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ARTIGO ORIGINAL

Quality of Postoperative Recovery in Elderly Cancer Patients

Qualidade do Recobro Pós-Operatório em Doentes Neoplásicos Idosos

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Palavras-chave
Cuidados Pós-Operatórios; Idoso; Neoplasias; Período de Recuperação da Anestesia; Recuperação de Função Fisiológica
Keywords
Aged; Anesthesia Recovery Period; Neoplasms; Postoperative Care; Recovery of Function

ABSTRACT

Introduction: Perioperative management of the elderly is an extensively debated issue. We aimed to determine the postoperative quality of recovery in very old patients with neoplasm submitted to curative surgery.

Material and Methods: An observational, prospective study was conducted including patients with neoplasm undergoing curative surgery and admitted to the Post-Anesthetic Care Unit. The Revised Cardiac Risk Index (RCRI) was applied. Very old patients were considered for patients older than 80 years. Vulnerability was evaluated using the Clinical Frailty Scale. Frailty was defined as a score ≥4. The World Health Organization Disability Assessment Schedule 2.0 (WHODAS) was used to assess preoperative disability, which was defined as a score ≥25%. EuroQol5 dimensions (EQ-5D) was applied to measure quality of life before surgery. The Portuguese version of Postoperative Quality of Recovery Scale (PQRS) was used at baseline (up to 14 days before surgery) and after surgery at minute 15 (T15), 40 (T40) and days 1 (D1) and 3, (D3) evaluating recovery in several domains. Recovery was defined as return to baseline values in each domain (physiologic, nociceptive, emotional, functional and cognitive). The Mann-Whitney, chi-square or Fisher's exact test were used for statistical analysis

Results: Of 148 patients, 12% were very old patients, who had higher ASA physical status ($p = 0.002$) and higher RCRI scores ($p < 0.001$). Very old patients presented more problems at mobility ($p = 0.005$), self-care ($p = 0.002$) and usual activities ($p = 0.004$), with the majority presenting frailty ($p = 0.032$) and disability ($p = 0.007$). Recovery was similar at all time points in every domain, except in the nociceptive domain at day 1 ($p = 0.042$).

Discussion and Conclusion: Very old patients had higher RCRI scores and presented more often with frailty, disability and limitations in EQ-5D. Nonetheless, in this study, they presented complete recovery with a frequency comparable to the other patient.

RESUMO

Introdução: A abordagem perioperatória do idoso é um tema bastante debatido atualmente. O nosso objetivo foi determinar a qualidade de recobro pós-operatório em idosos com neoplasia submetidos a cirurgia curativa.

Material e Métodos: Efetuou-se um estudo observacional prospetivo, incluindo pacientes submetidos a cirurgia neoplásica curativa e admitidos na Unidade Pós-Anestésica. Aplicou-se o Índice de Risco Cardíaco Revisto (IRCR). Foram considerados doentes muito idosos aqueles com idade >80 anos. Avaliou-se fragilidade usando a *Clinical Frailty Scale*, sendo definida por uma pontuação ≥4. A incapacidade foi avaliada pelo *World Health Organization Disability Assessment Schedule* 2.0 (WHODAS 2.0) e definida por uma pontuação ≥25%. Avaliou-se qualidade de vida pré-operatória usando o *EuroQol* 5 *dimensions* (EQ-5D). A qualidade de recobro foi avaliada pela versão portuguesa do *Postoperative Quality of Recovery Scale* (PQRS), realizada no pré-operatório (até 14 dias antes da cirurgia) e no pós-operatório ao minuto 15, 40 e nos dias 1 e 3, avaliando recuperação em vários domínios. Definiu-se recuperação como retorno aos valores basais para cada domínio (fisiológico, nociceptivo, emocional, funcional e cognitivo). Foram usados os testes de Mann-Whitney, qui-quadrado ou teste exato de Fisher para análise estatística.

