

Level of Evidence	Source	Study Type	ENT Domain	Scope	Key Findings	Limitations and biases
1 (Randomized trial or Systematic review)	Mutzbauer et al. 2001	Randomized, double-blind trial	Otology (ET function)	15 divers (30 ears)	O ₂ dives caused transient ET dysfunction; antioxidants (C + E) did not prevent it. First controlled experiment on hyperbaric ET adaptation.	Randomized design with clear methodology; small sample size limits precision → low risk of bias.
	Moayed S et al. 2025	Randomized, double-blind trial	Otology (Middle Ear Barotrauma)	1 study (42 treatment vs 42 placebo)	Tested pseudoephedrine prophylaxis before first HBO ₂ exposure. Found no significant reduction in ear-pain scores, Teed scores, or need for rescue oxymetazoline compared with placebo.	Prospective randomized design with clear protocol and adequate power calculation → low risk of bias.
	Livingstone DM et al. 2017	Systematic review	Otology	62 studies	74 papers synthesised; evidence-based recommendations for outer, middle, inner-ear disorders and prevention.	Transparent PRISMA methods; heterogeneous observational data → moderate risk of bias.
	Livingstone DM & Lange B 2018	Systematic review	Rhinology & OMF	32 studies	Sinus barotrauma, barodontalgia, TMD, post-op fitness; practical ENT guidance.	Systematic approach; observational evidence only → moderate risk of bias.
	Lindfors OH et al. 2021	Systematic review (+ meta-style synthesis)	Otology (IEBt vs IEDCS)	41 studies (580 patients)	Quantitative tables; algorithm to differentiate IEBt / IEDCS.	Robust synthesis; predominance of retrospective data → moderate risk of bias.

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	Lindfors OH et al. 2021 [MEBt survey]	Cross-sectional survey	Otology (MEBt prevalence & risk factors)	1,881 Finnish divers (27% response rate)	81% reported lifetime MEBt; 38% used medications; 1% required ENT surgery. Strongest risk factors: poor Valsalva success (OR 11.56; 95% CI 7.24-18.47), poor Toynbee success (OR 3.51; 95% CI 1.95-6.30).	Large survey; self-report bias; 27% response rate introduces selection bias → moderate risk of bias.
	Lindfors OH et al. 2021 [Sinus survey]	Cross-sectional survey	Rhinology (sinus barotrauma)	1,881 Finnish divers (same cohort as MEBt survey)	49% reported sinus barotrauma; 32% used medications. Risk factors: pollen allergy OR 1.59, smoking OR 2.04, ≥3 URTIs/year OR 2.76.	Same cohort as Lindfors MEBt 2021; self-report bias → moderate risk of bias.
	Rozycki SW et al. 2018	Systematic review	Otology (IEBt/ IEDCS - HOOYAH tool)	302 manuscripts screened; 21 included	Developed HOOYAH diagnostic tool for differentiating IEBt from IEDCS. Tinnitus 73% IEBt; vertigo 46%. Conservative management for IEBt; recompression within 6h for IEDCS.	Systematic search; tool not prospectively validated → moderate risk of bias.
	Chen T et al. 2023	Systematic review	Rhinology	27 studies (232 patients)	Pooled data on barosinusitis; 92% surgical success; management algorithm.	Comprehensive search; uneven primary quality → moderate risk of bias.
	Lechner M et al. 2018 - Part 2	Systematic review / guideline synthesis	Fitness to Dive	> 30 guidelines & studies	Compared UK, US, EU ENT fitness criteria; clarified contraindications & return-to-dive timelines.	Clear inclusion & comparative analysis; consensus-based evidence → low risk of bias.
	Alolaiwi L et al. 2025	Systematic review (SWiM, JBI)	Oral & Maxillofacial	7 cross-sectional studies	Prevalence of orofacial pain, barodontalgia, TMD; prevention framework.	JBI appraisal; very high heterogeneity → moderate risk of bias.

