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VALIDITY OF USING THE ASA PERIOPERATIVE RISK SCALE IN CLINICAL PRACTICE.

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ОБҐРУНТОВАНІСТЬ ВИКОРИСТАННЯ ШКАЛИ ПЕРІОПЕРАЦІЙНОГО РИЗИКУ ASA В КЛІНІЧНІЙ ПРАКТИЦІ

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Вступ. Розрахований ризик АСК для конкретного пацієнта не може слугувати прямим показником операційного ризику, тому що, наприклад, ризик хірургічного втручання для пацієнта високого ризику, якому проводять операцію з видалення катаракти з місцевою анестезією, повністю відрізняється від ризику хірургічного втручання для того самого пацієнта, якому здійснюється втручання на серці. Важкі захворювання серця, печінки, кишківника чи нирок, хоча й сильно впливають на фізичний стан пацієнта, не можуть бути віднесені до системних захворювань. Місцеві захворювання також можуть змінити фізичний стан, але вони не були згадані в класифікації ASA.

Матеріали та методи. Дослідження проведено на основі аналізу інформації з першоджерел дослідження щодо 1799 пацієнтів, які обстежувалися ретроактивно протягом 2008–2016 рр. (протягом 108 місяців) у клініці кафедри анестезіології-реаніматології № 10, 1 Валеріу Герег, Національний науково-практичний центр невідкладної медицини (Кишинів, Республіка Молдова).

Результати. Модель має такі характеристики: омнібусні тести коефіцієнтів моделі χ^2 = 11,916, df = 2, p = 0,003 (результат є статистично значущим), Nagelkerke R Square = 0,063, що означає, що хронічна дихальна недостатність і вік представляють 6,3% варіабельності в летальність у цієї категорії пацієнтів, тест Хосмера і Лемешоу p > 0,05, ці змінні викликають інтерес і можуть бути використані для побудови відповідної математичної моделі.

Висновок. У Республіці Молдова рівень смертності пацієнтів, яким проводять планові втручання на стегновій кістці, порівнянний зі світовими даними, у групі ризику ASA II смертність дорівнює нулю, а в групі ASA III – 3,5%. Особливості локального дослідження показують тенденцію до зниження летальності в пацієнтів молодшого віку.

Ключові слова: ASA, вік, стать, анестезіологічний ризик.

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Introduction. Calculated ASA risk for a particular patient cannot serve as a direct indicator of the operative risk, because (for example) the surgery risk for a high-risk patient undergoing cataract surgery with local anesthesia is completely different from the surgery risk for the same patient who is submited to an intervention on the heart. Severe diseases of the heart, liver, intestine or kidney, although they greatly affect of the physical condition of the patient, cannot be labeled as systemic disease. Local diseases may also change physical condition, but they were not mentioned in the ASA classification.

Materials and methods. The study was conducted based on the analysis of information from the primary research sources regarding 1799 patients who were investigated retroactively, during the years 2008-2016 (for 108 months), in the Clinic of the Chair of anesthesiology-reanimatology no. 1 Valeriu Ghereg of the National Scientific-Practical Center of Urgent Medicine (Chisinau, Republic of Moldova).

Results. The model has the following characteristics: Omnibus Tests of Model Coefficients χ^2 = 11,916 df = 2 p = 0.003 (the result is statistically significant), Nagelkerke R Square = 0.063, which means that chronic respiratory failure and age represent 6.3% of the variability in lethality at this category of patients, Hosmer and Lemeshow Test p> 0.05, these variables are of interest and can be used to construct the respective mathematical model.

Conclusion. In the Republic of Moldova, the mortality rate of patients undergoing elective interventions on the femur is comparable with the world data, in the ASA II risk group the mortality is zero, and for the ASA III group - 3.5%. The particularities of the local study show the decreasing tendency of the lethality and the patients being younger.

Key words: ASA, age, gender, anesthesiology risk.

Introduction. The concept of classification of physical condition was suggested in 1941 by a committee of the American Society of Anesthesiologists [1]. Since the establishment of the ASA, studies have found that this is significantly associated with postoperative morbidity and mortality [2]. However, the ASA anesthetic risk is not a relevant parameter for estimating the lethality rate. An argument may be that the lethality rate determined by the anesthesiology risk is low (2%) and there are other factors, which are not related to the status of the patients, and are considered "intuitively" sometimes, without considering the anesthesiological risk.

The ASA score is frequently used to estimate subjectively preoperative health status. While initially created for the collection and reporting of statistical data in anesthesia [1], is now used to predict perioperative risk [3].

Perioperative morbidity and mortality is a significant public health problem, due to its impact on patients' health, short- and long-term survival and also the resources used in the health service. Surgical complications occur in 3-17% of patients [4, 5].

