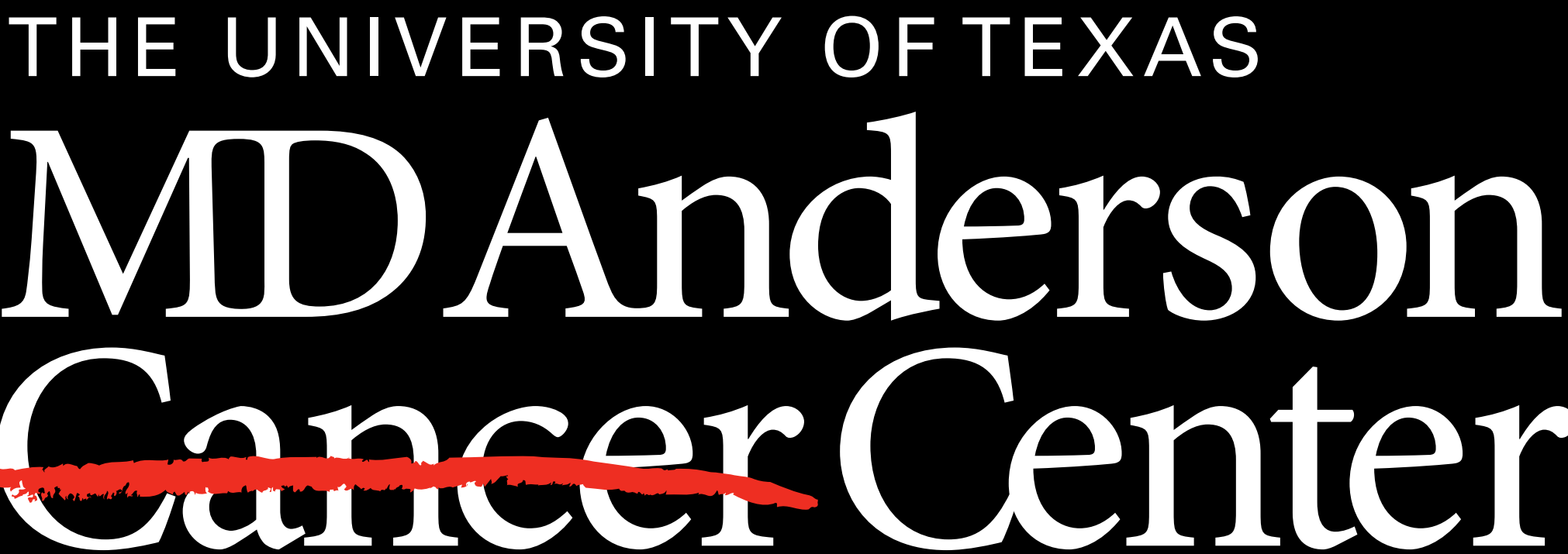




Extremity Soft Tissue SARcoma ReCOstruction Nomograms (SARCON): A Clinicoradiomic, Machine Learning-Powered Predictor of Postoperative Outcomes

