

Early Prediction Of Scar Outcomes: A Prospective Study On The Predictive Value Of 3-month Scar Assessments For 12-month Results

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Background

- Scar quality is traditionally assessed at 12 months, once remodeling is complete.
- However, this long timeline delays treatment decisions and outcome evaluation.
- The 3-month mark aligns with the early remodeling phase.
- Predicting long-term outcomes earlier could enhance patient counseling, guide early interventions, and shorten clinical trial durations.

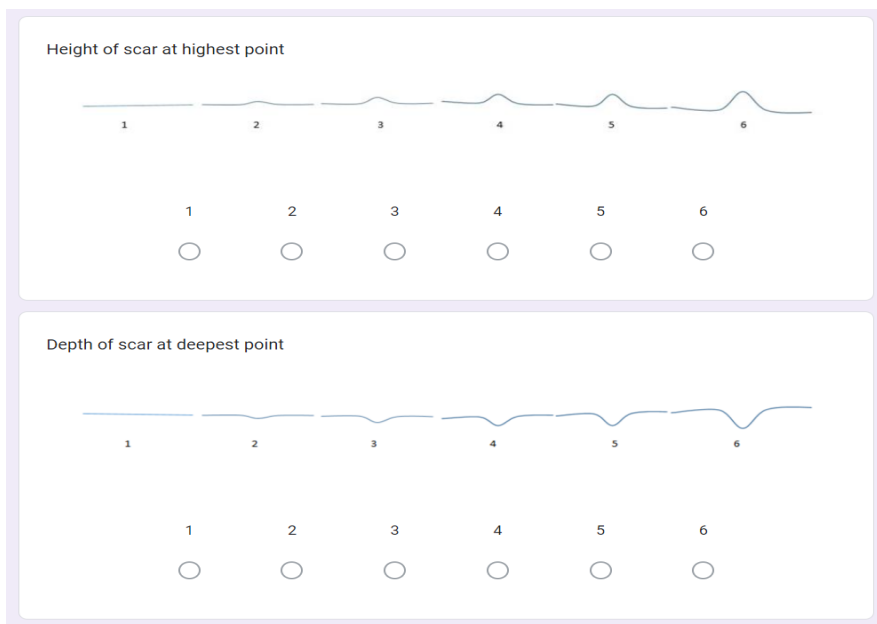
	3 months postoperative	12 months postoperative
Good Scar		
Bad Scar		

Hypothesis

We hypothesize that scar assessments at 3 months postoperatively can accurately predict 12-month scar outcomes.

