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Postoperative quality of recovery measurements as endpoints in comparative anaesthesia studies: a systematic review

Maxime Léger[1,2,*], Maëva Campfort[1], Cléor Cayla[1], Sigismond Lasocki[1] and Emmanuel Rineau[1]

[1]Département d'Anesthésie Réanimation, Centre Hospitalier Universitaire d'Angers, Angers, France and [2]INSERM UMR 1246, SPHERE, Nantes University, Tours University, Nantes, France

*Corresponding author. E-mail: maxime.leger@chu-angers.fr, Twitter: @mxmleger

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Editor—Recovery after surgery and anaesthesia is a multidimensional process that carries stress, anxiety, pain, and even minor complications.[1] Clinical evaluation of perioperative intervention generally addresses only some morbidity parameters without looking at the overall recovery.[2] These evaluations should focus on what the patient experienced (i.e. patient-centred outcome measures) rather than on doctors' perceptions of success.[3] Several scales have been developed and validated to measure the quality of postoperative recovery (QoR) (e.g. the 9-item QoR,[4] QoR-40,[5] QoR-15,[6] ObsQoR-11 scores,[7] or even the postoperative quality of recovery scale[8]). In a recent international consensus, the SteP–COMPAC group has highlighted the value of these postoperative recovery scales for standardising outcomes in perioperative medicine.[9] Our objective was to evaluate the use of early QoR scales as an endpoint in comparative studies in the field of anaesthesia.

This systematic review was registered (PROSPERO registration number CRD42020211561). We searched MEDLINE via PubMed from January 1, 1900 to October 31, 2020 to identify all published comparative studies using a QoR scale as an endpoint (primary or secondary). We focused on the anaesthesia literature, and selected the 24 anaesthesiology journals with the highest impact factors. We applied different search terms addressing the QoR or the use of one of the most popular scales in the title or abstract. The complete search strategy and list of the selected anaesthesiology journals are presented in the Supplementary material. Inclusion criteria for considering an article were: comparative study using a scale to measure the QoR as an endpoint, and assessing an intervention in the field of anaesthesia. We focused on human studies involving adults (age >15 yr old). We did not include systematic reviews, meta-analyses, case reports, study protocols, editorials, or other comments. One reviewer (ML) screened the titles and abstracts to exclude ineligible articles. Three reviewers (ML, MC, and CC) extracted data independently from the full text of all potentially eligible articles. Another reviewer of the group cross-checked all extracted data. All discrepancies were resolved by the third reviewer, who did not participate in the initial collection or cross-checking. We focused on the endpoints, and reported the use of a scale to measure the early QoR, detailing data concerning the QoR scale. We detailed article information including authors, title, journal of publication, year of publication, study design, and the country in which the patients were included. We collected information concerning the study population, the type of surgical procedure, the type of anaesthesia, and the type of intervention studied. The list of included studies, list of excluded non-comparative studies, and the flow chart are detailed in the Supplementary material.

Of 339 screened records, 148 (43.7%) comparative studies were included. The median sample size was 89.5 (65.5–135.0), while the median age was 50.0 (42.4–56.4) yr and the median proportion of women was 63.7% (47.7–100.0%). The main characteristics of the included studies are presented in Supplementary material. Among the

