

Avascular Necrosis of the Femoral Head

ELECTIVE — but staged by collapse, not by time from onset

An adjunct in early, pre-collapse femoral-head osteonecrosis, aiming to preserve the joint and delay or avoid arthroplasty.

TREATMENT PROTOCOL

Pressure	2.0–2.5 ATA (2.5 ATA in the anchor trial)
Duration	60–70 min at pressure; up to 90 min in some series, with an optional 10-min air break
Frequency	Once daily
Sessions	Ficat I: 30–40, then MRI and orthopaedic review at 1 month. Ficat II: 30–40, a pause of 20–30 days, then a further 20. Ficat IIIA and beyond: repeatable once or twice at 4–6 months
Review	After 40 treatments, with a new MRI at least a month later

PATIENT SELECTION

Who to treat	Early-stage aseptic osteonecrosis, most evidence in the femoral head, at Ficat I–II or Steinberg I–II — that is, pre-collapse. Earlier stages respond best.
Who not to treat, or when to stop	Limited value after subchondral collapse (Ficat III and beyond) — benefit is stage-dependent and falls away once the joint surface has collapsed; the manual says definitive surgery for collapsing cortical bone should not be postponed.
Mechanism	Raises oxygen tension in the ischaemic femoral head; reduces marrow oedema and intraosseous pressure, interrupting the compartment-like ischaemia-oedema cycle; supports angiogenesis and osteogenesis.
Outcome measure	Pain and range of motion; arthroplasty rate; radiographic healing and MRI normalisation; Harris Hip Score.

WHAT THE NUMBERS SHOW

- Camporesi 2010 RCT (n=20, double-blind, hyperbaric-air control, Ficat II): significant pain and range-of-motion improvement at 6 weeks; at 7 years (uncontrolled after crossover) all substantially pain-free, no arthroplasty, radiographic healing in 7 of 9 hips.
- Paderno 2021 (10 studies, 721 patients): clinical benefit OR 3.84 (95% CI 2.10–7.02, P<0.00001).
- Niu 2026 network meta-analysis (29 studies, 2,177 hips): HBO regimens ranked first for pain, but no intervention reduced conversion to hip replacement; every outcome low or very low certainty.
- Cao 2025 (10 studies, 568 patients): improved events RR 1.83 (95% CI 0.37–9.09, P=0.46) — no significant difference against control.
- Reis 2003 (16 hips, Steinberg I): MRI normalisation 81% treated against 17% in another centre's published untreated patients.

EVIDENCE BASE

Shape and certainty	Anchored by one small double-blind randomised trial (n=20, single centre). Multiple meta-analyses exist, but the positive ones are heterogeneous, predominantly Asian, and one (Paderno) shares authorship with the anchor trial; the meta-analysis isolating the controlled comparison is null, and a 2026 network meta-analysis found no intervention reduced hip replacement. UHMS accepts this at grade 2B; ECHM at Type 2 / Level B. The wiki holds the page as guarded.
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Study	Design	Result and risk of bias
Camporesi 2010, J Arthroplasty — PMID 20637561	Double-blind RCT, n=20	Positive in Ficat II; RoB 2 some concerns
Paderno 2021 — PMID 33808951	Meta-analysis, 10 studies	Positive, OR 3.84
Niu 2026, Front Cell Dev Biol — PMID 42529114	Network meta-analysis, 29 studies	Mixed — pain favours HBO; no effect on hip replacement
Cao 2025, EFORT Open Rev — PMID 40591670	Meta-analysis, 10 studies	Null against control, RR 1.83 (0.37–9.09)
Reis 2003, JBJS Br — PMID 12729112	Historical-control cohort, 16 hips	Positive; ROBINS-I critical

WHAT THE EVIDENCE DOES NOT SUPPORT

Cautions	No benefit after subchondral collapse. The meta-analysis isolating the controlled comparison found no significant difference against control despite real before-and-after gains — patients improve, but not measurably more than those who were not treated. The UHMS chapter and the positive trials share authorship, which the wiki flags as an independence caveat. A combination trial adding shockwave and alendronate showed no arthroplasty advantage and cannot isolate a hyperbaric effect.
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STATUS AND SOCIETY POSITIONS

Status	Not a PMB condition — M87.05 is not on the CMS coded list. Relies on the clinical and SAUHMA argument plus NRPL recognition, supported by UHMS 2B and ECHM Type 2 / Level B.
ICD-10 (SA)	M87.05, M87.15, M87.25, M87.35, M87.85, M87.95, M90.35
ECHM 2017 (Type, Level)	Initial-stage femoral head necrosis 2B

Compiled from the UHMS Hyperbaric Oxygen Therapy Indications Manual, 15th edition (2023) and the appraised trial evidence held in an HBOT evidence library. All treatments are 100% oxygen. US Navy Treatment Table profiles are named, not reproduced — the US Navy Diving Manual is the operative document at the chamber. Session counts are largely guideline convention rather than dose-finding evidence. This card summarises published parameters and does not replace those source documents or clinical judgement for the individual patient. Generated 28 October 2026. Not a SAUHMA publication and carries no society endorsement.