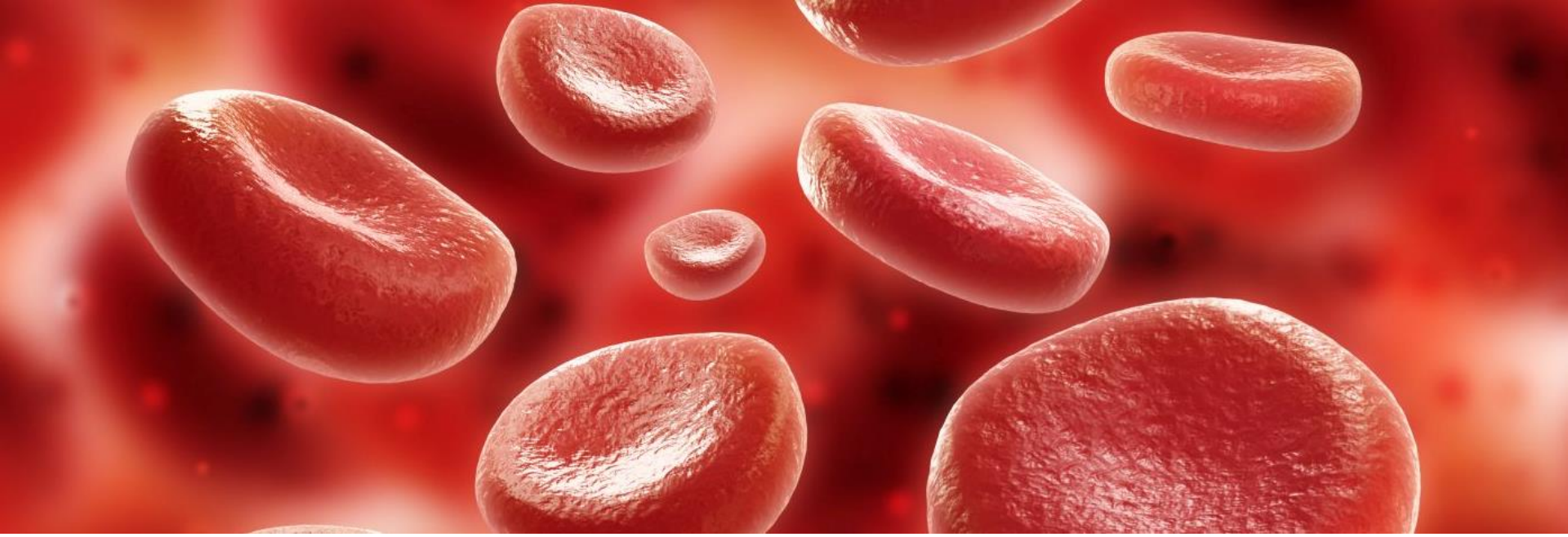


ИТ сепсиса и септического шока

дьявол в мелочах

д. м. н. профессор
Е. М. Шифман

Vincent et al. Critical Care (2016) 20:210
DOI 10.1186/s13054-016-1389-z

Critical Care

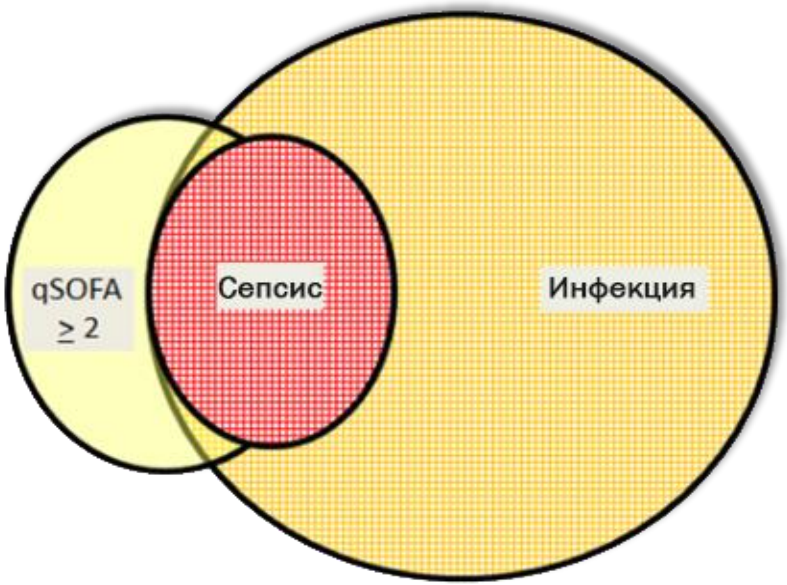
COMMENTARY Open Access

qSOFA does not replace SIRS in the definition of sepsis

Jean-Louis Vincent[1*], Greg S. Martin[2] and Mitchell M. Levy[3]

(qSOFA не замещает в определении сепсиса синдром системного воспалительного ответа)

- qSOFA ➔ повышает подозрение сепсиса и ускоряет дальнейшие действия
- qSOFA ≠ часть определения сепсиса



Диагноз шока

Intensive Care Med (2014) 40:1795–1815
DOI 10.1007/s00134-014-3525-z

CONFERENCE REPORTS AND EXPERT PANEL

Maurizio Cecconi
Daniel De Backer
Massimo Antonelli
Richard Beale
Jan Bakker
Christoph Hofer
Roman Jaeschke
Alexandre Mebazaa
Michael R. Pinsky
Jean Louis Teboul
Jean Louis Vincent
Andrew Rhodes

Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine

- Шок сопровождается признаками неадекватной перфузии тканей, выявляемых при физикальном обследовании.

