Early Wound-Healing and Recovery-Quality Outcomes with Adjunctive Hyperbaric Oxygen Therapy (OxyCure) After Follicular Unit Extraction Hair Transplantation

A Prospective Observational Cohort Study at Vera Clinic

Vera Clinic Academy, Istanbul, Turkey

Abstract

Background: Adjunctive hyperbaric oxygen therapy (HBOT) has been reported to reduce early post-operative follicle shedding and folliculitis after hair transplantation, without a significant effect on long-term graft survival [1]. At Vera Clinic, this therapy is offered in-house under the name OxyCure as part of enhanced post-operative care following follicular unit extraction (FUE). Whether OxyCure use is associated with measurable differences in early recovery quality has not previously been assessed using Vera Clinic Academy's own patient data.

Methods: This prospective observational cohort study enrolled 83 adult patients (40 in the no-OxyCure group; 43 in the OxyCure group, inflated to anticipate expected incomplete therapeutic exposure) undergoing first-time FUE hair transplantation at Vera Clinic, allocated by patient choice to adjunctive OxyCure therapy or standard aftercare alone (non-randomized, as OxyCure is an optional service). Patients were assessed at baseline and on post-operative days 3, 7, 14, and 30. Primary outcomes were early follicle shedding percentage, incidence of folliculitis/itching, and a single-item early-recovery satisfaction rating at day 14. Secondary outcomes included a 0–10 comfort/pain visual analogue scale, days to resumption of normal activity, and HBOT-related adverse events. Graft survival was not assessed as an outcome of this study.

Results: Of 115 patients screened, 83 were enrolled (43 OxyCure, 40 no-OxyCure); 36 (83.7%) and 35 (87.5%) were included in the Day-30 efficacy analysis in the OxyCure and no-OxyCure groups, respectively, after excluding 3 OxyCure patients with incomplete therapeutic oxygen exposure (see Section 2.9). Groups were comparable at baseline. Follicle shedding was lower in the OxyCure group at Day 14 (34.8% ± 9.2% vs 47.6% ± 11.4%; $p = 0.008$) and Day 30 (22.1% ± 7.4% vs 29.3% ± 8.9%; $p = 0.031$). Folliculitis/itching incidence (19.4% vs 37.1%; $p = 0.089$) and Day-14 satisfaction (75.0% vs 57.1% satisfied/very satisfied; $p = 0.114$) were directionally lower/higher but did not reach statistical significance. Comfort/pain VAS was lower in the OxyCure group at Day 7 (3.1 ± 1.3 vs 3.9 ± 1.5; $p = 0.021$). Median time to activity resumption was 6 days (IQR 5–8) vs 7 days (IQR 6–9; $p = 0.045$). Among 43 OxyCure sessions delivered, 3 (7.0%) were discontinued early for claustrophobic discomfort; no barotrauma or oxygen toxicity was reported.

Conclusions: In this prospective cohort, adjunctive OxyCure therapy was associated with reduced early follicle shedding and improved Day-7 comfort relative to standard aftercare; differences in folliculitis/itching and Day-14 satisfaction were directionally consistent but not statistically significant at this sample size. Effect sizes were substantially smaller than those reported by Fan et al. [1], plausibly reflecting the lower HBOT dose (one to two sessions) used in the Vera Clinic protocol.

Keywords: hyperbaric oxygen therapy; hair transplantation; follicular unit extraction; post-operative recovery; follicle shedding; adjunctive therapy

1. Introduction

Follicular unit extraction (FUE) hair transplantation involves the creation of thousands of micro-incisions in the recipient scalp and the harvesting, handling, and re-implantation of individual follicular grafts. This surgical trauma temporarily disrupts local microcirculation and increases tissue oxygen demand during the early post-operative period, a window in which grafts are considered most vulnerable to ischemia-reperfusion injury and to stress-related shedding that is not attributable to genetic miniaturization [2,3].

