CHOICE OF MODERN METHODS OF TREATMENT OF SEVERE ABDOMINAL INJURIES

Mustafakulov Ishnazar Boynazarovich
Head of the Department of Surgical Diseases No. 2, Associate Professor; Samarkand state medical university
Norov Mirvokhid Chariyevich
Surgeon of RRCEMMP Kashkadarin branch;
Juraeva Zilola Aramovna
Assistant of the Department of Endocrinology; Samarkand state medical university
Boynazarov Mehrozhmirzo Eshnazarovich
student of Termiz c cue branch of Tashkent medical academy

Abstract: Prospective analysis of the studied factors of unfavorable outcome in combined abdominal traumas in 70 victims has been carried out. Estimation of severity of condition during the first 24 hours according to APACHE II and SAPS II scales was made and working characterizing curves (WCC) and evaluation of areas under the curves (AUROC) were built. To reveal intensity and character of connection of APACHE II and SAPS II methods and also to reveal the character of interdependence, correlative and regressive analyses were performed. Strong correlative connection between APACHE II and SAPS II was revealed (rate=0.851) . To develop surgical tactics on admission, wide spread clinic laboratory parameters were tested : hemoglobin, hemotacrit , rate of heartbeats (RHB), AP and also Algover Index (AI). Prognosis of the outcome and development of complications in severe combined trauma is possible on the basis of evaluation of the severity of victims' condition according to APACHE II, SAPS II scales.

Key words: closed abdominal trauma, liver injury,

ВЫБОР СОВРЕМЕННЫХ МЕТОДОВ ЛЕЧЕНИЯ ТЯЖЕЛЫХ ТРАВМ ЖИВОТА

Аннотация: Проведен проспективный анализ изученных факторов неблагоприятного исхода при сочетанных травмах живота у 70 пострадавших. Проведена оценка тяжести состояния в течение первых суток по шкалам APACHE II и SAPS II, построены рабочие характеристические кривые (WCC) и оценка площадей под кривыми (AUROC). Для выявления интенсивности и характера связи методов APACHE II и SAPS II, а также выявления характера взаимозависимости были проведены корреляционный и регрессионный анализы. Выявлена сильная корреляционная связь между APACHE II и SAPS II (коэффициент = 0,851). Для выработки хирургической тактики при поступлении исследовали распространенные клинико-лабораторные показатели: гемоглобин, гематакрит, частоту сердечных сокращений (ЧСС), АД, а также индекс Альговера (ИИ). Прогноз исхода и развития осложнений при тяжелой сочетанной травме возможен на основании оценки тяжести состояния пострадавших по шкалам APACHE II, SAPS II.

Ключевые слова: закрытая травма живота, повреждение печени,

INTRODUCTION

Relevance. Abdominal injuries in concomitant trauma are one of the most difficult - problems in emergency surgery [1, 4, 6, 10, 14, 16, 21]. According to world statistics, combined abdominal trauma as a cause of death among patients under 50 years of age ranks first [6,10,26,29]

. With multiple and combined injuries, from 60 to 70% of the victims are admitted to medical institutions with symptoms of traumatic shock, and therefore, a third of those admitted die for the first day of treatment [1,5,8,11] .

The complexity of the problem of diagnosing and treating severe concomitant injuries cannot be solved by the imperativeness of the surgeon and his virtuoso technique . [2,4,7,9,12] . Therefore, with the modern method of objective assessment of the severity of the condition is the use of integrated systems [14,18,27,32,34] .

In most of the existing integral systems for assessing the severity of the condition, they do not reflect the effectiveness of treatment, therefore they cannot differentiate the prognosis in the above situation. Integral systems for daily assessment of the severity of the condition can largely overcome these problems [3,17,25,28,35].

Questions of qualitative prediction of the outcome of severe concomitant abdominal trauma remain unresolved; therapeutic tactics, the choice of the optimal volume of surgical intervention in the first hours after injury, depending on an objective assessment of the severity of the condition and prognosis, as well as the pathogenesis of postinfusion complications with increasing degrees of normovolemic hemodilution against the background of massive blood loss still remain unexplored [19,22,24,30,31,37] .

The purpose of the study . To develop a qualitative prognosis of the outcome on the first day (upon admission) depending on the severity of the condition of the victims with abdominal injuries in case of combined trauma to determine the treatment tactics.