Три органа, которые легко доступны для клинической оценки:

- ✓ кожа (степень перфузии тканей)
- ✓ почки (диурез)
- ✓ головной мозг (психический статус)

«3 окна» шока

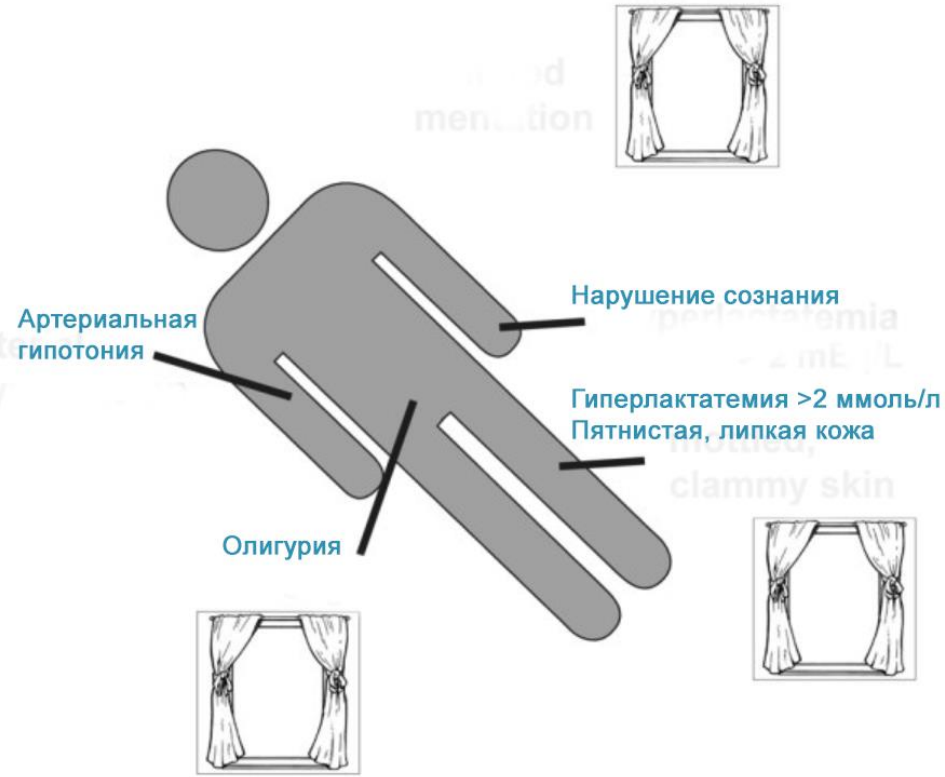
Vincent *et al. Critical Care* 2012, **16**:239
http://ccforum.com/content/16/6/239

CRITICAL CARE

REVIEW

Clinical review: Circulatory shock - an update: a tribute to Professor Max Harry Weil

Jean-Louis Vincent[1,*], Can Ince[2] and Jan Bakker[2]



Getting the Full Diagnostic Picture in Intensive Care Medicine: A Plea for "Physiological Examination"

To the Editor:

ATS Journals

AnnalsATS Volume 12 Number 11 | November 2015

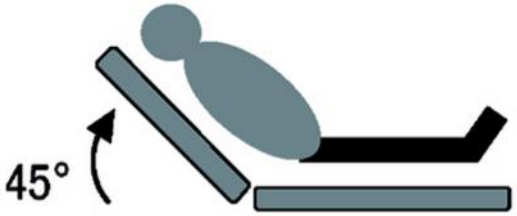
Bernd Saugel, M.D.
Julia Y. Wagner, M.D.
University Medical Center Hamburg-Eppendorf
Hamburg, Germany

Julia Wendon, M.D.
King's College London
London, United Kingdom

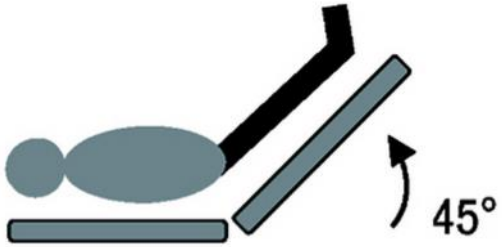
Azriel Perel, M.D.
Tel Aviv University
Tel Aviv, Israel

…Чтобы расширить понимание оценки у постели больного, мы хотим предложить, чтобы физикальное обследование было продолжено строгим физиологическим обследованием, которое является систематическим наблюдением за всей информацией, которая выводится на экраны мониторов.

Пассивное поднимание ног



- **подъем головного конца на 45 градусов: полу-лежачее положение**



- **пассивное поднимание ног**

Надежно как для пациентов на спонтанном дыхании,
так и для пациентов, находящихся на частичной вентиляции легких

Ограничения:

- ✓ *двусторонние переломы костей таза или костей ног*
- ✓ *установленная баллонная помпа*
- ✓ *внутрибрюшная гипертензия*
- ✓ *нестабильное внутричерепное давление*

Пассивное поднимание ног:

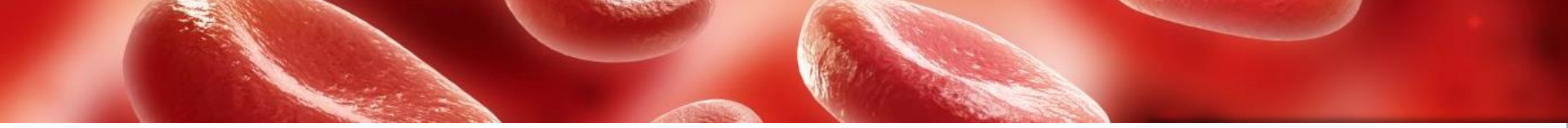
- Даже в случае внутрибрюшной гипертензии
- Эффекты подобны инфузионной терапии

