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CLINICAL RESEARCH

Effect of anesthetic technique on the quality of anesthesia recovery for abdominal histerectomy: a cross-observational study

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Abstract
Introduction: Spinal anesthesia combined with sedation and general anesthesia combined with epidural are two techniques often used for patients undergoing abdominal hysterectomy. There is no consensus that one of these techniques is superior regarding the perception of patients towards the quality of postoperative recovery. This observational cross-sectional study aimed to assess the quality of postoperative recovery in women undergoing open abdominal hysterectomy by comparing both anesthetic techniques.
Method: We recruited 162 women aged between 30 and 74 years to be submitted to abdominal hysterectomy. The anesthetic technique used followed the preference of the attending anesthesiologist without interference of the investigators. After applying the exclusion criteria, 80 patients underwent spinal anesthesia combined with sedation (Group 1) and 62 women underwent epidural anesthesia combined with general anesthesia (Group 2). The quality of postoperative recovery was evaluated using the questionnaire Quality of Recovery-40 (QoR-40) completed 24 hours after the end of the surgery.
Results: Eighty patients in Group 1 answered the QoR-40 questionnaire with an average rating of 179.4 points, median of 186.5, standard deviation of 17.4 and a confidence interval of 3.8. The 60 patients in Group 2 answered the QoR-40 with an average of 174.9 points, median of 178 points, standard deviation of 16 points and a confidence interval of 4.0 ($p = 0.024$).
Conclusion: Women who received spinal anesthesia combined with sedation considered quality of postoperative recovery better.

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Introduction

Hysterectomy consists of surgical removal of the uterus and, following C-section, it is the second most common surgery performed in female patients. This surgery is associated with a high emotional burden related to fertility, sexuality, and femininity, and can elicit strong physical, psychological, and social changes.[1]

Although surgical procedures focus on the improvement of health and feeling of well-being, they can also engender enough discomfort and emotional fragility to lead to the perception of decreased quality of life, even in the absence of specific complications.[2] Frequently, a poor postoperative recovery period can lead to prolonged length of stay, increasing hospital costs and diminishing patient satisfaction.[3,4] Thus, the multidisciplinary team should seek techniques that offer patients fast recovery and expeditious return to daily activities.[5]

Most studies assessing the quality of postanesthetic and surgical recovery, most of the time analyze elements such as recovery time, cardiorespiratory complications, pain, Postoperative Nausea and Vomiting (PONV), length of stay or other complications.[6] When they are considered alone, these aspects do not necessarily mirror the recovery of most patients undergoing anesthesia and surgery. Therefore, quality-of-life assessment from the patient's point of view has become an important factor to be considered in studies investigating the anesthesia and surgery effect on patient recovery and satisfaction.

Two anesthesia approaches commonly used for abdominal hysterectomy are general anesthesia combined with epidural and spinal anesthesia combined with sedation. No studies in the literature used adequate tools to compare these two techniques regarding the quality of postoperative recovery.

The present study aimed to evaluate the perception of the quality of postoperative recovery in women undergoing hysterectomy by comparing two techniques: general anesthesia combined with epidural and spinal anesthesia combined with sedation. Our hypothesis was that spinal anesthesia offers better quality of recovery 24 hours after anesthesia.

Method

This cross-sectional observational study was conducted according to the international standards for human research ethics established by the Declaration of Helsinki, and Resolution 466/12 from the Ministry of Health of Brazil. The study was approved by the regional ethics committee (033125/2016) and by the national system for registering research involving humans (Plataforma Brasil: CAAE 55339616.5.0000.5412). All patients included in the study signed an informed consent form. Data were collected in two hospitals located at an inland city of São Paulo State, assisted by the same anesthesiology team. The data collecting period occurred between September 2016 and March 2018.

The sample size calculation was based on the primary outcome, that is, the total score obtained in the Quality of Recovery-40 (QoR-40) questionnaire applied 24 hours postoperatively to women undergoing hysterectomy, from a pilot sample of 90 patients included in the total sample of this study, comparing spinal anesthesia combined with sedation to general anesthesia combined with epidural anesthesia. In this sample, there was a difference of 8 points between the mean scores for spinal anesthesia combined with sedation (186, standard deviation $\pm$ 13), and the mean scores for general anesthesia combined with epidural (178, standard deviation $\pm$ 12). Based on these data, the sample size estimated was 55 individuals per Group, to obtain a power of 90% and a type I error of 5%.

