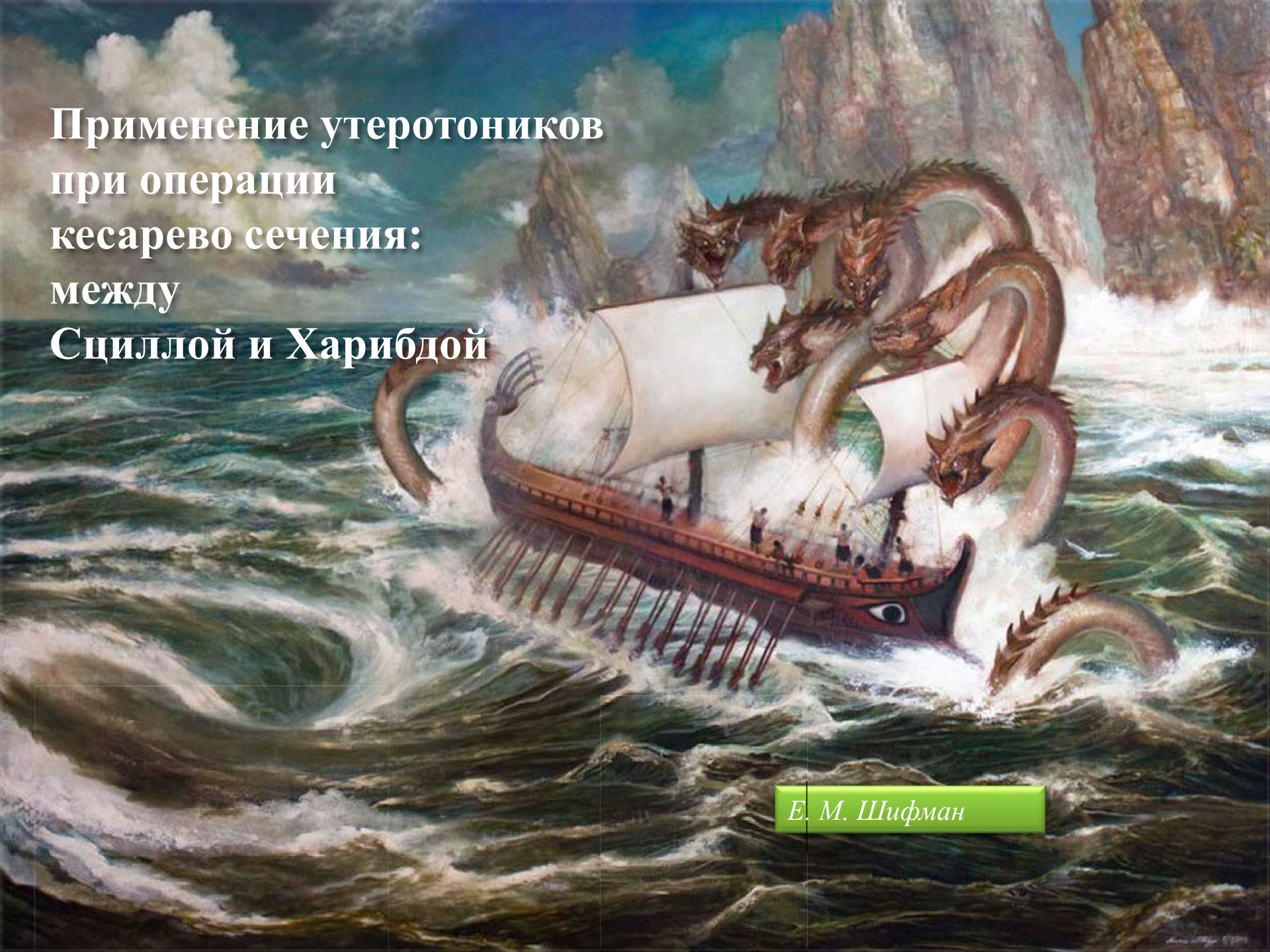
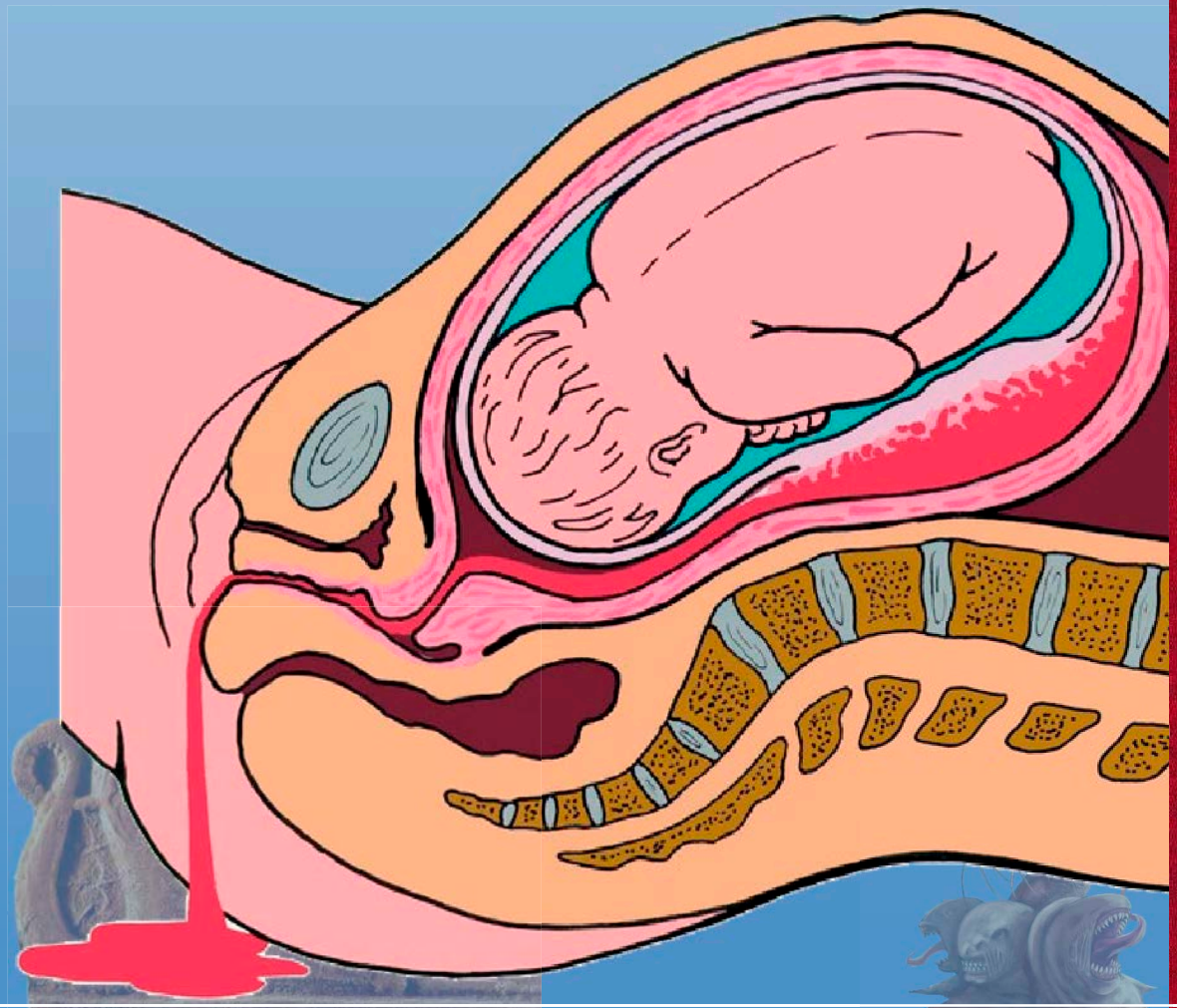
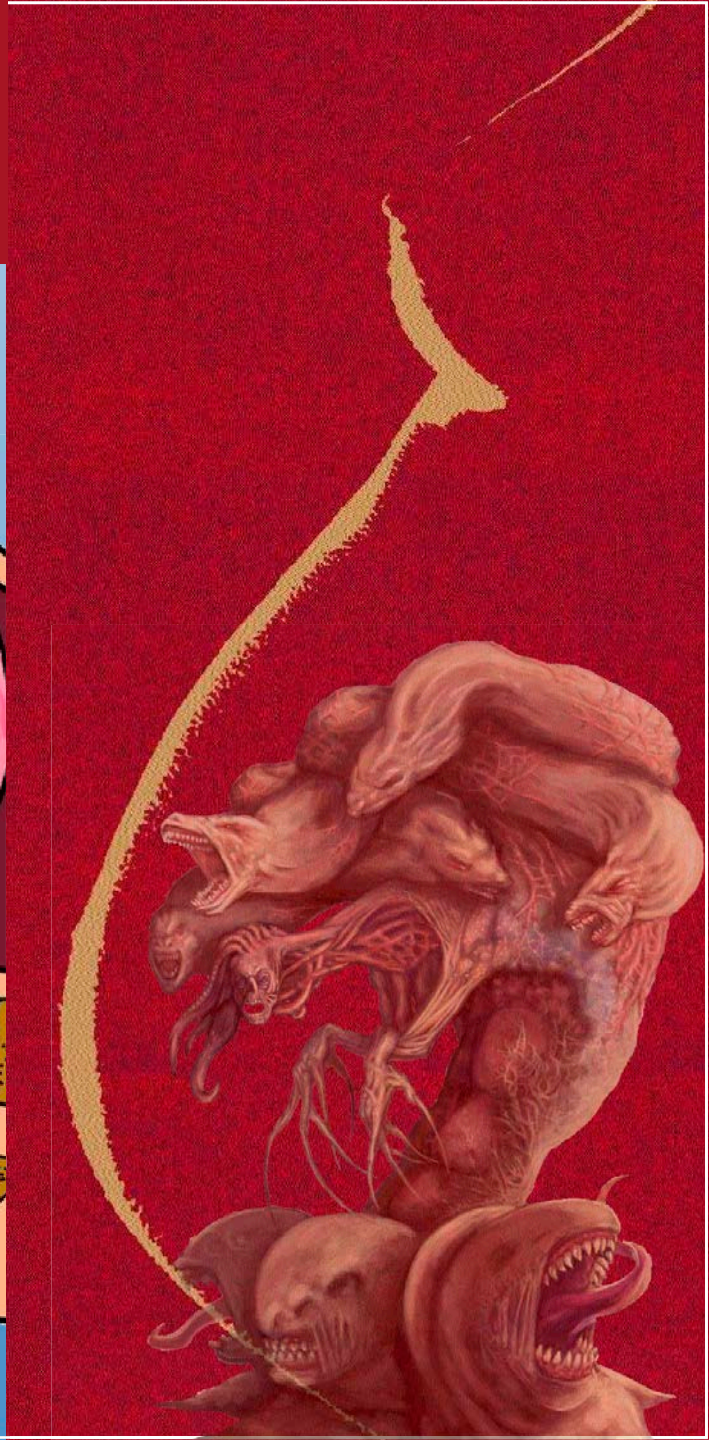


Применение утеротоников при операции кесарево сечения: между Сциллой и Харибдой

Е. М. Шифман

В 75–90% случаях послеродовое кровотечение – это гипо- или атоническое маточное кровотечение!!!





JAMA

Неблагоприятные явления при применении окситоцина

- **Смерть матери** → **легочная гипертензия**, **стеноз аорты**

(Robinson M. et al., JAMA 1967;200:378:378-381)

- **Желудочковая тахикардия** → **продленный синдром QT**
- **Инфаркт миокарда** → **у здоровых**

JAMA Network

May 1, 1967

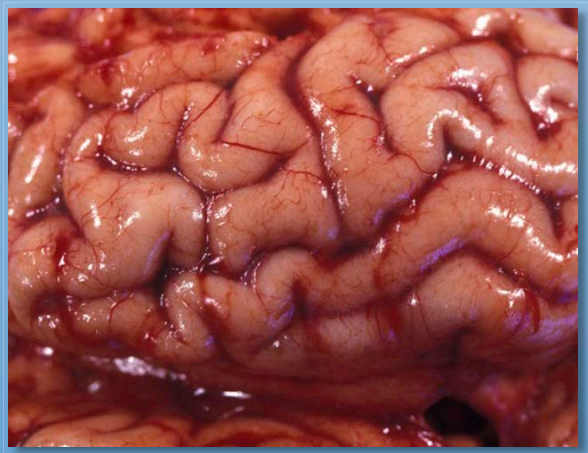
Congenital Aortic Stenosis in Pregnancy
Ventricular Fibrillation Induced by Oxytocin

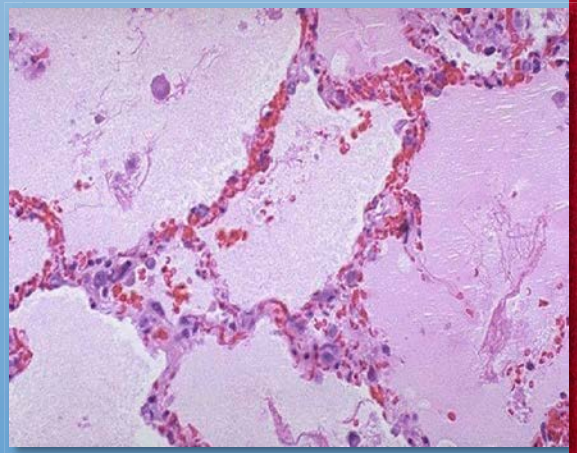
Martin Robinson, MD; Donald C. Greevy, MD; Jordan Katz, MD; et al

JAMA. 1967;200(5):378-381. doi:10.1001/jama.1967.03120180066009

Окситоцин – задержка жидкости

Реабсорбция свободной жидкости из дистальных извитых канальцев и собирательных протоков