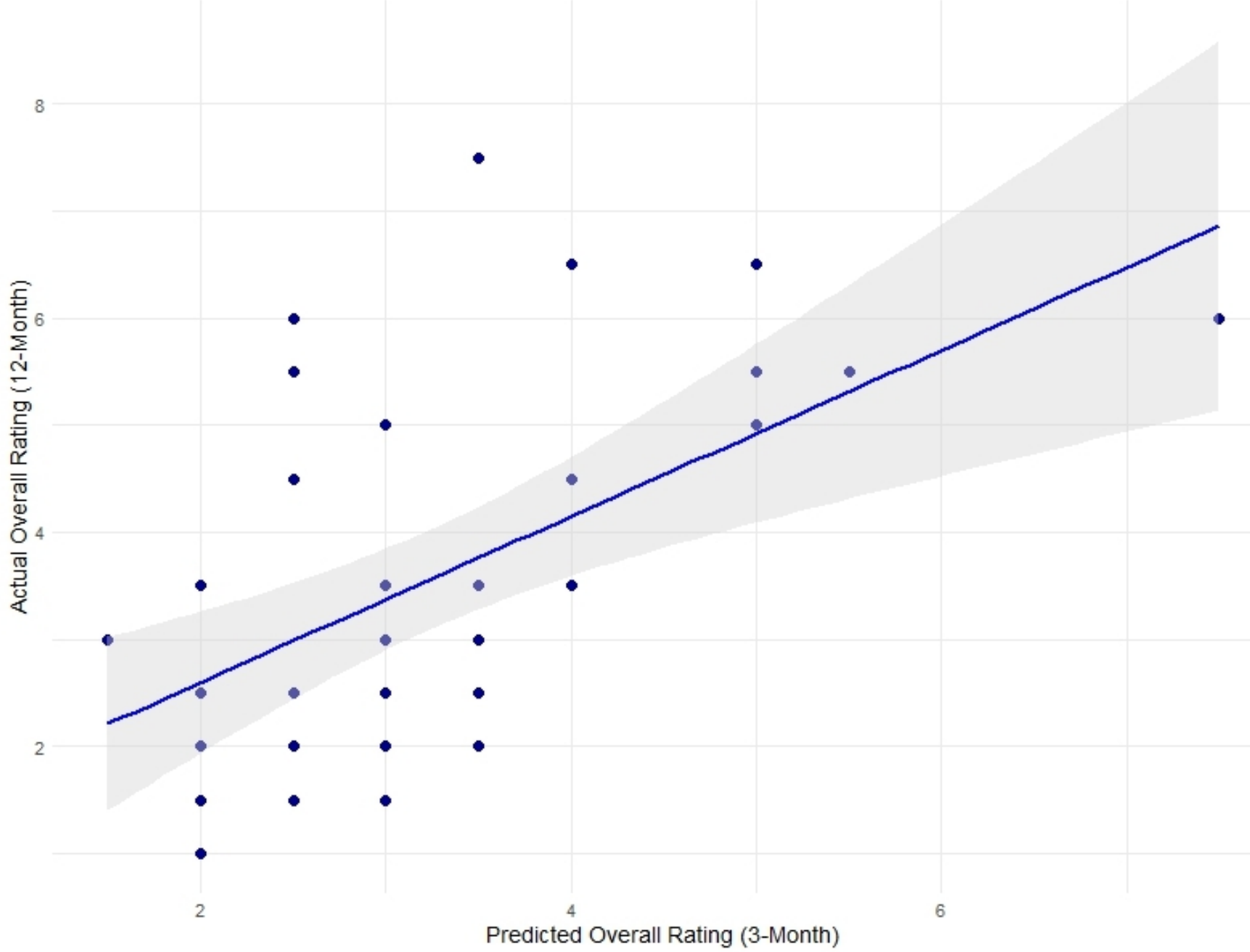