Resultados: Do total de 148 doentes, 12% foram considerados doentes muito idosos. Este grupo apresentava classificação ASA ($p = 0{,}002$) e pontuações IRIC ($p < 0{,}001$) superiores e manifestava mais problemas nos domínios mobilidade ($p = 0{,}005$), autocuidado ($p = 0{,}002$) e atividades diárias ($p = 0{,}004$). A maioria dos doentes muito

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idosos apresentava fragilidade ($p = 0,032$) e incapacidade ($p = 0,007$) pré-operatórias. A recuperação foi semelhante em todos os tempos e domínios, exceto no domínio nociceptivo no dia 1 ($p = 0,042$).

Discussão e Conclusão: Os doentes muito idosos tiveram pontuações superiores no IRCR, apresentavam mais frequentemente fragilidade, incapacidade e limitações no EQ-5D. No entanto, neste estudo, apresentaram recobro completo com uma frequência comparável aos restantes doentes.

INTRODUCTION

Patients can be defined based on their age, being classified as elderly if older than 65 years old.[1] This comes as an important matter, as the elderly population is increasing worldwide due to better medical care and living conditions.[2-4] As reported by current estimates, the percentage of the population aged 80 years and older will double by 2050, representing 9.6% of the European population.[5]

Despite elderly patients being particularly sensitive to stress caused by trauma, hospitalization, anesthesia and surgery, they are nowadays more often submitted to surgery, with age not being a contraindication to an increasing number of procedures.[2, 6]

These patients are recognized for having more comorbidities and a reduction of physiological reserve, resulting in increased vulnerability not only to emergency but also to elective surgery. It is also common that they present with frailty. Consequently, they may not tolerate the stress caused by anesthesia and surgery, and present a higher risk of complications, morbidity and mortality.[2,4,7-9]

However, the role of age itself, despite the severity of the disease, is poorly understood.[3,8] It is known that the risk of mortality and complications from anesthesia is elevated in patients aged 55-64 years and peaks in patients older than 85 years old.[9] Notwithstanding, some studies suggest that the risk from anesthesia and surgery is more related to the presence of comorbidities, higher ASA score or emergency surgery rather than the age of the patient alone.[4,6,8] Notably, age itself, independent of coexisting medical illness, does not seem to be a significant risk factor in outcome from oncologic procedures or in survival.[3]

There is a high incidence of cancer in the geriatric population and higher life expectancy is associated with higher risk of cancer development. Many studies have dwelled on that older patients can be submitted to surgery and have the same survival rate as younger patients. Regardless of this, surgery may not be offered as a treatment option in many cases, due to concerns of higher morbidity and mortality risk. However with appropriate perioperative care, the risk is only slightly increased.[3,4]

As a way of measuring the quality of perioperative care and anesthesia, the achievement of a good postoperative recovery is nowadays recognized as an important outcome after surgery.[10]

Recovery is a continuous process with a predictable course over time, comprising an initial decline in function and then a progressive recovery.[10-12] Complete postoperative recovery is considered when function is reestablished and adverse symptoms are no longer present.[11]

It is important to measure quality of recovery after surgery on account that recovery is frequently incomplete and this occurrence has prognostic implications, related to short and long-term morbidity and mortality.[13] If we look at patients submitted to major surgery, they are rarely asymptomatic or with normal levels of function at the hospital discharge.[11] Early physical and cognitive recovery may be incomplete and often may be persistent, especially in patients older than 75 years old.[12-14]

The extent of early recovery, particularly related to the physiological domain, has a substantial impact on perioperative workflow, respiratory complications and incidence of rare adverse events.[10] It is also known that the presence of significant pain in the early postoperative period is associated with incomplete long-term nociceptive recovery.[13]

The concept of postoperative recovery has evolved throughout the times. Nowadays, the postoperative recovery is measured in a multidimensional way and is patient-focused. Royse *et al* developed the Postoperative Quality of Recovery Scale (PQRS), which allows real-time assessment of recovery, in multiple domains, such as physiologic, nociceptive, emotional, functional, cognitive and also gives an overall perspective of the patient status. This scale is applied in different timeframes, including immediate to long-term recovery measurements.[10,12-14]

By evaluating postoperative recovery in real-time, the PQRS is able to identify an individual patient with failure to recover in a specific domain, while it is happening. This allows implementation of targeted corrective interventions in a time point that has the most clinical impact[12,13] and gives the possibility to adequate resources to those with incomplete recovery and allow fast-track care to those with normal recovery.[11,12]

Our goal was to determine the postoperative quality of recovery in very old patients with neoplasm submitted to curative surgery.