В случае ответа на нагрузку жидкостью:

- Пассивное поднимание ног наполняет сердечные камеры, увеличивает преднагрузку, увеличивает сердечный выброс

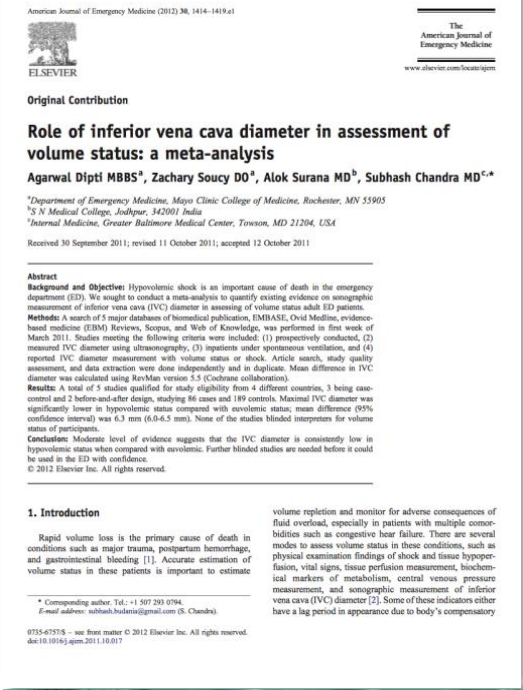
В случае отсутствия ответа на нагрузку жидкостью:

- Пассивное поднимание ног наполняет камеры сердца, увеличивает преднагрузку без увеличения сердечного выброса



- Данные сонографии нижней полой вены могут служить предикторами ответа на введение растворов.

- Мета-анализ 5 исследований пациентов с сепсисом, находящихся на ИВЛ, выявил разницу в 6,3 мм (95% CI 6,0–6,5 мм) в диаметре вены у пациентов с гипо- и нормоволемией



American Journal of Emergency Medicine (2012) 30, 1414–1419.e1

The American Journal of Emergency Medicine

ELSEVIER

www.elsevier.com/locate/ajem

Original Contribution

Role of inferior vena cava diameter in assessment of volume status: a meta-analysis

Agarwal Dipti MBBS[a], Zachary Soucy DO[a], Alok Surana MD[b], Subhash Chandra MD[c,*]

[a]Department of Emergency Medicine, Mayo Clinic College of Medicine, Rochester, MN 55905
[b]S N Medical College, Jodhpur, 342001 India
[c]Internal Medicine, Greater Baltimore Medical Center, Towson, MD 21204, USA

Received 30 September 2011; revised 11 October 2011; accepted 12 October 2011

Abstract

Background and Objective: Hypovolemic shock is an important cause of death in the emergency department (ED). We sought to conduct a meta-analysis to quantify existing evidence on sonographic measurement of inferior vena cava (IVC) diameter in assessing of volume status adult ED patients.

Methods: A search of 5 major databases of biomedical publication, EMBASE, Ovid Medline, evidence-based medicine (EBM) Reviews, Scopus, and Web of Knowledge, was performed in first week of March 2011. Studies meeting the following criteria were included: (1) prospectively conducted, (2) measured IVC diameter using ultrasonography, (3) inpatients under spontaneous ventilation, and (4) reported IVC diameter measurement with volume status or shock. Article search, study quality assessment, and data extraction were done independently and in duplicate. Mean difference in IVC diameter was calculated using RevMan version 5.5 (Cochrane collaboration).

Results: A total of 5 studies qualified for study eligibility from 4 different countries, 3 being case-control and 2 before-and-after design, studying 86 cases and 189 controls. Maximal IVC diameter was significantly lower in hypovolemic status compared with euvolemic status; mean difference (95% confidence interval) was 6.3 mm (6.0-6.5 mm). None of the studies blinded interpreters for volume status of participants.

Conclusion: Moderate level of evidence suggests that the IVC diameter is consistently low in hypovolemic status when compared with euvolemic. Further blinded studies are needed before it could be used in the ED with confidence.

1. Introduction

Rapid volume loss is the primary cause of death in conditions such as major trauma, postpartum hemorrhage, and gastrointestinal bleeding [1]. Accurate estimation of volume status in these patients is important to estimate volume repletion and monitor for adverse consequences of fluid overload, especially in patients with multiple comorbidities such as congestive hear failure. There are several modes to assess volume status in these conditions, such as physical examination findings of shock and tissue hypoperfusion, vital signs, tissue perfusion measurement, biochemical markers of metabolism, central venous pressure measurement, and sonographic measurement of inferior vena cava (IVC) diameter [2]. Some of these indicators either have a lag period in appearance due to body's compensatory

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0735-6757/$ – see front matter © 2012 Elsevier Inc. All rights reserved.
doi:10.1016/j.ajem.2011.10.017

Dipti A., Soucy Z., Surana A. et al. Role of inferior vena cava diameter in assessment of volume status: a meta-analysis. Am. J. Emerg. Med. 2016;30:1414-1419

Основные положения в диагностике и лечении гиповолемии у больных в критическом состоянии

REVIEW

CURRENT OPINION

Evidence-based fluid management in the ICU

Achim W. Schindler and Gernot Marx

Purpose of review
Evidence-based fluid therapy is complicated by blurred boundaries toward other fields of therapy and the majority of trials not focusing on patient-relevant outcomes. Additionally, recent trials unsettled the faith in traditional concepts on fluid therapy. The article reviews the evidence on diagnosis and treatment of hypovolemia and discusses the use of balanced solutions and early goal-directed therapy (EGDT) in septic shock resuscitation.