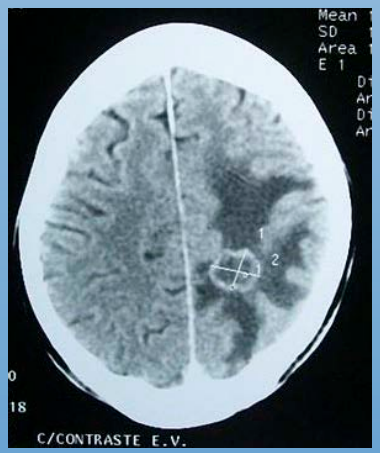


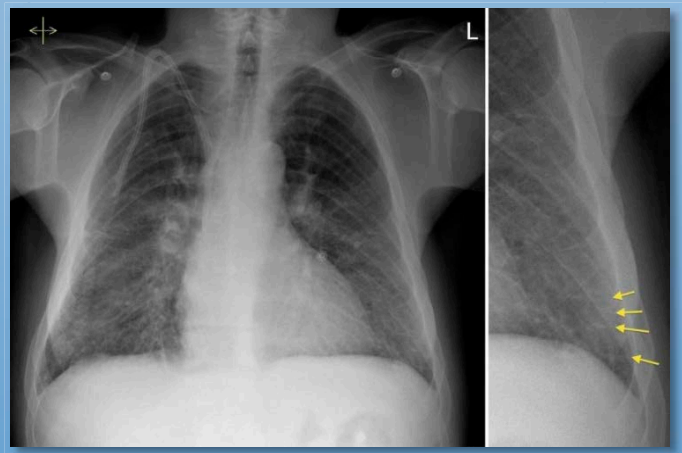
- **Интоксикация жидкостью** *(Водная интоксикация)*
  - ✓ Отек мозга
  - ✓ Судороги

✓ Отек легких

Окситоцин – задержка жидкости

Реабсорбция свободной жидкости из дистальных извитых канальцев и собирательных протоков





- **Интоксикация жидкостью**
  - ✓ Отек мозга
  - ✓ Судороги

✓ Отек легких

Боли за грудиной и отек легких – встречаются редко и также связаны с быстрым и болюсном введении 10 ЕД окситоцина

International Journal of Obstetric Anesthesia (2008) 17, 247–254
0959-289X/$ - see front matter
doi:10.1016/j.ijoa.2008.03.003

ELSEVIER
www.obstetanesthesia.com

CASE REPORT

The hemodynamics of oxytocin and other vasoactive agents during neuraxial anesthesia for cesarean delivery: findings in six cases

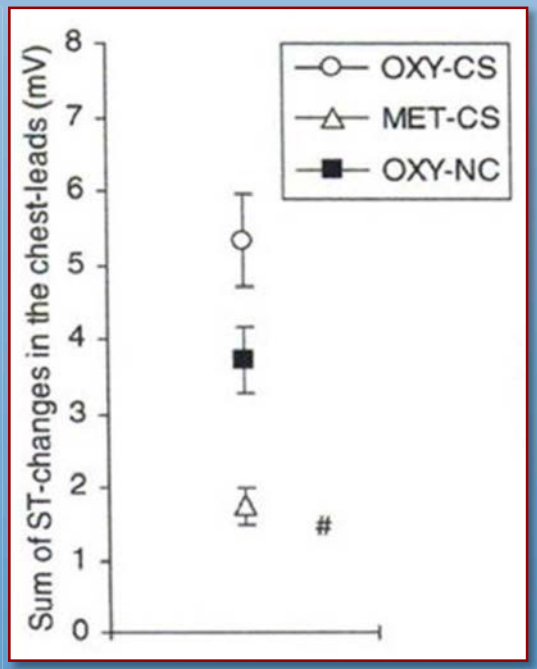
T. L. Archer,* K. Knape, D. Liles, A. S. Wheeler, B. Carter
Department of Anesthesiology, University of Texas Health Science Center, San Antonio, Texas, USA

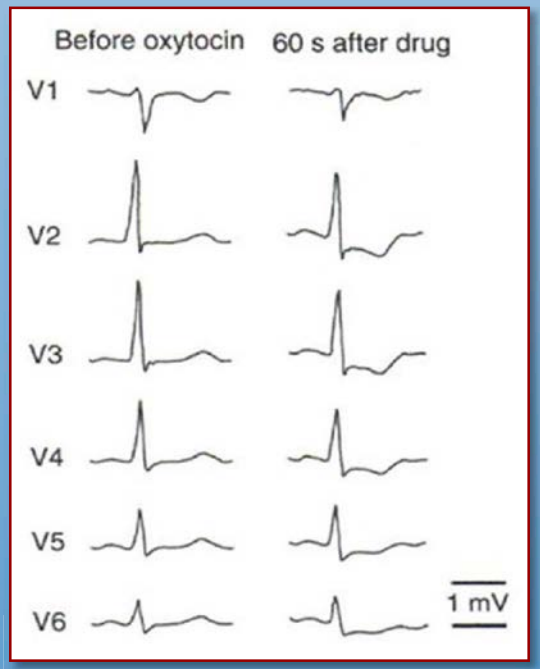
ABSTRACT
Oxytocin is a commonly used uterotonic that can cause significant and even fatal hypotension, particularly when given as a bolus. The resulting hypotension can be produced by a decrease in systemic vascular resistance or cardiac output through a decrease in venous return. Parturients with normal volume status, heart valves and pulmonary vasculature most often respond to this hypotension with a compensatory increase in heart rate and stroke volume. Oxytocin-induced hypotension at cesarean delivery may be incorrectly attributed to blood loss. Pulse power analysis (also called "pulse contour analysis") of an arterial pressure wave form allows continuous evaluation of systemic vascular resistance and cardiac output in real time, thereby elucidating the causative factors behind changes in blood pressure. Pulse power analysis was conducted in six cases of cesarean delivery performed under neuraxial anesthesia. Hypotension in response to oxytocin was associated with a decrease in systemic vascular resistance and a compensatory increase in stroke volume, heart rate and cardiac output. Pulse power analysis may be helpful in determining the etiology of and treating hypotension during cesarean delivery under neuraxial anesthesia.

Keywords: Oxytocin; Obstetrical hemorrhage; Pulse power analysis; Pulse contour analysis; PulseCO; LiDCO; Systemic vascular resistance; Cardiac output; Stroke volume; Hemodynamics of pregnancy

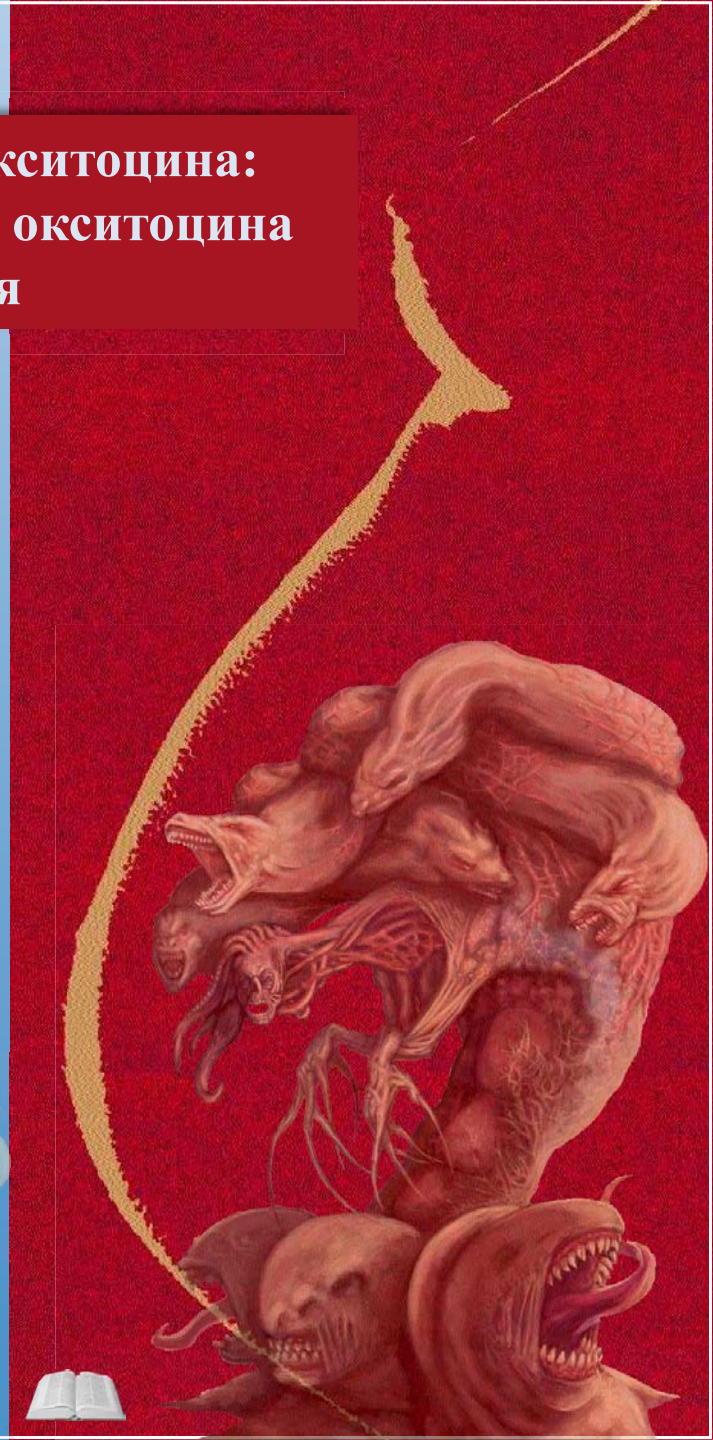
Archer TL, Knape K, Liles D, Wheeler AS, Carter B. The hemodynamics of oxytocin and other vasoactive agents during neuraxial anesthesia for cesarean delivery: findings in six cases. Int J Obstet Anesth 2008;17:247–54

Признаки ишемии миокарда после введения окситоцина: рандомизированное, двойное слепое сравнение окситоцина и метилэргометрина во время кесарева сечения





Средняя сумма изменений ST в скалярных грудных отведениях mV.



Svanstrom et al. Brit Anaesth 2008; 100, 683–689

Многочисленные исследования реакции рожениц на назначение больших доз окситоцина (10 ЕД внутривенно капельно после извлечения плода), показали различные проявления гемодинамических и других эффектов **мимикрии с анафилактоидными реакциями**. Необходим срочный пересмотр протоколов назначения окситоцина во время операции кесарево сечения.

B. N. Kjær, M. Krøigaard and L. H. Garvey.
Oxytocin use during Caesarean sections in Denmark – are we getting the dose right?// Acta Anaesthesiologica Scandinavica 60 (2016) 18–25.

ANESTHESIOLOGY
The Journal of the American Society of Anesthesiologists, Inc.

From: Changes in Blood Pressure and Cardiac Output during Cesarean Delivery: The Effects of Oxytocin and Carbetocin Compared with Placebo

Anesthesiology. 2013; 119(3):541–551. doi:10.1097/ALN.0b013e31829416dd

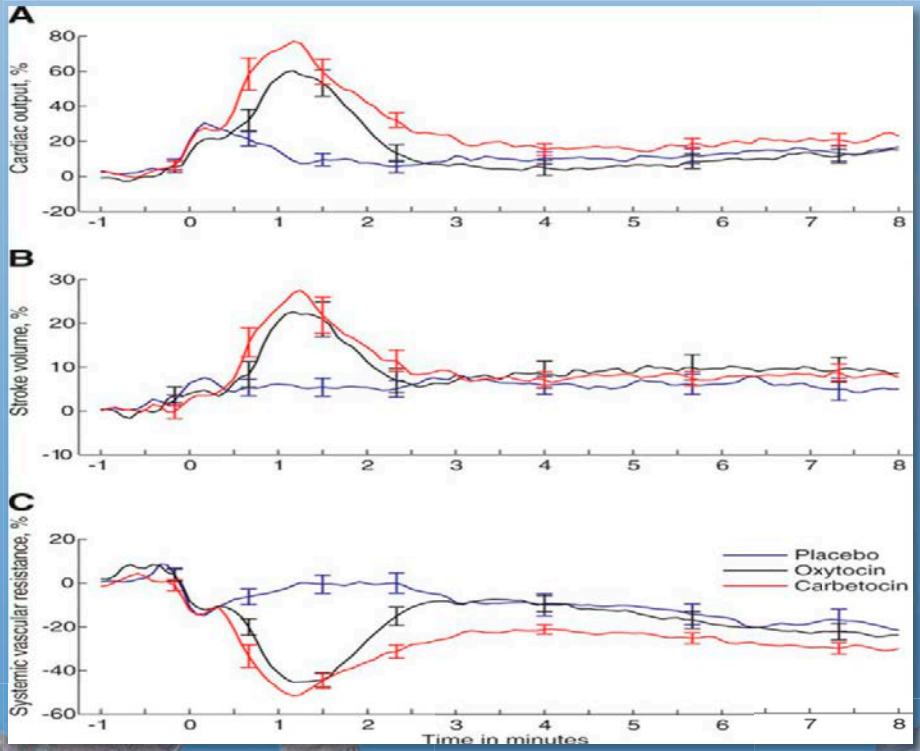


Figure Legend:
Estimated cardiac output (A), stroke volume (B), and systemic vascular resistance (C) in the three treatment groups the minute before and 8 min after intervention (intervention = time 0) presented as the percentage change from baseline representing measurements from the last 30 s before uterotomy.

ANESTHESIOLOGY
The Journal of the American Society of Anesthesiologists, Inc.