METHODS

SUBJECTS AND SETTING

After approval by the institutional ethics committee, provided by the Centro Hospitalar de São João Porto, Portugal, an observational prospective study was conducted, enrolling adult patients undergoing elective curative surgery

for cancer. A written informed consent was obtained.

The inclusion criteria were adult Portuguese-speaking patients submitted to elective curative surgery, under general or regional anesthesia and admitted to the Postoperative Anesthesia Care Unit (PACU). It included urologic, plastic, gynecologic and general surgery. Patients were excluded if they had not provided or were unable to provide informed consent, if they were younger than 18 years old, or if they had been admitted in the Intensive Care Unit.

DATA COLLECTION

Demographics such as sex, age, weight, height, body mass index (BMI), comorbidities, usual medication and physical status according to the American Society of Anesthesiologists Physical Status (ASA-PS) scale were recorded preoperatively. The Revised Cardiac Risk Index (RCRI) was evaluated accordingly to the criteria developed by Lee *et al*, considering six variables: high-risk surgery, history of ischemic heart disease, history of congestive heart disease, preoperative insulin therapy, preoperative serum creatinine >2.0 mg/dL and history of cerebrovascular disease.[15]

Very old patients (VOP) were defined for patients older than 80 years old.

Vulnerability was evaluated using the Clinical Frailty Scale, with frailty being defined as a score ≥ 4 in this scale. The Clinical Frailty Scale is a subjective measurement of patient frailty and is based on their appearance and clinical history. Both the attending anesthesiologist and an investigator independently determined the patient's level of frailty and the average was used to quantify this score: no frailty, 1.0 to 3.9; vulnerable, 4.0 to 4.9; mild, 5 to 5.9; moderate, 6 to 6.9; and severe, ≥ 7.0.[16]

The World Health Organization Disability Assessment Schedule 2.0 (WHODAS) is a 12-item score that measures disability. It was calculates attributing numerical values to each item on a 5-point Likert scale: none = 0; mild = 1; moderate = 2; severe = 3; and extreme = 4. The total score (between 0 and 48) was then divided by 48 and multiplied by 100 to convert it to a percentage of the maximum disability score. We considered a score of greater than or equal to 25% to indicate disability, based on the WHODAS and World Health Organization International Classification of Functioning, Disability and Health.[17]

To measure quality of life before surgery, the EuroQol five dimensions questionnaire (EQ-5D VAS) was used, which is a generic instrument, designed to measure health outcomes. The EQ-5D is a self-classifier and self-reported description of health problems according to a five-dimensional classification in terms of mobility, self-care, usual activities, pain/discomfort and anxiety/depression.[18]

The PQRS was used to evaluate quality of recovery after surgery. Baseline testing in all five domains was performed on a single occasion at 1 to 14 days before surgery. The immediate postoperative assessment was performed 15 minutes immediately after surgery (T15), with more focus on the physiological domain. Another measurement was performed 40 minutes after surgery (T40) in order to evaluate recovery at the time of discharge from the PACU. Late recovery was measured during the first week following surgery (D1 and D3) and is mainly designed to evaluate cognitive recovery as well as the return to previous or expected level of functioning. It is also possible to measure late long-term recovery regarding cognition and functional normality, usually at 3 months after surgery.The PQRS includes six domains of recovery: physiological (PD), nociceptive (ND), emotive (ED), functional recovery (FD), cognitive recovery (CD) and self-assessed recovery (SD).

PD includes physiologic variables (systolic blood pressure, heart rate, temperature, respiratory rate and oxygen saturation) and patient safety parameters regarding emergence and airway (airway control, level of agitation, level of consciousness and activity on command). The physiologic variables were scored accordingly to the limits broadly defined as normal: level 3 for values that belonged to acceptable ranges; level 2 for abnormal values; level 1 for excessively abnormal values. The remaining aspects within this domain were also associated with three levels: level 3 being the normal response, level 2 an abnormal response and level 1 an extremely abnormal response.