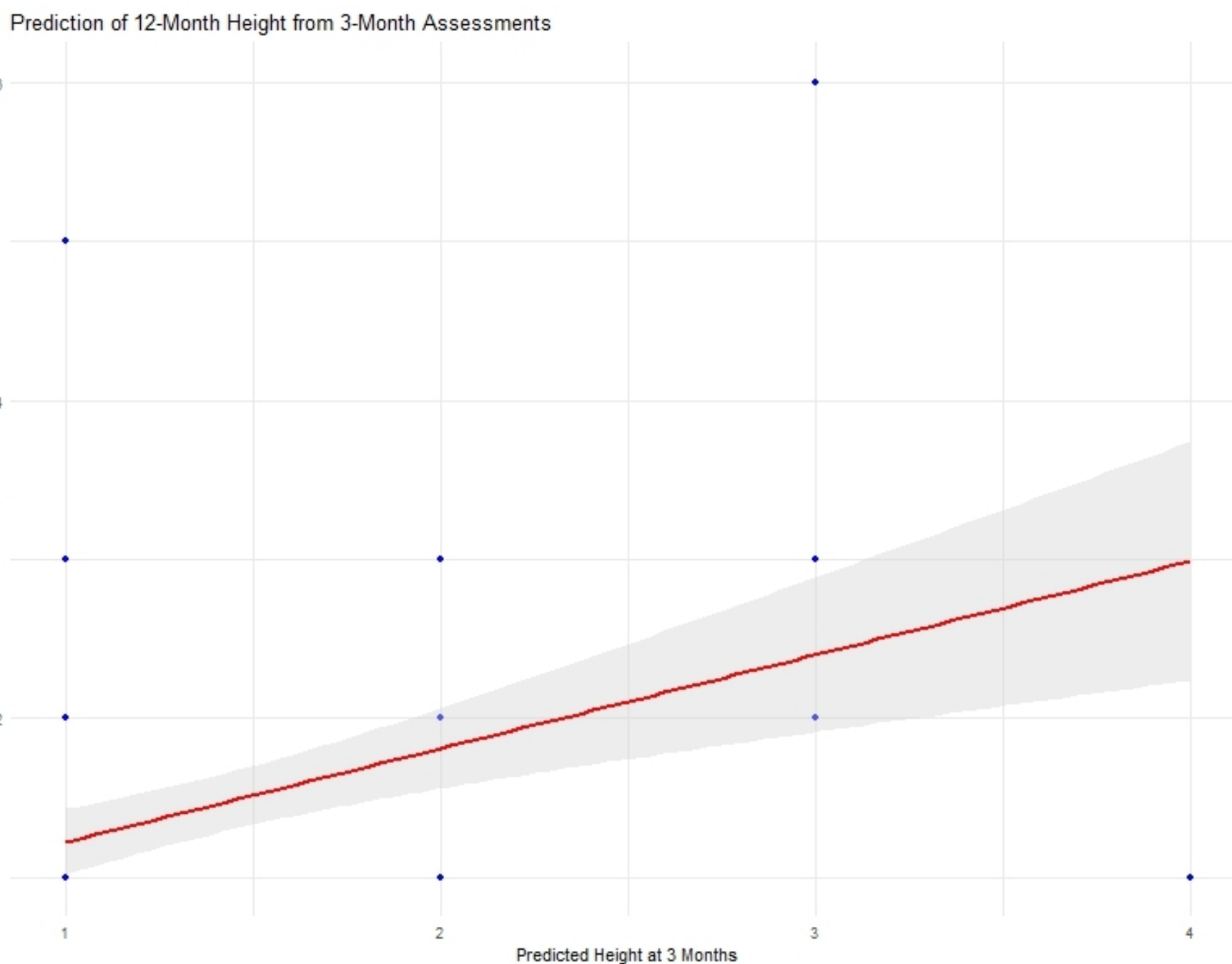