From: Changes in Blood Pressure and Cardiac Output during Cesarean Delivery: The Effects of Oxytocin and Carbetocin Compared with Placebo

Anesthesiology. 2013; 119(3):541–551. doi:10.1097/ALN.0b013e31829416dd

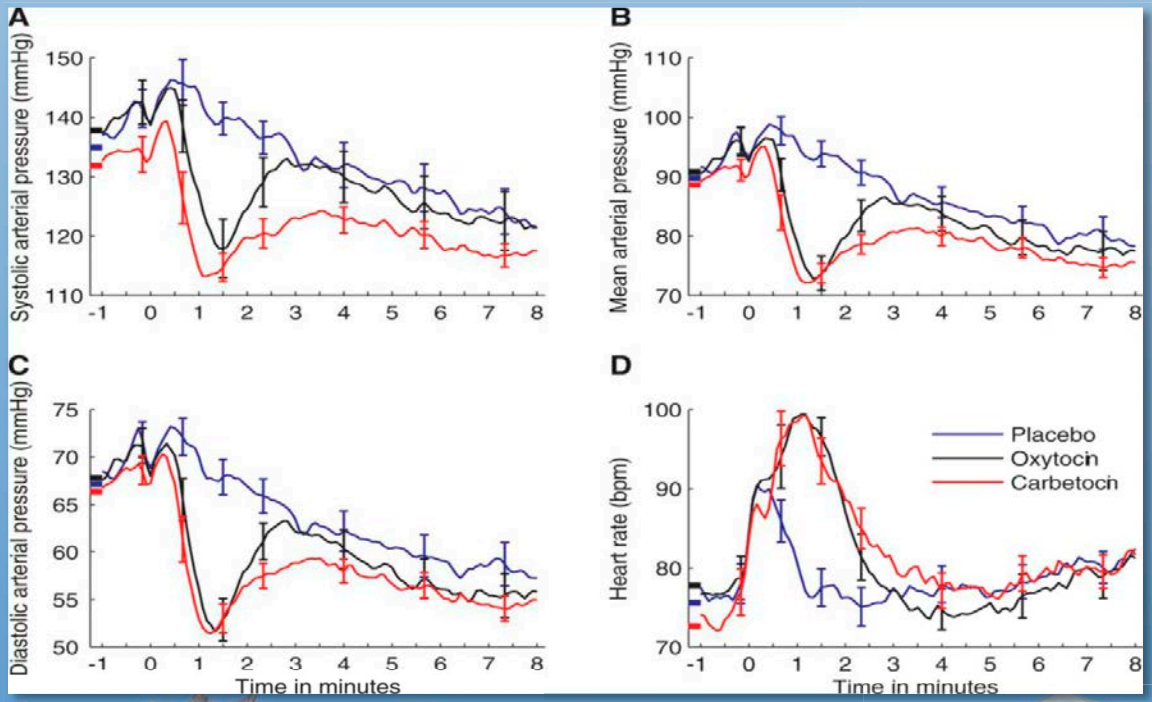
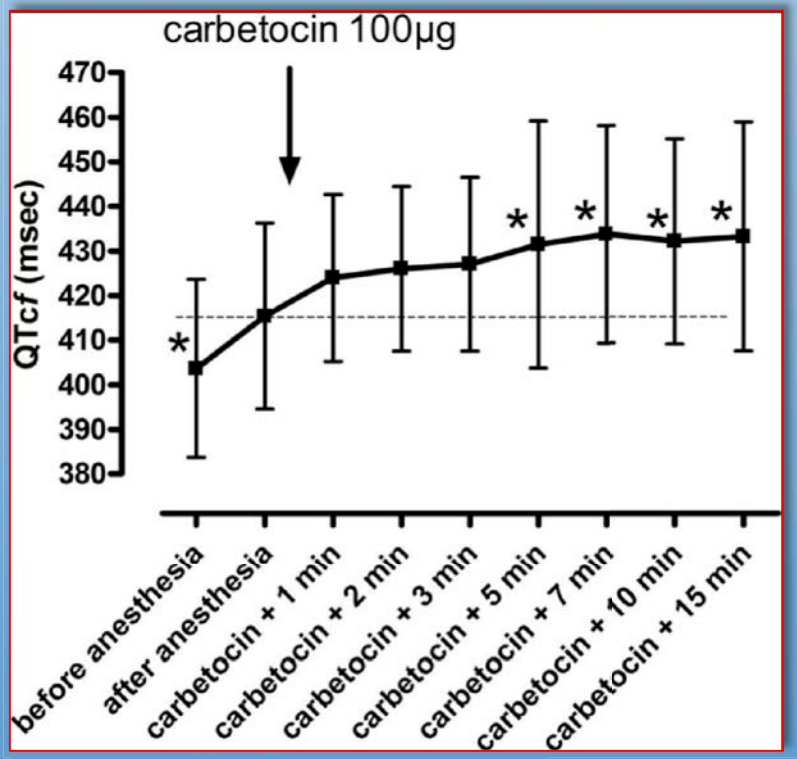
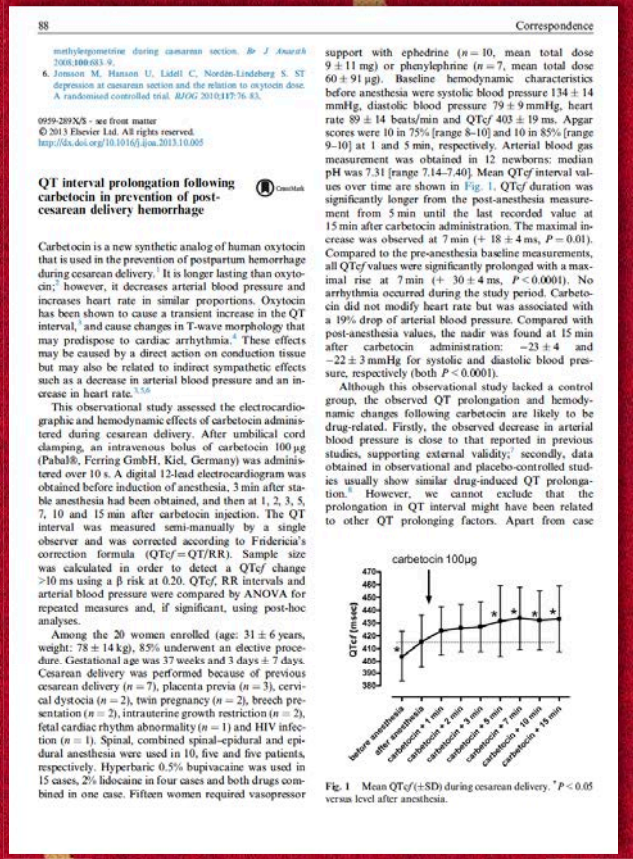


Figure Legend:

Invasive hemodynamic variables are presented as mean (SD) in the three treatment groups 1 min before and 8 min after intervention (intervention = time 0). The group means of the measurements in the last 30 s before uterotomy are indicated on the y-axis with horizontal lines. (A) Systolic arterial pressure, (B) mean arterial pressure, (C) diastolic arterial pressure, and (D) heart rate.





88 Correspondence

methylergometrine during caesarean section. *Br J Anaesth* 2008;100:683–9.

6. Jonsson M, Hansson U, Lidell C, Nordén-Lindeberg S, ST depression at caesarean section and the relation to oxytocin dose. A randomised controlled trial. *BJOG* 2010;117:76–83.

0959-289X/$ - see front matter
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http://dx.doi.org/10.1016/j.ijoa.2013.10.005

QT interval prolongation following carbetocin in prevention of post-cesarean delivery hemorrhage

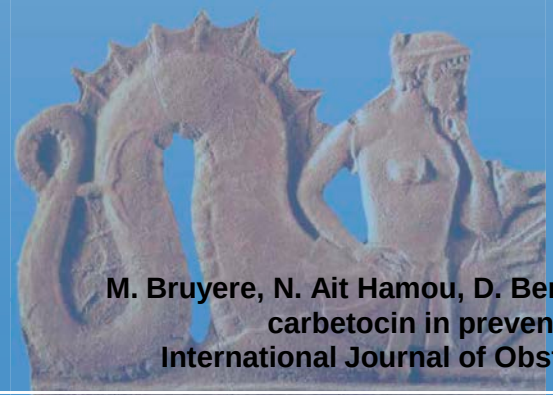
Carbetocin is a new synthetic analog of human oxytocin that is used in the prevention of postpartum hemorrhage during cesarean delivery.[1] It is longer lasting than oxytocin;[2] however, it decreases arterial blood pressure and increases heart rate in similar proportions. Oxytocin has been shown to cause a transient increase in the QT interval,[3] and cause changes in T-wave morphology that may predispose to cardiac arrhythmia.[4] These effects may be caused by a direct action on conduction tissue but may also be related to indirect sympathetic effects such as a decrease in arterial blood pressure and an increase in heart rate.[3,5,6]

This observational study assessed the electrocardiographic and hemodynamic effects of carbetocin administered during cesarean delivery. After umbilical cord clamping, an intravenous bolus of carbetocin 100 µg (Pabal®, Ferring GmbH, Kiel, Germany) was administered over 10 s. A digital 12-lead electrocardiogram was obtained before induction of anesthesia, 3 min after stable anesthesia had been obtained, and then at 1, 2, 3, 5, 7, 10 and 15 min after carbetocin injection. The QT interval was measured semi-manually by a single observer and was corrected according to Fridericia's correction formula ($QTcf = QT/RR$). Sample size was calculated in order to detect a QTcf change >10 ms using a β risk at 0.20. QTcf, RR intervals and arterial blood pressure were compared by ANOVA for repeated measures and, if significant, using post-hoc analyses.

Among the 20 women enrolled (age: 31 ± 6 years, weight: 78 ± 14 kg), 85% underwent an elective procedure. Gestational age was 37 weeks and 3 days ± 7 days. Cesarean delivery was performed because of previous cesarean delivery ($n = 7$), placenta previa ($n = 3$), cervical dystocia ($n = 2$), twin pregnancy ($n = 2$), breech presentation ($n = 2$), intrauterine growth restriction ($n = 2$), fetal cardiac rhythm abnormality ($n = 1$) and HIV infection ($n = 1$). Spinal, combined spinal–epidural and epidural anesthesia were used in 10, five and five patients, respectively. Hyperbaric 0.5% bupivacaine was used in 15 cases, 2% lidocaine in four cases and both drugs combined in one case. Fifteen women required vasopressor support with ephedrine ($n = 10$, mean total dose 9 ± 11 mg) or phenylephrine ($n = 7$, mean total dose 60 ± 91 µg). Baseline hemodynamic characteristics before anesthesia were systolic blood pressure 134 ± 14 mmHg, diastolic blood pressure 79 ± 9 mmHg, heart rate 89 ± 14 beats/min and QTcf 403 ± 19 ms. Apgar scores were 10 in 75% [range 8–10] and 10 in 85% [range 9–10] at 1 and 5 min, respectively. Arterial blood gas measurement was obtained in 12 newborns: median pH was 7.31 [range 7.14–7.40]. Mean QTcf interval values over time are shown in Fig. 1. QTcf duration was significantly longer from the post-anesthesia measurement from 5 min until the last recorded value at 15 min after carbetocin administration. The maximal increase was observed at 7 min (+ 18 ± 4 ms, $P = 0.01$). Compared to the pre-anesthesia baseline measurements, all QTcf values were significantly prolonged with a maximal rise at 7 min (+ 30 ± 4 ms, $P < 0.0001$). No arrhythmia occurred during the study period. Carbetocin did not modify heart rate but was associated with a 19% drop of arterial blood pressure. Compared with post-anesthesia values, the nadir was found at 15 min after carbetocin administration: −23 ± 4 and −22 ± 3 mmHg for systolic and diastolic blood pressure, respectively (both $P < 0.0001$).

Although this observational study lacked a control group, the observed QT prolongation and hemodynamic changes following carbetocin are likely to be drug-related. Firstly, the observed decrease in arterial blood pressure is close to that reported in previous studies, supporting external validity;[7] secondly, data obtained in observational and placebo-controlled studies usually show similar drug-induced QT prolongation.[6] However, we cannot exclude that the prolongation in QT interval might have been related to other QT prolonging factors. Apart from case

Fig. 1 Mean QTcf (±SD) during cesarean delivery. * $P < 0.05$ versus level after anesthesia.



M. Bruyere, N. Ait Hamou, D. Benhamou. QT interval prolongation following carbetocin in prevention of post-cesarean delivery hemorrhage. International Journal of Obstetric Anesthesia. 2016 Vol. 23, (1), P. 88–89

Применение метилэргометрина увеличивает риск развития ОИМ

Метилэргометрин должен вводиться строго по показания, с обязательным информированием анестезиолога-реаниматолога.

Тактика ведения акушерских пациенток с ОИМ зависит от его патогенеза. В описанном нами случае, при вазоспастическом (нетромботическом патогенезе) ОИМ, проведение тромболизиса или экстренной коронароангиографии нецелесообразно… .

ЗАМЕТКИ ИЗ ПРАКТИКИ

УДК 617-089.844+ 615.211:616-089.888.61

ИНФАРКТ МИОКАРДА ПОСЛЕ ОПЕРАЦИИ КЕСАРЕВА СЕЧЕНИЯ ПРИ СПИНАЛЬНОЙ АНЕСТЕЗИИ НА ФОНЕ ПРИМЕНЕНИЯ МЕТИЛЭРГОМЕТРИНА И ОКСИТОЦИНА (КЛИНИЧЕСКОЕ НАБЛЮДЕНИЕ)

С.В. Письменский, А.В. Пырегов

Федеральное Государственное Бюджетное Учреждение «Научный Центр Акушерства, Гинекологии и Перинатологии имени академика В.И.Кулакова» Минздравсоцразвития России. Москва, Россия.

MYOCARDIAL INFARCTION AFTER CESAREAN SECTION UNDER SPINAL ANESTHESIA DURING TREATMENT WITH OXYTOCIN AND METILERGOMETRIN (CLINICAL OBSERVATION)

S.V. Pismensky, A.V. Pyregov

Резюме

В статье приводится клиническое наблюдение инфаркта миокарда после операции кесарево сечение, выполненного под спинальной анестезией с применением утеротоников. Считаем, что использование метилэргометрина увеличивает риск развития острого инфаркта миокардка (ОИМ), а назначение препарата должно осуществляться строго по показания, с обязательным информированием анестезиолога-реаниматолога. Тактика ведения акушерских пациенток с ОИМ зависит от его патогенеза. В описанном нами случае, при вазоспастическом (нетромботическом патогенезе) ОИМ, проведение тромболизиса или экстренной коронароангиографии нецелесообразно, в остальном терапия стандартная.