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2 (Prospective studies)	Uzun C et al. 2002	Prospective cohort	Otology	24 divers (48 ears)	Mastoid pneumatization inversely related to MEB risk.	Prospective cohort with objective imaging; single-centre small cohort → moderate risk of bias.
	Uzun C. 2005	Prospective observational study	Otology (pre-dive ET screening)	31 military divers, 774 dives	9-step tympanometric battery + mastoid pneumatization assessment: PPV 86% for predicting symptomatic MEBt. Objective screening may complement self-assessment.	Military cohort; single centre; limited generalizability to recreational divers → moderate risk of bias.
	Skogstad et al. 2009	12-yr prospective cohort	Otology (hearing loss)	30 commercial divers	Dive exposure >650 dives associated with HF hearing loss (4 & 8 kHz)	Noise exposure confounders; modest sample
	Blake DF et al. 2015	Prospective observational cohort	Otology (MEBt in novice divers)	67 novice trainees, 4-day certification course	48/67 (72%) developed MEBt during training. Language of instruction not significantly associated with MEBt incidence (adjusted OR 0.82; 95% CI 0.21-3.91).	Short observation window; single site → moderate risk of bias.
	Jansen S et al. 2016 [same cohort as Meyer 2017]	Prospective observational cohort	Otology (MEBt, repetitive diving)	28 recreational divers, 437 dives over 6 days	MEBt prevalence 36.5% by final examination, increasing with dives per day. Greater experience was protective.	Same cohort as Meyer 2017 - not independent replication; saltwater only; short duration → moderate risk of bias.

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	Meyer M et al. 2017 [same cohort as Jansen 2016]	Prospective observational cohort	Otology (ET function, repetitive diving)	28 recreational divers, 437 dives over 6 days [same dataset as Jansen 2016]	Significant positive middle-ear pressure shift day 1 to day 3 ($P<0.0001$). Decreased compliance and increased peak pressure across diving week. Effects most pronounced in less experienced divers.	Same dataset as Jansen 2016; not independent replication; short-duration saltwater cohort → moderate risk of bias.
	St Leger Dowse M et al. 2022	Cross-sectional survey	Otology (aural health awareness)	790 UK scuba divers	79% reported ear disorders since learning to dive; 40% met ETDQ-7 threshold for ETD; 35% aborted a dive for ear problems; only 27% aware of UKDMC guidance. 23% self-medicated with decongestants.	Self-report survey; convenience sampling; response bias likely → moderate risk of bias.
	Duplessis C et al. 2008	Pilot interventional cohort	Otology	9 divers	Surfactant / laser ET tuboplasty improved equalization in most.	Non-randomized pilot with short follow-up → moderate risk of bias
3 (Retrospective cohort or case-control studies)	Klingmann C et al. 2007-2012	Retrospective cohort	Otology (IE DCS & barotrauma)	~100 cases across series	Strong link between right-to-left shunt and IE DCS; HBOT timing critical.	Retrospective design; consistent outcomes across series → moderate risk of bias.
	Kitajima et al., 2014	Retrospective cohort	Otology (AV)	44 divers w/ middle-ear diving accidents; 20 controls; serial ET function tests	97.7% of symptomatic divers had ET dysfunction; persistent AV often linked to allergic rhinitis; improvement with ET therapy	Retrospective design; single tertiary center → moderate risk of bias.

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	Klingmann C et al. 2006	Retrospective cohort	Neurotology	63 divers (mean 650 dives)	Alternobaric vertigo prevalence 27%; incidence ~6% of dives; 90% occurred on ascent; strong association with ETD; female divers had 4× risk	Recall bias; no imaging correlation; small female subgroup
	Gempp E & Louge P 2013	Retrospective case series	Otology (IEDCS)	115 recreational divers, 13-year period	IEDCS = 24% of treated DCS patients. Median onset 20 min post-surfacing. Pure vestibular 76.5%; cochlear 6%; combined 17.5%. Large R-L shunt in 77%; right-sided lateralisation 80% (P<0.001). Incomplete recovery 68%.	Retrospective single-centre; referral bias; follow-up completeness not stated → moderate risk of bias.
	Mason JS et al. 2023	Retrospective cohort	Otology (IEDCS)	23 IEDCS patients (24 episodes), Fiona Stanley Hospital 2014-2020	88% vestibular; 38% cochlear. Median depth 24.5 m; dive time 40 min. Median time to HBOT: 22 hours. Complete recovery 58%. PFO in 6/10 investigated.	Retrospective single-centre; small sample; treatment delay reflects system factors → moderate risk of bias.
	Guenzani S et al. 2016	Retrospective survey / case series	Otology (IEDCS in trimix divers)	126 recreational trimix divers (9 IEDCS cases)	7.1% reported ≥ 1 IEDCS episode; 7/9 without omitting decompression stops. All had vestibular symptoms; 5/9 had PFO; 3/9 had persistent balance problems after event.	Retrospective questionnaire; small case numbers; self-selected trimix sample → high risk of bias.
	Azzopardi C et al. 2019	Retrospective database analysis	Otology (vestibulo-cochlear DCI trends)	437 DCI cases treated in Malta 1987-2017	Vestibulo-cochlear DCI prevalence increasing over 30 years while musculoskeletal DCI decreasing, suggesting changing diving practice patterns.	Long retrospective window; potential diagnostic criteria drift and coding biases over 30 years → moderate-to-high risk of bias.