The study included patients, aged between 30 and 74 years, physical status ASA (American Society of Anesthesiologists) I or II to be submitted to open abdominal hysterectomy proposed by the gynecology surgeon.

Exclusion criteria were refusal to participate in the study; presence of impaired cognitive function; use of psychoactive drugs; fear of intraoperative anesthetic technique failure; presence of a complication that would lead to anesthetic technique conversion, the need for re-operation or admission to the intensive care unit; and patients opting to abandon research.

We recruited 162 patients to participate in the study, and the anesthetic technique was decided by the attending anesthesiologist, in agreement with the patient and the surgical team, without the influence of the investigators, but complying with the techniques and doses recommended in the anesthetic protocol of the team of anesthesiologists that worked at the two institutions in which the research was conducted.

In Group 1 with 80 patients, the anesthetic technique performed was sedation with intravenous midazolam and/or fentanyl combined with spinal anesthesia using 0.5% hyperbaric bupivacaine and morphine. At the end of the surgery, the patients were sent to the PostAnesthesia Care Unit (PACU).

In Group 2 with 62 women, the anesthetic technique performed was sedation with intravenous midazolam and/or fentanyl and single-shot epidural anesthesia using 50% enantiomeric excess levobupivacaine hydrochloride in concentrations ranging from 0.25–0.5% with epinephrine and morphine. Then, the patients received general anesthesia with intravenous injection of fentanyl, propofol and rocuronium. Tracheal intubation and mechanical ventilation were performed, and anesthesia was maintained using sevoflurane. Atropine and neostigmine were administered upon conclusion of the surgery. After confirmation of neuromuscular function recovery (monitoring of the train of four > 0.9), return of spontaneous breathing and awakening, the trachea was extubated, and the patient sent to PACU.

Both anesthetic techniques were completed with the institution's standard prescription of intravenous analgesia and antiemetic drugs that started one hour before the end of surgery, comprising intravenous administration of 100 mg of ketoprofen every 12 hours and 1 g of dipyrone every 6 hours for pain control, and 10 mg dexamethasone (single dose) combined with 8 mg ondansetron every 8 hours as antiemetics.

Upon PACU admission, and every 20 minutes, patients were assessed for pain and PONV using an 11-point numerical analog scale (where zero means no symptoms and ten means the highest intensity of symptoms possible). When pain score exceeded 3 points, the patient received 2 mg of morphine

at 20-minute intervals, until the pain score was less than 4 points. When the PONV assessment exceeded 3 points, the patient received 10 mL of medication consisting of 3 $mg.mL^{-1}$ of dimenhydrinate, 5 $mg.mL^{-1}$ of pyridoxine hydrochloride, 100 $mg.mL^{-1}$ of glucose and 100 $mg.mL^{-1}$ fructose in a single dose.

After reaching a score equal to or greater than nine in the modified Aldrete and Kroulik assessment, patients were discharged from the PACU and were sent to the floor where they continued receiving the analgesic and antiemetic medications initiated in the operating room. When they complained of pain, they received 100 mg of tramadol as rescue medication for pain, with a minimum interval of 8 hours. If they had PONV, they would be medicated with 10 mL of the medication comprised of dimenhydrinate, pyridoxine, glucose, and fructose every 12 hours.

The quality of recovery was assessed using the QoR-40 questionnaire. It consists of 40 questions divided into five dimensions: emotional state; physical comfort; psychological support; physical independence; and pain. Its score varies between 40 (worst evaluation) and 200 (best evaluation) and each question is scored according to the frequency in which it occurs in an interval that varies between 1 to 5 points, according to the Likert scale. The questionnaire has two parts. In Part A, questions indicate positive aspects, and the highest score is attributed to the highest occurrence. In Part B, questions indicate negative aspects and the higher the occurrence, the lower the score attributed.[7,8] Validity, reliability, user-friendliness, responsiveness and cross-cultural adaptation to Portuguese of the QoR-40 were established in previous studies, revealing a high reliability coefficient.[4,9,10] Several clinical trials successfully used QoR-40 to assess the quality of post-surgical and postanesthesia recovery.[11–13] The score of 142 points is a cut-off point and higher values indicate good quality postanesthetic satisfaction.[11] The questionnaire used in this study is found in Annex 1.

