management decision. Supervised machine learning models were developed in the R programming language for the prediction of Surgical *vs* Conservative management. Logistic Regression, Support Vector Machines, Naïve Bayes, and XG Boost classifiers were developed. The highest performing classifiers based on accuracy underwent model optimisation using feature selection and dimensionality reduction, hyperparameter tuning, and cross-validation. The model with the highest F-score (harmonic mean of precision and recall) was chosen.

The highest performing model was a Support Vector Machine classifier using the radial basis frequency kernel, 10-fold repeated cross validation, and tuning of the Gaussian kernel and penalty hyperparameters. On unseen testing data this model demonstrated an F-score of 0.84 with precision of 0.8 and recall of 0.89.

The management of patients with thoraco-abdominal aortic aneurysm disease can be challenging and involves complex decision-making. This can be further complicated by existing comorbidities that may affect their ability to undergo exercise testing. The machine learning algorithm developed can be used to aid clinician decision-making regarding management outcome. Our future work will involve further development of the machine learning algorithm using larger datasets and combining other pre-assessment data. Using nationally linked data sources, we aim to train this model to predict morbidity and mortality outcomes after surgical intervention.

Acknowledgements

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Postoperative troponin and preoperative CPET are associated with mortality in an elective UK noncardiac surgical cohort

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Both postoperative troponin T (TnT)[1 2] values and preoperative cardiopulmonary exercise testing (CPET)[3] parameters can identify patients at increased risk of mortality after major noncardiac surgery. We analysed prospectively collected data from a single UK centre to assess if postoperative TnT values and preoperative CPET parameters are associated with postoperative mortality in a UK surgical cohort.

We analysed the records of patients who underwent major noncardiac surgery at our institution between June 2015 and October 2021, who underwent a CPET assessment, and had postoperative TnT results available. We performed univariate and multivariate analysis of patients' highest TnT result obtained within the first three postoperative days to assess TnT values >20 ng L^{-1} and >65 ng L^{-1}, CPET variables and patient characteristics, and their association with 90-day mortality.

We identified 815 patients with complete CPET, TnT, and patient characteristics data in our cohort: 462 had hepatobiliary surgery, 147 general surgery, 124 vascular surgery, and 82 had other surgery. Univariate analysis showed significant association of TnT and a range of CPET variables with mortality. In multivariate models with TnT >20 ng L^{-1} and a CPET variable, TnT (P<0.005), VE/VCO_2 slope (as a continuous variable and >34; P=0.014 and P=0.10, respectively), and percent predicted peak VO_2 (P=0.015) remained statistically significantly associated with 90-day mortality, but not VO_2 peak (P>0.05). Of these, the highest odds ratio (OR) was associated with TnT (ranging between 4.54 and 4.92 depending on the CPET variable used in the model), whereas the second strongest predictor was VE/VCO_2 >34 (OR 2.33, 95% confidence interval 1.22–4.44).

Our data confirmed that both preoperative CPET and postoperative TnT are independent predictors of increased risk of 90-day mortality. Our study supports the practice of regular TnT screening in postoperative patients.

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Propofol effects on the heart rate and electrocardiogram in humans

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Despite decades of clinical use, literature on the effect of propofol on the heart rate (HR) is mixed. Some studies report bradycardic risks, some find no effects, and others show increased HR.[1] Clinical research is complicated by the bradycardic effects of opioid co-administration. Theoretically, propofol may increase HR by inhibiting brainstem cardiac parasympathetic neurons.[2] In this study, we performed an advanced secondary analysis of electrocardiographic (ECG) data collected in volunteers undergoing a slow propofol infusion.[3] We hypothesised that free of other medication, propofol would increase the HR.

Data were from single-channel ECG collected in N=16 healthy volunteers (eight female, 28.6 [7] yr) undergoing a slow propofol induction to estimated effect-site concentration of 4 μg ml^{-1} and subsequent emergence.[3] In each subject, HR, ECG waveforms, and R-wave amplitudes were extracted using the Python biosspy toolbox. Spearman correlation and P-values were used to test associations between propofol and ECG parameters in 23 5-min segments.