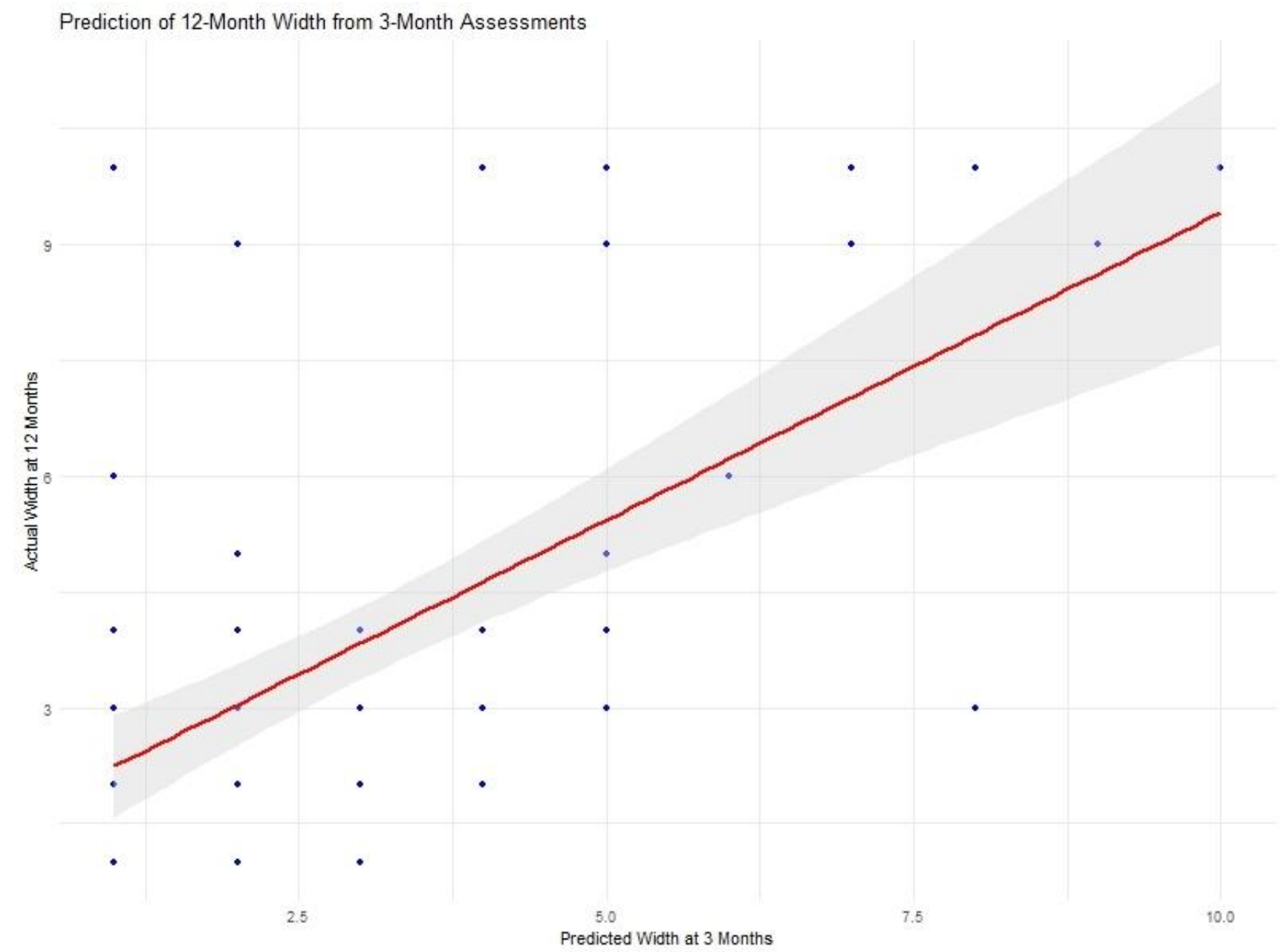
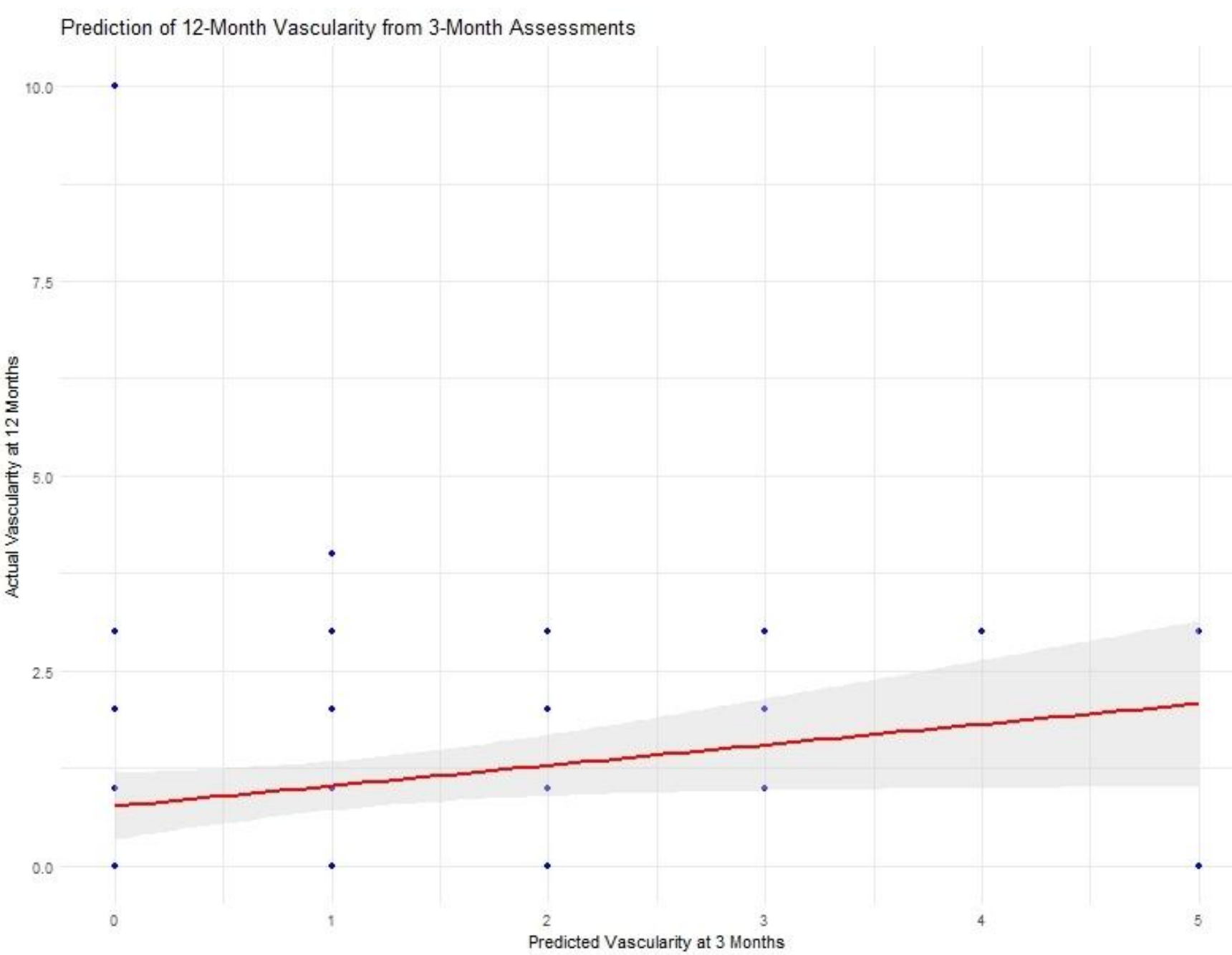