Recent findings
Hypovolemia should be diagnosed and its treatment guided by a multifaceted approach, including medical history, physical examination, volume responsiveness, and technical parameters – dynamic indicators, volumetric indicators, sonography, and metabolic indicators. Central venous pressure and pulmonary artery occlusion pressure should be avoided. In ICU patients, balanced crystalloids should primarily be used, because unbalanced infusions (especially saline) cause hyperchloremic acidosis which is associated with renal impairment and infections. Colloids are beneficial to restore blood volume rapidly. Hydroxyethyl starch may be harmful although the validity of the respective recent studies is limited by methodological flaws. Early aggressive fluid therapy is still beneficial in septic shock resuscitation, despite recent trials challenging the EGDT concept. Today, 10 years after Rivers, 'usual care' includes aggressive fluid resuscitation that is as effective as formal EGDT.

Summary
Evidence-based fluid therapy includes a multifaceted diagnostic approach, the primary use of balanced crystalloids and early aggressive (septic) shock resuscitation.

Keywords
balanced crystalloids, fluid therapy, ICU, shock resuscitation

INTRODUCTION

Every patient in the ICU receives intravenous fluids. Considering this quantitative relevance it is remarkable that pathophysiological concepts and schools of thought predominated fluid therapy over decades and are still of significant influence compared to evidence-based approaches. Such an approach is complicated by its blurred boundaries toward other fields of critical care that use fluids as an integral part of a treatment, for example, therapy of different shock types. Furthermore, many trials focus on surrogates like fluid balance or hemodynamic stabilization instead of patient-relevant outcomes.

During the last 10 years, three trials – 'Efficacy of Volume Substitution and Insulin Therapy in Severe Sepsis' (VISEP) [1], Crystalloid versus Hydroxyethyl Starch (CHEST) [2], and 'Scandinavian Starch for Severe Sepsis/Septic Shock' (6S) [3] – raised substantial concern about the use of hydroxyethyl starch (HES) in patients with severe sepsis and septic shock. These trials showed an increased mortality and renal morbidity if such patients were treated with HES. Despite substantial methodological limitations in each of these trials [4–8], they induced uncertainty about the optimum fluid therapy not only but especially for critically ill patients.

In 2011, the 'Deutsche Gesellschaft für Anaesthesiologie und Intensivmedizin' (German Society of Anaesthesiology and Intensive Care, DGAI) initiated the development of an evidence-based guideline on fluid therapy that was published in 2014 [9**]. This guideline is strictly focused to diagnosis and treatment of (absolute and relative) hypovolemia, it excludes adjacent fields of intensive care. The evidence base of this guideline contributes

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Curr Opin Anesthesiol 2016, 29:158–165
DOI:10.1097/ACO.0000000000000303

- Integrate medical history, physical examination, and valid technical findings to diagnose hypovolemia and to guide therapy
- Valid technical findings are
  - PLR-induced changes in blood flow (blood pressure changes can be used alternatively),
  - Dynamic parameters (SVV, PPV, PPV),
  - Lactate clearance,
  - Volumetric parameters (ITBV/GEDV),
  - Sonography of heart and inferior vena cava.
- Do not use static parameters like CVP or PAOP to diagnose hypovolemia
- Administer balanced solutions and avoid saline for fluid resuscitation
- Crystalloids should be preferred in critically ill patients
- Shock states with absolute or relative hypovolemia should be treated fast and aggressively, using a defined goal (EGDT)
- For shock resuscitation colloids might be preferable compared to crystalloids, due to their superior ability to restore euvolemia
- Do not use HES in critically ill patients

FIGURE 1. Key issues for diagnosis and treatment of hypovolemia in critically ill patients.

EARLY GOAL-DIRECTED THERAPY

Treating shock states as early as possible is a quite established concept. And in 2001 Rivers *et al.* [10] published a single-center study showing a dramatically improved survival (Mortality 30.5 vs. 46.5%) in 263 patients with septic shock that received EGDT. To reach the goal of optimized central venous oxygenation a complex, pathophysiologically reasonable treatment was used, including fluid administration, vasopressors, inotropic support, and transfusion. Recently, EGDT was challenged by three multicenter trials that compared EGDT protocols similar to Rivers' protocol with 'usual care' as a control – ARISE [12**], ProCESS [13**], and ProMISe [11**]. Together, these trials included 1860 and 1886 patients in the EGDT and the control arm, respectively. None of these trials showed EGDT concerning mortality.

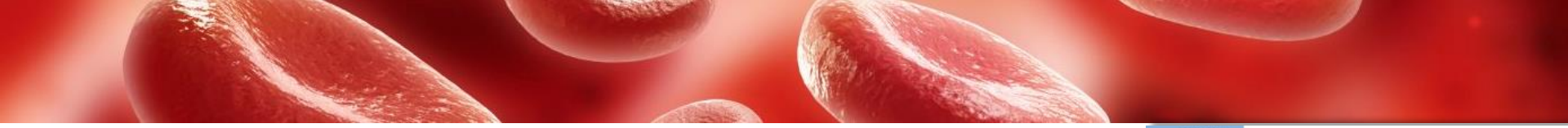
The lack of reproducibility rather demonstrates how profoundly 'usual care' changed after the initial publication than showing inefficacy of EGDT. Within the first 6 h Rivers EGDT group received 42% more fluids than the control group. After the sixth hour the control group caught up and during

Table 1. Comparative summary of hemodynamic therapy in four trials of early goal-directed therapy in septic shock patients