The ND takes account of pain and nausea. A face chart was presented to the patient and the equivalent number was then recorded, ranging from 1 to 5 (Likert Rating Scale).

The ED surveys feelings of anxiety and depression and was scored with the 1 to 5 Likert Rating Scale, the same way as for the ND.

The FD assesses the impact of recovery in daily life activities. It was scored based on the difficulty in performing these activities: 3 - if they are easily done; 2 - done with difficulty; 1 - not done at all.

The CD includes five tests that evaluate orientation, verbal memory, executive functioning, attention and concentration, each of them resulting in performance scores. These tests are derived from validated and widely used neurocognitive tests.

The overall patient SD reflects a subjective experience related to the recovery process in terms of the impact of the surgery in patients' ability to perform activities of daily living, clarity of thought, ability to work and satisfaction with anesthetic care. It is the only domain that does not require a baseline measurement since it does not measure recovery per se. Using SD we evaluate patient satisfaction with overall recovery. The results were obtained 3 days after surgery and scored with a 5-point scale, based on a face chart, identically to the ND and ED. For study reasons patients were then classified as having complete or incomplete satisfaction.

The definition of recovery used by the PQRS was the return to baseline values or better. For each patient, the results obtained in every domain at each time frame were compared to baseline values and classified as either recovered or not recovered. Any failure to recover within one domain classifies the patient as not-recovered.[10]

In case a patient was unable or refused to complete all or a part of the PQRS, the missing data was excluded from the statistical analyses.

Intraoperative data were recorded, including type and duration of anesthesia, drugs and intraoperative fluids. Length of PACU and hospital stay were also recorded.

STATISTICAL ANALYSIS

Descriptive analysis of variables was used to summarize data. Ordinal and continuous data are presented as median and interquartile range, since they do not follow a normal distribution, based on the Kolmogorov–Smirnov test for normality of the underlying population, the Mann-Whitney test, chi-square or Fisher's exact test were used for comparisons. Differences were considered statistically significant when p was <0.05.

Analysis was performed using the Statistical Package for Social Sciences (SPSS) version 22.0.

RESULTS

148 patients undergoing urologic, gynecologic, plastic and general surgery were enrolled in this study. Seventeen out of the 148 patients, (12%) were classified as VOP. The median age of the VOP group was significantly higher (82 vs 63 years old, $p < 0.001$) compared to the all group., Nevertheless, as presented in Table 1, VOP had similar data related to demographics such as gender (65 vs 50 male, 83 vs 73 female, $p = 0.809$), BMI (25.2 vs 25.8 kg/m^2, $p = 0.442$) and duration of anesthesia (150 vs 135 minutes $p = 0.857$). There were no differences for PACU length of stay (140 vs 133 minutes, $p = 0.786$) and hospital length of stay (8 vs 7 days, $p = 0.128$).

VOP had higher ASA-PS scores (71% vs 30%, for ASA III and IV, $p = 0.001$) and higher RCRI total score (59% vs 11%, $p < 0.001$). VOP presented a greater frequency of congestive heart failure (65% vs 5%, $p < 0.001$), ischemic heart disease (35% vs 12%, $p = 0.008$) and chronic kidney disease (24% vs 3%, $p = 0.006$). There were no differences concerning the rate of other comorbidities, such as diabetes mellitus (12% vs 5%, $p = 0.23$), cerebrovascular disease (6% vs 2%, $p = 0.389$) and dyslipidemia (53% vs 34%, $p = 0.314$). We found no differences between percentage of VOP and other patients being submitted to major surgery (53% vs. 38%, $p = 0.242$).

The detailed demographics of the population along with intraoperative data are summarized in Table 1.