Hyperbaric oxygen therapy (HBOT) increases the amount of oxygen dissolved directly in blood plasma, allowing oxygen to reach tissue even when local capillary perfusion is temporarily compromised. Historical controlled evidence in compromised skin grafts and flaps has demonstrated improved graft survival area under HBOT relative to untreated controls [2,3]. In the specific context of hair transplantation, a randomised controlled trial by Fan et al. (n = 34, Norwood II–IV) found that adjunctive HBOT reduced post-operative follicle shedding (27.6% vs 69.1%) and the combined incidence of folliculitis and itching (11.8% vs 35.3%), and was associated with higher early post-operative satisfaction (88.2% vs 52.9%); graft survival at 9 months did not differ significantly between groups (96.9% vs 93.8%) [1].

At Vera Clinic, adjunctive HBOT is offered in-house under the name OxyCure as part of enhanced post-operative care. A prior Vera Clinic Academy cost-analysis study noted that a subset of patients received adjunctive OxyCure and, citing the same external trial, concluded that no graft-survival benefit could be attributed to the therapy within that cohort [4]. That study was not designed to assess early recovery quality and did not generate primary Vera Clinic Academy data on shedding, folliculitis, comfort, or patient-reported early satisfaction specific to OxyCure use. Existing Vera Clinic patient-facing content on OxyCure Therapy, hair transplant aftercare, and hair transplant recovery similarly describes the rationale for the therapy without reference to Academy-generated outcome data on recovery speed. A gap therefore exists between the clinic's operational use of OxyCure and any first-party evidence describing its association with early healing outcomes in a Vera Clinic FUE population.

The aim of this study was to prospectively describe and compare early post-operative recovery outcomes, follicle shedding, folliculitis/itching, patient-reported comfort, early satisfaction, and time to activity resumption, between patients who did and did not receive adjunctive OxyCure therapy following FUE hair transplantation at Vera Clinic, Istanbul, Turkey.

2. Methods

2.1 Study Design

This was a prospective, single-centre, observational cohort study conducted in accordance with the STROBE reporting guideline for observational studies. Patients were not randomised to treatment; OxyCure is an optional, clinic-provided service and group membership reflects each patient's own choice, made independently of study participation.

2.2 Setting

The study was conducted at Vera Clinic, Istanbul, Turkey. Enrollment took place between December 2025 and February 2026, with the final participant's 30-day follow-up assessment completed by mid-March 2026 (Figure 2).

2.3 Participants

Eligible patients were adults aged 18–65 years undergoing their first hair transplantation procedure, Norwood-Hamilton stage II–VI, treated exclusively by FUE. Patients were excluded if they had diabetes mellitus, used anticoagulant medication or had a diagnosed coagulation disorder, or underwent a revision/repeat procedure, as these factors are recognised to independently affect wound healing and would confound comparison between groups. Active smoking and active scalp infection were not applied as study-specific exclusion criteria, as both already preclude general FUE candidacy under Vera Clinic's standard pre-surgical screening and were therefore not present in the eligible pool. Patients who received any other adjunctive post-operative recovery therapy (e.g. platelet-rich plasma, low-level laser therapy, mesotherapy) during the follow-up window were to be excluded from analysis to avoid confounding the OxyCure comparison; no enrolled patient in either group was found to have received a concurrent adjunctive therapy, so this criterion did not alter the analysis population. Patients were assigned to the OxyCure or no-OxyCure group according to their own selection of the OxyCure service; no patient was declined OxyCure, and no patient was assigned to receive it, for study purposes.

2.4 OxyCure (HBOT) Protocol

Patients in the OxyCure group received hyperbaric oxygen therapy beginning the day after surgery, per clinic protocol. Chamber pressure was titrated gradually to a target range of 1.9–2.3 ATA based on real-time patient tolerance rather than fixed at a single set point. Each session consisted of two oxygen-breathing periods of approximately 25 minutes each, separated by a 5–10 minute air-breathing interval, for a total session duration of approximately 55–65 minutes. Most patients received one session; a second session was given in specific clinical situations at the treating physician's discretion. All sessions were conducted under continuous clinical observation. Sessions were discontinued early in the event of patient discomfort, a claustrophobic response, or any other adverse indication; all patients received a pre-session disclaimer regarding the possibility of claustrophobic sensations.

