow-up essential

OTOLOGY

Balloon dilation of the Eustachian tube: clinical experience in the management of 126 children

Dilatazione tubarica con balloon: nostra esperienza nella gestione di 126 bambini

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Acta Otorhinolaryngologica Italica, 2017
IF: 2.1, Q2

Introduction

- Initially used only in adults due to anatomical concerns
- First pediatric use: German Armed Forces Hospital, Ulm (2010)

Study Overview

- Retrospective review 60 children (28 m–12 y/o)
- Additional 66 children: parental survey + phone interviews
- Indication: refractory Eustachian tube dysfunction unresponsive to medical/surgical treatment
  (anti-inflammatory agents, decongestants, anti-allergic agents, autoinflation) and surgical treatments (i.e. adenoidectomy, turbinoplasty, myringotomy and tympanostomy tube placement)
- Valsalva maneuver and Toynbee test + Tympanogram (intact TM) + Otomicroscopy.
- Pre op and 6 - 8 wks post op

Surgical Technique

- Modified Sudhoff technique with 30° Hopkins rod
- Balloon inflated to 10 bar for 2 minutes under endoscopy
- Post-op care: xylometazoline drops, panthenol ointment 3 days
- Autoinflation (Valsalva/Otovent) from day 3 post-op

https://www.youtube.com/watch?v=Z1B1z9nhgDI

Results (Group 1)

- 60 children: mean age 6.3 years, mean follow-up 13 months
- 30 unilateral, 30 bilateral dilations
- Positive Valsalva or tympanogram: 8.4% pre-op → 81.7% post-op
- Adhesions resolved in 81.8% of affected cases
  (TM- promontory, TM- long process of incus)
- Minor complications: 1 case epistaxis, s/p bipolar coagulation

Results (Group 2)

- 34 parents (51.5% response rate), mean child age 8 years
- Mean follow-up: 9.5 months
- Hearing improved in 76.5% of children
- Parent satisfaction: 55.9% very satisfied, 25.4% satisfied
- Complications: mild epistaxis n=1, transient pain n=1, otitis media n=3
- 9/34 repeated Balloon dilation

Discussion

- Hesitation: fear of carotid artery injury, (children thinner vessel walls)
- Misconception: osseous portion was being dilated
- Reality: targets cartilaginous portion, safely away from carotid canal
- Balloon length concerns (20 mm) ? → by age 7, Eustachian tube ≈ adult length
- Infant anatomy: cartilaginous-to-osseous ratio ~8:1 vs. 4:1 in adults
- Smaller catheters (1.5 cm, 1.0 cm) are available

Efficacy and safety of balloon dilation of eustachian tube in children: Systematic review and meta-analysis

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International Journal of Pediatric Otorhinolaryngology, 2022
IF: 1.2, Q3

Briefing

- 7 studies; 408 children analyzed; Mean age: 9.9 y/o
- Mean follow-up: 19.2 months
- Type B tympanograms 64.2% → 16.1%
- Air-bone gap (ABG) improved: 25.3 dB → 10.2 dB post-BDET
- BDET vs. ventilation tube: greater ABG improvement (−6.4 dB; p = 0.002)

Characteristics of included studies.

Author	Year	SD	Country	N1	N2	Age	F (N)	Groups	Previous Surgery	Follow-up (Months)	Outcome
Toivonen+ [30]	2021	Prospective with a retrospective matched Cohort	USA	26	46	12.5	10	VT &BDET	VT+ Adenoidectomy	27.6	PTA+ Tympanogram+ Valsalva+ Mucosal Inflammation score+ Complications
Tisch [31]	2020	Retrospective	Germany	167	299	9.1	NA	BDET	VT + Adenoidectomy	2.6	PTA + Tympanogram+ Complications
Chen+ [32]	2020	Retrospective	China	25	46	10.2	12	VT vs BDET	VT	18	PTA + Tympanogram+ Complications
Demir+* [33]	2020	Retrospective	Turkey	62	55	7	17	VT vs BDET	NA	14.4	PTA + Tympanogram+ Complications
Howard [18]	2020	Retrospective	USA	43		12.4	18	BDET	VT + Adenoidectomy	NA	Complications
Leichtle [34]	2017	Retrospective	Germany	52	97	8	25	BDET	VT + Adenoidectomy	12	Tympanogram + Complications
Jenckel [35]	2014	Retrospective	Germany	33	56	11	14	BDET	VT + Adenoidectomy	14	Tympanogram + Complications