Materials and methods. The study was conducted based on the analysis of information from the primary research sources regarding 1799 patients who were investigated retro-prospctively, during the years 2008–2016 (for 108 months), in the Clinic of the

Chair of anesthesiology-reanimatology no. 1 Valeriu Ghereg of the National Scientific-Practical Center of Urgent Medicine (Chisinau, Republic of Moldova).

Initially, descriptive statistics were performed (tables, box graphs, pie), the age value being adjusted to the sex of the patients and the anesthesiological risk ASA. Age, considering the distribution different from the normal one, was represented in the form of median, 25th, 75th percentiles, as well as the intercvartile deviation. The null hypotheses were formulated, according to which there are no changes in the values of the age in dynamics. Hypothesis testing was performed by the nonparametric method (Kruskal-Wallis), in the case of applied statistical significance and multiple comparisons. The determination of the trend in dynamics was estimated by the Jonckheere-Terpsta test. Also, in the case of statistical significance, in order to estimate and the practical value the effect size was calculated, 95% confidence intervals (95% CI) for the difference of the medians. The aforementioned procedures were also applied for the data not adjusted to the sex of the patients and the anesthesiological risk ASA.

The patient's age-anesthesia risk association after ASA was estimated by applying the Spearman ρ test for categorical (ASA) and continuous (age) data. Initially, the relationships examined were appreciated by constructing the scatterplot with the approximation line. Effect size is a basic criterion for assessing practical significance. The results were adjusted for the sex of the patients. The effects of age and sex of patients on ASA anesthesia risk were estimated by constructing a regression model.

Results. Obviously, older age presents a higher anesthesiological risk (Figure 1). The interdependence of these factors is not quantitatively estimated in the literature.

Taking into account the fact that the sex of patients may be a confounding factor for these relationships, we analyzed the relationship between age and ASA risk for men and women separately (Figure 2.). To verify this idea, we investigated if exist a relation between the sex of patients and ASA by applying the $\chi 2$ Pearson test, which is equal to 87,797 df = 2 $p < 0.001$. That is, the null hypothesis (there is no link between the sex of patients and the anesthesiological risk ASA) can be rejected and the relationship examined has at least statistical significance ρ Spearman (for men) = 0.493 $p < 0.001$, for women 0.446 $p < 0.001$. That is 24.3% of the anesthesiological risk is determined by age

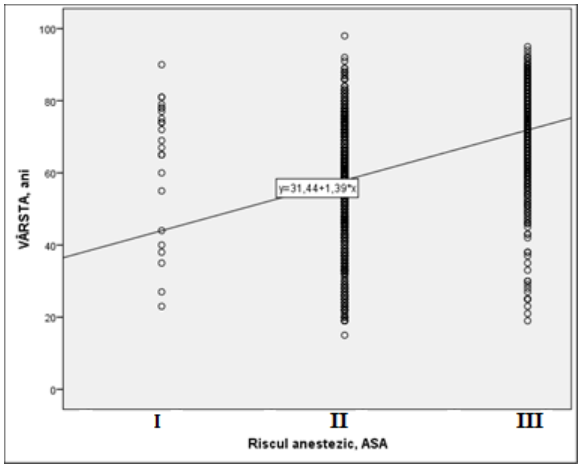

Fig. 1. The correlation diagram between age and anesthetic risk ASA, with the approximation line

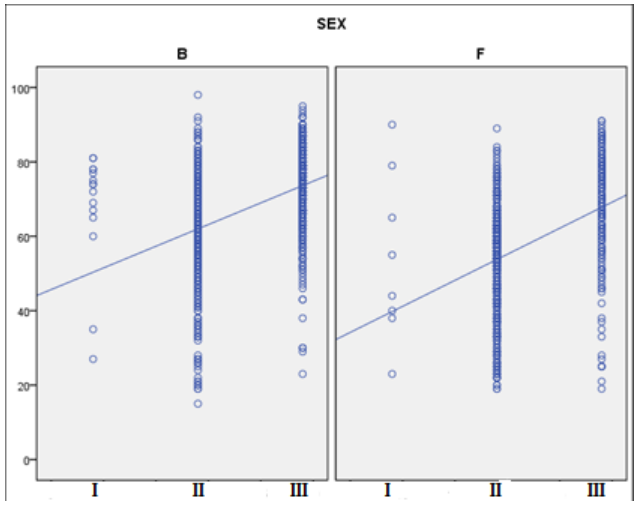

Fig. 2. Correlation diagram between age and anesthetic risk ASA, with approximation line, adjusted results for biological phenotype

in men and 19.9% in women. These results are more true than the 26.8% obtained for the total population.

Este important de menţionat că trendul pentru bărbaţi şi femei este similar până la 72 de ani, adică acumularea deceselor este uniformă.