VOP presented more often with preoperative frailty (53% vs

Table 1. Comparison of patients' baseline demographic and operative variables

VARIABLE N (%) OR MEDIAN (IQR)	ALL N=148	NON-VOP N=131	VOP N=17	*P*
Age in years, Median (IQR)	65 (55-75)	63 (53-71)	82 (81-85)	<0.001
Gender, N (%)				0.809
Male	65 (43.9)	58 (44.3)	7 (41.2)	
Female	83 (56.1)	73 (55.7)	10 (58.8)	
BMI in KG/M^2, Median	25.7	25.8	25.2	0.442
Female	83 (56.1)	73 (55.7)	10 (58.8)	
ASA physical status, N (%)				0.001
I	14 (9.5)	14 (10.7)		
II	83 (56.1)	78 (59.5)	5 (29.4)	
III	50 (33.8)	38 (29)	12 (70.6)	
IV	1 (0.7)	1 (0.8)		
Comorbidities /Medication, N (%)				
Ischemic Heart Disease	21 (14.2)	15 (11.5)	6 (35.3)	0.008
Congestive Heart Failure	17 (11.5)	6 (4.6)	11 (64.7)	<0.001
Diabetes Mellitus	8 (5.4)	6 (4.6)	2 (11.8)	0.23
Chronic Kidney Disease	8 (5.4)	4 (3.1)	4 (23.5)	0.006
Cerebrovascular Disease	4 (2.7)	3 (2.3)	1 (5.9)	0.389
Dysplidemia	54 (36.5)	45 (34.4)	9 (52.9)	0.314
Benzodiazepines Therapy	27 (18.2)	20 (15.3)	7 (41.2)	0.017
Major Surgery, N (%)	59 (39.9)	50 (38.2)	9 (52.9)	0.242
RCRI, N(%)				<0.001
0	69 (46.6)	66 (50.4)	3 (17.6)	
1	54 (36.5)	50 (38.2)	4 (23.5)	
2	14 (9.5)	10 (7.6)	4 (23.5)	
>3	11 (7.4)	5 (3.8)	6 (35.3)	
Duration of Anesthesia (MIN), Median (IQR)	150 (116 – 210)	150 (120 – 210)	135 (90 – 240)	0.857
Type of Anesthesia, N (%)				0.311
General	102 (68.9)	92 (70.2)	10 (58.8)	
Loco-Regional	11 (7.4)	9 (6.9)	2 (11.8)	
Combined	33 (22.3)	29 (22.1)	4 (23.5)	
Analgesia and Sedation	2 (1.4)	1 (0.8)	1 (5.9)	
PACU Lenght of Stay (MIN), Median (IQR)	133 (23-29)	133 (44-1000)	140 (39-1000)	0.786
Hospital Lenght of Stay (days), Median (IQR)	7 (2-8)	7 (1-44)	8 (2-52)	0.128

LEGENDA:
IQR – interquartile range; BMI – body mass index; ASA – American Society of Anesthesiologists; RCRI – Revised Cardiac Risk Index; PACU – Post-Anesthetic Care Unit

28%, p = 0.032) and disability (47% vs 18%, p = 0.007). When comparing quality of life before surgery, VOP showed more limitations in some EQ-5D domains, such as mobility (59% vs 26%, p = 0.005), self-care (41% vs 12%, p = 0.002) and daily life activities (59% vs 25%, p = 0.005). EQ-VAS median was similar between both groups of patients (60 vs 55, p = 0.414). Health status scores are shown in Table 2.

When analyzing postoperative recovery, VOP presented more frequently complete recovery in the ND at D1 (94% vs 71%, p = 0.030).Recovery in the remaining domains was similar at all time frames, as exposed in Table 3. According to the PQRS, VOP were less frequently completely satisfied with recovery (53% vs 79%, p = 0.016).