		Rivers	ARISE	ProCESS	ProMISe
Fluids administered before study protocol started	EGDT	N/A	2515	2254	1950
	Usual care	N/A	2591	2083	2000
Fluids administered during the first 6 h of the study	EGDT	4981	4479	5059	3950
	Usual care	3499	4304	5511	3784
	Surplus volume in EGDT ml (% of control)	1482 (42.4)	175 (4.1)	697 (16.0)	166 (4.4)
Vasopressor therapy (percentage of patients)	EGDT	27.4	66.6	54.9	53.3
	Usual care	30.3	57.8	44.1*	46.6
Inotropic support (percentage of patients)	EGDT	13.7	15.4	8.0	18.1
	Usual care	0.8	2.6	0.9*	3.8
Redcell transfusion (percentage of patients)	EGDT	64.1	13.6	14.4	8.8
	Usual care	18.5	7.0	7.5*	3.8

EGDT, early goal-directed therapy. Adapted from [10,11**–13**].
*Significant difference ($P < 0.05$) between the EGDT and usual care group.

Schindler A.W., Marx G. Evidence-based fluid management in the ICU Curr. Opin. Anaesthesiol. 2016;29:158–165



- Не применяйте для диагностики гиповолемии статические параметры, такие как ЦВД или ДЗЛК,
- Вводите сбалансированные растворы и избегайте введения физраствора для интенсивной терапии
- У пациентов в критическом состоянии следует отдавать предпочтение кристаллоидам
- Шоковые состояния с абсолютной или относительной гиповолемией следует лечить быстро и агрессивно
- Для интенсивной терапии шока коллоиды могут быть предпочтительнее, благодаря лучшей способности восстанавливать нормоволемию по сравнению с кристаллоидами
- Не применяйте ГЭК у больных в критическом состоянии

REVIEW

Evidence-based fluid management in the ICU

Achim W. Schindler and Gernot Marx

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Curr Opin Anesthesiol 2016, 29:158–165
DOI:10.1097/ACO.0000000000000303

www.co-anesthesiology.com Volume 29 • Number 2 • April 2016

Schindler A.W., Marx G. Evidence-based fluid management in the ICU Curr. Opin. Anaesthesiol. 2016;29:158–165

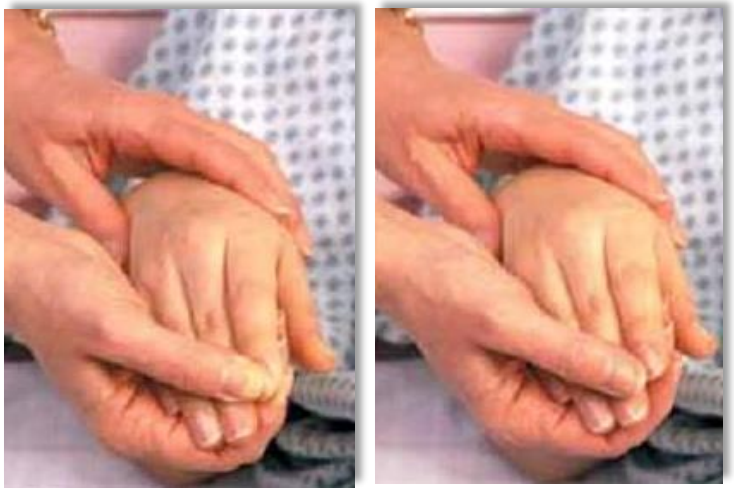
Исследование времени восстановления капиллярного кровотока при септическом шоке

Intensive Care Med (2014) 40:958–964
DOI 10.1007/s00134-014-3326-4

ORIGINAL

H. Ait-Oufella
N. Bige
P. Y. Boelle
C. Pichereau
M. Alves
R. Bertinchamp
J. L. Baudel
A. Galbois
E. Maury
B. Guidet

Capillary refill time exploration during septic shock



Давление восстановления в капиллярах (индекс) 15 с

- проспективное обсервационное исследование
- 59 пациентов с септическим шоком (46% пневмония, 27% инфекции брюшной полости)
- Пациенты включались при начале введения вазопрессоров с 24 ч расширением объема, норэпинефрин
- мониторинг гемодинамики САД > 65 мм рт. ст.
- Время капиллярного восстановления к 6 ч (индекс пальца)

Исследование времени восстановления капиллярного кровотока при септическом шоке

Intensive Care Med (2014) 40:958–964
DOI 10.1007/s00134-014-3326-4

ORIGINAL

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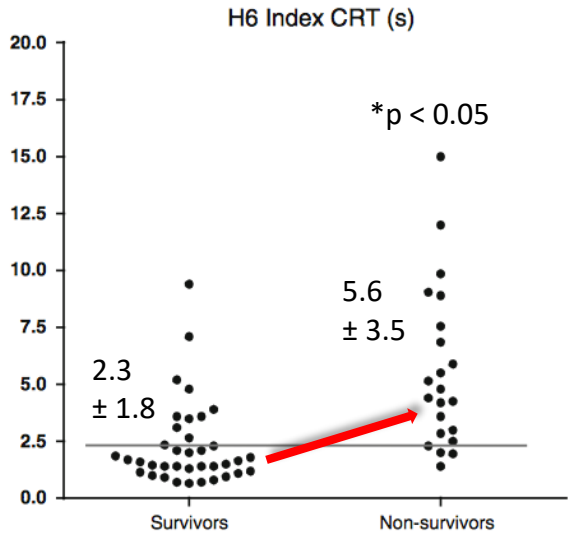
J. L. Baudel
A. Galbois
E. Maury
B. Guidet

Capillary refill time exploration during septic shock



2–3-х кратное увеличение индекса восстановления капиллярного у невыживших при сепсисе.