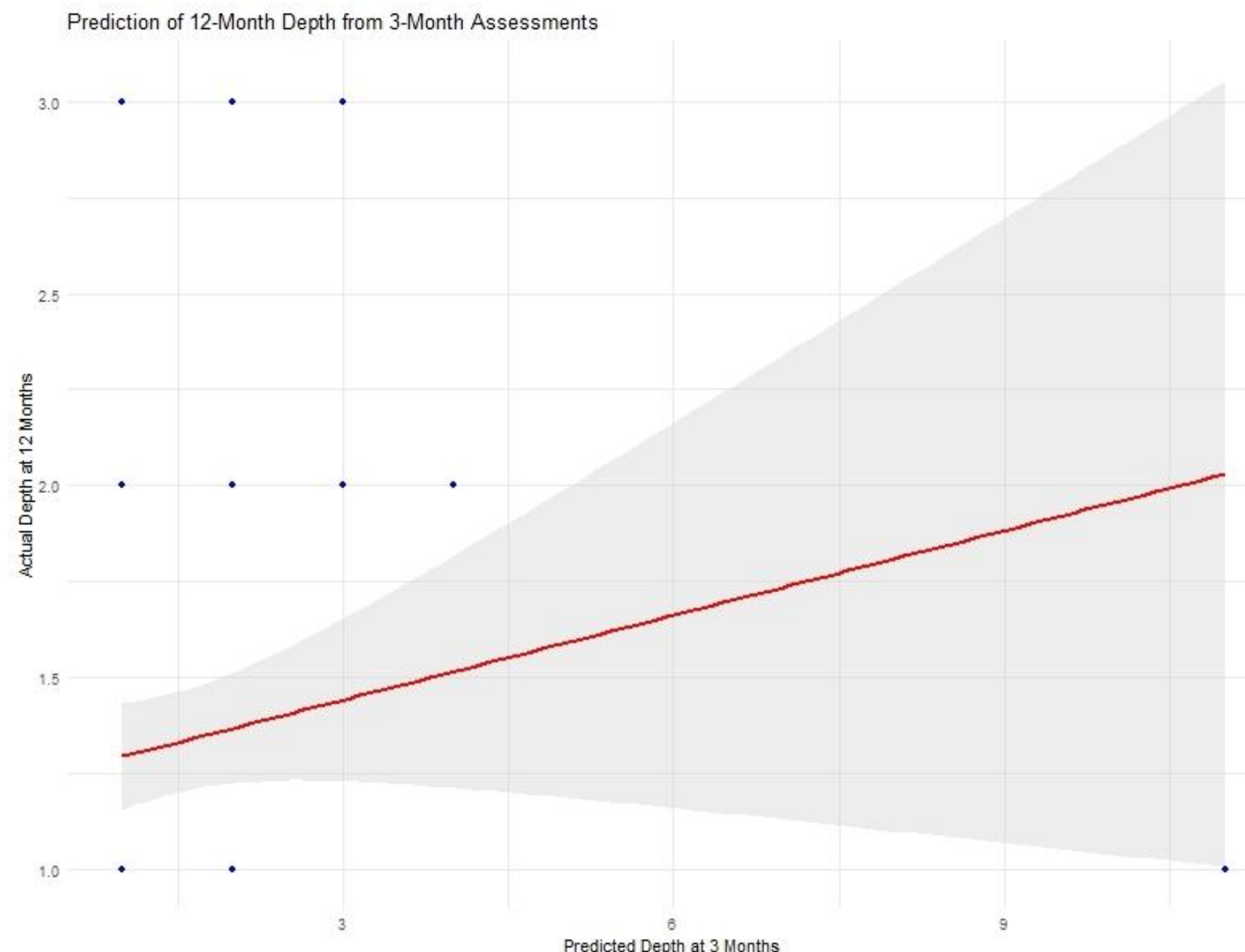