Table 2. Comparison of health status scores between the two groups of patients

VARIABLES	NON-VOP (N=131)	VOP (N=17)	*P*
WHODAS	8 (4-19)	17 (5 – 47)	0.021
Disability, N (%)			0.007
Yes	24 (18.3)	8 (47.1)	
No	107 (81.7)	9 (52.9)	
Frailty, N (%)			0.032
Yes	36 (27.5)	9 (52.9)	
No	95 (72.5)	8 (47.1)	
EQ-5D, N (%)			
Mobility			0.005
Yes	34 (26.0)	10 (58.8)	
No	97 (74.0)	7 (41.2)	
Self-Care			0.002
Yes	16 (12.2)	7 (41.2)	
No	115 (87.8)	10 (58.8)	
ADL			0.005
Yes	33 (25.2)	10 (58.8)	
No	97 (74.0)	7 (41.2)	
Anxiety			0.723
Yes	103 (78.6)	14 (82.4)	
No	28 (21.4)	3 (17.6)	
Pain			0.304
Yes	45 (34.4)	8 (47.1)	
No	86 (65.6)	9 (52.9)	
EQ-VAS, MEDIAN	60	55	0.414

LEGENDA:
WHODAS – World Health Organization Disability Assessment Schedule; EQ-5D – EuroQol 5 dimensions questionnaire; ADL – activities of daily living

Table 3. Comparison of recovery in every domain at each time point using the PQRS

VARIABLE	N	NON-VOP (N,%)	VOP (N,%)	*P*
Physiological				
T15	148	18 (13.7)	0 (0)	0.096
T40	146	36 (27.9)	4 (23.5)	0.478
D1	143	94 (74.6)	11 (64.7)	0.386
Nocieptive				
T15	148	100 (76.3)	13 (76.5)	0.629
T40	146	90 (69.8)	14 (82.4)	0.218
D1	143	89 (70.6)	16 (94.1)	0.030
D3	140	93 (74.4)	11 (73.3)	0.572
Emotive				
T15	148	44 (33.6)	6 (35.3)	0.889
T40	146	43 (33.3)	6 (35.3)	0.872
D1	143	50 (39.4)	6 (37.5)	0.885
D3	140	48 (38.7)	8 (50.0)	0.386
Cognitive				
T15	148	11 (8.4)	0	0.248
T40	146	22 (17.1)	1 (5.9)	0.209
D1	143	22 (17.3)	5 (31.3)	0.157
D3	140	26 (21.0)	3 (18.8)	0.568
Functional				
T40	146	25 (19.4)	2 (11.8)	0.353
D1	143	42 (33.3)	5 (29.4)	0.747
D3	140	60 (48.0)	5 (33.3)	0.282
Overall Perspective				0.016
Yes	113	104 (79.4)	9 (52.9)	
No	35	27 (20.6)	8 (47.1)	

LEGENDA:
T15 – minute 15 after surgery; T40 – minute 40 after surgery; D1 – day one after surgery; D3 – day three after surgery

DISCUSSION

In this study, it was observed that VOP had a similar quality of postoperative recovery comparing to non-VOP. This was significant for every domain at each time point, except for the ND at D1, where VOP showed complete recovery more frequently.

Due to the ever-growing number of elderly patients submitted to surgery, it is important to analyze whether their specificities influence in a negative way their postoperative recovery. This

could lead to surgical treatment being proposed to VOP more often, ensuring that the best treatment option can be assigned.

The PQRS is a useful tool to evaluate quality of recovery after surgery since it allows comparison of recovery in multiple domains between different groups of patients. It was shown that this scale is able to demonstrate differences between groups where expected even with relatively small samples.[14,19,20]

VOP are acknowledged for having more comorbidities and lower physiological reserve, making them more susceptible to postoperative complications and mortality.[2,8,21] Accordingly, perioperative management of these patients should focus on expedite recovery and avoid functional decline.[6]

In fact, in this study, we observed that VOP were more often frail and disable than non-VOP. VOP also presented higher scores of ASA-PS classification, higher RCRI total score and higher incidence of some comorbidities such as congestive heart failure, ischemic heart disease and chronic kidney disease.

When assessing quality of life through EQ-5D, VOP showed more limitations in comparison with their younger counterparts. Domains such as mobility, self-care and daily life activities often times exhibited higher scores in VOP.

These features do not seem to have a significant impact when it comes to postoperative recovery, since complete recovery was achieved with a frequency comparable to non-VOP. Hence, their commonness in some patients should not be established as an obstacle to surgical treatment.