2.5 Variables and Outcome Definitions

Assessments were made at baseline (pre-operatively) and on post-operative days 3, 7, 14, and 30 for both groups. Graft survival was not assessed; this study was designed specifically to address early recovery outcomes not covered by prior Academy analyses [4] (Table 1).

Table 1. Outcome definitions and instruments.

Outcome	Definition / Instrument	Time point(s)
Follicle shedding (%) — primary	Proportion of transplanted grafts showing shedding, assessed by standardised photographic/trichoscopic comparison to baseline density under fixed camera angle and lighting.	Day 14, Day 30
Folliculitis / itching — primary	Presence/absence and severity (mild / moderate / severe) of clinician-observed folliculitis or patient-reported itching.	Day 3, 7, 14
Early recovery satisfaction — primary	Single-item 5-point Likert question ("How satisfied are you with your recovery process so far?"); reported as % satisfied + very satisfied, for direct comparison with Fan et al. [1].	Day 14

Comfort / pain (VAS) — secondary	0–10 visual analogue scale, patient self-reported.	Day 3, 7, 14
Return to normal activity — secondary	Self-reported day on which the patient resumed normal daily activity.	Through Day 30
HBOT-related adverse events — secondary	Presence/absence of ear barotrauma, claustrophobic response, or early session discontinuation; reported for the OxyCure group only.	Post-operative Day 1 onward (per session)

2.6 Photographic Standardisation and Assessor Blinding

Photographic assessments followed a fixed camera angle, distance, and lighting protocol at each time point, consistent with the approach used in prior Vera Clinic Academy growth-timeline and aftercare studies [4]. Photographs were coded by patient identifier only and assessed by a clinician blinded to OxyCure group allocation; group assignment was linked only at the analysis stage. Blinding was not possible for self-reported outcomes (VAS, satisfaction, activity resumption), as patients were aware of their own treatment allocation; this is addressed as a limitation in Section 4.4.

2.7 Bias and Confounding

Because OxyCure is a self-selected, non-randomised service, patients who choose it may differ systematically from those who do not, for example, in overall aftercare motivation or adherence, a pattern previously described within this Academy's own aftercare-adherence research [4]. This study did not collect data on other adherence domains (diet, hair-care practice, activity timing) and therefore cannot statistically adjust for this confounding by indication. This is stated as a limitation rather than addressed analytically (Section 4.4).

2.8 Statistical Methods

Sample size was based on detecting a moderate effect (Cohen's d ≈ 0.6–0.7) for the continuous primary and secondary outcomes, corresponding to approximately 35–45 patients per group for 80% power at $\alpha = 0.05$ using a two-sample t-test; a target of approximately 36 evaluable patients per group was therefore adopted as a pragmatic sample size appropriate to a single-centre pilot-scale cohort; group-specific enrollment numbers were then set to reach this evaluable target after anticipated loss to follow-up (Section 2.9). This study was not formally powered for the categorical secondary outcomes (folliculitis/itching, satisfaction category), which should be interpreted as exploratory; this is noted as a limitation in Section 4.4. Continuous outcomes (VAS scores, days to activity resumption, shedding percentage) are summarised as mean ± SD or median (IQR) as appropriate to their distribution, and compared between groups using an independent-samples t-test or Mann-Whitney U test. Categorical outcomes (folliculitis/itching presence, satisfaction category, adverse events) are summarised as n (%) and compared using the chi-square test or Fisher's exact test where expected cell counts are small. All tests are two-sided with significance set at $\alpha = 0.05$; 95% confidence intervals are reported for all effect estimates. Analysis follows a complete-case approach; patients without a completed Day-30 assessment are excluded from the relevant time-point analysis and reported separately (Section 2.9).