SCOPE AND METHODS OF RESEARCH

The prospective phase of the study involved a comprehensive study of risk factors for adverse outcomes in combined abdominal injuries in 70 patients. The study took into account the age and gender of the victims, the time from injury to hospitalization, hemodynamic indicators of the severity of the condition, the volume and duration of the operation, the amount of blood loss.

We studied outcomes in affected people of different age groups. The average age of survivors was 32.15±7.45 years, the average age of deceased victims was 35.35±17.45 years (p=0.251 - differences are not significant).

The overall mortality rate among 70 patients with closed combined abdominal trauma was 61.4% (out of 70 patients, 43 victims died), and in the control subgroup of the most prognostically unfavorable victims - 87%.

Identification of significant differences among the groups of surviving and deceased patients by a number of factors (gender, age, assessment on integral scales) makes it possible to predict the outcome using regression analysis. We performed such an analysis according to the data of the first day from the moment of injury and according to the dynamics of the severity of the condition in 70 victims.

At the same time, no regular dynamics of an increase in mortality with increasing age was noted, which is probably associated with a small number of victims in groups. Thus, mortality in the group of victims under 20 years old was 83.33% (5 out of 6 died), in the group of victims aged 20-29 years 46.0% (12 out of 26 died), and in the group 30-39 years old 53.3% (8 out of 15 died), in the group of victims 40-49 years old 46.6% (7 out of 15 died), and in the group over 50 years old - 87.5% (7 out of 8 died).

As is known, the severity of the condition upon admission of the victims makes a significant contribution to the frequency of lethal outcomes. We assessed the severity of the

condition on the first day using the APACHE scale II in patients with abdominal injuries in concomitant trauma.

Mathematical expectation (arithmetic mean) on the APACHE scale II for surviving victims was 6.47 points, and the standard deviation was 2.54 points; for the deceased victims, the figures were not statistically different: the mathematical expectation was 8.55 points, the standard deviation was 4.31 points. The information is presented in Table.

Table

APACHEII score at admission in surviving and deceased victims

	Number observations	APACHE II Expectation	Standard deviation
survived	46	6.47	2.54
Died	24	8.55	4.31

Simple, widely used, affordable and reliable instruments are needed for rapid assessment and selection of surgical tactics upon admission of a patient with a severe closed abdominal injury. Unfortunately, widely used in the practice of intensive care units of the APACHE scale II and SAPS II cannot be used for surgical risk stratification, not only because of their bulkiness and the need to assess a large number of clinical and laboratory parameters, but also for quite objective reasons - they do not correlate with the probability of a lethal outcome in case of a closed abdominal injury on admission ($p = 0.20$ and $p=0.756$, respectively), which does not allow using them to develop surgical tactics.

To identify the strength and nature of the relationship between the APACHE scales II and SAPS II , as well as elucidating the nature of interdependence, we conducted correlation and regression analyzes. A direct strong correlation was found between the APACHE scales II and SAPS II ($r=0.851$).

Formula describing scale dependence in severely traumatized patients: APACHE II (points) = 2.216 + 0.381 x SAPS II (points).

To assess the resolution of the APACHE scales II and SAPS II and for the prediction of lethal outcome, we built operating characteristic curves (ROC - receiveroperatorcurves) and estimated areas under the curves (AUROC).
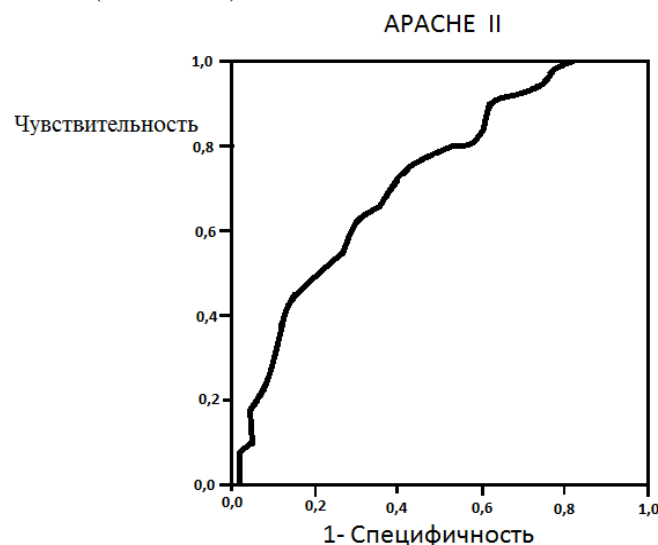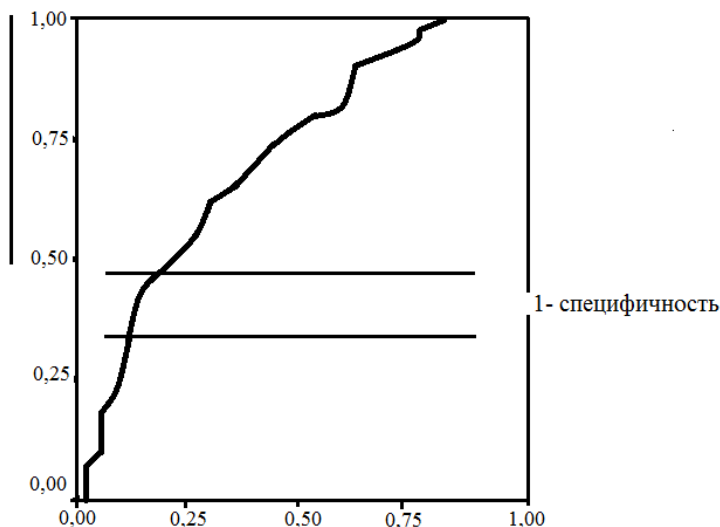