included studies, 127 (85.8%) were RCTs. For the other studies, 16 (76.2%) were prospective cohorts, four (19.0%) were *post hoc* analyses, and one (4.8%) had a before/after design. The first uses of a QoR scale in a comparative were in the early 2000s, and their use has only increased in recent years (Fig. 1). The QoR scores most commonly used as endpoints were the QoR-40 (63 studies, 42.6%), the 9-items QoR (41 studies, 27.7%), and the QoR-15 (22 studies, 14.9%). Figure 1 highlights the recent increased use of the QoR-15 and QoR-40 scores. The included studies covered a wide variety of surgical specialities, with gynaecological and obstetrical surgery accounting for 25%, general surgery for 18.9%, and orthopaedic surgery for 14.9% (see Supplementary material). The majority of surgical specialities have been evaluated by the 9-items QoR, the QoR-40, and the QoR-15 scores. Five studies concerned gastroenterology (endoscopic procedures), but we found no study on interventional radiology. Four studies used the ObsQoR-11 score to assess postpartum QoR. The main modality of anaesthesia was general anaesthesia that could be combined with locoregional analgesia (85.0%), whereas locoregional anaesthesia alone represented 7.5% of the studies. Forty studies (27%) studied specifically an outpatient population. The studies were conducted in countries around the world, with a predominance of non-European English-speaking countries (USA, 46 studies; Australia, 27 studies; Canada, 12 studies; more detailed information in Supplementary material). Several European countries reported less than three studies with the use of a QoR scale (e.g. Germany, France, UK). The most frequently used measurement timelines were H24 (83.0%) and H48 (32.7%), with 68 studies (45.9%) measuring QoR at multiple timelines. Only seven studies (4.7%) measured QoR at 1 month or more. It is probably preferable to use quality of life scales at this time.

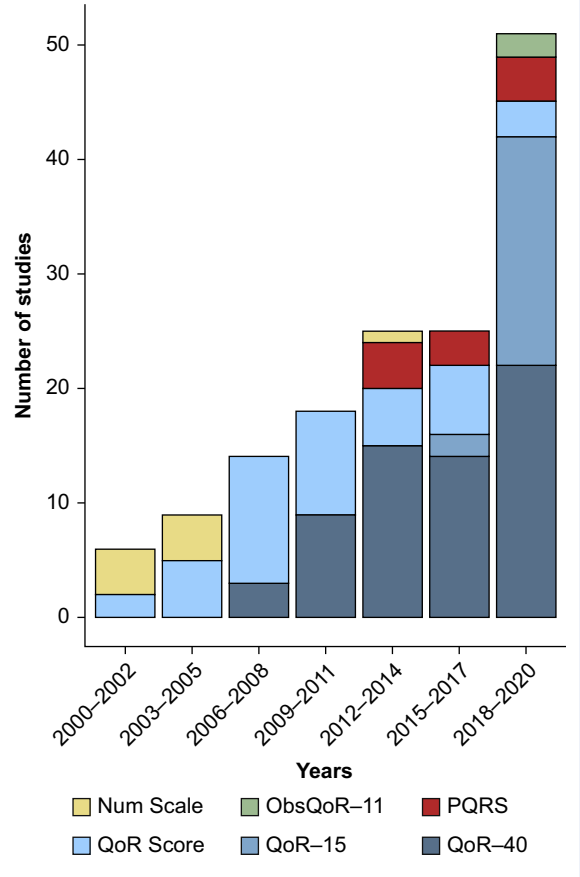

Fig 1. Time representation of the use of a postoperative recovery quality scale as an endpoint in comparative studies according to the type of QoR scale. Num Scale, numerical scale; PQRS, postoperative quality recovery scale; QoR, quality of postoperative recovery.

Fifty-two RCTs (35.1%) used a QoR scale as the primary endpoint. Among them, 39 RCTs (75%) measured QoR at 24 h after surgery. The statistical analysis concluded that there was a significant difference in the primary endpoint for 31 (59.6%).

One of the strengths of global QoR scales is that they integrate several components of patient recovery without emphasising one (e.g. opioid pain reduction at the cost of adverse effects). The multiple psychometric validations of QoR scales on different populations and at different timeframes ensure a quantitative, standardised, reliable, and reproducible measure of health status after surgery and anaesthesia. A few limitations restrain the diffusion of these scales: the psychometric validation of translations is complex, filling in the survey may require time and external help, and their use is difficult for patients with cognitive problems or who do not speak the appropriate language.

Despite the increasing use of QoR scales in anaesthesia over the past decade, our review shows that these scales are still under-used as primary endpoints in RCTs. Few studies have used these recovery scales in the countries of the European continent so far. We recommend further translation and validation of these scales to support their usefulness as an endpoint for perioperative intervention assessment.