Twenty-four hours after the end of the surgery, the patients were asked to complete the questionnaire by investigators who had no knowledge of the anesthetic procedure performed. The investigator remained close to the patient's bed, without interfering in the answers, only paying attention to clarify any possible doubt.

In addition to the QoR-40 total score, other data were also collected: 1) age, duration of surgery; and 2) evaluation of pain and PONV occurrence in the initial 24 hours of the postoperative period, through the specific questions regarding these issues in the dimensions of QoR-40.

Statistical analysis

After data acquisition, quantitative data were entered into an Excel® database, then transferred and analyzed by means of SPSS® software version 24. The Mann-Whitney test was used for comparing groups regarding the ordinal data and non-Gaussian continuous data (presented as median and interval), whose results did not show normal distribution by the Komolgorov-Smirmov test. Student's *t*-test was used to compare the parametric quantitative data. We accepted a power of 90% and a type 1 error of 5%.

Results

A total of 162 patients were recruited to participate in the study and 20 were excluded. The reasons for exclusion were: seven patients refused to participate, eight patients did not complete the questionnaire correctly, two patients required conversion of the chosen anesthetic technique due to intraoperative pain, two patients were submitted to anesthetic techniques different from the two techniques evaluated, and one patient required admission to the intensive care unit due to surgical complications. Thus, 142 patients were evaluated (Fig. 1).

Table 1 shows the mean age of the patients and the mean duration of the surgery, regarding the anesthetic techniques evaluated. There was no difference observed between the groups regarding the mean age of participants, but there was a difference between the groups regarding the mean duration of the surgery, with a longer mean duration for Group 2.

Table 2 shows the scores attributed by the patients to the quality of postoperative recovery, using the Qor-40, its dimensions, and the sum of the three questions related to the presence of PONV in the initial 24 hours postoperatively. These three questions were then inserted into the physical comfort dimension.

Table 2 shows that in Group 1 patients had a QoR-40 total score higher than those in Group 2 ($p = 0.024$), predominantly in the dimensions of physical comfort, emotional states, and psychological support. In the physical independence and pain dimensions, there was no statistical difference between the groups. We can also observe that Group 1 had a higher score related to the presence of PONV in the first 24 hours, which reveals greater comfort and better quality regarding this item ($p < 0.001$).

Table 3 compares the two anesthetic techniques according to the QoR-40 cut-off score, which divides patients into two categories: good quality of recovery (scores greater than or equal to 142) and poor quality of recovery (scores below 142).

In Table 3, there was no statistical difference between the Groups regarding the classification of the quality of recovery of patients.

Discussion

This cross-sectional observational study examined 142 questionnaires that assessed the perception of the quality of postoperative recovery 24 hours postoperatively in women submitted to open abdominal hysterectomy, comparing two commonly used anesthetic managements: spinal anesthesia combined with sedation (Group 1), and epidural combined with general anesthesia (Group 2). The study revealed no difference between the groups regarding the mean age of the patients assessed. Concerning surgery duration, we observed that Group 2 had a longer surgical time compared to Group 1 ($p < 0.001$). This is because the investigators did not interfere with the anesthetic technique when using randomization, leaving the anesthesiologist free to decide for the anesthesia technique whose duration is more controllable (Group 2) in patients expected to undergo longer