Regardless of the prevailing vulnerability of VOP, the time required to achieve discharge criteria can be expected to be extended, but not in a clinically significant way.[22] Older patients may need more time to mobilize completely, but generally it does not surpass one day.[21] Indeed, in this study, the hospital length of stay did not differ between older and younger patients.

Other studies have reported that older patients tend to have less pain than younger patients for the same procedure.[19,23-25] Royse *et al.* reported that older patients had a similar postoperative recovery when compared to younger patients, with a better recovery in the ND during the first three days after being submitted to knee arthroscopy.[19] In our study, the finding of more frequent complete recovery in the ND at D1 in VOP, comes to an agreement with that data.

Royse *et al.* also analyzed the predictors of patient satisfaction with anesthesia and surgery care and reported that only the incomplete recovery in the ND contributed to incomplete satisfaction.[26] Other studies have emerged that come to terms with this finding.[27] Satisfaction is generally reported as very high, with similar high levels in a diverse range of patient populations and thus it is considered to be a poor discriminator of quality of recovery.[14,26,27] In this study, we found that VOP were less frequently completely satisfied with the recovery of anesthesia, in spite of similar recovery in the ND at D3.

With increasing age, comes an association with suboptimal early cognitive function recovery after surgery.[12,14] Studies on the assessment of this issue using the PQRS reported failure of cognitive recovery associated with the presence of pain and nausea, but did not find differences in cognitive recovery related to age.[27] In our analysis, we did not find differences in the CD recovery between VOP and younger patients, even though VOP showed complete recovery more frequently in the ND at D1. Indeed, this association may not always be present, depending on the extent of pain and nausea.[27]

Although a contradiction in cognitive recovery was not present, this is consistent with the finding that cognitive dysfunction at hospital discharge is present in all age groups although it is important to point out that postoperative cognitive dysfunction is a different entity from incomplete cognitive recovery.[12,27]

Recovery in the ED, FD and CD was incomplete in a substantial proportion of patients at all time points. This was accurate for both VOP and non-VOP, with no significant difference between both groups. The patients included in this study had neoplastic disease, which can be a big emotional impact with influence in the results of ED. On the other hand, a substantial number of patients from both groups was submitted to major surgery, which may explain the frequent incomplete recovery in the FD and may also have had an impact in cognitive recovery. Since recovery domains are often intertwined, with incomplete recovery in one domain resulting in incomplete recovery in others, incomplete recovery in the FD and CD could also have led to incomplete ED recovery.[11-13]

Despite the discriminative validity of the PQRS, the smaller cohort of VOP may have impaired the capacity of the study to find differences. This may have had a greater impact when analyzing domains where no differences were reported between both groups. The selection of neoplastic patients may have had impact in the analysis of the results since these patients have comorbidities more often than the general population as well as poorer general health outcomes. Besides, neoplastic surgery includes a great variety of surgeries having different magnitude and severity, also resulting in a heterogeneous sample. Nonetheless, and despite the poor health status and frailty of VOP, we detected no differences comparing them with the other patients from our cohort of surgical neoplastic patients. Postoperative concerns can then be adjusted according to this finding. More studies have to be designed with a greater number of patients to assess the impact of age in the postoperative recovery.

CONCLUSION

Very old patients had higher ASA physical status, higher

RCRI scores and presented more often with frailty, disability and limitations in quality of life before surgery. Nonetheless, in this study, they presented complete recovery with a frequency comparable to the other patients.

Responsabilidades Éticas
Conflitos de interesse: Os autores declaram não possuir conflitos de interesse.
Suporte financeiro: O presente trabalho não foi suportado por nenhum subsídio ou bolsa.
Confidencialidade de dados: Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação dos dados de doentes.
Protecção de pessoas e animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial.

Ethical Disclosures
Conflicts of interest: The authors have no conflicts of interest to declare.
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Confidentiality of data: The authors declare that they have followed the protocols of their work center on the publication of data from patients.
Protection of human and animal subjects: The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

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