Смертность увеличивается с увеличением времени капиллярного кровотока

Количественная оценка по 6-бальной шкале от 0 до 5

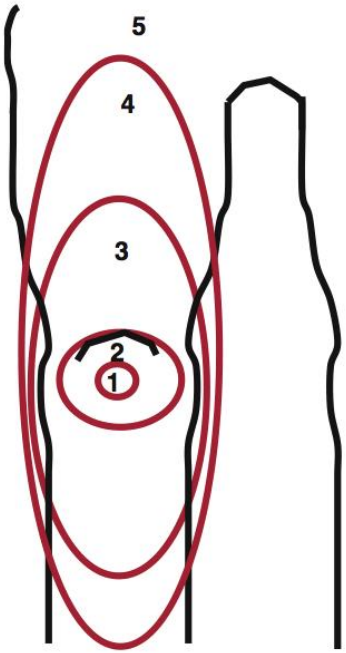
Intensive Care Med (2011) 37:801–807
DOI 10.1007/s00134-011-2163-y

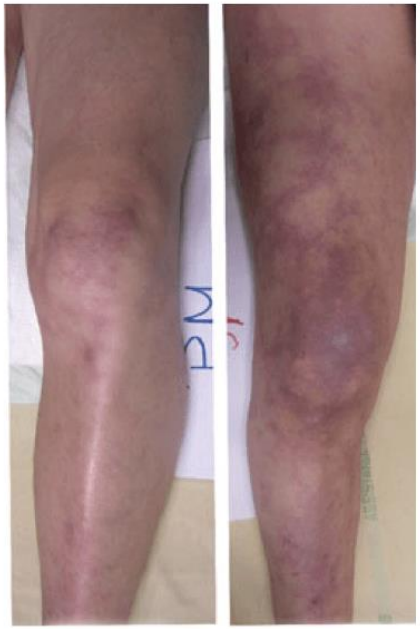
ORIGINAL

H. Ait-Oufella
S. Lemoinne
P. Y. Boelle
A. Galbois
J. L. Baudel
J. Lemant
J. Joffre
D. Margetis
B. Guidet
E. Maury
G. Offenstadt

Mottling score predicts survival in septic shock

Пятнистость
(мраморность)





2 балла 4 балла

Методика «либеральной» оксигенотерапии в раннем периоде интенсивной терапии при сепсисе?

1) Нет четких доказательств о том что гипероксия пагубна в фазе интенсивной терапии сепсиса
2) Большинство доклинических данных позволяют предположить что кратковременная гипероксия может оказывать положительное действие
3) Следует учитывать множество факторов:
   - ✓ вазоконстрикцию
   - ✓ короткий временной промежуток
   - ✓ определение PaO_2
   - ✓ …

Либерализм это психическое расстройство

Six et al. Critical Care (2016) 20:195
DOI 10.1186/s13054-016-1368-4

Critical Care

RESEARCH Open Access

Hyperoxemia as a risk factor for ventilator-associated pneumonia

Sophie Six[1†], Karim Jaffal[1†], Geoffrey Ledoux[1], Emmanuelle Jaillette[1], Frédéric Wallet[2] and Saad Nseir[1,3*]

Oxygen therapy for sepsis patients in the emergency department: a little less?

Stolmeijer, Renate[a]; ter Maaten, Jan C.[a]; Zijlstra, Jan G.[b]; Ligtenberg, Jack J.M.[a]

European Journal of Emergency Medicine: June 2014 - Volume 21 - Issue 3 - p 233–235
doi: 10.1097/MEJ.0b013e328361c6c7
Short Reports

Hindawi
Canadian Respiratory Journal
Volume 2017, Article ID 2834956, 7 pages
https://doi.org/10.1155/2017/2834956