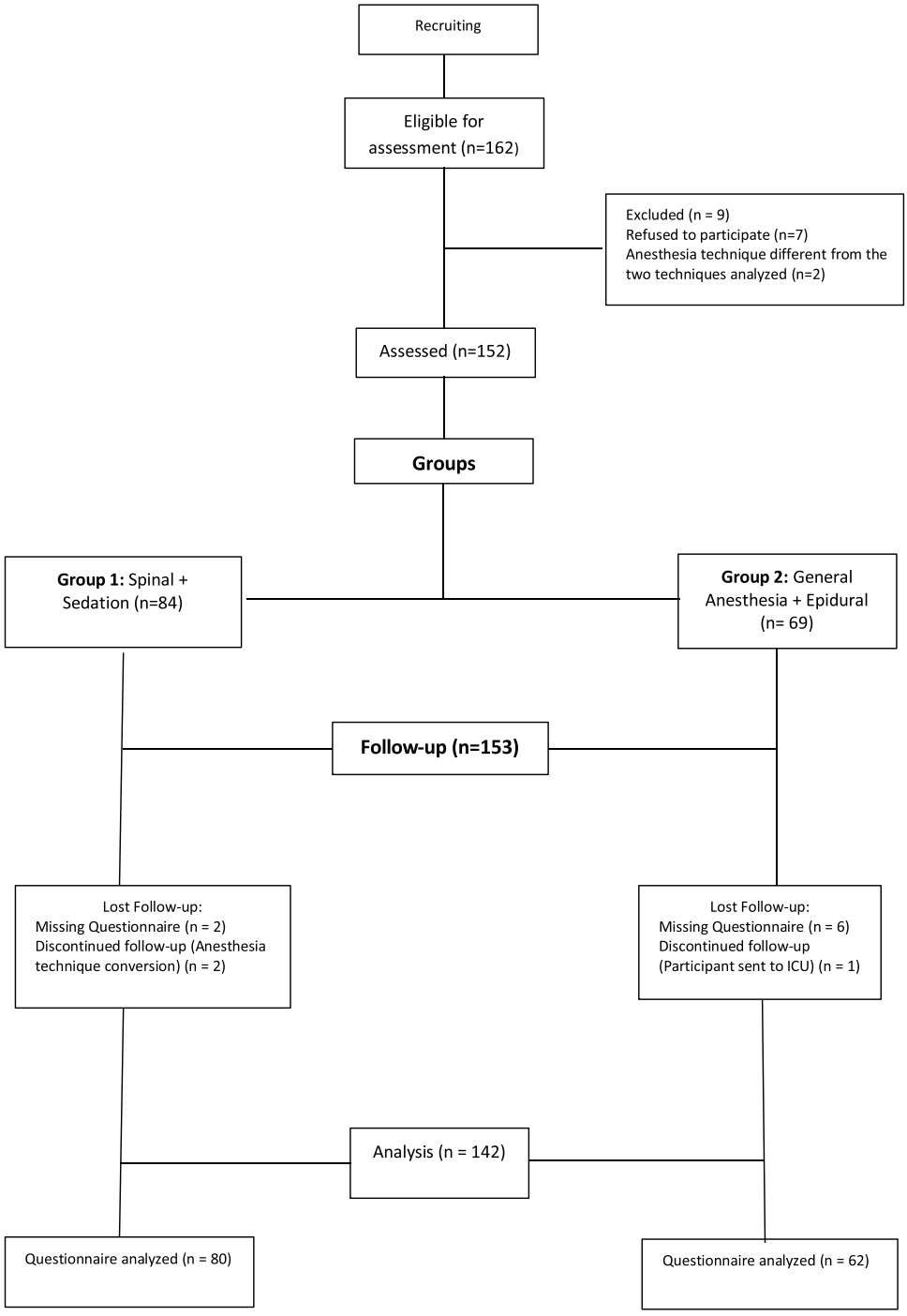

Figure 1 Flowchart describing allocation of patients.

Table 1 Comparison between groups according to age and duration of surgery.

	Type of anesthesia	n	Mean	Standard deviation (±)	p^a
Age	Spinal + Sedation	80	44.98	6.129	0.501
	Epidural + General Anesthesia	62	46.23	6.959	
	Total	142	45.64	6.521	
Duration of the surgery	Spinal + Sedation	80	99.44	22.385	< 0.001
	Epidural + General Anesthesia	62	142.38	39.047	
	Total	142	119.14	37.732	

[a] Student *t* test.

Table 2 QoR-40 scores according to dimensions and occurrence of PONV 24 hours postoperatively for patients submitted to spinal combined with sedation, or general anesthesia combined with epidural.