Rice. 1. Operating characteristic curve of the APACHE II scale.

MATERIALS AND METHODS

Area under the operating characteristic curve for evaluating the resolution of the APACHE scale II in relation to predicting a lethal outcome was 0.717 (AUROC = 0.717, p < 0.001). However, for good resolution, the area under the curve for the scale should be greater than 0.9 (90%), (H - L 3.45; p=0.840).

SAPS scale has an unsatisfactory resolution for predicting a lethal outcome in patients with severe concomitant injury. II (AUROC - 0.763; p< 0.001), (H - L ; p=0.783).


Rice. 2. Operating characteristic curve of the SAPS II scale.

As can be seen, neither the APACHE scale II nor SAPS scale II do not have a good resolution for predicting a lethal outcome in patients with severe concomitant injury.

To develop a surgical approach on admission, we tested widely used clinical and laboratory parameters: hemoglobin, hematocrit, leukocytes, heart rate, blood pressure, and the Algover index (AI).

MATERIALS AND METHODS

The concentration of hemoglobin and the number of leukocytes at admission do not correlate with the probability of death (p=0.68 and p=0.343, respectively). The level of hematocrit at admission has a weak negative correlation with the probability of death (r = -0.234, p = 0.02). The hematocrit level does not allow its use for stratification of patients with closed abdominal trauma due to poor operational performance (AUROC = 0.639, no cutoff point).
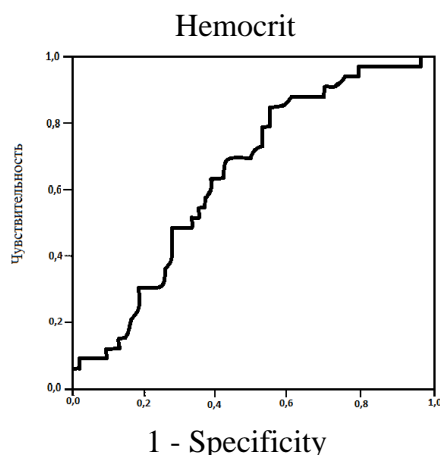

Rice. 3. Characteristic curve of hematocrit in closed abdominal trauma.

However, the assessment of hematocrit level 3 hours after admission has a high prognostic value (AUROS = 0.729), while a decrease in hematocrit less than 20.4 can predict a lethal outcome with a sensitivity of 71% and a specificity of 68%. However, the need to use this parameter in active bleeding is questionable.
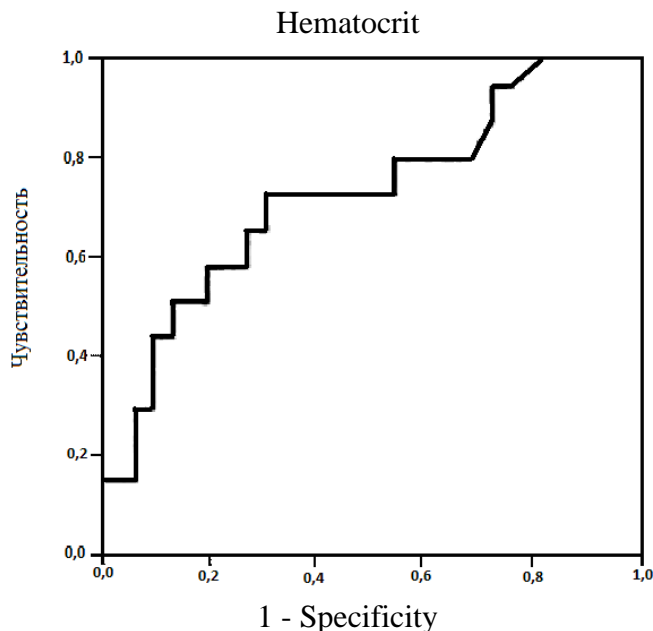
Hematocrit