At peak estimated effect-site propofol concentrations, R-wave amplitude decreased and QT interval shortened (Fig. 1a). HR increased from 58.2 (10) beats min^{-1} at baseline to 73.4 (8.8) beats min^{-1} at peak anaesthesia (increase of 4.2 [1.5] beats

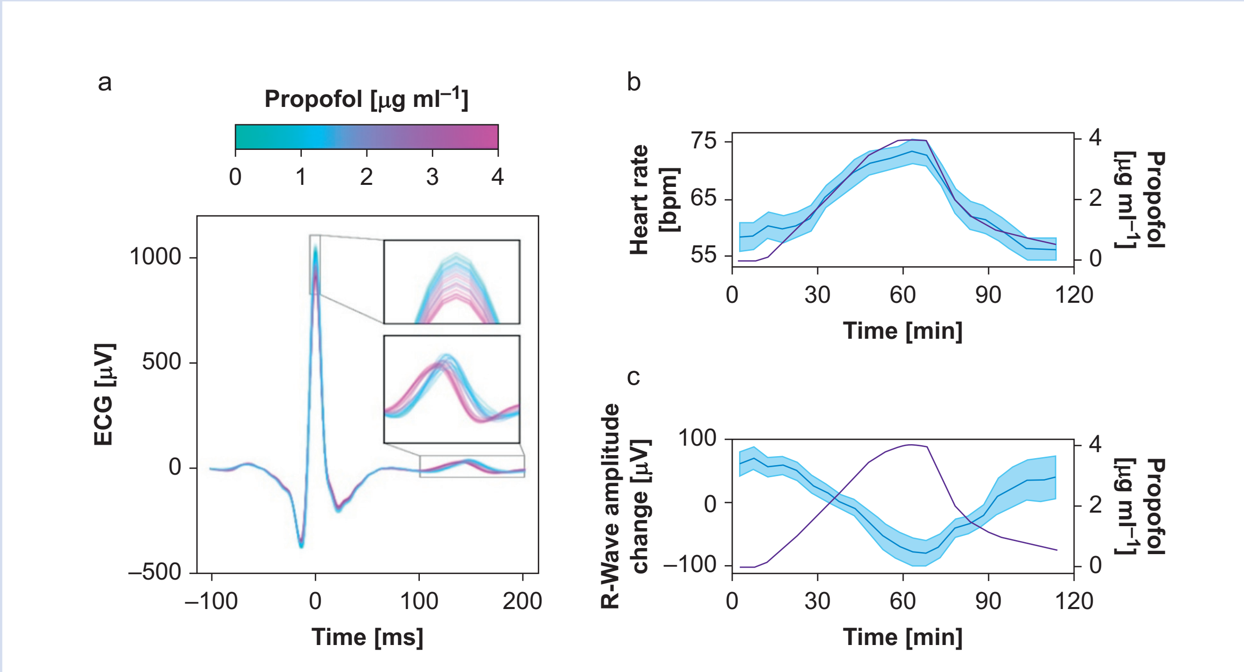

Fig 1. (a) Group-mean ECG waveform across propofol concentrations. (b) Group-level heart rate (purple; mean [SEM]) and propofol effect-site concentration (black). (c) Group-level demeaned R-wave amplitude and propofol concentration.

min^{-1}/[μg ml^{-1}]; Cohen's d=1.55). HR tracked propofol concentrations with Spearman ρ=0.923, P<0.001 (Fig. 1b). R-wave amplitude was also strongly inversely correlated with propofol effect-site concentration (Spearman ρ=−0.902, P<0.001, Fig. 1c).

In healthy subjects without concomitant medication, a slow propofol infusion significantly increased the HR, likely as a result of decreased parasympathetic inhibition confirmed by spectral HR variability analysis (results not shown). The shortened QT interval reflected a faster HR. R-wave amplitude reduction may be linked to the effect of propofol on myocardial contractility. These results clarify existing literature and can inform clinical practice in younger populations.

Acknowledgements

This research was funded by the Wellcome Trust (203139/Z/16/Z) and the MRC Development Pathway Funding Scheme (MR/R006423/1). For open access purposes, authors have applied a CC-BY public copyright licence to any Author Accepted Manuscript version arising from this submission.

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Adding objectivity to submaximal exercise testing by assessment of heart rate recovery at home—a healthy volunteer study iv (search-iv)

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The number of older, frail, and comorbid patients undergoing high-risk surgeries is rising leading to demand for a robust perioperative risk assessment framework. The current 'gold-standard' cardiopulmonary exercise testing (CPET) is expensive and not tolerated by all patients. submaximal exercise tests (SETs) provide an accessible alternative for assessing patient fitness. Our group has demonstrated quantifying heart rate recovery (HRR) after SETs by calculation of area under the (heart rate *vs* time) curve (AUC) has value in predicting postoperative complications.[1] However, this method still requires laboratory testing and is an inefficient use of clinician and patient time. The fields of digital health and wearable technology may offer solutions. This study aims to assess the feasibility, acceptability, and reproducibility of conducting community-based SETs by means of wearable technology.

After ethical approval and informed consent, 13 healthy volunteers were recruited. Volunteers first undertook a laboratory-based SET, to generate a control HRR profile, then performed multiple community-based SETs while wearing a heart rate (HR) monitor (VivaLink,