Dimensions	Type of anesthesia	Mean	Median	Standard Deviation (±)	Q1	Q3	N	IC	p[a]
QoR-40	Epi + GA	174.9	178	16	165	187	62	4	0.024
	Spinal + Sed	179.4	186.5	17.4	170.8	191	80	3.8	
Comfort	Epi + GA	52.4	53.5	5.4	50	56	62	1.3	0.01
	Spinal + Sed	54	56	6.6	51	59	80	1.4	
Emotions	Epi + GA	43.8	44.5	5	41	48	62	1.2	0.046
	Spinal + Sed	45.2	47	5.1	43	49	80	1.1	
Physical independence	Epi + GA	14.5	15	3.7	12	17	62	0.9	0.303
	Spinal + Sed	15.2	16	3.7	13	17.3	80	0.8	
Support	Epi + GA	31.9	34	3.9	30	35	62	1	0.019
	Spinal + Sed	33	35	3.4	32	35	80	0.7	
Pain	Epi + GA	32.2	33	3.6	32	34	62	0.9	0.286
	Spinal + Sed	32	33	2.8	31	34	80	0.6	
PONV 24 h[b]	Epi + GA	13.2	14	2.2	12.3	15	62	0.6	< 0.001
	Spinal + Sed	14.3	15	1.3	14	15	80	0.3	

Epi + GA: General anesthesia combined with epidural.
Spinal + Sed: Spinal anesthesia combined with sedation.
[a] Mann-Whitney Test.
[b] The PONV 24 h value was calculated by the sum of the answers in the QoR-40 related to the occurrence of nauseas, vomiting, and vomiting without residue.

Table 3 Comparison between the two anesthesia techniques according to the quality of postoperative recovery.

Quality according to QoR-40	Epi + GA		Spinal + Sedation		Total		p[a]
	n	%	n	%	n	%	
Good	60	96.80%	76	95.00%	136	95.80%	0.602
Bad	2	3.20%	4	5.00%	6	4.20%	

The quality of the postoperative recovery was considered good when QoR-40 score was equal or higher than 142. When the score was lower than 142 the quality was considered bad.
[a] Mann-Whitney Test.

duration surgery, based on information the anesthesiologist obtains from a previous discussion with the surgery team.

It was also observed that in Group 1 patients had higher QoR-40 scores than Group 2 (p = 0.024). Based on a difference of 8.5 points between the medians found in Groups 1 (186.5 points) and 2 (178 points), this change can be considered as clinically relevant to our daily practice, since differences greater than 6.3 points in the QoR-40 are deemed clinically important.[14] A possible selection bias may have happened as anesthesiologists may have preferred the general anesthesia technique combined with epidural in surgeries in which a previous discussion with the surgeon suggested a more complicated and time-consuming surgery. This preference occurs because when using this anesthesia technique there is more control over anesthetic time. In spite of this, the difference between anesthetic techniques observed was mainly in the dimensions of physical comfort, emotional state, and psychological support, with a higher score attributed by Group 1 (Table 2). This shows that, in addition to a component of physical comfort related to measurable physical symptoms such as PONV, tremors and dizziness, emotional components surveyed in the emotion state and support dimensions also influenced the QoR-40 total score. Perhaps the feeling of greater control, offered by maintaining intraoperative awareness, may explain the better assessment of the quality of recovery in patients in Group 1.

A high level of preoperative anxiety is recognized as negatively affecting recovery from anesthesia and postoperative pain control;[15] also, strategies to decrease anxiety during the performance of regional anesthesia and during surgery can improve patient satisfaction associated with the procedure performed.[16,17] Nevertheless, an observational study measuring the quality of recovery in patients undergoing lower limb surgery revealed that deep sedation can be identified as a factor that decreases the QoR-40 score.[13] Therefore, a sedation strategy enabling to decrease anxiety without loss of consciousness seems preferable.