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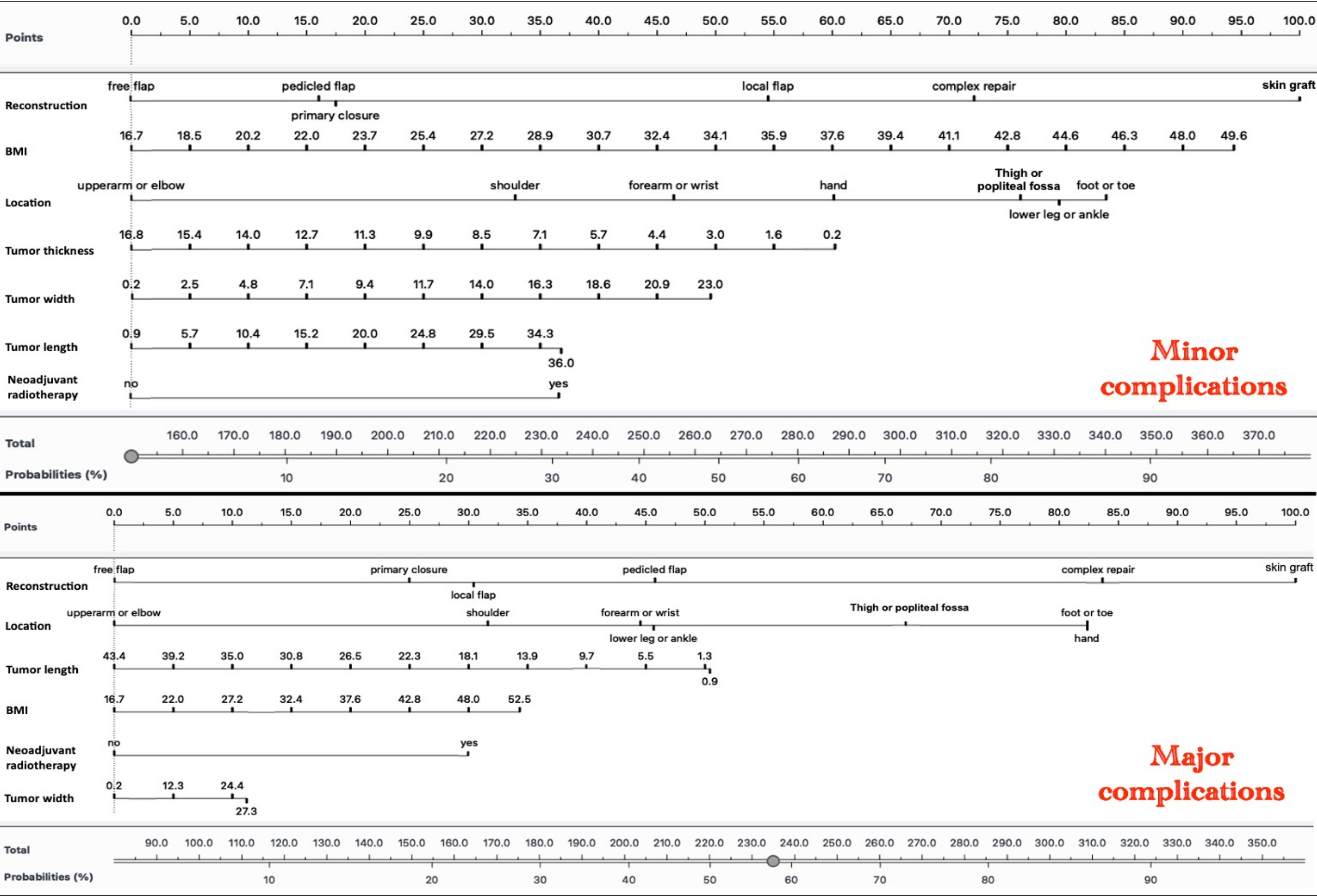
Purpose

Wound closure modality after limb-sparing extremity soft-tissue sarcoma (eSTS) resection is fraught with uncertainty. Leveraging machine learning and clinicoradiomic data, we developed SARCON (Sarcoma ReCOstruction Nomograms), a tool that provides probabilistic estimates of adverse outcomes based on the selected reconstructive modality.

Methods

This retrospective cohort study of limb-sparing eSTS resections integrated clinical variables and radiomic features, including eSTS and limb dimensions. Target outcomes included surgical site infections, wound dehiscence, seroma formation, and minor and major complications. For each outcome, three machine learning classifiers—Logistic Regression with Lasso regularization, Naïve Bayes, and FasterRisk—were developed and evaluated using 10-fold cross-validation, 50 random 80-20% splits, leave-one-out cross-validation, and a test dataset. The best-performing model for each outcome was used to construct a respective nomogram

Figure. Extremity Soft Tissue SARcoma ReCOstruction Nomograms (SARCON) for predicting minor and major complications



Results

A total of 316 limb-sparing eSTS resections were analyzed, predominantly located in the thigh (54%), lower leg (17%), and upper arm (11%). Postoperative outcomes included surgical site infections (12%), wound dehiscence (16%), seroma formation (8.5%), minor complications (34%), and major complications (25%). Logistic Regression with Lasso regularization consistently outperformed the other models across all outcomes, achieving AUROCs ranging from 0.83 to 0.93 in all tests

Conclusions

By providing probabilistic estimates of adverse outcomes based on reconstructive modality, SARCON empowers surgeons to anticipate complications and optimize reconstructive strategies.



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