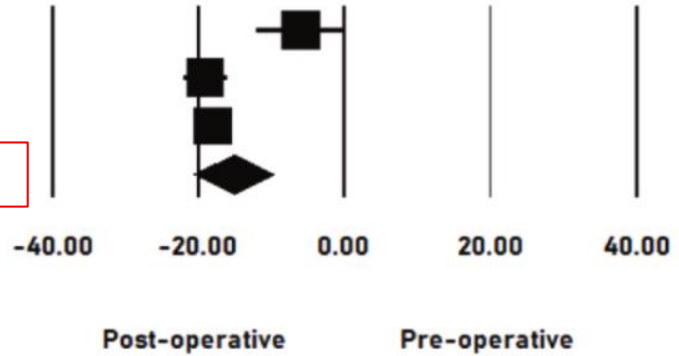
ABG Mean Difference

preop vs post op

Study name	Difference in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Toivonen, 2021	-6.000	3.109	9.669	-12.094	0.094	-1.930	0.054
Chen, 2020	-19.030	1.556	2.420	-22.079	-15.981	-12.233	0.000
Demir, 2020	-18.000	1.208	1.458	-20.367	-15.633	-14.906	0.000
	-15.149	2.790	7.785	-20.618	-9.681	-5.430	0.000

Statistics for each study

Difference in means and 95% CI

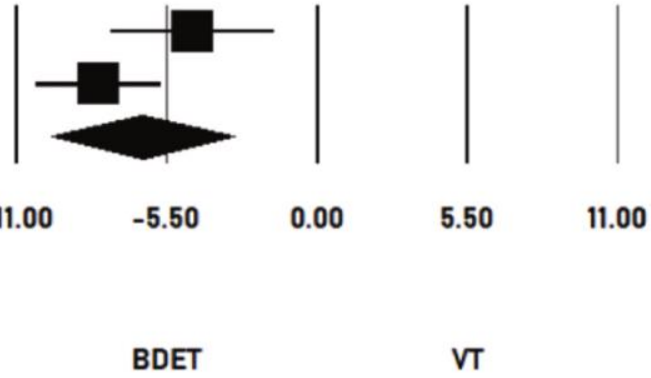


ABG Mean Difference (BDET Vs. VT)

Study name	Difference in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Chen, 2020	-4.570	1.513	2.288	-7.535	-1.605	-3.021	0.003
Demir, 2020	-8.000	1.180	1.392	-10.312	-5.688	-6.781	0.000
	-6.416	1.710	2.924	-9.767	-3.064	-3.752	0.000

Statistics for each study

Difference in means and 95% CI



Two-arm meta-analysis results comparing BDET vs VT.

ETBD vs VT	No. of Study	Pooled Estimate	95%CI (LL-UL)	SE	I [2]	P-value
Pre-operative ABG (Std Mean Diff)	2	0.016	(-0.515-0.546)	0.271	73	0.9
Post-operative ABG (Std Mean Diff)	2	−0.928	(-1.5–0.35)	0.295	74	0.002
Post-operative ABGMean Diff	2	−6.416	(-9.76—3.06)	1.7	68.7	<0.001
Failure Rate (OR)	3	0.24	(0.1–0.4)		80.9	0.013

1. Failure: need for reoperation, persistent type B tympanogram or the persistence of symptoms.
2. BDET showed a significant lower failure rate

Complication

- Pooled complication rate: 5.1% (95% CI 3.1–8.4) across 7 studies
- Most complications: self-limited epistaxis
- 2 cases of patulous Eustachian tube (resolved, Toivonen et al.)
- 1 case of vertigo (vestibular migraine, Howard et al.)
- 3 cases of hemotympanum (resolved spontaneously)

Take Home Message

- At risks vs non at risks
- Watchful waiting
- Op indication
  a. TM damage (retraction, perforation)
  b. OME with ≥41 dB hearing loss
  c. Bilateral OME ≥3 months / unilateral ≥6 months
  d. Recurrent AOM with persistent fluid
  e. Consider adenoidectomy (≥4 years) if recurrent tympanostomy
- Guideline unproved: antibiotics, steroids, antihistamines, autoinflation, decongestants
- Balloon dilatation: effective, safe, lack trial or RCT

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