Modified ASA Physical Status (7 grades) May Be More Practical In Recent Use For Preoperative Risk Assessment

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Citation

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Abstract

By dividing up ASA physical status (5-grade) class 2, 1933 patients were classified into 7 grades, which were grade 1a, 1b, 2a, 2b, 3, 4 and 5. Many patients were classified in grade 1a, and the distribution in each grade gradually decreased in elective cases, whereas most of patients were limited in grade 2 of ASA. On the other hand, there were more patients in grade 1b and 2a associated with some risk factors in emergency cases than those in grade 2 for ASA. Complications gradually increased from grade 1a in revised classification or 1 in ASA classification to 3 in elective cases and from grade 1a or 1 to 4 and 5 in emergency cases both in the revised and ASA classifications. Reevaluation of ASA physical status (7-grade) can provide a better grading outcome for predicting the incidence of intra- and postoperative complications in surgical patients compared with the conventional ASA's.

INTRODUCTION

Strategies for risk reduction in perioperative patients are very important in anesthetic management. The preoperative assessment of patients must be a large part of these precautions. The American Society of Anesthesiologists (ASA) proposed the physical status classification of preoperative patients for anesthetic risk assessment in 1963 [1], which is widely used and upheld. Although this classification stands to assess the global anesthetic conditions for patients, it does not exactly assess the periopertive conditions for recent practical use [2], because the circumstances of perioperative patients are becoming diversely and strictly since establishment of ASA physical status in 1963 [1]. Furthermore, it is difficult to estimate whether the class 2 patient have an accurate risk ranging from mild to moderate-severe systemic disorders since the ASA class 2 is very broad and does not accurately reflect the patients' risk. In this respect, we proposed a modification of the ASA classification for more precise and practical use in 1996 [3]. In this report, therefore, we confidently examined the usefulness of our new 7-grade classification including anesthetic and/or surgical risk categories in routine anesthesia practice.

MATERIALS AND METHODS

The subjects were 1933 patients undergoing operation at Kinki University Medical Center during the 18-month period from January 2005 to June 2006. They were assessed both by 5-grade ASA physical status protocol and by our new 7-grade preoperative status assessment (Table 1).

Figure 1

Table 1: Corresponding grade in each classification for ASA and revised assessments

(Grade)	ASA classification	(Grade)	Revised classification
1	class 1	1a	Normal healthy patient.
		1b	Patient with mild systemic disease. Normal health patient, with operative or anesthetic risk(s).
2	class 2	2a	Patient with moderate systemic disease. Patient with mild systemic disease, with operative or anesthetic risk(s).
		2b	Patient with moderate to severe systemic disease that does not limit activity. Patient with mild systemic disease, with operative and anesthetic risks. Patient with moderate systemic disease, with operative or anesthetic risk(s).
3	class 3	3	Patient with severe systemic disease that limits activity, but is not incapacitating. Patient with moderate systemic disease that does not limit activity, with operative and anesthetic risk(s). Patient with moderate to severe systemic disease that does not limit activity, with operative or anesthetic risks.
4	class 4	4	Patient with an incapacitating systemic disease that is a constant threat to life. Patient with severe systemic disease that limits activity, incapacitated.
5	class 5	5	Moribund patient no expected to survive 24 hours with or without operation.

In the event of emergency operation, precede the number with an E.

Postoperative complications within one week in operated patients were collected from their medical records. The

intra- and postoperative complications were as follows: respiratory system (hypoxemia: PaO_2 <60 mmHg, hypercarbia: $PaCO_2$ >50 mmHg, apnea, atelectasis, pulmonary edema, asthma attack, pneumothorax, acute bronchitis or pneumonia), cardiovascular system (hypotension: systolic BP <80 mmHg, hypertension: systolic BP >160 mmHg, cardiac conductive disorder, continuous arrhythmia, myocardial ischemic attack, low cardiac index <2.1 $L \cdot min^{-1} \cdot m^{-2}$ or cardiac arrest), fluid and blood system (hypo- or hyperelectrolytemia, anemia: hemoglobin <7.0 $gl \cdot dl^{-1}$, embolism, continuous bleeding or disseminated intravascular coagulation syndrome), nervous system (continuous vomiting, tremor, palsy, convulsions, pathologic sedation or coma), gastrointestinal, hepatobilliary and urinary systems (hematemesis, melena, jaundice hepatic failure or oliguria: urine output <1 $ml \cdot kg^{-1} \cdot hr^{-1}$) and death of unknown cause. The complications of postoperative acute pain and related problems (excitation, tachycardia, tachypnea, etc.) and prolonged hypnosis were excluded in this study. Typical operative and anesthetic risk factors were added to the conventional assessment (Table 2).