Authors' contributions

Designed the study: ML, MC, CC, ER
Carried out the review and selection of the included studies, and acquired the data: ML, MC, CC
Conducted the statistical analysis: ML
Wrote the first draft of the manuscript: ML, MC, CC, ER
Made substantial contributions to the conceptual design and revised the final version of the manuscript: SL
Contributed to conception and design, acquisition of data, or analysis and interpretation of data; drafted the article or revised it critically for important intellectual content; approved the final version; and agreed to be accountable for all aspects of the work thereby ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: all authors.

Declarations of interest

ML was the developer of a validated version of the French translation of the QoR-15 (FQoR-15). No other competing interests declared.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bja.2021.03.008.

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Microcirculatory effects of landiolol: a double-blind, randomised, controlled study after cardiac surgery

Arnaud Ferraris[1,2,*], Matthias Jacquet-Lagrèze[1,2], Laure Cazenave[1,2], William Fornier[1], Wajma Jalalzai[1], Nicolas Rousseau-Saine[1], Bernard Allaouchiche[3], Stephane Junot[3], Matteo Pozzi[4], Jean-Luc Fellahi[1,2], and for the Anesthésie-Réanimation Coeur-Thorax-Vaisseaux (ARCOTHOVA) Group

[1]Service d'Anesthésie-Réanimation, Hôpital Louis Pradel, Hospices Civils de Lyon, Lyon, France, [2]Laboratoire CarMeN, Inserm UMR 1060, Université Claude Bernard Lyon 1, Lyon, France, [3]VetAgro Sup, Université de Lyon, Unité APCSe, Campus Vétérinaire de Lyon, Marcy l'Etoile, France and [4]Service de Chirurgie Cardiaque, Hôpital Louis Pradel, Hospices Civils de Lyon, Lyon, France

*Corresponding author. E-mail: arnaud.ferraris@chu-lyon.fr

Keywords: cardiac surgery; cardiopulmonary bypass; landiolol; microcirculation; postoperative atrial fibrillation

Editor—Microcirculatory disturbances are commonplace after cardiopulmonary bypass.[1] Postoperative atrial fibrillation (POAF) occurs in nearly 30% of patients undergoing conventional cardiac surgery.[2] Landiolol, a short-acting i.v. beta blocker, could reduce both the incidence of POAF and postoperative microcirculatory abnormalities.[3] However, the effects of landiolol on microcirculation remain poorly documented. The aim of this prospective randomised, controlled, double-blind study conducted in patients undergoing cardiac surgery was to assess the microcirculatory effects of landiolol given at a moderate dose to prevent POAF. We tested the hypothesis that landiolol could limit cardiopulmonary-bypass-induced microcirculatory abnormalities.

From January to November 2019, 59 adult patients undergoing conventional cardiac surgery with cardiopulmonary bypass at the University Hospital Louis Pradel (Lyon, France) were enrolled on their arrival to the ICU after Ethics Committee approval. The trial was registered with ClinicalTrials.gov (NCT03779178). Patients with preoperative atrial fibrillation, contraindications to beta blockers, hyperlactataemia >4 mM, postoperative inotropic drug requirement, postoperative norepinephrine >0.3 μg kg^{-1} min^{-1}, acute respiratory distress syndrome, or haemodynamic instability were not included. Subjects were randomised into a landiolol group (n=30) and a control group (n=29). A complete set of measurements was carried out in all subjects before landiolol infusion (T0) and at 10 μg kg^{-1} min^{-1} i.v. (T1). Treatment was stopped if MAP was <65 mm Hg or HR <60 beats min^{-1}.

Microcirculation was assessed first with peripheral near-infrared spectroscopy (NIRS; INVOS™ Oximetry; Medtronic, Minneapolis, MN, USA) combined with a vascular occlusion test, as described.[1] We analysed the following variables: desaturation speed during ischaemia