***Ключевые слова:** острый инфаркт миокарда, метилэргометрин, тромболизис*

Abstract

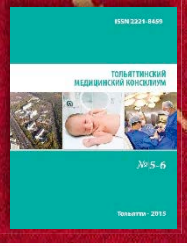
The article presents a clinical observation of myocardial infarction after cesarean section performed under spinal anesthesia with the use of uterotonics. We believe that the use of metilergometrina increases the risk of acute myocardial miokardka (AMI), and use of the drug should be carried out strictly according to the testimony, with the obligatory informing Anaesthetist. Management of obstetric patients with AMI depends on its pathogenesis. In the case described by us, in vasospastic (netrombotichesksm pathogenesis) of AMI, thrombolysis or emergency coronary angiography is impractical in the rest of the standard therapy.

***Keywords:** acute myocardial, metilergometrin, thrombolysis*

Введение

У женщин детородного возраста острый инфаркт миокарда случается достаточно редко. Частота его развития во время беременности не превышает от 2 до 5 случаев на 100 000 женщин [1, 2]. Принимая во внимание тенденцию к увеличению среднего возраста беременных, а также воздействия таких распространенных ныне факторов риска, как курение, сахарный диабет и стресс, можно ожидать возрастание удельного веса данной патологии. Напомним, что беременность сама по себе способна увеличивает вероятность развития ОИМ в несколько раз [3].

Известно, что ОИМ может развиться на любой стадии беременности. Наиболее распространенная локализация инфаркта - передняя стенка и верхушка левого желудочка. Частая причина возникновения ИМ в пред- и послеродовом периоде - спонтанное расслоение стенки проксимального отдела левой передней венечной артерии. Считают, что в основе этого процесса лежат структурные и биохимические изменения стенки сосуда, обусловленные избытком прогестерона, а также эозинофилия и недостаточность плазматического фактора, стимулирующего синтез простациклина и увеличение концентрации липопротеинов [4, 5, 6]. Литературные данные свидетельствуют, что до введения в рутинную практику первичных интервенционных методик лечения, смертность в остром периоде заболевания (преимущественно в III



Письменский С.В., Пырегов А.В. Инфаркт миокарда после операции кесарева сечения при спинальной анестезии на фоне применения метилэргометрина и окситоцина (клиническое наблюдение) // ТОЛЬЯТТИНСКИЙ МЕДИЦИНСКИЙ КОНСИЛИУМ. 2015. №5-6.59-63.

УДК 615.217.03:618.714-005.1-084

Шифман Е.М.[1], Куликов А.В.[2], Кругова Л.В.[3], Вартанов В.Я.[3], Маршалов Д.В.[4]

БЕЗОПАСНОСТЬ ПРИМЕНЕНИЯ УТЕРОТОНИКОВ: ЧТО ДОЛЖЕН ЗНАТЬ АНЕСТЕЗИОЛОГ-РЕАНИМАТОЛОГ?

[1]ГБУЗ МО МОНИКИ им. М.Ф. Владимирского, 129110, Москва;
[2]ГБОУ ВПО «Уральский государственный медицинский университет» Минздрава РФ, 620028, Екатеринбург;
[3]ГБУЗ СО «Тольяттинская городская клиническая больница № 5», 4450030, Тольятти;
[4]ГБОУ ВПО «Саратовский государственный медицинский университет им. В.И. Разумовского» Минздрава РФ, 410017, Саратов

Важнейшим аспектом профилактики и лечения послеродовых кровотечений является применение утеротоников. В обзоре внимание сфокусировано на надлежащем использовании окситоцина. Анализ литературы баз данных Scopus, Web of Science, MedLine, The Cochrane Library, EMBASE, Global Health, CyberLeninka, РИНЦ использовал материалы ведущих мировых организаций: World Health Organization, American Academy of Family Physicians, Royal College of Obstetricians and Gynaecologists (RCOG), International Federation of Obstetrics and Gynecology (FIGO), Collège National des Gynécologues et Obstétriciens Français, American College of Obstetricians and Gynecologists (ACOG), Cochrane Reviews. Показано, что окситоцин остается препаратом первой линии как для профилактики, так и лечения послеродовых маточных кровотечений. При плановом кесаревом сечении использование 5 МЕ окситоцина в качестве стандартной дозы является чрезмерной и требует переоценки. Адекватное сокращение матки может быть достигнуто более низкими дозами окситоцина (0,5–3 ЕД). Медленное болюсное введение окситоцина может эффективно минимизировать сердечно-сосудистые побочные эффекты без ущерба для терапевтического эффекта, так как побочные эффекты окситоцина зависят от дозы и представляется целесообразным вводить его медленно в виде инфузии. При гипотонии матки, если нет адекватного ответа на начальной стадии лечения с окситоцином, внимание должно быть уделено использованию утеротоников 2-й линии. У гемодинамически нестабильных пациенток при использовании окситоцина необходимо проявлять предельную осторожность. Считаем, что необходима дальнейшая работа по изучению и внедрению безопасных схем интраоперационного применения утеротоников.

Ключевые слова: *обзор, утеротоники, побочные действия, осложнения.*

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Shifman E.M.[1], Kulikov A.V.[2], Krugova L.V.[3], Vartanov V.Ya.[3], Marshalov D.V.[4]

SAFETY OF UTEROTONICS: WHAT ANAESTHESIOLOGIST SHOULD KNOW ABOUT THEM?

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The most important aspect of the prevention and treatment of postpartum hemorrhage is the use of uterotonics. The review focused attention on the proper use of oxytocin. The analysis of literature, Scopus databases, Web of Science, MedLine, The Cochrane Library, EMBASE, Global Health, CyberLeninka, RISC, used materials leading organizations: World Health Organization, American Academy of Family Physicians, Royal College of Obstetricians and Gynaecologists (RCOG), International Federation of Obstetrics and Gynecology (FIGO), Collège National des Gynécologues et Obstétriciens Français, American College of Obstetricians and Gynecologists (ACOG), Cochrane Reviews has shown that oxytocin remains the drug of first-line, both for prevention and treatment of postpartum uterine bleeding. When a planned Caesarean section 5 IU oxytocin use as a standard dose is excessive and requires re-evaluation. Adequate uterine contractions can occur with lower doses of oxytocin (0,5–3 units). A slow bolus administration of oxytocin can effectively minimize the cardiovascular side effects without compromising the therapeutic effect. Since the side effects of oxytocin dose dependent, is expedient oxytocin administered as a slow infusion. If hypotension uterus, if there is no adequate response to initial treatment with oxytocin, attention should be paid to the use of second-line uterotonic. In hemodynamically unstable patients should be using oxytocin is necessary to exercise the utmost restraint. We believe that further work is needed on the study and implementation of security schemes intraoperative use of uterotonics.

Keywords: *review, uterotonics, side effects, complications.*

For citation: Shifman E.M., Kulikov A.V., Krugova L.V., Vartanov V.Ya., Marshalov D.V. Safety of uterotonics: what anaesthesiologist should know about them? *Anesteziologiya i reanimatologiya (Anaesthesiology and Reanimatology. Russian journal).* 2017; 62(3): 220-224. (In Russ.). DOI: http://dx.doi.org/10.18821/0201-7563-2017-62-3-220-224

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Безопасность применения утеротоников: что должен знать анестезиолог-реаниматолог?

Анестезиология и Реаниматология. 2017. 62 (3). С. 220–224

Еще одна трагедия…

- **Во время операции кесарево сечения не проводился должный мониторинг.**

В частности, не проводился интраоперационный мониторинг ЭКГ *(стандарт мониторинга, зафиксированный документах МЗ РФ).*

Учитывая, что в клиническом описании симптомов и патологоанатомическом заключении присутствуют

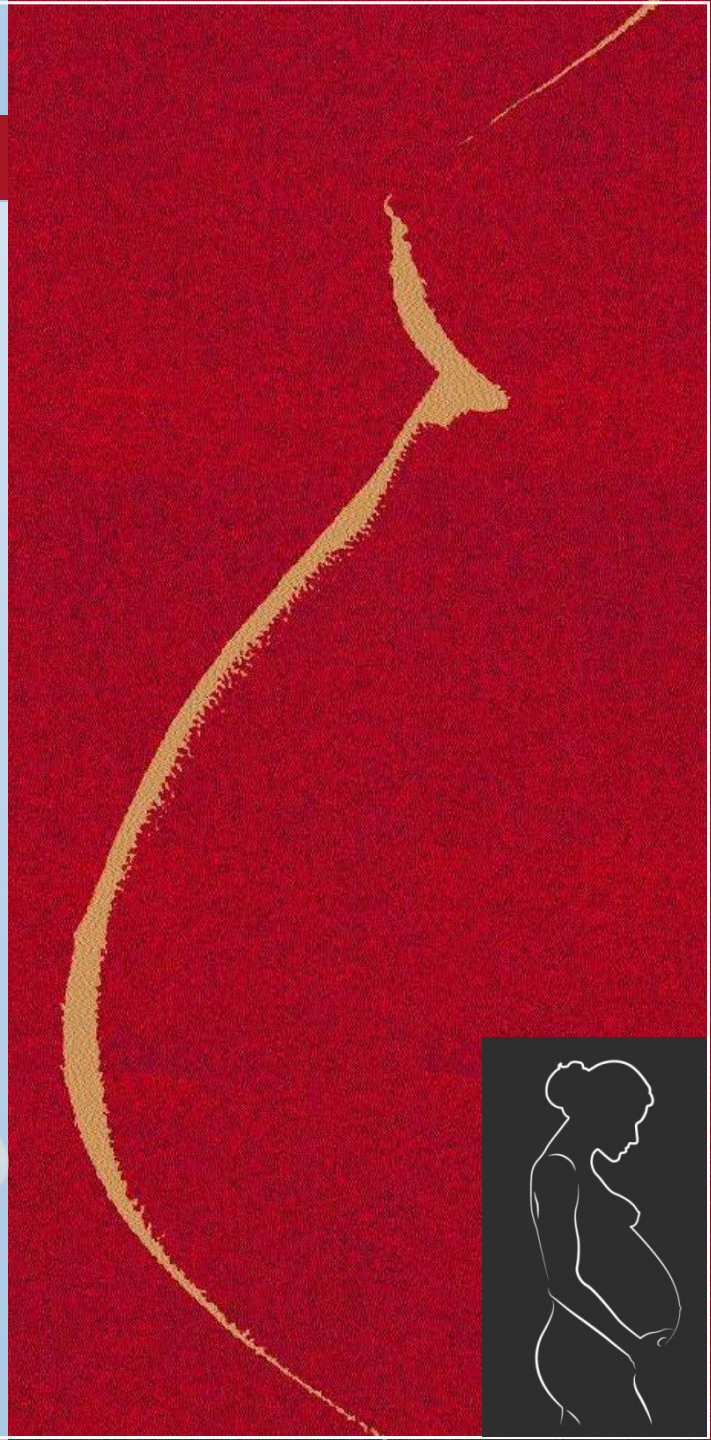
«острая сердечная недостаточность

… при отсутствии признаков исходной соматической патологии

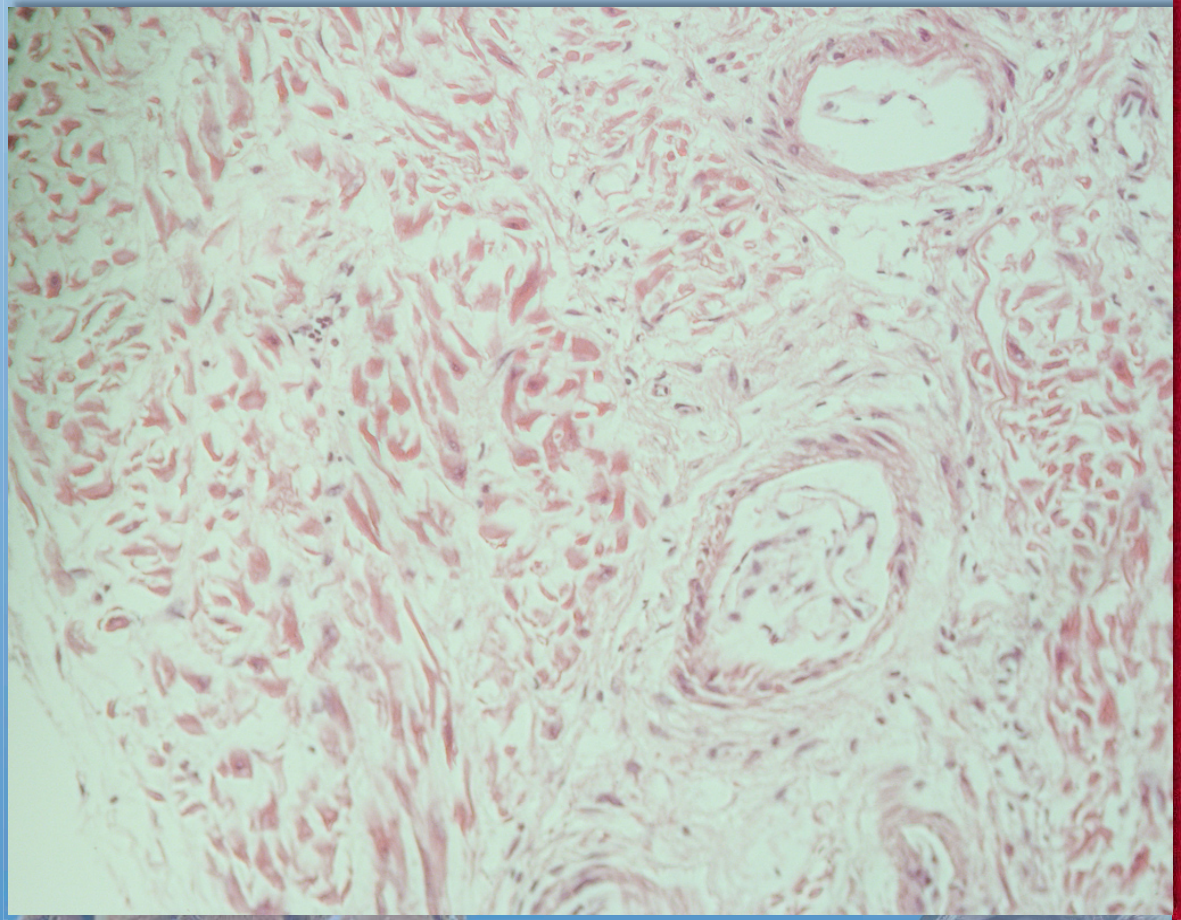
… острый коронароспазм

… с отёком стромы миокарда»,

следует, что с высокой долей вероятности эти явления наступили вследствие прямого нарушения инструкции по режиму введения окситоцина для профилактики и лечения послеродовых кровотечений.