Figure 2

Table 2: Typical operative and anesthetic risk factors excluding physical status for revised assessment

Operative factors:	cardiovascular operation, thoracotomy/sternotomy, thoracoscopic operation, operation in airway, expectation of severe bleeding, prolonged operation, brainstem operation, prolonged postoperative controlled ventilation, pregnancy except cesarean section, etc.
Anesthetic factors:	special position, expectation of difficult intubation, expectation of difficult intravenous cannulation, susceptibility of malignant hyperthermia, full stomach, one lung/divided ventilation, refusal of blood transfusion, not in operating room, etc.

Systemic disorders such as, anemia and obesity are included in ASA physical status.

Half point was added when each of the specific risk factors in anesthetic and surgical categories such as difficult tracheal intubation, refusal of blood transfusion and open heart surgery was present. In this new 7-grade classifications, we classified that the grade 1.0 was to grade 1a (no risk of life), the grade 1.5 was to grade 1b (almost no risk of life), the grade 2.0 was to 2a (light risk of life) and the grade 2.5 was to 2b (middle risk of life). There were no changes in grade 3 (heavy risk of life), 4 (very dangerous risk of life) and 5 (almost death risk of life), because grade 3 included points from 3.0 to below 4.0, grade 4 included points from 4.0 to below 5.0 and grade 5 included points from 5.0 or more.

ETHICAL CONSIDERATIONS

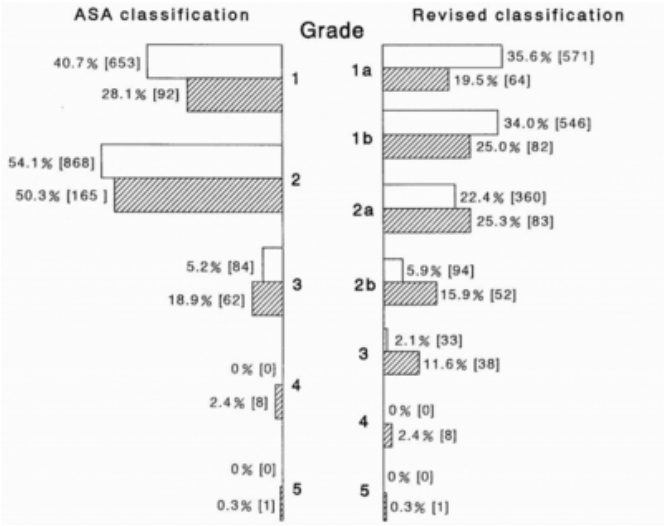
All patients were informed orally that the preoperative risk would be assessed by both ASA and its revised classification, and these two assessments would not influence therapy during the perioperative period. Consent was obtained and recorded in each of their medical records. Only patients with grade 4 or 5 of ASA and the revised classifications were not directly informed, and instead, their legal representatives were informed because of the poor mental condition of the patients. This protocol was approved by the Ethical Committee of The Kinki University School of Medicine.

RESULTS

The distribution of grades in the preoperative risk assessment of the ASA versus the revised classification in elective cases is shown in Figure 1.

Figure 3

Figure 1: Distribution of grades in ASA and revised classifications for elective operations (open bars) and emergency operations (shaded bars). Figures represent [No. of patients] and their incidences (%) vs. total number of patients. Total number of patients is 1,605 in elective operations and is 328 cases in emergency operations, respectively.

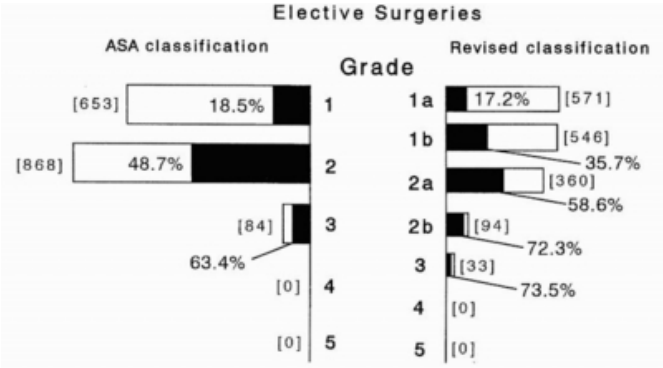


The number of patients in the revised classification gradually decreased from grade 1a to 3. In contrast, the number of patients in the ASA classification was not evenly distributed in grades 1 to 3. There were no patients with grades 4 and 5 in both the ASA and revised classifications. The incidence of intra- and postoperative complications with the ASA versus the revised classification for each grade in elective cases is shown in Figure 2. The incidence at complication (%) in both the ASA and revised classifications gradually increased from grade 1 to 3 and 1a to 3, respectively. However, the largest numbers of patients in the ASA and revised

classifications were distributed in grade 2 and grade 1b and 2a, respectively.

