IMPACT OF PERIOPERATIVE HYPERBARIC OXYGEN THERAPY ON FREE FLAPS OUTCOMES FOR REFRACTORY OSTEORADIONECROSIS: A SCOPING REVIEW

Authors: Natalie Quinn BS, Logan McColl MD, MBA, Darien Reed BS, Fahad Rind MD, Karthik Chakravarthy BS, PhD, Nolan Seim MD, MBA
Institutions: Ohio State University College of Medicine, Department of Otolaryngology – Head and Neck Surgery, The Ohio State University, Columbus, OH

The James
The Ohio State University
Wexner Medical Center

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Introduction

Hyperbaric oxygen therapy (HBOT) in head and neck reconstruction is most studied for osteoradionecrosis (ORN), which affects the mandible and skull base.[1–5]

The utility, optimal population, timing, and dosing for HBOT in ORN remain debated and understudied.[4,6–8]

Objectives

- To describe study- and patient-level clinical, surgical, and free-flap outcomes among ORN patients treated with free-flap reconstruction and perioperative HBOT.
- To characterize the existing evidence, assessing completeness of outcome reporting and appraising evidence quality.

Methods

Data Sources: PubMed, EMBASE, Scopus, Web of Science, Cochrane Library (inception-Sept 10, 2026).

Review Methods: PICO-framed systematic search per PRISMA; titles, abstracts, and full texts independently dual-screened.

Eligibility Criteria: ORN patients undergoing vascularized free flap reconstruction with perioperative HBOT

Outcomes of Interest: study- and patient-level demographic, disease, adjuvant therapy, HBOT protocol, and free flap outcome data

Risk of Bias: Methodological quality was appraised using JBI checklists appropriate to study design

Results

Study Selection: 348 screened → 235 duplicates removed → 113 screened, 80 excluded → 33 assessed, 29 excluded → 4 included.

Table 1. Studies Included

Variable	Ang	Sawhney	Kadakia	LaBanc
Institution	Single	Multi-[1]	Multi-[1]	Multi-[1]
Study design	Case series	Case series	Case series	Retro. cohort study
N	21	37	23*	311
HBOT/Non-HBOT	10 / 11	26 / 11	17 / 6	131 / 180

[1]All share one private-practice site.
*23 free-flap subset of 47 total

Table 2. Clinical Characteristics Reported

Variable	Ang	Sawhney	Kadakia	LaBanc	%
Demographics	●	●	●	●	100%
Cancer Type	●	○	●	○	50%
Primary Site	●	○	●	○	50%
TNM Staging	●	○	○	○	25%
RT Exposure	●	●	●	●	100%
RT Dose	●	●	○	○	50%
Chemotherapy Exposure	●*	○	○	○	25%
Time from RT to ORN Diagnosis	●	●	○	○	50%
Site of ORN	●	●	●	●	100%
Pathologic Fracture Present	●	●	○	○	50%
% Complete	100 %	60%	50%	30%	60%

*Reported; no patients received.

Table Legend:
●= reported; ○= not reported

%: percent of studies reporting the variable

% Complete: percent of studies complete for all variables

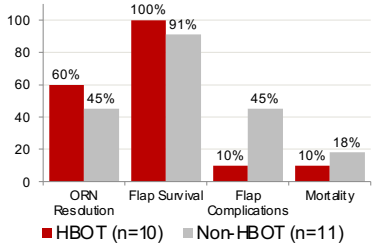
Table 3. Interventions Reported

Variable	Ang	Sawhney	Kadakia	LaBanc	%
Adjuvant Antibiotics	○	●	●	○	50%
Perioperative HBOT Timing	●	●	●	●	100%
HBOT Sessions	●	●	●	●	100%
HBOT Pressure	○	○	○	○	0%
HBOT Duration	○	○	○	○	0%
% Complete	40%	60%	60%	40%	50%

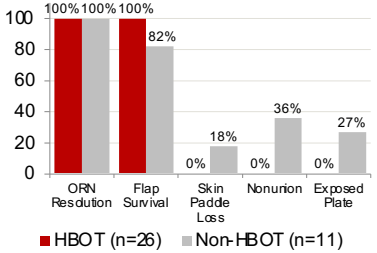
Table 4. Clinical Outcomes Reported

Variable	Ang	Sawhney	Kadakia	LaBanc	%
Flap Type	●	●	●	●	100%
Flap Survival	●	●	●	●	100%
Flap Complication	●	●	●	●	100%
ORN Resolution	●	●	●	○	75%
Length of Stay	○	○	○	○	0%
Follow-Up Duration	●	●	●	○	75%
Mortality	●	○	●	○	50%
% Complete	86%	71%	86%	43%	71%

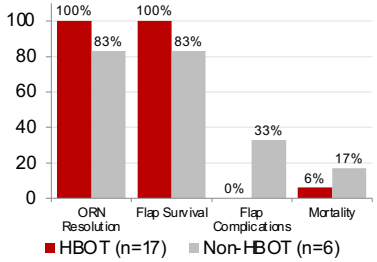
HBOT vs. Non-HBOT Outcomes: Ang et al. 2003



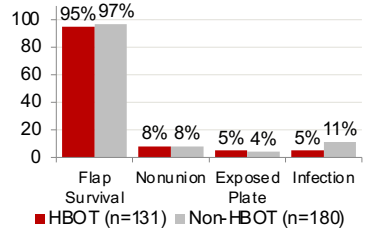
HBOT vs. Non-HBOT Outcomes: Sawhney et al. 2013



HBOT vs. Non-HBOT Outcomes: Kadakia et al. 2017



HBOT vs. Non-HBOT Outcomes: LaBanc et al. 2025



Discussion & Conclusion

- HBOT assignment was not clinically based. All were assigned by access/preference.
- Reporting was inconsistent: demographics and flap outcomes were well reported, but zero studies reported HBOT dosing (pressure, duration).
- Flap survival and ORN resolution were similar across arms; non-HBOT patients had more flap complications and higher mortality in most studies.
- Three of four studies share the same senior author/practice and overlap in enrollment years.
- Given non-standardized assignment, incomplete reporting, and possible cohort overlap, no valid conclusions can be drawn on perioperative HBOT's utility in free flap reconstruction for ORN.
- Future studies must use randomized or propensity-matched designs, clinically driven assignment, and standardized reporting.