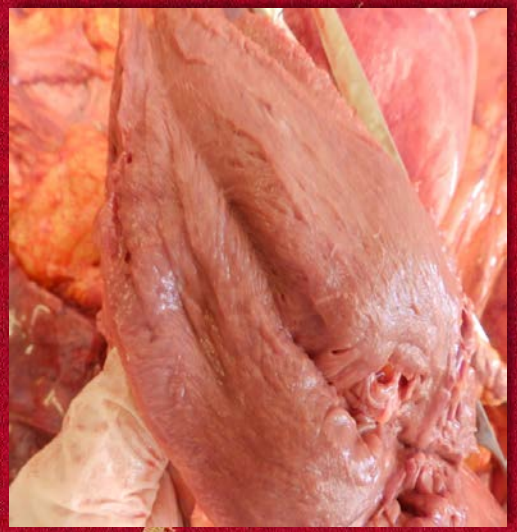


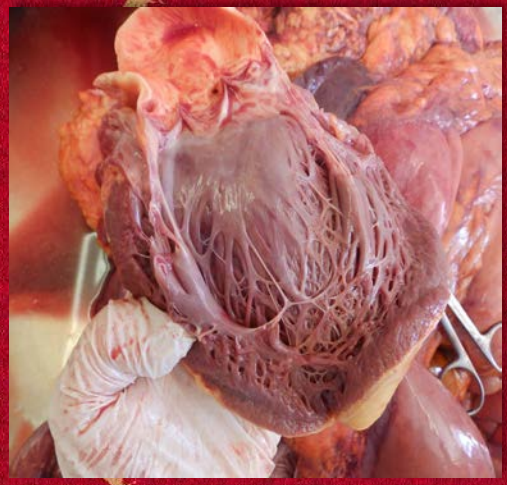
Норм, сосуды, фрагментация КМЦ, отек стромы



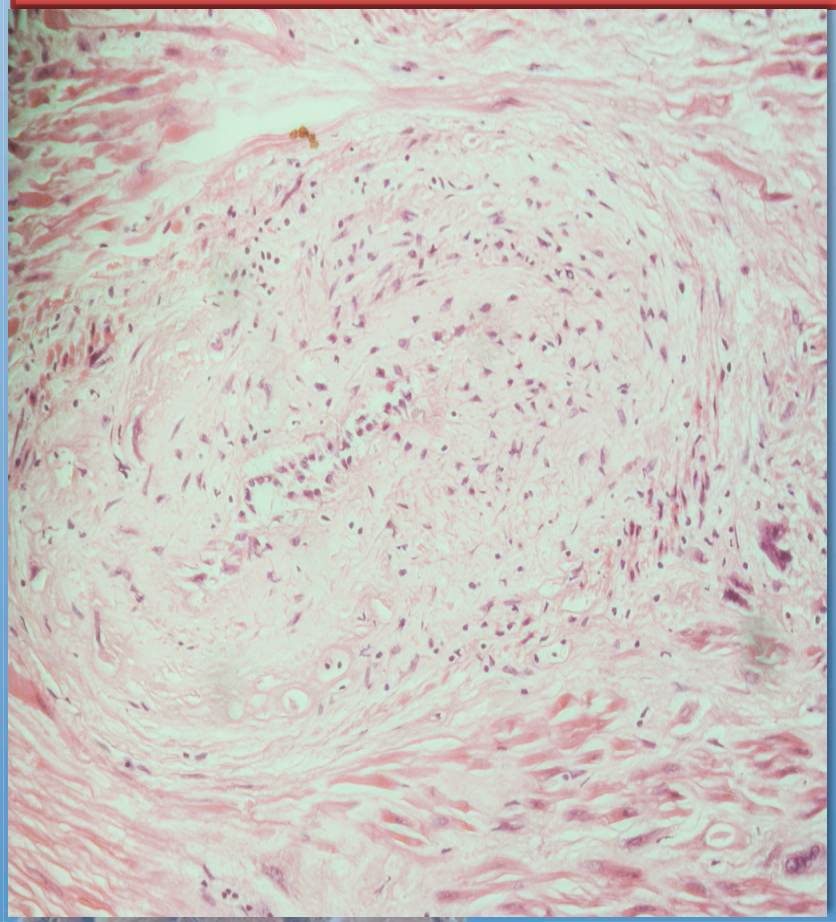
Еще одна трагедия…

- **Полости дилатированы, пустые.**
  В магистральных сосудах темная жидкая кровь.
  Пристеночный эндокард гладкий, бледный.
  Сосочковые мышцы не утолщены,
  хордальные нити в норме.
- **На разрезе миокард дряблой консистенции, волокнистый, бледно-коричневый.**
  Клапаны сердца тонкие, гладкие;
  аортальный клапан – периметр 7 см,
  митральный – 10 см,
  трехстворчатый клапан – 10.5 см,
  клапан легочной артерии – 7 см.
  В правом желудочке добавочная хорда.
- **Коронарные сосуды с гладкой интимой.**
  Аорта, магистральные сосуды,
  с гладкой желтой интимой.

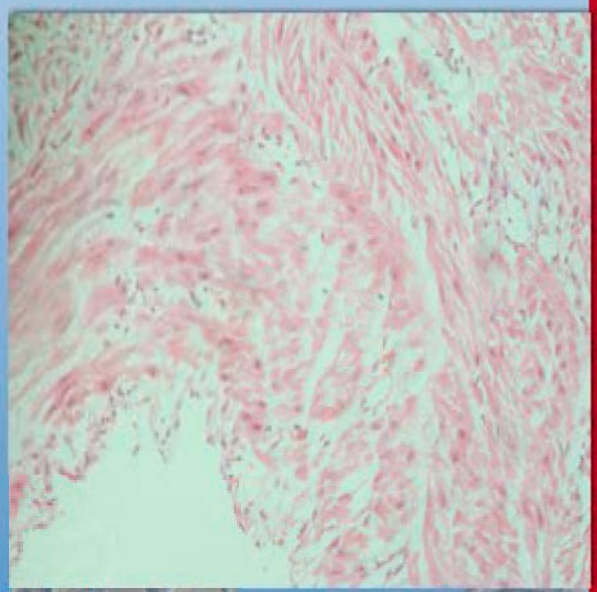




Спазмированный сосуд, периориентация ядер



Фрагментация-кардиомиоцитов



Еще одна трагедия…

Вследствие выявленной в ходе операции «Аневризмы матки» при врастании плаценты (**placenta increta** 27,5 %) и опасности массивного маточного кровотечения, принято решением о расширение объема операции «экстирпации матки»

Введено дополнительно 5 ЕД окситоцина в/в болюсно и 5 ЕД инфузия окситоцина на 20 мл раствора кристаллоида.

В 10:45 переход на общую анестезию интубация трахеи, ИВЛ. На этапе выделения мочевого пузыря в 10:50 зафиксирована остановка сердечной деятельности, начаты реанимационные мероприятия.
Без эффекта

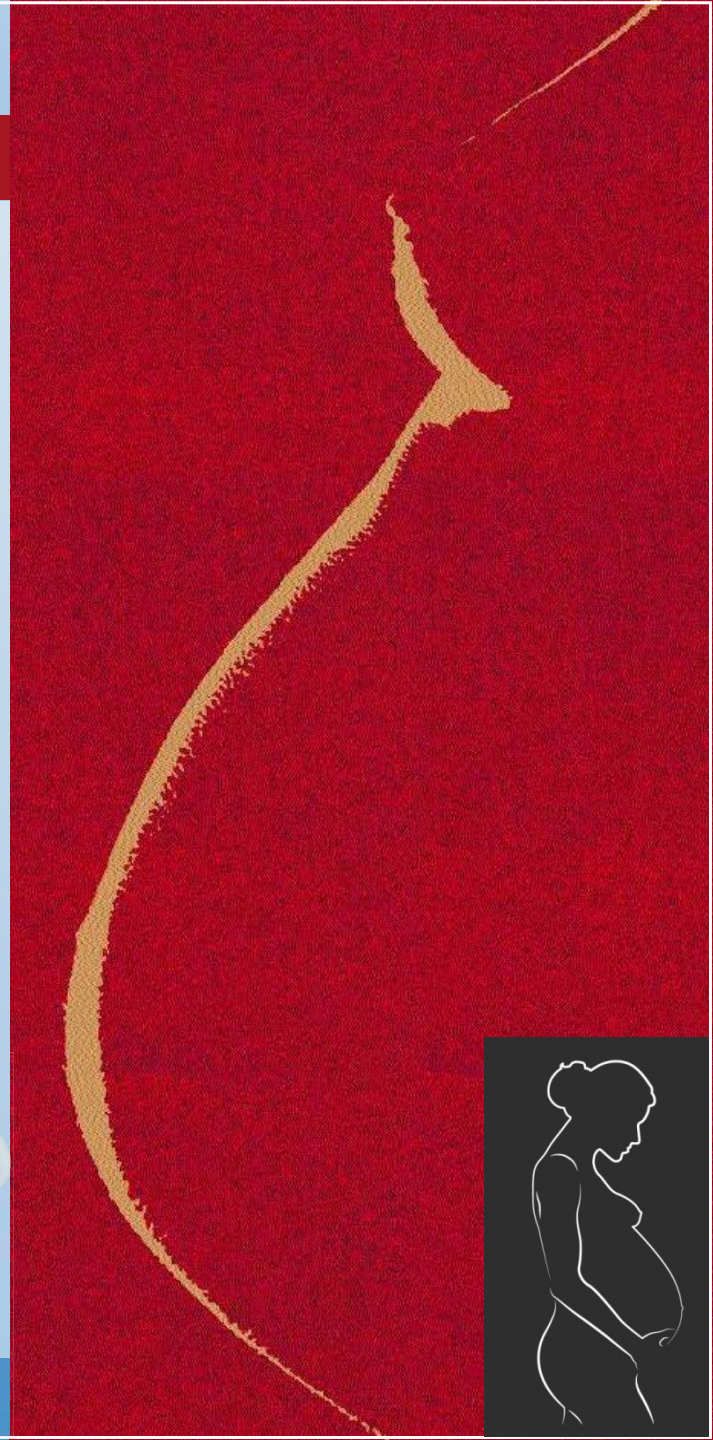
Еще одна трагедия…

Беременна Х., 35-ти лет с четвертой настоящей беременностью на сроке 38–39 недель, состоявшая на диспансерном наблюдении в группе высокого риска (кесарево сечение в 2000 г, 2015 г., 2003 г мед. аборт), доставлена фельдшером в ГУЗ … ЦРБ в (**04:00 17.07.2017**),

Через 2 часа с момента манифестации боли внизу живота, пояснице, усиливающимися во время схватки с диагнозом: Предвестники родов на сроке 38–39 недель беременности.

Через 3 часа 20 мин. (**07:40 17.07.2017**) с момента госпитализации: присоединились боли схваткообразного характера и диагностирован «Первый период родов на сроке 38–39 недель в ножном предлежании. Несостоятельный рубец на матке».

Через 2 часа 35 мин. (**09:55 17.07.2017**) пациентка взята в операционную, где выполнена «нижнесрединная лапаротомия с иссечение кожного рубца, с разведением спаек. Корпоральное кесарево сечение продольным разрезом при беременности 38–39 недель», на 15 минуте от начала операции извлечена живая доношенная девочка (*массой 3140 гр, длиной 52 см, по шкале Апгар 7–9 баллов*). **Во время операции 10 ЕД окситоцина на 200 мл физраствора, прокапано в течении 20 минут.**

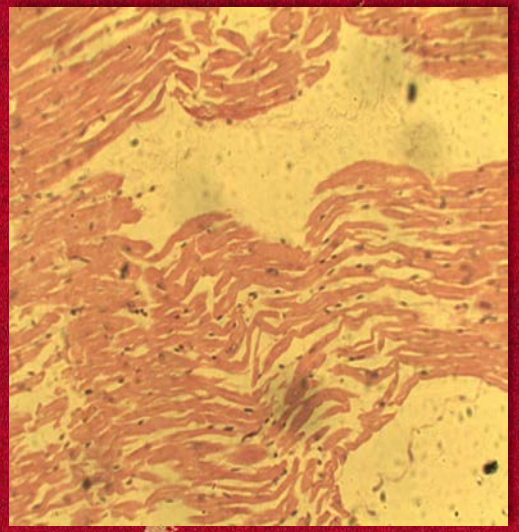


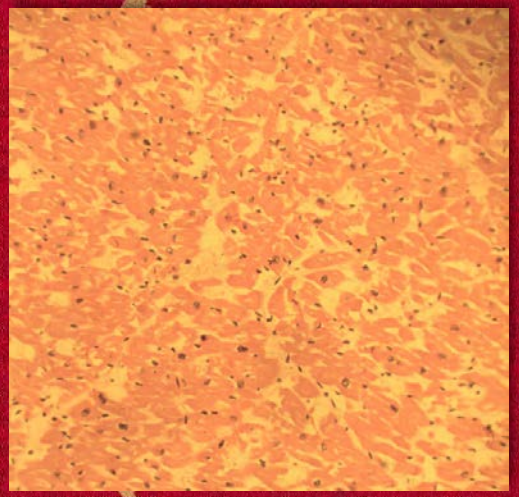
Еще одна трагедия…

- **Миокард:** выраженный межуточный и межклеточный отек, периваскулярные кровоизлияния; зернистая дистрофия саркоплазмы ардиомиоцитов, отмечается очаги дискоидного распада с фрагментацией мышечных волокон, очаговыми кровоизлияниями в эпи- мио- и эндокард.