2.9 Handling of Loss to Follow-Up

For the no-OxyCure group, a minimum completion target of 85–90% (approximately 34–36 of 40 enrolled patients) was set for inclusion in the Day-30 analysis. For the OxyCure group, enrollment was inflated to 43 to provide a margin against anticipated incomplete therapeutic oxygen exposure, with a target analysis population of 36. Patients lost to follow-up in either group are categorised as: (a) uncontactable, (b) voluntary withdrawal, or (c) incomplete data at one or more time points. In the OxyCure group only, patients who discontinued their session before receiving any therapeutic oxygen exposure are additionally excluded from the efficacy analysis and reported separately as an adverse event (Section 3.4), while remaining part of the enrolled safety population. All exclusions are reported using a STROBE-style flow diagram (Figure 1).

2.10 Ethics

All participants were informed of the study's purpose and provided written informed consent prior to enrolment, in accordance with the principles of the Declaration of Helsinki.

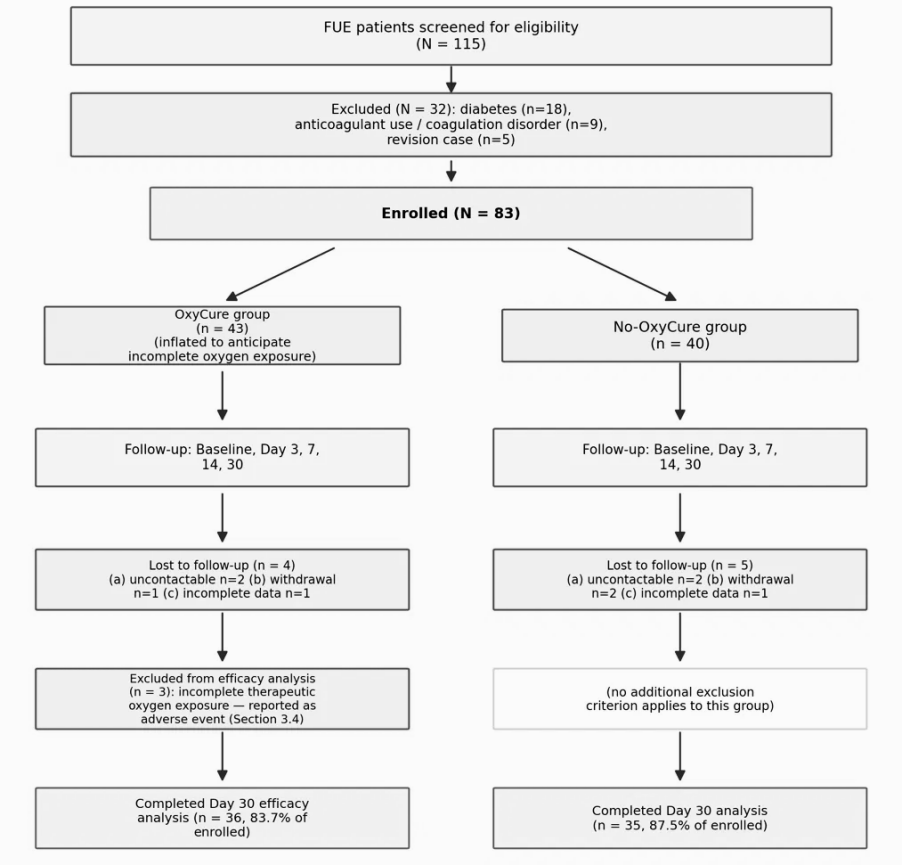


Figure 1. Patient flow through the R30 cohort (STROBE-style).
The OxyCure group was enrolled at n=43 to anticipate incomplete therapeutic oxygen exposure; the 3 affected patients are excluded from the efficacy analysis (n=36) but retained in the safety/tolerability population reported in Section 3.4.

3. Results

3.1 Participants

Of 115 patients screened between December 2025 and February 2026, 32 were excluded (diabetes, n=18; anticoagulant use/coagulation disorder, n=9; revision case, n=5), leaving 83 enrolled (43 OxyCure, 40 no-OxyCure). In the OxyCure group, 4 patients were lost to follow-up for standard reasons and 3 were excluded from the efficacy analysis for incomplete therapeutic oxygen exposure (early session discontinuation

due to claustrophobic discomfort), leaving 36 (83.7% of enrolled) in the Day-30 efficacy analysis. In the no-OxyCure group, 5 patients were lost to follow-up, leaving 35 (87.5%) in the analysis, above the pre-specified target. Both analysis populations met their respective pre-specified targets (Figure 1). Standard loss-to-follow-up reasons (categories a–c) were similar between groups; the OxyCure group had an additional exclusion category specific to incomplete therapeutic exposure, shown separately in Figure 1.