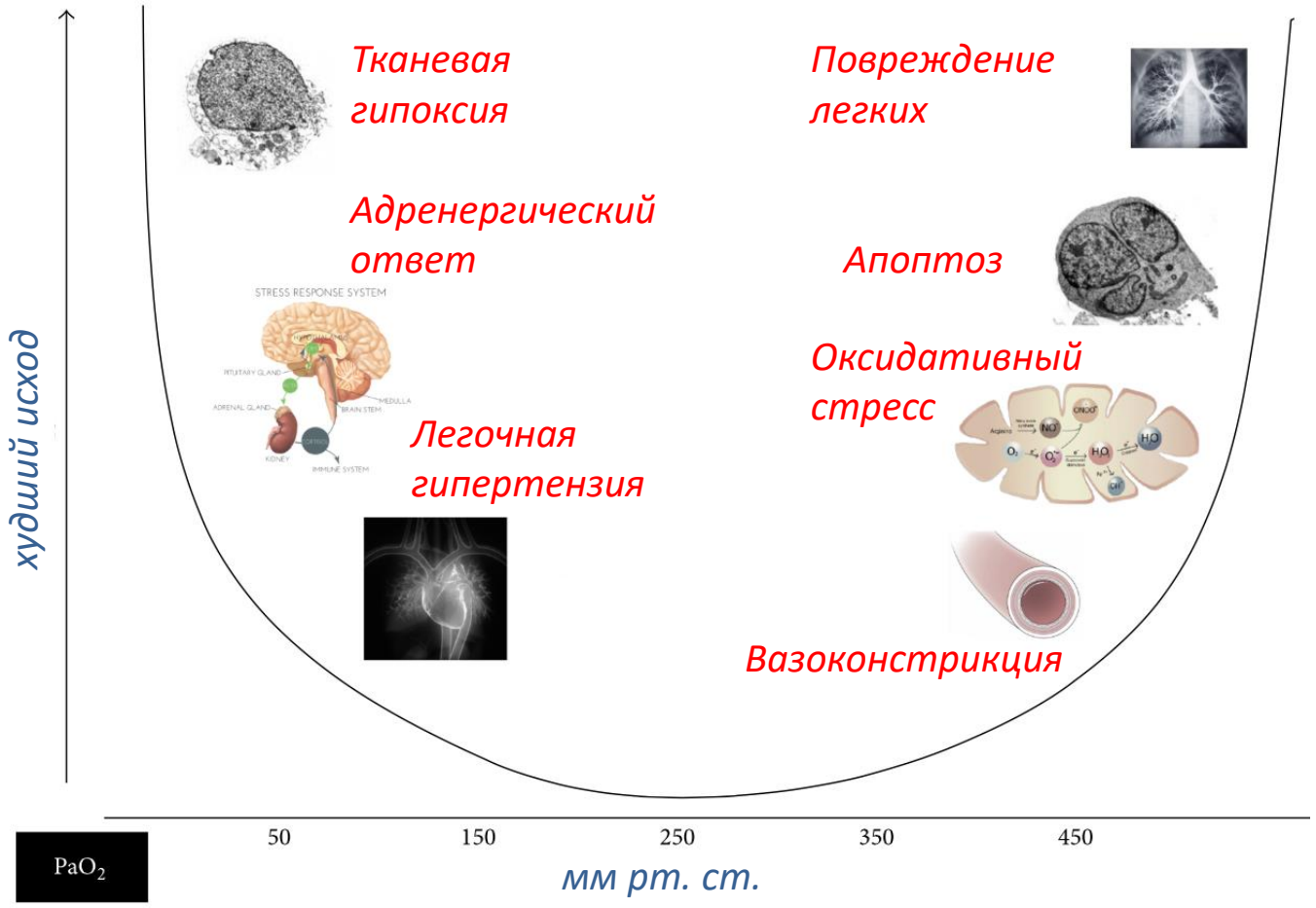
Hindawi

Review Article

Harmful Effects of Hyperoxia in Postcardiac Arrest, Sepsis, Traumatic Brain Injury, or Stroke: The Importance of Individualized Oxygen Therapy in Critically Ill Patients

Jean-Louis Vincent,[1] Fabio Silvio Taccone,[1] and Xinrong He[2]

Кислород в раннем периоде интенсивной терапии сепсиса?



Jean-Louis Vincent, Fabio Silvio Taccone, and Xinrong He. Harmful Effects of Hyperoxia in Postcardiac Arrest, Sepsis, Traumatic Brain Injury, or Stroke: The Importance of Individualized Oxygen Therapy in Critically Ill Patients. Hindawi Can R Journal Vol 2017, ID 2834956

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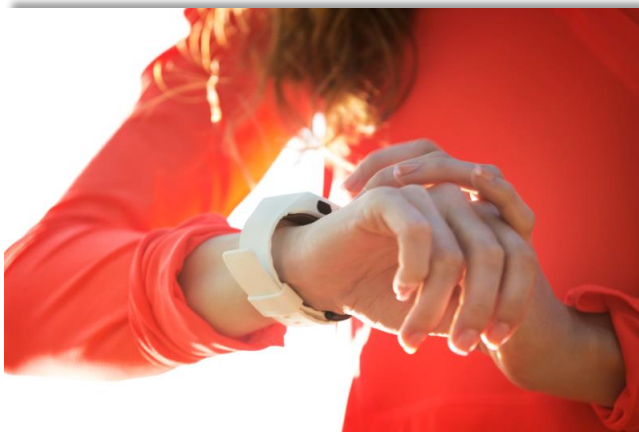
Вазопрессоры в раннем периоде

- Вазопрессоры влияют не только на АД и зависит от:
  - ✓ наполнение системы циркуляции
  - ✓ кривая функции сердца
  - ✓ сопротивление микроциркуляции



- Во время начальной фазы шока вазопрессоры могут набрать стрессовый объем
- Ограниченная доказательность относительно лучшего хронометража, но…
- Как можно раньше лечите гипотонию!
- Упущение времени приводит к ухудшению исхода
- Деэскалация при отсутствии необходимости

Возможные проблемы при применении вазопрессоров

- Чрезмерное увеличение при постнагрузке
  - ✓ *Дальнейшее снижение кровотока*
  - ✓ *Чрезмерное увеличение периферического сопротивления*
  - ✓ *Дальнейшее снижение перфузионного давления в органах*
- Риск ишемии
- Чрезмерная тахикардия
  - ✓ *Увеличение потребления миокардом кислорода*
  - ✓ *Уменьшение времени диастолы*
- Увеличение клеточного кальция
  - ✓ *Аритмия*

BJA
British Journal of Anaesthesia

Что мы должны делать сейчас?