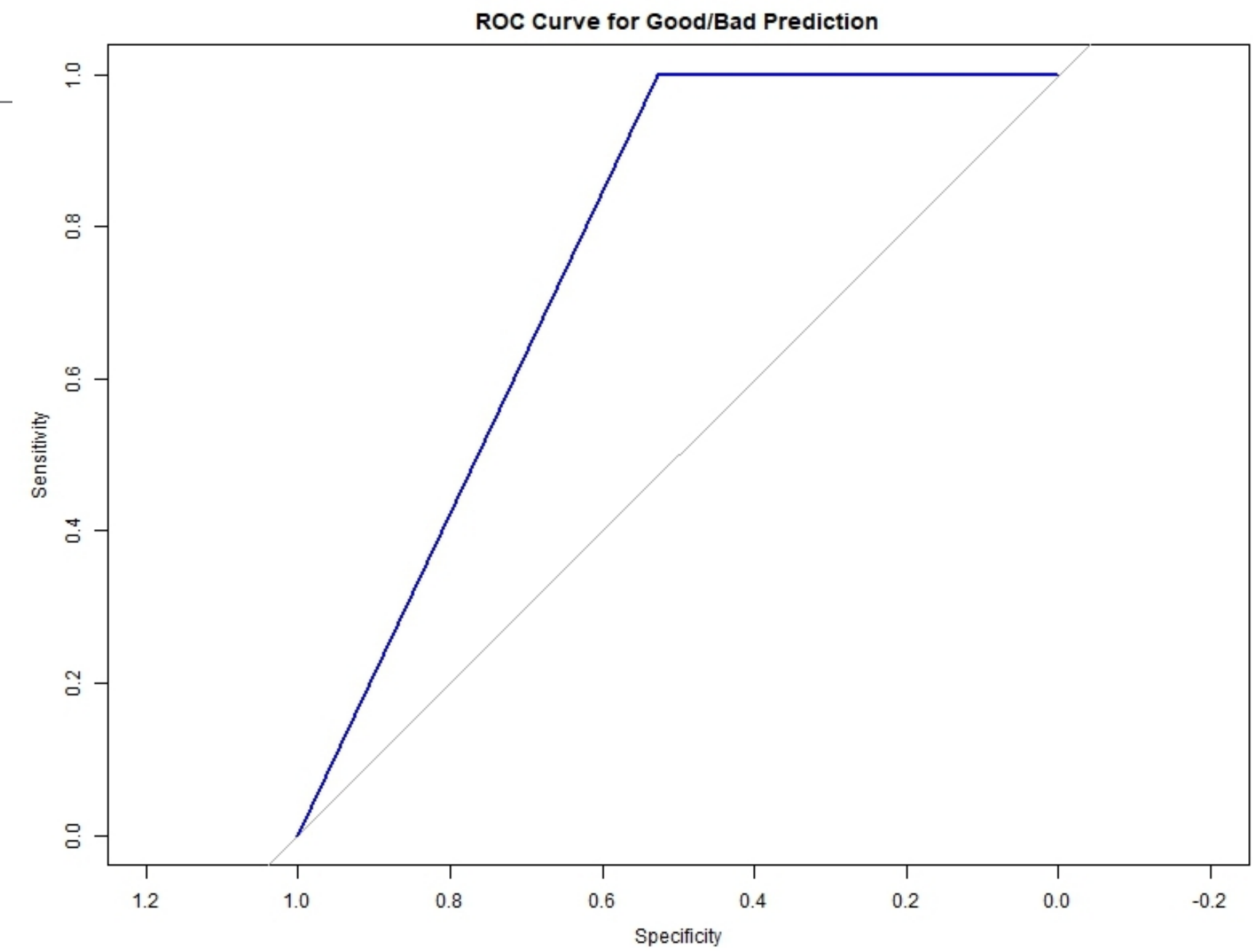
Methods