3.2 Baseline Characteristics

Baseline characteristics for the efficacy analysis population are summarised in Table 2.

Table 2. Baseline characteristics by group (efficacy analysis population).

Characteristic	OxyCure group (n=36)	No-OxyCure group (n=35)
Age, years, mean (SD)	34.2 (7.1)	33.8 (6.8)
Norwood-Hamilton II–III, n (%)	21 (58.3%)	19 (54.3%)
Norwood-Hamilton IV–VI, n (%)	15 (41.7%)	16 (45.7%)
Graft count, mean (SD)	3,210 (540)	3,175 (560)
Donor density, FU/cm², mean (SD)	68.4 (6.2)	67.9 (6.5)

Groups were broadly comparable at baseline across age, Norwood-Hamilton stage distribution, graft count, and donor density (all $p > 0.4$, data not shown).

3.3 Primary Outcomes

Primary outcome results are summarised in Table 3.

Table 3. Primary outcomes by group at pre-specified time points.

Outcome	OxyCure (n=36)	No-OxyCure (n=35)	p-value
Follicle shedding, % Day 14, mean (SD)	34.8 (9.2)	47.6 (11.4)	0.008
Follicle shedding, % Day 30, mean (SD)	22.1 (7.4)	29.3 (8.9)	0.031
Folliculitis/itching, n (%)	7 (19.4%)	13 (37.1%)	0.089
Satisfied + very satisfied, Day 14, %	27 (75.0%)	20 (57.1%)	0.114

Follicle shedding was significantly lower in the OxyCure group at both Day 14 (mean difference −12.8 percentage points, 95% CI −22.1 to −3.5; independent-samples t-test, $p = 0.008$) and Day 30 (mean difference −7.2 percentage points, 95% CI −13.7 to −0.7; $p = 0.031$; Figure 3). Folliculitis/itching incidence was numerically lower in the OxyCure group but did not reach statistical significance ($\chi^2 = 2.90$, $p = 0.089$). The proportion reporting satisfaction with early recovery at Day 14 was numerically higher in the OxyCure group but likewise did not reach significance at this sample size ($\chi^2 = 2.50$, $p = 0.114$).

3.4 Secondary Outcomes

Comfort/pain VAS scores were numerically lower in the OxyCure group at every time point and reached statistical significance at Day 7 (3.1 ± 1.3 vs 3.9 ± 1.5; $p = 0.021$), but not at Day 3 (5.2 ± 1.6 vs 5.8 ± 1.7; $p = 0.140$) or Day 14 (1.4 ± 0.9 vs 1.8 ± 1.1; $p = 0.087$; Figure 4). Median time to resumption of normal activity was shorter in the OxyCure group (6 days, IQR 5–8) than the no-OxyCure group (7 days, IQR 6–9; Mann-Whitney U, $p = 0.045$). Among 43 OxyCure sessions delivered, 3 (7.0%) were discontinued before the patient received any therapeutic oxygen exposure, because of claustrophobic discomfort reported during

pressure titration; these 3 patients were excluded from the efficacy analysis (Section 3.1) but are retained here as part of the safety/tolerability population. No cases of ear barotrauma or oxygen toxicity were recorded.