Rice. Fig. 4. Characteristic curve of hematocrit 3 hours after admission of patients with closed abdominal trauma

Systolic BP at admission has a negative inverse correlation with the probability of death (rho = -372, p< 0.001). The operational characteristics of the test with systolic blood pressure less than100 мм Hg _ - sensitivity 70%, specificity 75%, AUROC = Q .721.
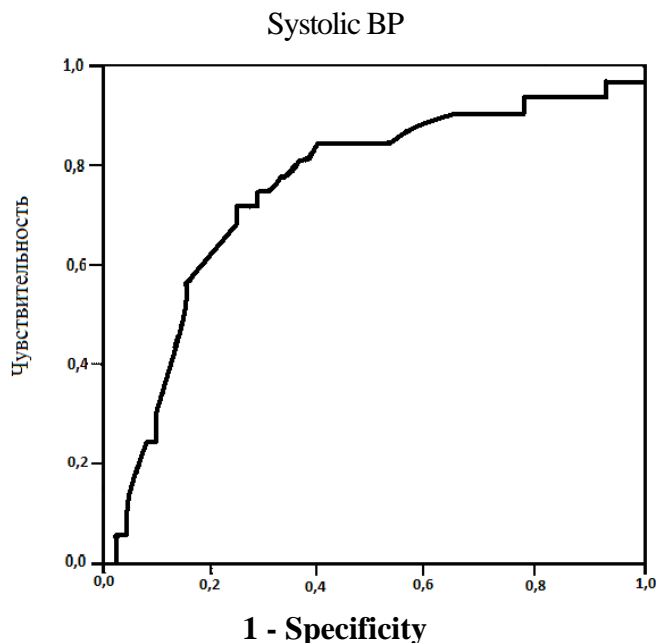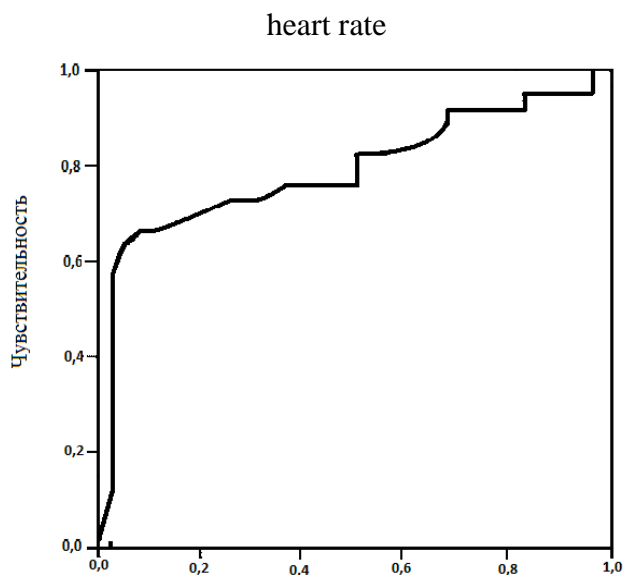

Systolic BP

Rice. 5. Characteristic curve of systolic blood pressure at admission.

The heart rate at admission has a correlation of average strength with the probability of a lethal outcome (rho =0.378, p<0.001).

The probability of a lethal outcome increases sharply with an initial heart rate of more than 1000 per minute (AUROC = 0.725, sensitivity 74%, specificity 89%).