  Эндотелий мелких артерий и артериол набухший с сочным эндотелием выступает в просвет сосуда.

  Местами потеря поперечной исчерченности отдельных мышечных волокон.





РЕЦЕНЗИЯ Еще одной трагедии

- **Хронология событий**
  - ✓ *Из индивидуальной карты беременной:*

В 29 нед. пациентка ночью поступила
в экстренном порядке в акушерское отделение
1-го уровня с жалобами на головокружение,
тошноту, рвоту. При поступлении АД 210/110 мм рт. ст.
В 00 час. 10 мин. за паховые сгибы согласно
биомеханизму родов в тазовом предлежании извлечен
плод женского пола массой 1100 гр.,
ростом 35 см в асфиксии 3 степени
с оценкой по Апгар 3 балла,
передана неонатологу.

Для профилактики кровотечения в/в введено 10 МЕ окситоцина.

Введение окситоцина продолжено в течение 5 суток в послеродовом периоде в/м 2 раза в сутки.

РЕЦЕНЗИЯ Еще одной трагедии

По заключению СКТ подтвержден геморрагический инсульт в СМА справа с прорывом крови в желудочковую систему, с формированием гематомы, без дислокации срединных структур, с кровоизлиянием в ствол мозга, отек мозга.

Заключение нейрохирурга при повторном осмотре консультантами санавиации: оперативное лечение (наложение вентрикулярного дренажа) не показано.

- **Хронология событий**
  - ✓ *Из индивидуальной карты беременной:*

Carvalho et al. В своих исследованиях показали, что ED90 окситоцина составляет 0.35 IU (95% ДИ, 0.18 до 0.52 ДИ).

Carvalho JC, Balki M, Kingdom J, Windrim R: Oxytocin requirements at elective cesarean delivery: A dose-finding study. Obstet Gynecol 2004; 104 (5 Pt 1):1005–10.

OBSTETRICS & GYNECOLOGY

Wolters Kluwer

Oxytocin Requirements at Elective Cesarean Delivery: A Dose-Finding Study

José C. A. Carvalho, MD, PhD, Mrinalini Balki, MD, John Kingdom, MD, and Rory Windrim, MD

OBJECTIVE: Oxytocin is frequently used by intravenous bolus and infusion to minimize blood loss and prevent postpartum hemorrhage at cesarean delivery. Current dosing regimens are arbitrary whereas large doses may pose a serious risk to the mother. The purpose of this study was to estimate the minimum effective intravenous bolus dose of oxytocin (ED_{90}) required for adequate uterine contraction at elective cesarean in nonlaboring women.

METHODS: A randomized, single-blinded study was undertaken in 40 healthy term pregnant women presenting for elective cesarean under spinal anesthesia. Oxytocin was administered by bolus according to a biased coin up-and-down sequential allocation scheme with increments or decrements of 0.5 IU. Uterine contraction was assessed by the obstetrician, who was blinded to the dose of oxytocin, as either satisfactory or unsatisfactory. After achieving sustained uterine contraction, an infusion of 40 mU/min of oxytocin was started. Oxytocin-induced adverse effects and intraoperative complications were recorded and blood loss was estimated. Data were interpreted by parametric analysis based on logistic regression model and nonparametric analyses at 95% confidence intervals (CIs).

RESULTS: The ED_{90} of oxytocin as determined by logistic regression model fitted to the data was estimated to be 0.35 IU (95% CI 0.18–0.52 IU), with nonparametric estimates of 97.1% (95% CI 84.9–99.8%) response rate at 0.5 IU, and 100% (95% CI 92.2–100%) at 1.0 IU. The estimated blood loss was 693 ± 487 mL (mean ± standard deviation).

CONCLUSION: The bolus dose of oxytocin used at elective cesarean deliveries in nonlaboring women can be significantly reduced while maintaining effective uterine contraction. Alteration in practice will likely reduce the potential adverse effects of this drug when given in large bolus doses, but may require modification of the techniques to remove the placenta. (Obstet Gynecol 2004;104:1005–10. © 2004 by The American College of Obstetricians and Gynecologists.)

In many institutions, oxytocin is routinely administered by intravenous bolus and infusion at cesarean delivery after delivery of the fetus. Oxytocin promotes uterine contraction, thereby reducing blood loss from the placental site. However, when given in large doses and as a rapid bolus, oxytocin is associated with various adverse effects, including hypotension, nausea, vomiting, chest pain, headache, flushing, and myocardial ischemia.[1,2] For these reasons, the manufacturer's instructions do not recommend bolus administration.

A variety of regimens for administration of oxytocin have been described previously but appear to be empirical.[3–6] Furthermore, the minimum effective dose of oxytocin at cesarean delivery has not yet been established. The purpose of our study was therefore to estimate the minimum effective dose (ED_{90}) of oxytocin required to produce adequate uterine contraction at elective cesarean delivery in nonlaboring women.

MATERIALS AND METHODS

After obtaining approval from the Research Ethics Board at Mount Sinai Hospital, a randomized, single-blinded study was performed with 40 healthy term pregnant women scheduled for elective cesarean delivery. Patients were recruited between October 1, 2003, and January 21, 2004, and 20 surgeons were involved in the study. All patients with conditions that predispose to uterine atony and postpartum hemorrhage such as placenta previa, multiple gestation, preeclampsia, macrosomia, hydramnios, uterine fibroids, history of uterine atony and postpartum bleeding, or bleeding diathesis were excluded from the study. A written informed consent was obtained from the patients before enrollment in the study. All patients received 30 mL of 0.3 mol/L sodium citrate orally, 30 minutes before the institution of spinal anesthesia. Baseline blood pressure (BP) and heart rate were calculated as the mean of 3 readings, 2 minutes apart, recorded in the admitting unit using an automated noninvasive BP device. An 18G peripheral intravenous line was inserted and 10 mL/kg of lactated Ringer's solution was given as preload.

After skin disinfection and local infiltration, a subarachnoid puncture was performed in the sitting position at L_{2-3} or L_{3-4} interspace using a 27G Whitacre needle. Anesthetic blockade of up to a T_4 dermatomal level was

From the Departments of Obstetrics and Gynecology and Anesthesia and Pain Management, Mount Sinai Hospital, Toronto, Ontario, Canada.

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doi:10.1097/01.AOG.0000142709.04450.bd

IOJA 2010 editorial
Oxytocin protocols during cesarean delivery: time to acknowledge the risk/benefit ratio?

L. Tsen & M. Balki

- 3 ед. ударная доза
- 3 мин. Оценка
- 3 ед. доза спасения
- 3 общих дозы (1 ударная, 2 спасения)
- 3 ед/л @ 100 мл/час поддержка

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doi:10.1016/j.ijoa.2010.05.001

EDITORIAL

ELSEVIER
www.obsetanesthesia.com

Oxytocin protocols during cesarean delivery: time to acknowledge the risk/benefit ratio?

A hormone discovered and synthesized over 50 years ago, oxytocin is currently used in the majority of births in developed countries and a growing number of births in the developing world.[1] Commonly employed to induce or augment the process of labor to effect vaginal delivery, oxytocin is also used as the first line drug to restore uterine tone and minimize postpartum blood loss following cesarean delivery. The purpose of this editorial, which is echoed in the review article by Dyer and colleagues in this issue of IJOA,[2] is to illuminate the risks associated with large intravenous (i.v.) bolus doses of oxytocin administered during cesarean delivery and to advocate an evidenced-based, infusion approach to dosing.

The administration of oxytocin is associated with significant maternal, fetal, and neonatal adverse events. Maternal arrhythmias, hypotension, uterine hyperstimulation and hyponatremia,[3,4] fetal decreases in oxygen saturation (SaO_2) related to contraction frequency,[5,6] and neonatal seizures, hyperbilirubinemia, or retinal hemorrhage[7,8] have been reported following oxytocin use. During cesarean delivery, with oxytocin administered following delivery, maternal morbidity and mortality are the most relevant concerns. The 1997–99 triennial audit of the Confidential Enquiries into Maternal Deaths in the United Kingdom (UK), reported the deaths of two women from cardiovascular instability following an i.v. bolus of oxytocin 10 IU.[9] Awareness of these deaths resulted in a dose reduction in the UK to an i.v. bolus of 5 IU;[2] however, even this dose, and the method of administration, may cause hypotension, tachycardia, decreased free water clearance, peripheral flushing, nausea, emesis and signs of myocardial ischemia.[10–13]

Although practitioners may be aware of these risks, the associated professional liability is the proverbial mountain hidden in plain sight: oxytocin remains *the* drug most commonly associated with preventable adverse events during childbirth, and *the* drug implicated in nearly half of all paid obstetric litigation claims.[14] Moreover, the United States Food and Drug Administration (FDA) has placed a black box warning restricting oxytocin use (during labor) to *medical* indications.[15] Furthermore, the Institute for Safe Medication Practices (ISMP), an independent, nonprofit organization whose recommendations are utilized by groups including the Joint Commission in evaluating medication safety, recently added oxytocin to the list of *high-alert* medications.[16] This distinction, which identifies drugs "bearing a heightened risk of harm when used in error" that may "require special safeguards to reduce the risk of error", has been applied to only 11 other specific drugs.[16]

In an effort to improve patient safety, the *cause célèbre* of the contemporary medical community, practitioners have questioned the high-dose, non-standardized oxytocin practices currently in use.[17–19] The re-evaluation of oxytocin acknowledges the unpredictable therapeutic index (in which a given dose can result in either hypertonic contractions or no discernable effect), use of excessive starting doses, lack of a predetermined, lock-step protocol that predicates increasing doses on determination of insufficient lower doses, and practices that contribute to normalization of deviance (degradation of professional or technical standards based on individual experience).[17–19] Interestingly, this call to action stops abruptly at the door of the operating room, despite literature demonstrating that common clinical practices result in unnecessary, excessive oxytocin doses. In non-laboring women undergoing cesarean delivery, a 'ceiling effect' of oxytocin 5 IU is witnessed, beyond which no further improvement in uterine tone and blood loss is observed;[20] in laboring women, high doses of oxytocin did not obviate the need for additional uterotonic agents.[21] Interestingly, a small loading dose of oxytocin (ED 90 = 0.35 IU) has been determined to be sufficient in producing adequate uterine contractions during elective cesarean deliveries in non-laboring women;[22] a similarly low loading dose (ED 90 = 2.99 IU) is required in laboring women.[23] Women who have received oxytocin augmentation for labor have greater blood loss despite higher oxytocin doses; this appears to originate from signal attenuation and desensitization of the oxytocin receptors, in a time and concentration dependent manner.[24–27] Similarly, continued high-dose oxytocin exposure in the postpartum period may also lead to acute receptor desensitization and render the myometrium less responsive to additional oxytocin.[27]

The current guidelines for the administration of oxytocin during cesarean delivery are diverse, empiric, and vague. The most recent editions of major obstetric

J Obstet Anesth. 2010 Jul;19(3):243-5

Цитирую:

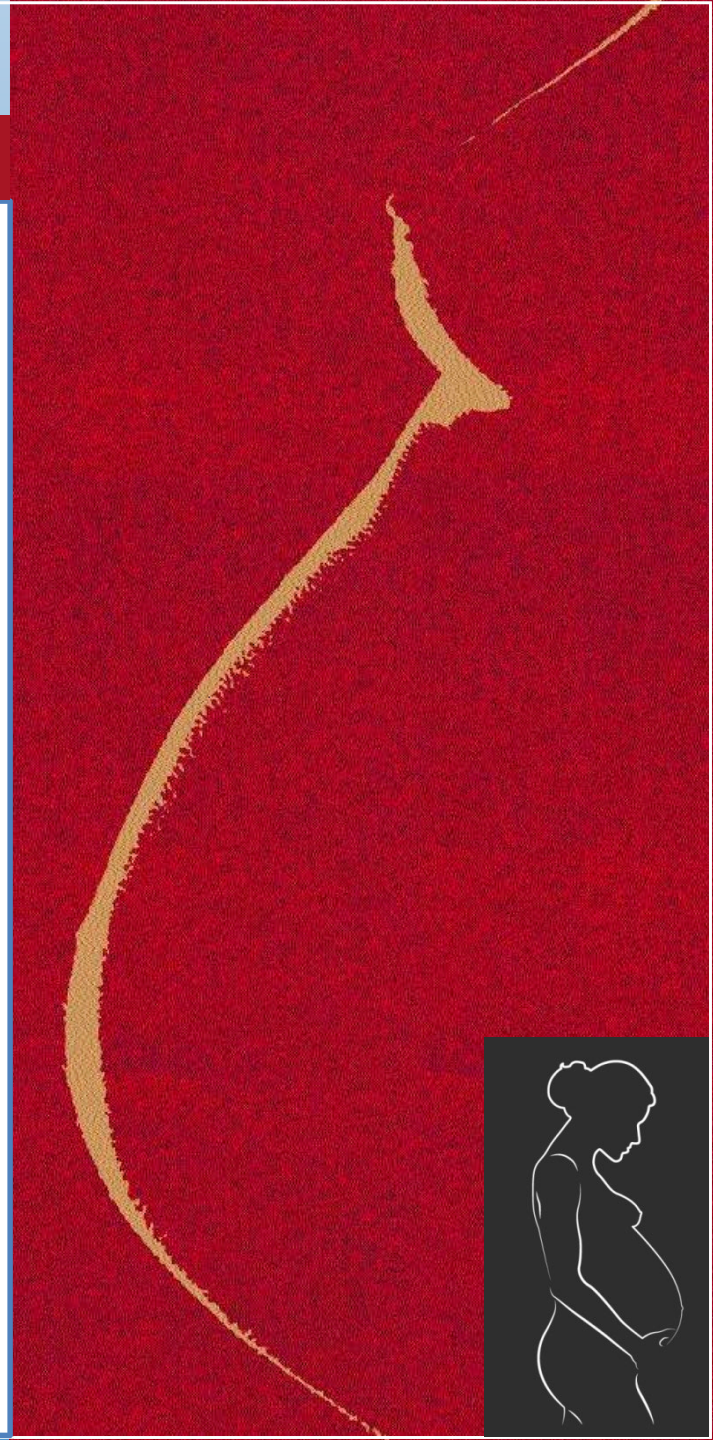
1.1 ***Профилактика и лечение гипотонических кровотечений в послеродовом периоде:***

1. **В/в капельная инфузия — в 1000 мл негидратирующей жидкости растворить 10–40 МЕ окситоцина; для профилактики маточной атонии обычно необходимо 20–40 мЕД/мин окситоцина.**
2. **В/м введение — 5 МЕ/мл окситоцина после отделения плаценты**

1.2 6.2 Для приготовления стандартной инфузии окситоцина в 1000 мл негидратирующей жидкости растворить 1 мл (5 МЕ) окситоцина и тщательно перемешать, вращая флакон.