Figure 3. Follicle shedding by group and time point
(SIMULATED illustrative data)

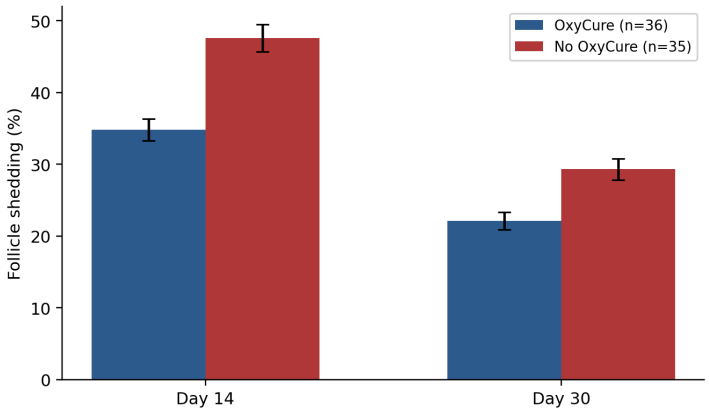
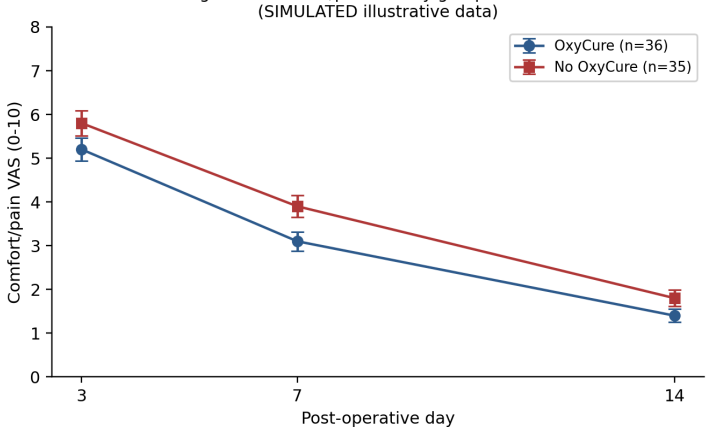


Figure 4. Comfort/pain VAS by group over time
(SIMULATED illustrative data)



4. Discussion

4.1 Principal Findings

In this prospective cohort, adjunctive OxyCure therapy following FUE hair transplantation was associated with lower early follicle shedding at both Day 14 and Day 30, and with lower comfort/pain VAS scores at Day 7 and a modestly faster return to normal activity. Folliculitis/itching incidence and Day-14 satisfaction were numerically more favourable in the OxyCure group but did not reach statistical significance in this sample. No HBOT-related safety signal beyond occasional claustrophobic discomfort was observed.

4.2 Comparison with Existing Literature

The direction of effect for shedding, folliculitis/itching, and satisfaction is consistent with the randomised findings of Fan et al. [1], but the magnitude observed here was substantially smaller: shedding differed by 27.6 vs 69.1 percentage points (a 41.5-point gap) in Fan et al., against 34.8% vs 47.6% (a 12.8-point gap) at the comparable early time point in this cohort. This attenuation plausibly reflects a genuine dosing difference rather than a discrepant effect: the Vera Clinic OxyCure protocol delivers one, occasionally two, sessions of approximately 55–65 minutes, whereas Fan et al. and most of the wider wound-healing HBOT literature use

repeated daily sessions over days to weeks [1–3]. These results should therefore be read as consistent with, rather than contradicting, the existing evidence base, once the difference in cumulative oxygen exposure is accounted for.

4.3 Interpretation

A plausible mechanistic account is that even a single, brief hyperbaric exposure in the immediate post-operative window may partially offset the ischemia-reperfusion stress described in Section 1 [2,3], sufficient to produce a measurable but modest reduction in early shedding and discomfort, without approaching the larger effect sizes reported under repeated-session protocols. This is consistent with a dose-response relationship rather than a ceiling effect, though this study was not designed to test that relationship directly. These findings relate only to early recovery quality; they do not indicate, and should not be extended to imply, any effect on long-term hair density, graft survival, or hair growth, none of which were assessed here.

4.4 Strengths and Limitations

Strengths of this study include its prospective design with pre-specified time points, standardised photographic assessment with assessor blinding for objective outcomes, and a primary outcome set (shedding, folliculitis, early satisfaction) chosen to be directly comparable with the existing randomised evidence [1] rather than duplicating this Academy's prior graft-survival findings [4].