- Design:** Prospective single-center cohort study.
- Participants:** 40 adult surgical patients with visible scars at 3 and 12 months post-op.
- Inclusion:** Age ≥18, visible surgical scars, completed both timepoints.
- Assessments:**
 - Binary scar quality (“good” vs. “poor”) rated by two blinded surgeons.
 - Continuous measures: width, height, depth, vascularity, pigmentation, overall opinion.
 - Patient-reported outcomes using SCAR-Q and POSAS scales.
- Analysis:**
 - Logistic regression for binary outcomes.
 - Linear regression for continuous outcomes.
 - ROC curves (AUC) for predictive accuracy.
 - Inter-rater reliability via ICC and Cohen’s Kappa.



Results

- Binary Prediction:**
 - Scars rated “good” at 3 months remained “good” at 12 months with 77.5% overall accuracy.
 - Sensitivity: 100%, Specificity: 52.6%, AUC = 0.763.
 - Negative predictive value (NPV) = 100% — no “poor” scars improved.
- Continuous Predictive Metrics (Linear Regression):**
 - Width:** Strong predictor ($\beta = 0.80$, $R^2 = 0.37$, $p < 0.001$).
 - Height:** Moderate predictor ($\beta = 0.59$, $R^2 = 0.19$, $p < 0.001$).
 - Overall opinion:** Moderate predictor ($\beta = 0.78$, $R^2 = 0.30$, $p < 0.001$).
 - Vascularity:** Weak predictor ($\beta = 0.26$, $R^2 = 0.05$, $p = 0.048$).
 - Depth:** Not predictive ($\beta = 0.07$, $R^2 = 0.02$, $p = 0.17$).
 - Pigmentation:** 87.5% of predicted values matched 12-month outcomes.
- Inter-Rater Reliability:**
 - Width: ICC = 0.714 (good).
 - Height: ICC = 0.587 (moderate).
 - Vascularity: ICC = 0.362 (poor).
 - Cohen’s Kappa for “good” vs. “poor”: 0.505 (moderate agreement).



Conclusions

- Scar assessments at 3 months can reliably predict 12-month outcomes.
- Width, height, and overall appearance are strong early indicators of final scar quality.
- “Good” scars at 3 months rarely worsen; “poor” scars rarely improve without intervention.
- Vascularity and depth are less predictable and more variable over time.
- Early prediction enables proactive intervention, better patient counseling, and optimized clinical trial timelines.
- These findings support the use of 3-month evaluations as surrogate endpoints in scar research and care

Future Directions

- Expand study to multiple centers and larger patient cohorts.
- Include more diverse surgical procedures and skin types.
- Investigate predictive patterns across racial and ethnic groups.
- Explore AI-assisted scar prediction tools to improve consistency.
- Assess outcomes beyond 12 months to capture late remodeling changes.

Limitations

- Scar assessments performed by a small number of surgeons.
- Moderate inter-rater variability, particularly for vascularity and depth.
- Small sample size (n=40) limits subgroup analysis.
- Results may not fully capture scar progression beyond 12 months.

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