No statistical difference between groups were found regarding physical independence and pain dimensions (Table 2). Together with the high percentage of patients who attributed a good quality of recovery (Table 3), this absence of difference between the groups reveals adequate postoperative analgesia obtained by performing neuraxial block and administering parenteral analgesics in both groups. The presence of pain during the postoperative period is associated with decreased quality of recovery.[13,18,19]

When evaluating the literature, we found that postoperative analgesia obtained by neuraxial opioids can generate greater patient satisfaction.[16] In patients submit-

ted to hysterectomy, neuroaxis anesthesia provides better quality of recovery, when compared to general anesthesia without associated blockade. In addition, a decreased consumption of parenteral opioids due to neuraxial anesthesia was also related to better quality of recovery.[20] Another meta-analysis described the importance of the combination of neuraxial blockade with general anesthesia, showing decrease of mortality and incidence of respiratory, cardiovascular and gastrointestinal complications.[21] Another prospective cohort study, with patients under general anesthesia submitted to orthopedic surgeries performed below the knees – associated or not with peripheral nerve blockades – observed that the patients who received the blockades were more satisfied and with less intensity pain.[22]

It can also be observed that Group 1 scored higher in the QoR-40 questions related to PONV in the initial 24 hours, which indicates greater comfort and better quality regarding these three questions ($p < 0.001$), and mirroring a better general perception of the quality of recovery.[13,18,19]

From the data depicted in Table 3, we observed that most patients (95.8%) attributed a QoR-40 total score greater than or equal to 142 points, a score associated with good quality recovery. Only six patients (4.2%) reported a QoR-40 total score below 142. There were no differences between groups. From this finding, it can be concluded that the two evaluated anesthetic techniques allowed good quality recovery 24 hours postoperatively. This is ascribed to the multidisciplinary team's concern with the main factors that can determine worse quality of recovery (pain and PONV), that are prevented with anesthetic techniques combined with blocks[23] and parenteral drugs.[7,24]

The major limitations found in this study were the individuality and subjectivity of the issue, which causes different interpretations regarding questions present in the questionnaire selected for the study. Questions like: ''Do you feel support from family or friends?'' and ''Do you feel lonely?'' are examples of questions in which the interpretation of the influence of the anesthetic technique becomes difficult. Undeniably, new tools and new studies must be designed so that the matter can be better understood.

Nevertheless, the QoR-40 proved to be valuable as a starting tool for the quantification of the quality of postoperative recovery, enabling to compare anesthetic techniques in a perspective that is still less approached in the scientific literature: through the patient's eyes.

Conclusion

We concluded that the perception of the quality of postoperative recovery in patients who underwent hysterectomy 24 hours after surgery was higher in patients who underwent spinal anesthesia combined with sedation compared to those receiving general anesthesia combined with epidural.

Authors' contributions

Daniel de Carli: Study design and planning, collecting, analyzing and interpretating of data, wrote and reviewed the manuscript.

José Fernando Amaral Meletti: Study design and planning, wrote and reviewed the manuscript.

Larissa Schneider Gratacós: Obtained informed consents; collected intraoperative data and questionnaires.

Victor Cristiano Ramos Gomes: Obtained informed consents; collected intraoperative data and questionnaires.

Nicole Dutra Marques: Obtained informed consents; collected intraoperative data and questionnaires.

Rodrigo Pauperio Soares de Camargo: Study design and planning.

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Conflicts of interest

The authors declare no conflicts of interest.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.bjane.2021.01.013.

References

1. Melo MCB, Barros ÉND. Histerectomia e simbolismo do útero: possíveis repercussões na sexualidade feminina. Rev SBPH. 2009;12:80–99.
2. Lee WK, Kim MS, Kang SW, Kim MS, Lee JR. Type of anaesthesia and patient quality of recovery: a randomized trial comparing propofol-remifentanil total i.v. anaesthesia with desflurane anaesthesia. Br J Anaesth. 2015;114:663–8.
3. Poitras S, Beaule P, Dervin GF. Validity of a short-term quality of life questionnaire in patients undergoing joint replacement: the Quality of Recovery-40. J Arthroplasty. 2012;27:1604–8.
4. Kluivers KB, Riphagen I, Vierhout ME, Brölmann HA, de Vet HC. Systematic review on recovery specific quality-of-life instruments. Surgery. 2008;143:206–15.
5. Murphy GS, Szokol J, Greenberg SB, et al. Preoperative dexamethasone enhances quality of recovery after laparoscopic cholecystectomy: effect on in-hospital and postdischarge recovery. Anesthesiology. 2011;114:882–90.
6. Estivalet FF, Bagatini A, Gomes CR. Remifentanil associated to propofol or sevoflurane for videolaparoscopic cholecystectomy: a comparative study. Rev Bras Anestesiol. 2002;52:385–93.
7. Myles PS, Weitkamp B, Jones K, Melick J, Hensen S. Validity and reliability of a postoperative quality of recovery score: the QoR-40. Br J Anaesth. 2000;84:11–5.
8. Myles PS, Hunt JO, Nightingale CE, et al. Development and psychometric testing of a quality of recovery score after general anesthesia and surgery in adults. Anesth Analg. 1999;88:83–90.
9. Gornall BF, Myles PS, Smith CL, et al. Measurement of quality of recovery using the QoR-40: a quantitative systematic review. Br J Anaesth. 2013;111:161–9.
10. Eduardo AHA, Santos CB, Carvalho AMP, Carvalho EC. Validation of the Brazilian version of the Quality of Recovery - 40 Item questionnaire. Acta Paul Enferm. 2016;29:253–9.
11. Pereira LG, Costa M, Sousa G, Abelha F. Quality of recovery after anaesthesia measured with QoR-40: a prospective observational study. Braz J Anesthesiol. 2016;66:369–75.