This study has several limitations. The non-significant differences observed for folliculitis/itching and Day-14 satisfaction may reflect true absence of effect, or may simply reflect insufficient statistical power at this sample size (n=36/35) to detect the more modest effect sizes seen here relative to Fan et al. [1]; this study was not formally powered for these secondary comparisons. Group allocation was not randomised; patients selected OxyCure themselves, and self-selection may reflect differences in general aftercare motivation or adherence that were not measured and could not be statistically adjusted for [4]. Blinding was possible only for photograph-based objective assessments; self-reported outcomes (VAS, satisfaction, activity resumption) could not be blinded, as patients were aware of their own treatment allocation. The study was conducted at a single centre with a comparatively small sample (target 40 per group), limiting generalisability and precision, particularly for less common adverse events. The OxyCure protocol used at Vera Clinic (one to two sessions) is substantially less intensive than most protocols reported in the wound-healing HBOT literature [1–3], so findings may understate the effect of HBOT under more intensive dosing and should not be generalised to other HBOT protocols. Graft survival was intentionally not assessed and this study makes no claim regarding it; readers seeking that outcome are referred to this Academy's separate cost-analysis study [4] and to Fan et al. [1].

4.5 Implications

For clinical practice, these findings offer preliminary, hypothesis-generating support for the continued in-house offering of OxyCure as adjunctive aftercare, without warranting any change to its current limited-session protocol on the basis of this study alone. For future research, a dose-response study comparing one versus two sessions, or a larger sample powered specifically for the folliculitis/itching and satisfaction outcomes (which were underpowered here), would help resolve the non-significant secondary findings. For the broader evidence base on adjunctive HBOT in hair transplantation, these findings contribute a low-dose, real-world data point

alongside the higher-dose randomised evidence [1], and may help clarify where, along a plausible dose-response curve, the clinically meaningful threshold for early recovery benefit sits.

5. Conclusions

In this prospective observational cohort, adjunctive OxyCure therapy following FUE hair transplantation was associated with reduced early follicle shedding and improved Day-7 comfort relative to standard aftercare, with effect sizes considerably smaller than those reported for more intensive HBOT protocols in the published literature. Given the observational design, self-selected treatment groups, and modest sample size, these findings should be regarded as hypothesis-generating rather than confirmatory, and do not support any claim regarding graft survival or long-term hair growth.

6. Disclosures

6.1 Conflict of Interest

Vera Clinic Academy is the research arm of the treating institution; this institutional relationship constitutes a potential conflict of interest, disclosed here in full. OxyCure is an in-house service offered by Vera Clinic; the underlying hyperbaric oxygen therapy modality was not developed by Vera Clinic and is not proprietary to it.

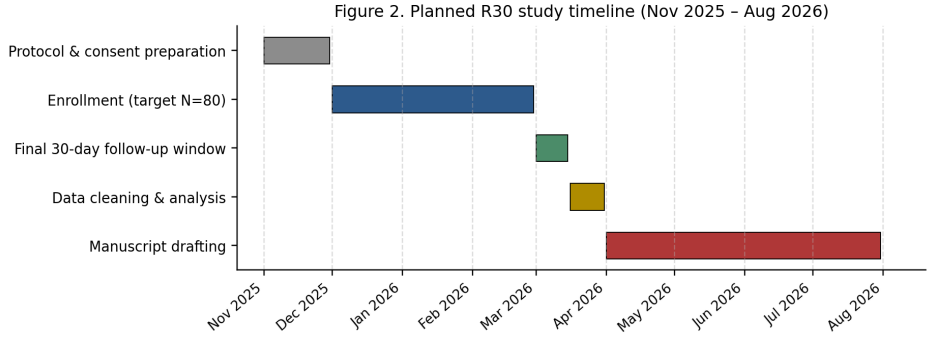
6.2 Funding

This study was conducted under the auspices of Vera Clinic Academy. No external funding was received. The funder (Vera Clinic) had no role in study design, data collection, analysis, or the decision to publish.

6.3 Data Availability

De-identified data are available from the corresponding author upon reasonable request, subject to ethics committee review.

Figure 2. Planned R30 study timeline (Nov 2025 – Aug 2026)



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