Figure 4

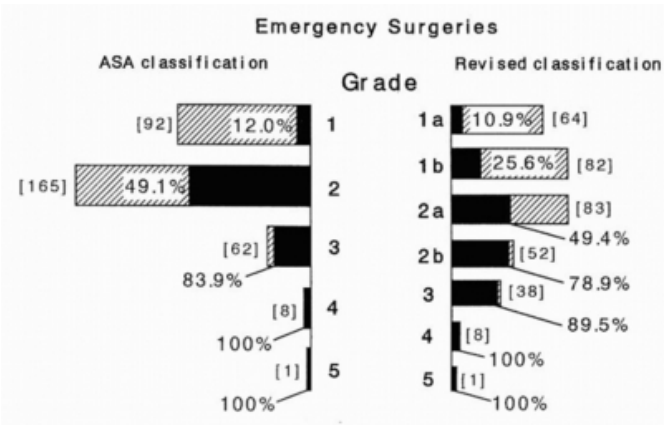
Figure 2: Incidence of complications in each grade of ASA and revised classifications for elective cases. Closed bars represent the incidence (%) of complications vs. [No. of patients] in each grade.



In terms of emergency cases (Figure 3), the largest numbers of patients in the revised classification were distributed in grades 1b and 2a, while those in ASA classification were mostly in grade 2. The distribution of complication incidence (%) in both the ASA and the revised classification showed a gradual increase from grade 1 to 5, whereas the largest numbers of patients in the ASA classification were distributed in grades 2 and 3, and the largest numbers of patients in the revised classification were distributed in grades 2a 2b and 3.

Figure 5

Figure 3: Incidence of complications in each grade of ASA and revised classifications for emergency cases. Closed bars represent the incidence (%) of complications vs. [No. of patients] in each grade.



DISCUSSION

ASA physical status assessment is clearly a reasonable method for classifying the risk in preoperative patients, improving on the older method proposed in 1941 [4,5]. However, the ASA assessment includes both well controlled mild complications in class 2 altogether, and also includes both controllable moderate to severe complications and uncontrollable moderate to severe complications in class as well. In addition, the majority of intra- and postoperative complications were concentrated in class of ASA for both elective and emergency cases. Thus, there were few significant indications to prevent intra- or postoperative complications from the preoperative classification, and actually, in was necessary to classify these complex conditions more clearly. Some medical institutions all over the world have already established their own detailed assessment methods for practical use [2, 5, 6,7,8,9,10,11,12,13]. Especially, Goldman et al. classified cardiac risk index for high-risk cardiac patients [11], and Prause et al. analyzed ASA physical status and cardiac risk index, whose combined assessment might predict perioperative mortality [14]. In fact, perioperative mortality prediction is a very important subject in the field of surgery, and cardiac problems greatly influence perioperative mortality. However, many patients have various problems that are not limited in cardiac, importantly, and in the majority of perioperative patients, comprehensive prediction of a wide range of complications is needed. Hence, assessing systemic problems is necessary and beneficial rather than just assessing cardiac problems for most perioperative patients. However, there are few studies [2, 10, 12, 13] examining systems other than the heart. Accordingly, we did not only assess the patients' physical condition but also assessed their underlying diseases and operative problems as risk factors that possibly influence intra- and postoperative physical management [2]. We finely classified patients into seven classes rather than five, by dividing up ASA class 2. The results showed that the number of patients gradually decreased from grade 1a to 5 in elective cases, and there were naturally many patients with grade 1b or 2a in emergency cases that were associated with various risk factors. The distribution of intra- and postoperative complications ASA reversed with a decrease from grade 5 to 1a in emergency cases compared with elective cases. Thus, this revised classification is practical and reasonable, because the prediction of intra- and postoperative complications with this assessment was more accurate than that with the conventional ASA classification. Besides, this classification could be acceptable for most practitioners, because it is principally based on the ASA physical status. Consequently, we propose that the 7-grade

risk assessment be applied to the practice in daily anesthesia.

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