В 1 мл приготовленной таким образом инфузии содержится 5 мЕД окситоцина.

Для точного дозирования инфузионного раствора следует применять инфузионную помпу или другое подобное приспособление.



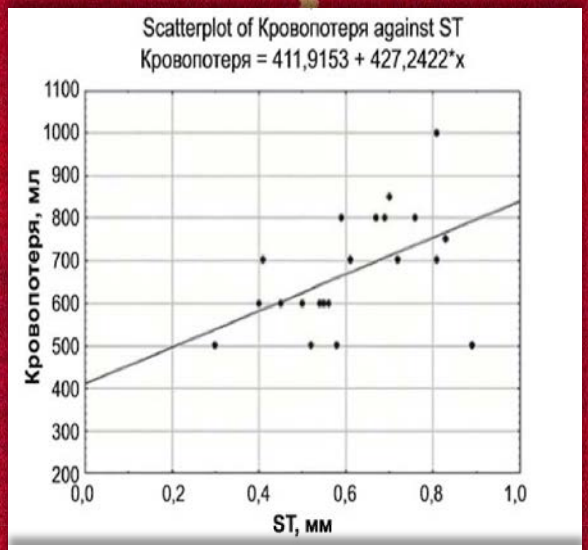
5 ЕД или 10 ЕД?

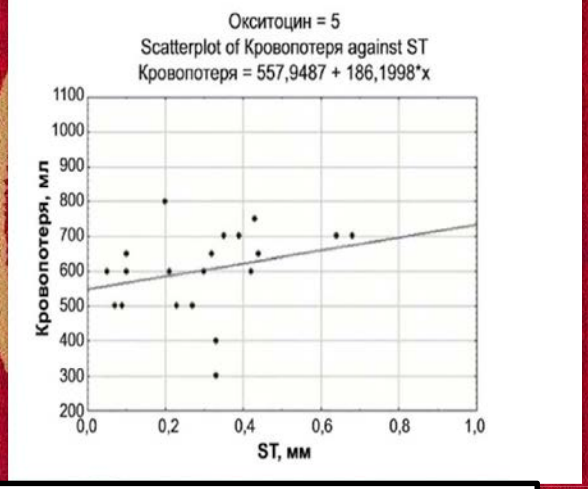
1. Возраст в интервале от 15 до 25 лет не влияет на риск развития депрессии сегмента ST и артериальной гипотонии.

2. Риск развития депрессии сегмента ST больше 0,5 мм в 8,6 раза выше при введении окситоцина (ОТ) в дозе 10 ЕД по сравнению с дозой 5 ЕД.

3. Риск развития депрессии сегмента ST во время инфузии ОТ при наличии артериальной гипотонии у юных первородящих возрастает более чем в 4,9 раза выше по сравнению с первородящими оптимального репродуктивного возраста.

Окситоцин 10 ЕД





Влияние дозы окситоцина на изменение сегмента st, артериальную гипотонию и величину кровопотери у роженицразных возрастных групп во время операции кесарева сечения Е.Н. Дегтярев, Е.М. Шифман, Г.П. Тихова, А.В. Куликов. Вестник интенсивной терапии имени А.И.Салтанова, 2018 г., № 3 с.77-85

5 Ед или 10 Ед?

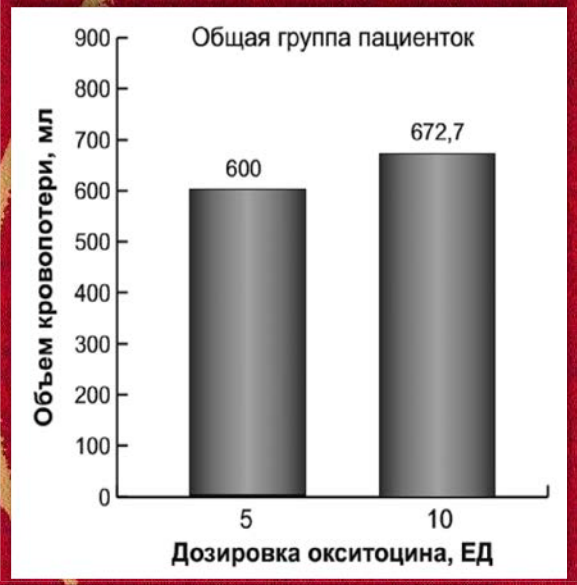
Введение 10 ЕД ОТ во время плановой операции кесарева сечения у соматически здоровых пациенток юного и оптимального репродуктивного возраста не снижает объема кровопотери по сравнению с 5 ЕД ОТ.

У первородящих юного возраста объем кровопотери при операции кесарева сечения в среднем больше при дозе ОТ 10 ЕД по сравнению с дозировкой 5 ЕД *(эффект статистически значим).*

Увеличение объема кровопотери коррелирует с глубиной депрессии сегмента ST на фоне введения 10 ЕД ОТ

Средние значения объема кровопотери — депрессия сегмента *ST*

Депрессия сегмента *ST*	НЕТ	ЕСТЬ	*p* (Депрессия сегмента *ST* НЕТ/ЕСТЬ)
ОТ 5 (20/2)	590,0 ± 116,5	700,0 ± 0,0	0,206
ОТ 10 (5/18)	600,0 ± 70,7	694,1 ± 140,2	0,168
p (ОТ 5/ОТ 10)	0,857	0,955	—
Общая группа	*592,0 ± 107,7*	*694,7 ± 132,2*	*0,007*



Влияние дозы окситоцина на изменение сегмента ST, артериальную гипотонию и величину кровопотери у рожениц разных возрастных групп во время операции кесарева сечения Е.Н. Дегтярев, Е.М. Шифман, Г.П. Тихова, А.В. Куликов. Вестник интенсивной терапии имени А.И.Салтанова, 2018 г., № 3 с.77-85

Окситоцин и ишемия миокарда

Общая группа пациенток: дозы ОТ 10 ЕД и 5 ЕД, риск острой ишемии миокарда были в **36** раз выше

Группа юных первородящих: дозы ОТ 10 ЕД и 5 ЕД , риск развития ишемии миокарда в **45** раз выше.

Группа взрослых пациенток: дозы ОТ 10 ЕД и 5 ЕД , риск развития ишемии миокарда в **30** раз.

«… Риск развития ишемии миокарда во время инфузии окситоцина при наличие артериальной гипотонии у юных возрастает более чем в 11 раз по сравнению с первородящими оптимального репродуктивного возраста»

Таблица 2. **Частота развития ишемии миокарда и артериальной гипотонии в общей группе пациенток и в подгруппах пациенток юного и оптимального репродуктивного возраста**

*Table 2. **The incidence of developing myocardial ischemia and arterial hypotension in the joint group of patients and subgroups of young patients and patients of optimal reproductive age***

Гипотония / *Hypotension*	Ишемия / *Ischemia*	Нет ишемии / *No ischemia*	ОШ (95% ДИ), *p* / *OR (95% CI), p*
Общая группа / *Joint group*	13/19	8/25	4,6 (1,4;16,6) *p* = 0,02
Группа юных / *Young group*	8/9	5/12	11,2 (1,04; 120,4) *p* = 0,046
Группа взрослых / *Adult group**	5/10	3/13	3,3 (0,6; 19,9) *p* = 0,19

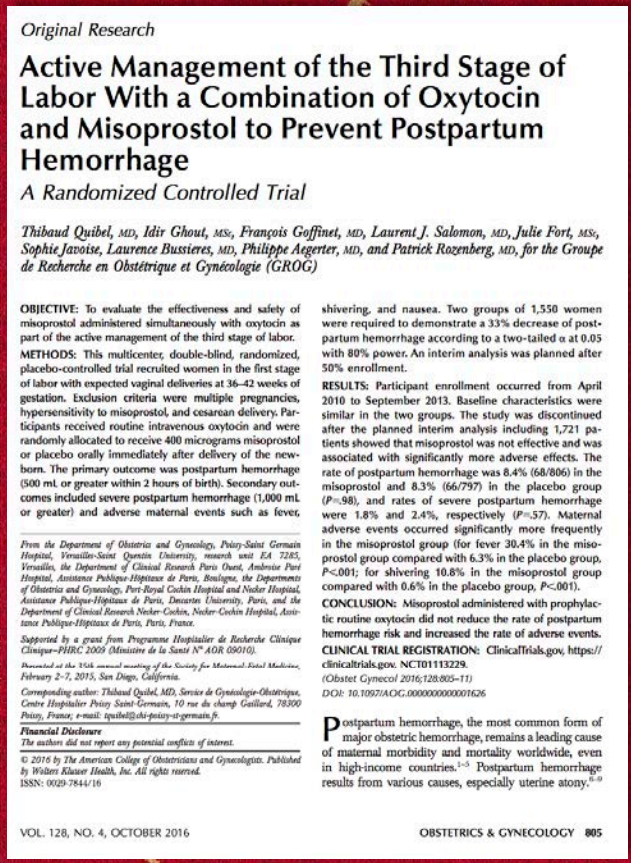
Результаты представлены как число пациенток с гипотонией (n) из общего числа пациенток с ишемией или без (N): n/N.
**Группа пациенток оптимального репродуктивного возраста.*
Results are presented as the number of patients with hypotension (n) out of the total number of patients with or without ischemia (N): n / N.
**Group of patients of optimal reproductive age.*

Е.Н.Дегтярёв, Е.М.Шифман, Г.П.Тихова, А.В.Куликов, А.А.Бухтин, И.В.Жуковец. Окситоцин как фактор риска развития ишемии миокарда. Вопросы гинекологии, акушерства и перинатологии, 2018, том 17, №4, с. 5–10

OBSTETRICS & GYNECOLOGY

- **Мизопростол показал утеротонический эффект**
- **Менее ясна роль мезопростола как дополнения к окситоцину:**
  - ✓ **Widmer с соавторами,** *Lancet. 2010 May 22; 372 (9728): 1808-13*
- **Уменьшает ли добавление мезопростола к окситоцину** *(как составляющая активной профилактики 3-ей стадии родов)* **послеродовое кровотечение?**

Thibaud Quibel, MD, Idir Ghout, MSc, François Goffinet, MD, Laurent J. Salomon, MD, Julie Fort, MSc, Sophie Javoise, Laurence Bussieres, MD, Philippe Aegerter, MD, and Patrick Rozenberg, MD) Active Management of the Third Stage of Labor With a Combination of Oxytocin and Misoprostol to Prevent Postpartum Hemorrhage: A Randomized Controlled Trial Obstet. Gynecol. 2016; 128 (4): 805-811



Original Research

Active Management of the Third Stage of Labor With a Combination of Oxytocin and Misoprostol to Prevent Postpartum Hemorrhage

A Randomized Controlled Trial

Thibaud Quibel, MD, Idir Ghout, MSc, François Goffinet, MD, Laurent J. Salomon, MD, Julie Fort, MSc, Sophie Javoise, Laurence Bussieres, MD, Philippe Aegerter, MD, and Patrick Rozenberg, MD, for the Groupe de Recherche en Obstétrique et Gynécologie (GROG)

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CONCLUSION: Misoprostol administered with prophylactic routine oxytocin did not reduce the rate of postpartum hemorrhage risk and increased the rate of adverse events.

CLINICAL TRIAL REGISTRATION: ClinicalTrials.gov, https://clinicaltrials.gov, NCT01113229.

(Obstet Gynecol 2016;128:805–11)

DOI: 10.1097/AOG.0000000000001626

Postpartum hemorrhage, the most common form of major obstetric hemorrhage, remains a leading cause of maternal morbidity and mortality worldwide, even in high-income countries.[1–3] Postpartum hemorrhage results from various causes, especially uterine atony.[4–9]

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Financial Disclosure

The authors did not report any potential conflicts of interest.

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OBSTETRICS & GYNECOLOGY

- **Приведено, чтобы показать снижение частоты послеродового кровотечения с 7,5 до 5,0%**
  - ✓ **N = 3,100**
- **Запланированный промежуточный анализ остановлен после набора 1 721 пациентки по причине**
  - ✓ **Бесперспективности**
  - ✓ **Неожиданно высокой частоты неблагоприятных явлений**

Original Research

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A Randomized Controlled Trial

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OBSTETRICS & GYNECOLOGY

- **Накопленные данные позволяют предположить низкую эффективность добавления мизопростола**
- **Неблагоприятные побочные явления**
- **Вероятно, имеет ограниченную роль в предупреждении/лечении послеродового кровотечения в условиях высоких ресурсов**

Thibaud Quibel, MD, Idir Ghout, MSc, François Goffinet, MD, Laurent J. Salomon, MD, Julie Fort, MSc, Sophie Javoise, Laurence Bussieres, MD, Philippe Aegerter, MD, and Patrick Rozenberg, MD. Active Management of the Third Stage of Labor With a Combination of Oxytocin and Misoprostol to Prevent Postpartum Hemorrhage: A Randomized Controlled Trial
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OBSTETRICS & GYNECOLOGY

	Мизопростол	Плацебо	P-значение
Лихорадка	30.4%	6.3%	<0.001
Озноб	10.8%	0.6%	<0.001
Тошнота	2.7%	1.0%	0.01
Рвота	2.2%	0.8%	0.02
Диарея	0.7%	0%	0.03

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OBSTETRICS & GYNECOLOGY

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Послеродовое кровотечение	8.4%	8.3%	0.98
Тяжелое послеродовое кровотечение	1.8%	2.4%	0.57
Подгруппа высокого риска	11.5%	11.4%	0.95

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DOI: 10.1097/AOG.0000000000001626

Postpartum hemorrhage, the most common form of major obstetric hemorrhage, remains a leading cause of maternal morbidity and mortality worldwide, even in high-income countries.[1–3] Postpartum hemorrhage results from various causes, especially uterine atony.[4–9]

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Заключение

Карбетоцин – многообещающий утеротоник

- Сходная эффективность с окситоцином в предупреждении послеродового кровотечения
- Лучший профиль безопасности по сравнению с окситоцином

- **Карбетоцин является синтетическим, длительно действующим агонистом окситоцина и обладает периодом полужизни примерно в 4–10 раз большим, чем окситоцин.**

  В настоящее время он лицензирован для профилактики атонии матки после кесарева сечения в условиях спинальной или эпидуральной анестезии.