This heart rate value can serve as a dividing point for the choice of surgical tactics « damage control ".
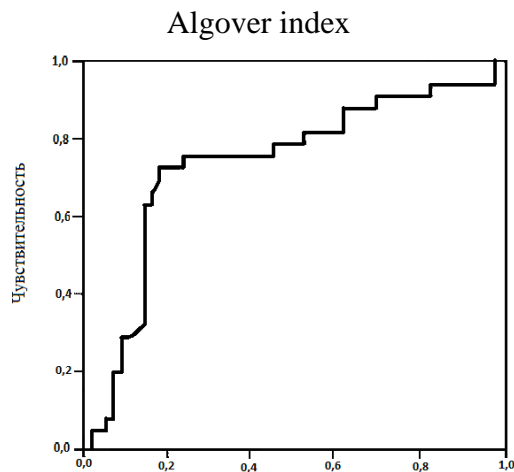

1- Specificity

Rice. 6. Characteristic curve of heart rate in closed abdominal trauma

Often mentioned in the medical literature, the Algover index (AI) (heart rate / blood pressure ratio), according to our data, has a correlation of average strength with the probability of a lethal outcome (rho = : -0.392, p <0.001). AI has a strong inverse correlation with heart rate (rho =-765, p <0.001).

Based on the assessment of heart rate, it is possible to calculate IA even without assessing the value of blood pressure, the measurement of which in a non-invasive way in shock can lead to significant errors:

Algover index (AI) = 0.014 x HR - 0.467 (p < 0.001)

The probability of a lethal outcome increases sharply with an AI value of more than 1 (AUROC = 0.733, sensitivity 76%, specificity 76%). This parameter can also serve as a dividing point for the choice of surgical tactics « damage control ".


1 - Specificity

Rice. Fig. 7. Characteristic curve of IA in closed abdominal trauma.

CONCLUSIONS

One of the simplest predictive tools can be the assessment of the condition of the skin of the extremities according to the visual analogue scale for evaluating the condition of the extremities (1 point - warm, 2 points - cold, 3 points - cold with marbling, 4 points - cyanosis). The scale has a correlation of average strength with the probability of a lethal outcome (r=0.334, p=0.03).

The division point of the scale is 3 points, that is, the appearance of marbling of the skin with the development of severe shock (sensitivity 75%, specificity 75%).

Limb condition

1 - Specificity
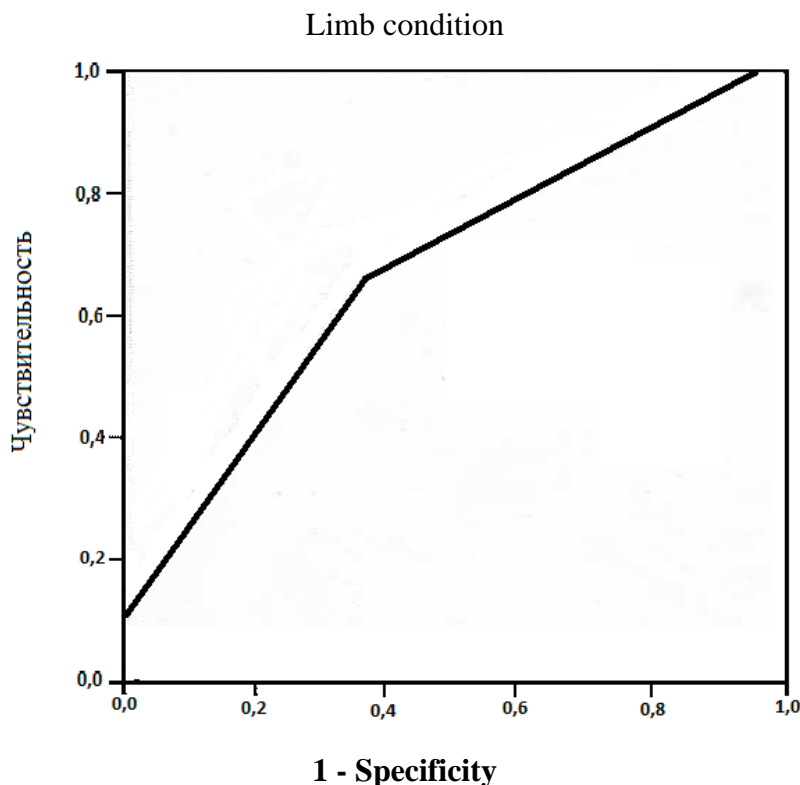
Rice. 8. Characteristic curve of temperature and color of extremities.

The data obtained allow us to draw the following conclusions:

1) Predicting the outcome and development of complications in severe concomitant trauma in victims is possible using APACHE integral scales II , SAPS II .

2) The probability of a lethal outcome increases sharply with an AI value of more than 1 (AUROC = 0.733, sensitivity 76%, specificity 76%). This parameter can also serve as a dividing point for the choice of surgical tactics « damage control ".

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