

# Compromised Grafts and Flaps

**START AS SOON AS COMPROMISE IS SUSPECTED — salvage falls away by 24 h**

A salvage adjunct for compromised but not yet necrotic grafts and flaps, raising oxygen tension in the marginally perfused bed.

## TREATMENT PROTOCOL

|           |                                                                                                                        |
|-----------|------------------------------------------------------------------------------------------------------------------------|
| Pressure  | 2.0–2.5 ATA                                                                                                            |
| Duration  | 90–120 min, depending on facility and patient                                                                          |
| Frequency | Twice daily on initiation, stepping down to once daily once the area proves viable and stable                          |
| Sessions  | No fixed count — driven by tissue response; <b>TcPO2 below 40 mmHg warrants continued therapy</b> (Francis 2017)       |
| Review    | After 20 treatments, at two separate points: preparing the recipient site, and again after the graft or flap is placed |

## PATIENT SELECTION

|                                   |                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Who to treat                      | Grafts and flaps that are <b>compromised but not yet necrotic</b> — failing perfusion, venous congestion, arterial insufficiency, reperfusion injury, or an irradiated or hypoxic bed at high risk of failure.                                                                                                                                              |
| Who not to treat, or when to stop | <b>Not for healthy, well-perfused grafts and flaps.</b> Not indicated in any routine skin grafting (Francis 2017). A 10-patient randomised study of routine use in uncomplicated free-flap transfer found no difference, but analysed only 8. Surgically correctable causes — venous congestion, anastomotic compromise — must be fixed first or alongside. |
| Mechanism                         | Raises oxygen tension in the marginally perfused bed; enhances fibroblast function and collagen synthesis; stimulates angiogenesis; mitigates reperfusion injury through nitric-oxide and VEGF-mediated suppression of neutrophil adhesion.                                                                                                                 |
| Outcome measure                   | Complete graft take and graft-area survival; flap necrosis; healing time. <b>Transcutaneous oximetry predicts failure below about 50 mmHg at pressure.</b>                                                                                                                                                                                                  |

## WHAT THE NUMBERS SHOW

- Perrins 1967 RCT** (n=48): complete take **64% vs 17%, NNT about 2**; mean graft-area survival by intention to treat **84.2% vs 62.7%, difference 21.5% (t=2.92, P<0.01)**. *The widely quoted 29% figure is per-protocol, not the intention-to-treat result.*
- Waterhouse 1993** (free flaps): **89% salvage when started within 24 h; total loss when started after 3 days.**
- Bowersox 1986** (n=105): failure was tied to delay beyond two weeks — 19.8 against 4.6 days post-operatively.
- Roje 2008** (n=388, war injuries): skin-graft lysis 23% vs 52%; flap necrosis 15% vs 51%, both P<0.001.
- Uniyal 2025 RCT** (n=64): graft uptake at day 7 **91.7% vs 83.1%, P=0.026.**

## EVIDENCE BASE

|                     |                                                                                                                                                                                                                                                                                              |
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| Shape and certainty | About 24 records. UHMS grades this <b>class IB</b> — one randomised trial plus non-randomised studies. An independent GRADE review rates graft-take evidence low to moderate. Cochrane 2013 found four trials too heterogeneous to pool — a lack of high-quality evidence, Perrins included. |
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| Study                                  | Design                                | Result and risk of bias                   |
|----------------------------------------|---------------------------------------|-------------------------------------------|
| Perrins 1967, Lancet — PMID 4164367    | RCT, n=48                             | <b>Positive</b> ; RoB 2 high              |
| Uniyal 2025 — PMID 40215364            | RCT, n=64                             | Positive                                  |
| Vishwanath 2011, MJAFI — PMID 27365816 | RCT, n=10, routine use                | <b>Null</b> ; 8 analysed, underpowered    |
| Carter 2026 — PMID 42199243            | SR / meta, 24 studies, 2,246 patients | Positive; UHMS-linked authorship declared |
| Eskes 2013, Cochrane — PMID 24343585   | SR, 4 trials                          | Lack of high-quality evidence             |

## WHAT THE EVIDENCE DOES NOT SUPPORT

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Cautions | Routine or prophylactic use on uncomplicated flaps is not supported. A case-control study of perioperative treatment for breast reconstruction after radiotherapy (15 per arm) found no difference in complications; the treated group started with <b>worse baseline radiation damage</b> (3.55 vs 2.89, P=0.001) — confounding, not harm. A 2026 flap-survival odds ratio of 8.57 is directional only, resting predominantly on Chinese-database trials. A 2026 plastic-surgery meta-analysis (18 studies) pooled complications at <b>OR 0.48 (95% CI 0.09–2.66, P=0.40)</b> — <b>null</b> , although its abstract calls it a 52% reduction. |
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## STATUS IN SOUTH AFRICA

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| Status | Accepted indication in South Africa (NRPL-recognised); no dedicated SAUHMA protocol. No direct PMB code — argued via the underlying condition requiring the graft or flap. |
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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 03 October 2026. Not a SAUHMA publication and carries no society endorsement.