12. Mihara T, Ishii T, Ka K, Goto T. Effects of steroids on quality of recovery and adverse events after general anesthesia: meta-analysis and trial sequential analysis of randomized clinical trials. PLoS One. 2016;11:e0162961.
13. Moro ET, Silva MA, Couri MG, Issa DD, Barbieri JM. Quality of recovery from anesthesia in patients undergoing orthopedic surgery of the lower limbs. Rev Bras Anestesiol. 2016;66:642–50.
14. Myles PS, Myles DB, Galagher W, Chew C, MacDonald N, Dennis A. Minimal clinically important difference for three quality of recovery scales. Anesthesiology. 2016;125:39–45.
15. Ali A, Altun D, Oguz BH, Ilhan M, Demircan F, Koltka K. The effect of preoperative anxiety on postoperative analgesia and anesthesia recovery in patients undergoing laparascopic cholecystectomy. J Anesth. 2014;28:222–7.
16. Wu CL, Rowlingson AJ, Partin AW, et al. Correlation of postoperative pain to quality of recovery in the immediate postoperative period. Reg Anesth Pain Med. 2005;30:516–22.
17. Kubulus C, Schmitt K, Albert N, et al. Awake, sedated or anaesthetised for regional anaesthesia block placements?: a retrospective registry analysis of acute complications and patient satisfaction in adults. Eur J Anaesthesiol. 2016;33:715–24.
18. Royse CF, Chung F, Newman S, Stygall J, Wilkinson DJ. Predictors of patient satisfaction with anaesthesia and surgery care: a cohort study using the Postoperative Quality of Recovery Scale. Eur J Anaesthesiol. 2013;30:106–10.
19. Myles PS, Williams DL, Hendrata M, Anderson H, Weeks AM. Patient satisfaction after anaesthesia and surgery: results of a prospective survey of 10,811 patients. Br J Anaesth. 2000;84:6–10.
20. Castro-Alves LJS, De Azevedo VLF, Braga TFDF, Goncalves AC, et al. The effect of neuraxial versus general anesthesia techniques on postoperative quality of recovery and analgesia after abdominal hysterectomy: a prospective, randomized, controlled trial. Anesth Analg. 2011;113:1480–6.
21. Pöpping D, Elia N, Van Aken H, et al. Impact of epidural analgesia on mortality and morbidity after surgery: systematic review and meta-analysis of randomized controlled trials. Annals Surg. 2014;259:1056–67.
22. Elkassabany N, Cai LF, Mehta S, et al. Does regional anesthesia improve the quality of postoperative pain management and the quality of recovery in patients undergoing operative repair of tibia and ankle fractures? J Orthopaedic Trauma. 2015;29:404–9.
23. Abdallah FW, Morgan PJ, Cil T, et al. Ultrasound-guided multilevel paravertebral blocks and total intravenous anesthesia improve the quality of recovery after ambulatory breast tumor resection. Anesthesiology. 2014;120:703–13.
24. Schraag S, Pradelli L, Alsaleh Ajo, et al. Propofol vs. inhalational agents to maintain general anaesthesia in ambulatory and inpatient surgery: a systematic review and meta-analysis. BMC Anesthesiol. 2018;18:162.