- **В отдельных случаях сообщалось об использовании карбетоцина для лечения послеродовых кровотечений**

The Fetal Medicine Foundation

Arch Gynecol Obstet (2014) 289:555–567
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MATERNAL-FETAL MEDICINE

Medical prevention and treatment of postpartum hemorrhage: a comparison of different guidelines

Michael K. Bohlmann · Werner Rath

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Abstract
Background Postpartum hemorrhage (PPH) remains a common cause of maternal mortality worldwide, mainly caused by uterine atony. Medical intervention plays an important part in prevention and therapies of PPH. Prophylactic interventions include the use of uterotonic drugs. We elaborated the consistency of national and international guidelines on these medical approaches.
Materials and methods Medical approaches in PPH were extracted from recent publications. Furthermore, the current guidelines of the World Health Organization, the FIGO and of the American, British, Canadian and German Societies of Obstetricians and Gynecologists on PPH were analyzed.
Results Oxytocin is considered as therapy of first choice. However, the examined guidelines fail to give unequivocal recommendations on further uterotonics in PPH, which may partially be attributed to differing publication dates of the guidelines.
Conclusion International guidelines on PPH are characterized by differing recommendations. However, recent publications suggest that adhering to local guidelines significantly reduces the prevalence of severe PPH.

Keywords Postpartum hemorrhage · Medical prevention · Treatment · Uterotonics · International guidelines

Abbreviations
ACOG American Congress of Obstetricians and Gynecologists
DGGG German Society for Gynecology and Obstetrics
FIGO Fédération Internationale de Gynécologie et d' Obstétrique
PPH Postpartum hemorrhage
RCOG Royal College of Obstetricians and Gynaecologists
SOGC Society of Obstetricians and Gynaecologists of Canada
WHO World Health Organization

Introduction
Postpartum hemorrhage (PPH), remaining the most common cause of maternal mortality, is responsible for 25 % of the maternal deaths worldwide [38]. The vast of majority of cases of PPH (67–80 %) is caused by uterine atony [62]. Primary PPH is traditionally defined as blood loss from the genital tract >500 ml within 24 h after birth, while abnormal or excessive blood loss from the birth canal, occurring 24 h to 12 weeks postnatally, defines secondary PPH. Severe PPH is found when blood loss exceeds 1,000 ml within 24 h after delivery [84].
The prevalence of both PPH and severe PPH are estimated approximately 6 and 1.9 % of all deliveries, displaying a wide geographic variation [12, 92]. Additionally,

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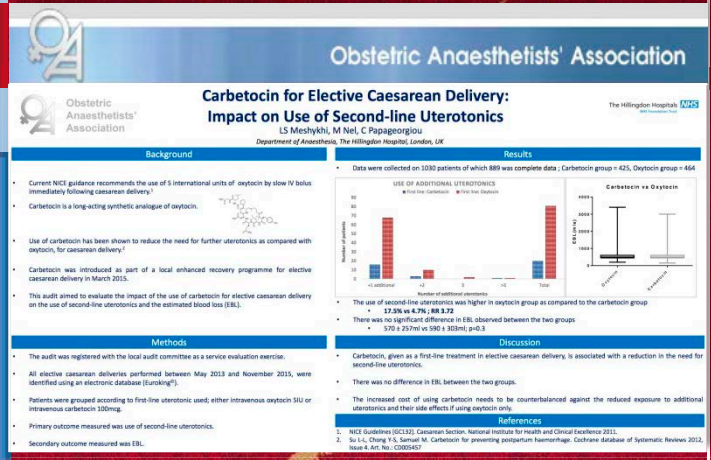
При введении **карбетоцина**, как препарата первой очереди при плановом КС, отмечалось снижении потребности в повторных введениях утеротоников

Не отмечено разницы по объему кровопотери в группах (*окситоцин* и *карбетоцин*)

Увеличение стоимости при лечении карбетоцином сопоставимо с уменьшением дополнительного применения утеротоников второй очереди и побочными эффектами применения только окситоцина


Obstetric Anaesthetists' Association

Carbetocin for Elective Caesarean Delivery: Impact on Use of Second-line Uterotonics

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Department of Anaesthesia, The Hillingdon Hospital, London, UK

Background

- Current NICE guidance recommends the use of 5 international units of oxytocin by slow IV bolus immediately following caesarean delivery.[1]
- Carbetocin is a long-acting synthetic analogue of oxytocin.
- Use of carbetocin has been shown to reduce the need for further uterotonics as compared with oxytocin, for caesarean delivery.[2]
- Carbetocin was introduced as part of a local enhanced recovery programme for elective caesarean delivery in March 2015.
- This audit aimed to evaluate the impact of the use of carbetocin for elective caesarean delivery on the use of second-line uterotonics and the estimated blood loss (EBL).

Methods

- The audit was registered with the local audit committee as a service evaluation exercise.
- All elective caesarean deliveries performed between May 2013 and November 2015, were identified using an electronic database (Euroking®).
- Patients were grouped according to first-line uterotonic used; either intravenous oxytocin 5IU or intravenous carbetocin 100mcg.
- Primary outcome measured was use of second-line uterotonics.
- Secondary outcome measured was EBL.

Results

- Data were collected on 1030 patients of which 889 was complete data ; Carbetocin group = 425, Oxytocin group = 464

USE OF ADDITIONAL UTEROTONICS

Carbetocin vs Oxytocin

- The use of second-line uterotonics was higher in oxytocin group as compared to the carbetocin group
  - 17.5% vs 4.7% ; RR 3.72
- There was no significant difference in EBL observed between the two groups
  - 570 ± 257ml vs 590 ± 303ml; p=0.3

Discussion

- Carbetocin, given as a first-line treatment in elective caesarean delivery, is associated with a reduction in the need for second-line uterotonics.
- There was no difference in EBL between the two groups.
- The increased cost of using carbetocin needs to be counterbalanced against the reduced exposure to additional uterotonics and their side effects if using oxytocin only.

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Obstetric Anaesthetists' Association

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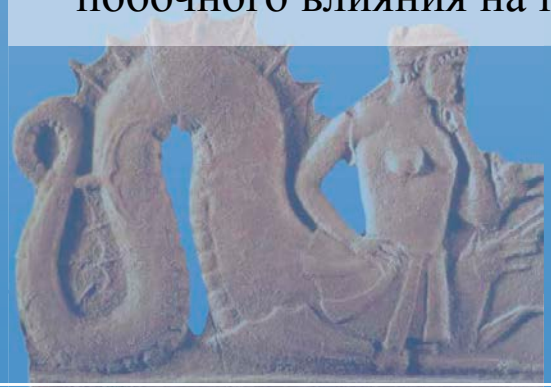
Заключительные комментарии

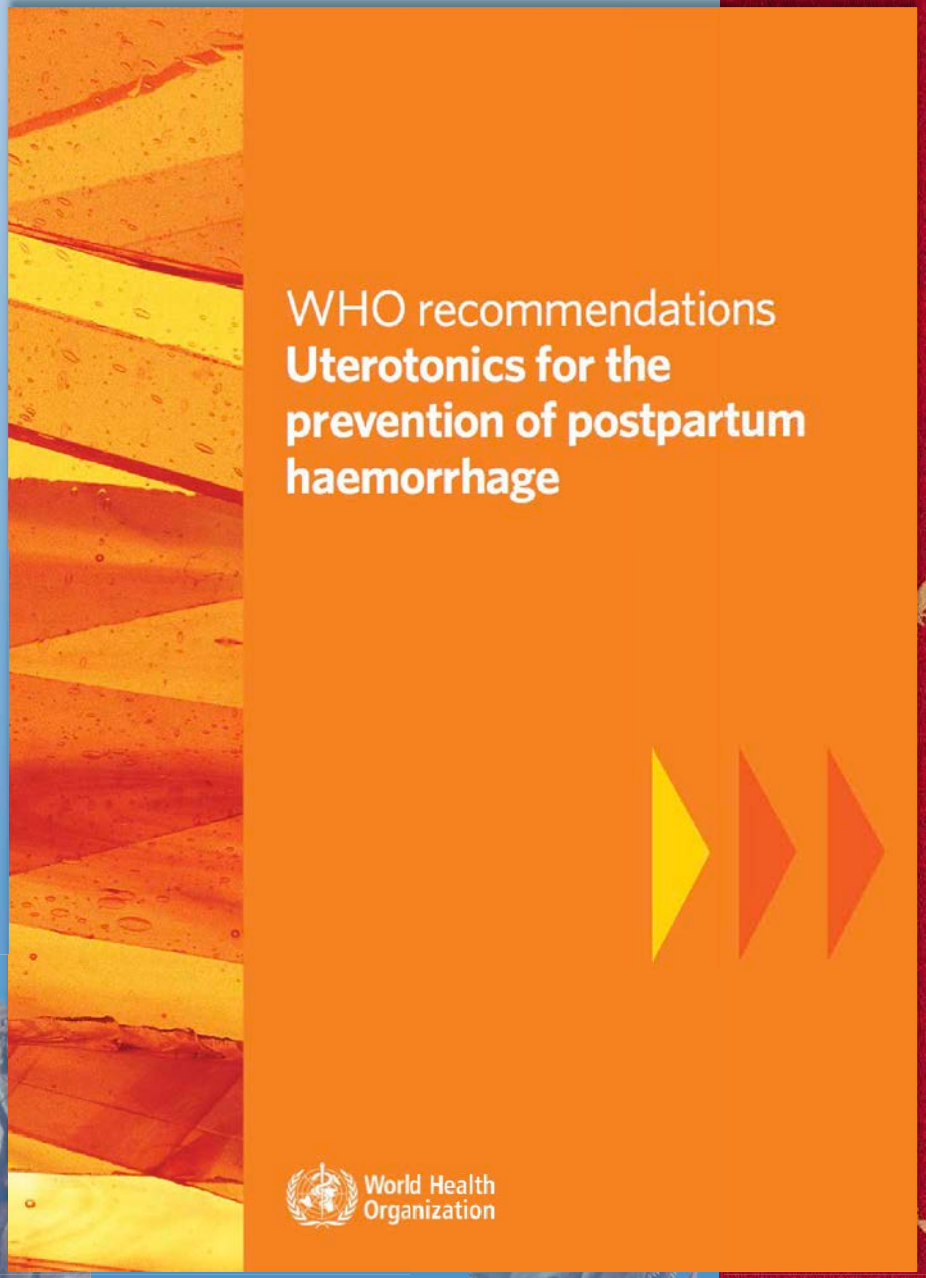
- Для профилактики послеродового кровотечения карбетоцин эффективнее окситоцина
- Профиль побочных эффектов карбетоцина лучше, чем у синтометрина
- Период полураспада утеротоников отличается:
  - ✓ окситоцин – **3 мин.**
  - ✓ эргометрин – **12 мин.**
  - ✓ **карбетоцин** – **40 мин.**
- Не смотря на больший период полураспада, у карбетоцина более кратковременный период побочного влияния на гемодинамику



Заключение

- Окситоцин-ассоциированное влияние на гемодинамику включает:
  - ✓ *Вазодилатацию*
  - ✓ *Увеличение сердечного выброса*
  - ✓ *Снижение АД*
  - ✓ *Изменения на ЭКГ*

- У карбетоцина по сравнению с окситоцином отмечаются более краткосрочные гемодинамическое побочные эффекты, несмотря на больший период его полураспада.


WHO recommendations
Uterotonics for the prevention of postpartum haemorrhage
World Health Organization

ПРОФИЛАКТИКА, АЛГОРИТМ ВЕДЕНИЯ, АНЕСТЕЗИЯ И ИНТЕНСИВНАЯ ТЕРАПИЯ ПРИ ПОСЛЕРОДОВЫХ КРОВОТЕЧЕНИЯХ
Клинические рекомендации (протокол лечения)

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O44/O44.0/O44.1/O45/O45.8/O45.9/O46/O46.0/O46.8/O46.9/O67/O67.0/O67.8/O67.9 /O72/O72.0/O72.1/O72.2

Медицинские профессиональные некоммерческие организации разработчики

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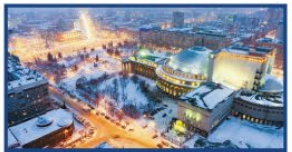

Новосибирск
14–15 февраля

Йошкар-Ола
4–5 марта

Тула
14–15 марта

Москва
Первый Всероссийский конгресс по кровотечениям и тромбозам в акушерстве
6–7 апреля

Саранск
11–12 апреля

Хабаровск
23–24 апреля

Улан-Удэ
28–29 мая

Нальчик
6–7 июня

Владимир
27–28 июня

Калининград
5–6 сентября

Москва
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21–23 сентября

Махачкала
9–10 октября

Екатеринбург
17–18 октября

Пенза
30–31 октября

Омск
14–15 ноября

Мурманск
28–29 ноября

Ростов-на-Дону
12–13 декабря

Брянск
19–20 декабря