- «Стратегия гемодинамически-обоснованной инфузионной терапии»
  - ✓ универсальное, агрессивное введение растворов при септическом шоке несет относительный риск, и что гемодинамически-обоснованный, консервативный подход дает лучший исход
- Начальная инфузионная терапия при септическом шоке болюсом 500 мл кристаллоидов
  - ✓ Максимум ~ 20 мл/кг (С важными исключениями*)

**DKA, Hyponatremia, Severe Gloss etc*

  - ✓ Выбор раствора ---- для следующего дня
  - ✓ Инфузионная терапия должна определяться ответом на раствор
- Титрование растворов на основании объем-ответ и вазопрессоры в фазе оптимизации

P. Marik, R. Bellomo; Br J Anaesth. 2016

Лейкоцитоз у родильниц

Проведен поиск по базам
PubMed, *Embase*, and *ClinicalTrials.gov*
для обнаружения сообщений о количестве лейкоцитов
у здоровых женщин с одноплодной беременностью
без клинических признаков инфекционного процесса
до и после введения кортикостероидов
через 24, 48, 72 и/или 96 часов

OBSTETRICS & GYNECOLOGY

Monday, May 16, 2016

8:00 AM–8:10 AM

Maternal Leukocytosis After Antenatal Corticosteroid Administration: A Systematic Review and Meta-Analysis [15]

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Laura Price, MD, Mark P. MacEachern, MLIS, Michelle T. Housey, MPH, Elizabeth Langen, MD, and Melissa E. Bauer, DO

INTRODUCTION: To establish the expected range of maternal leukocytosis in healthy pregnant women without infection after antenatal corticosteroid administration.

METHODS: PubMed, Embase, and ClinicalTrials.gov were searched to identify studies that reported white blood cell (WBC) counts in healthy women with singleton gestations without signs of clinical infection preceding and after antenatal corticosteroid administration at 24, 48, 72, and/or 96 hours. The mean, standard deviation, and two standard deviations from the mean were reported. The inverse variance weighting technique was used to calculate weighted means, as well as one and two standard deviations from the mean to determine the expected range of WBC count for each time period.

RESULTS: Eight studies met inclusion criteria (695 patients and 1,748 data points). Mean maternal WBC count values prior to antenatal corticosteroid administration and 24, 48, 72, and 96 hours after corticosteroid administration were 10.4, 13.7, 12.8, 11.5, and 11.1×10^9/L, respectively. A subset of patients with preterm premature rupture of membranes (PPROM) had mean WBC count values prior to corticosteroid administration and 24 and 48 hours after corticosteroid administration of 10.0, 13.8, and 13.0×10^9/L. The highest second standard deviation from the mean was 18.3×10^9/L, which occurred at 24 hours after antenatal corticosteroid administration.

CONCLUSION/IMPLICATIONS: Leukocytosis mean peaks at 24 hours after corticosteroid administration. The highest second standard deviation from the mean was 18.3×10^9/L. More studies are required to determine if further infectious workup is warranted in women receiving antenatal corticosteroids when WBC values are outside of this range.

Financial Disclosure: *The authors did not report any potential conflicts of interest.*

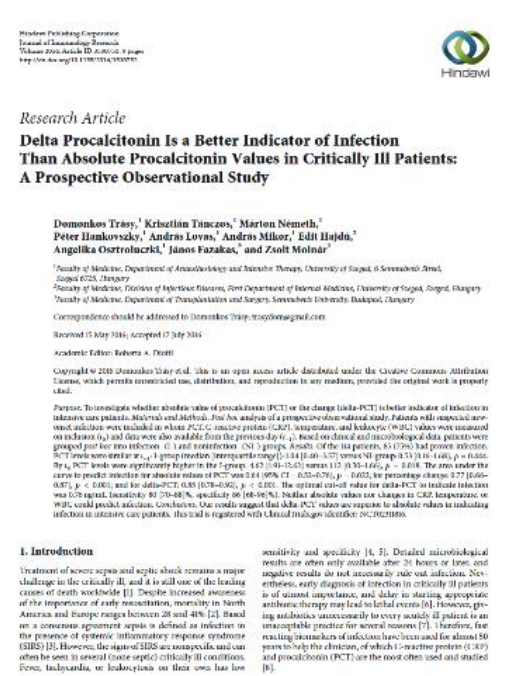
Bauer S. T. Maternal Leukocytosis After Antenatal Corticosteroid Administration: A Systematic Review and Meta-Analysis OBSTETRICS & GYNECOLOGY May 16, 2016

Важна не только абсолютная цифра, но и динамика

- Оптимальное пороговое значение для дельты-прокальцитонина, подтверждающей инфекцию составило 0.76 нг/мл чувствительность 80 [70–88]%, специфичность 86 [68–96]%

Ни абсолютные значения, ни изменения СРБ, температуры или лейкоцитов не могут предсказать инфекцию

Заключение: результаты работы позволяют предположить, что значения дельта-прокальцитонина являются лучшими по сравнению с абсолютными значениями в подтверждении инфекции у пациентов в критическом состоянии.



Research Article

Delta Procalcitonin Is a Better Indicator of Infection Than Absolute Procalcitonin Values in Critically Ill Patients: A Prospective Observational Study

Domonkos Trásy,[1] Krisztián Tánczos,[2] Márton Németh,[2] Péter Hankovszky,[1] András Lovas,[1] András Mikor,[1] Edit Hajdú,[2] Angelika Osztroluczki,[1] János Fazakas,[3] and Zsolt Molnár[1]

Domonkos Trásy, Krisztián Tánczos, Márton Németh,1 Péter Hankovszky, András Lovas, András Mikor, Edit Hajdú, Angelika Osztroluczki, János Fazakas, Zsolt Molnár. Delta Procalcitonin Is a Better Indicator of Infection Than Absolute Procalcitonin Values in Critically Ill Patients: A Prospective Observational Study. Journal of Immunology Research Volume 2016 (2016), Article ID 3530752, 9 pages. http://dx.doi.org/10.1155/2016/3530752

Индивидуально ориентированная интенсивная терапия

Теодор Жерико «Плот „Медузы“». Гибель фрегата «Медуза», потерпевшего кораблекрушение у африканских берегов ровно 200 лет назад — в 1816-м году

Спасибо за внимание!