Most likely, we can say that our patients are younger (at least according to the passport data), because in the Republic of Moldova, the elderly are canceled based on the major risk. If we make a graph, in which we reflect the cumulative frequencies of deaths depending on the sex of the patients, we notice that the trend is different for men and women. In the male gender we see the characteristic trend and for the previous chart, for women the accumulation of deaths is uniformly realized (Fig. 3.). It is important to note that the trend for men and women is similar for up to 72 years, namely the accumulation of deaths is uniform.

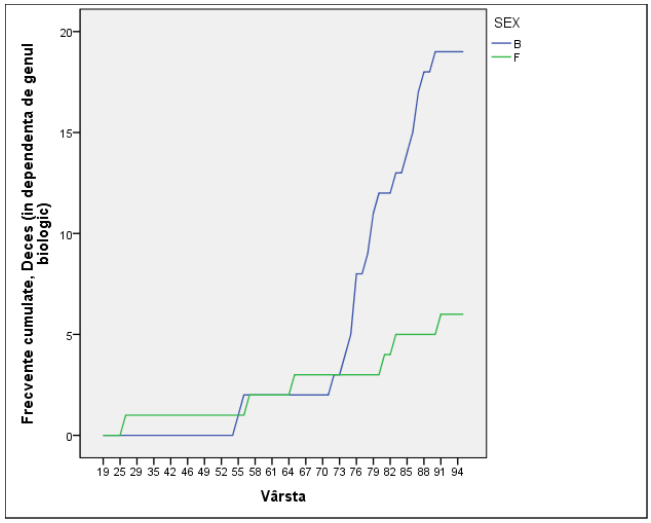

Fig. 3. Polygon of cumulative frequencies of deaths by age and sex, for patients with elective interventions on the femur with ASA III

Our model, with which we try to predict the potential death of the patient will include the age of the patients and the presence / absence of chronic respiratory failure. We need to consider multicollinearity, a situation in which the independent variables (covariances) have strong relationships with each other, which can be a source of errors in the assumed model.

Age has an association with chronic respiratory failure (r = 0.108, p = 0.004), a very weak correlation, although we have the right to use these parameters.

The model has the following characteristics: Omnibus Tests of Model Coefficients χ^2 = 11,916, df = 2, p = 0.003 (the result is statistically significant), Nagelkerke R Square = 0.063, which means that chronic respiratory failure and age represent 6.3% of the variability in lethality at this category of patients, Hosmer and Lemeshow Test p > 0.05, that is, these variables are of interest and can be used to construct the respective mathematical model (Table 5.15). OR for respiratory failure being 4,098, 95% CI 1,796–9,352.

Table 5.15

Variables in the Equation

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Respiratory failure	1,411	,421	11,226	1	,001	4,098	1,796	9,352
	Age	,018	,020	,783	1	,376	1,018	,979	1,059
	Constant	−5,033	1,515	11,039	1	,001	,007		

a. Variable(s) entered on step 1: Respiratory failure, age.

Discussions. The association of postoperative morbidity leads to mortality, thus the accumulation of morbidities precedes mortality. Increased morbidity after surgery correlates equally with increased mortality.

In our study, the following issue was also examined: what is the lethality rate of patients who have elective femoral surgery in our clinic? For 46 months, out of 1779 elective surgeries on the femur, 25 patients died in the postoperative period (the lethality after discharge), the lethality rate being 1.4%. In the group with the anesthesiology risk ASA I-II (1063 interventions) no deaths were recorded, and in the group with the anesthesia risk III, the lethality constituted 3.49% (25 cases out of 691 elective surgeries on the femur).

As mentioned previously in the case of patients with anesthesiological risk I-II, who were operated on the femur, there were no deaths, information that we enjoy. At the same time, the mortality rate in patients with high anesthesia risk was 3.49% (25 cases of 716 performed anesthesia). Taking into account the fact that the anesthesiological risk of the patients increases in dynamics (because the contingency of patients changes in order to predominate men, the male gender being a negative factor for the anesthesiological risk), we are interested to identify the factors that affect the lethality rate for this category of patients.

The analysis of our data mentions the significance for respiratory failure, which is in discordance with publications by authors from other countries, where in the lethality rate, heart failure predominates [6].

Conclusion. In the Republic of Moldova the mortality rate of patients undergo elective surgery on the femur is comparable with the world data, in the ASA II risk group the mortality is zero, and for the ASA III group – 3.5%, the local study features show a decreasing tendency for lethality and patients being younger.

Chronic respiratory failure and age are the risk factors for increased lethality in patients with ASA III, beneficiaries of surgery on the femur. The proposed predictive models are far from ideal, which further requires the study and determination of potential factors for optimizing the prediction of lethality.

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