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	Stokes RJ et al. 2025	Prospective case series	Otology (IEDCS vestibular rehabilitation)	13 divers with acute IEDCS receiving vestibular rehabilitation	Vestibular/balance measures improved by discharge and 3-month follow-up. However, 67% still had objective vestibular deficits (positive HIT or nystagmus on VNG) despite symptom resolution. Early vestibular rehab recommended.	Small series; no control group; variable severity and treatment timing → high risk of bias.
	House et al., 2001	Retrospective survey	Otology	22 scuba divers post-stapedectomy	Only temporary middle-ear barotrauma symptoms; no cases of permanent cochleovestibular injury ∴ diving generally safe if ET function normal	Self-reported outcomes; selection bias; technique-era prostheses
	Klingmann C et al. 2007	Retrospective cohort	Diving accidents	306 divers	Prevalence: ETD 24%; MEBt 11%; IEBt 8%; sinusitis 11%; OE/exostoses 8%	Tertiary referral bias; not general population
4 (Case series)	Hintze JM et al. 2019	Case series (3 divers, 5 CIs)	Otology (CI)	5 implants	Demonstrated safety and rare electrode extrusion in CI divers.	Very small series; selection bias → high risk of bias.
	Smart D 2024	Case series	Otology (IEBt + HBOT)	5 consecutive divers with IEBt-associated SNHL	HBOT given 24h-12 days after diving: median improvement 28 dB across frequencies, 38 dB for PTA4. All 5 improved. Challenges blanket contraindication of recompression in IEBt-associated SNHL.	Very small series; no controls; causal attribution unconfirmed; requires prospective validation → high risk of bias.

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	Shupak 2006	Case series	Otology (Recurrent IEBt)	2 divers	Recurrent IEBt linked to abnormal cochlear aqueduct / IAC anatomy	Rare cases, limited generalizability
	Parell & Becker 1993	Long-term follow-up case series	Otology	20 divers	No recurrence of IEBt when equalisation optimised; supports return-to-dive in selected cases	No controls; self-selected divers
	Velepik M. et al., 2001	Case series	Otology (TM recon)	3 divers with >75% TM defects undergoing palisade tympanoplasty	All three divers passed audiological & pressure-tolerance testing at 6 months and successfully returned to diving; remained symptom-free at 2-year follow-up.	Very small sample; no control group; limited long-term detail
	Morvan et al., 2016	Case series	Otology (PLF after barotrauma)	11 PLF cases (8 scuba, 3 freediving); median 7.4 yr follow-up	7 surgical explorations: cochlear fenestral leaks visualised; early surgery → excellent hearing/ vestibular outcomes	Retrospective; referral and selection bias
5 (Case reports)	Parsons D et al. 2023	Case report	Otology (IEDCS)	1 diver (routine dive + recompression chamber drill)	IEDCS after non-extreme dive profile; highlights risk in apparently conservative diving scenarios.	Single case; limited generalizability → high risk of bias.
	Zeitler et al., 2018	Case report	Otology (Cochlear implant)	1 diver with a cochlear implant	No change in implant function or residual low-frequency hearing; no barotrauma or DCS	Single case ∴ low generalizability

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	Adkisson & Meredith, 1990	Case report	Otology (IEDCS + PLF)	1 diver w/ neurologic DCS + hearing loss; intraop round window fistula	DCS and IEBt can coexist; recompression improved symptoms; surgery resolved persistent deficits	Diagnostic overlap. Single case ∴ low generalizability
	Utz & Wise 2019	Case report	Facial nerve baroparesis	1 U.S. Navy diver with recurrent facial nerve palsy during ascent	Recurrent facial baroparesis linked to ET dysfunction + tympanic segment dehiscence on CT. Eustachian tube balloon dilation eliminated symptoms; 20+ subsequent dives uneventful.	Single case; limited follow-up (12 months); unclear generalisability; underlying anatomy atypical
	Hyams AF et al. 2004	Case report (+ review)	Facial nerve	1 + 23 cases from literature	Facial baroparesis post-overpressure; myringotomy ± steroids; full recovery.	Single case report with secondary data → high risk of bias.