EMS Bloodletting and Snake oil

Jeff Rabrich, DO, FACEP, EMT-P
Medical Director
St. Luke's-Roosevelt Hospital

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Head Salesman

Objectives

Objectives

- Discuss how EMS came about

Objectives

- Discuss how EMS came about
- Discuss the development of EMS devices and techniques

Objectives

- Discuss how EMS came about
- Discuss the development of EMS devices and techniques
- Review the implementation and removal of various devices

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- Review currently questionable devices

Objectives

- Discuss how EMS came about
- Discuss the development of EMS devices and techniques
- Review the implementation and removal of various devices
- Review currently questionable devices
- Future of EMS devices

Development of EMS devices

Development of EMS devices

- 1966 EMS White Paper: “Accidental Death and Disability”

Development of EMS devices

- 1966 EMS White Paper: "Accidental Death and Disability"
- DOT oversight

Development of EMS devices

- 1966 EMS White Paper: “Accidental Death and Disability”
- DOT oversight
- No standards or research

Development of EMS devices

- 1966 EMS White Paper: “Accidental Death and Disability”
- DOT oversight
- No standards or research
- 1970 Wedsworth-Townsend Act

Rotating Venous Tourniquets

Rotating Venous Tourniquets

- What was the concept?

Rotating Venous Tourniquets

- What was the concept?
- Did it work?

Rotating Venous Tourniquets

- What was the concept?
- Did it work?
- Why was it removed?

The Technique

Dec
15
ROTATING TOURNIQUET, BLOODLESS PHLEBOTOMY
Labels: + MEDICAL SURGICAL |

PURPOSE:
- to decrease congestion in the heart
- to decrease venous return

STEPS:
- apply the tourniquet: 3 extremities are occluded, leave 1 extremity free
- after 15 minutes, rotate the tourniquet, rotate in a clockwise direction
- rotate the tourniquet 3 times
- remove the tourniquet

EXAMPLE:
- 1 - 12:00 PM tourniquet is applied
- 2 - 12:15 PM rotate the tourniquet
- 3 - 12:30 PM rotate the tourniquet
- 4 - 12:45 PM rotate the tourniquet
- 5 - 1:00 PM remove all the tourniquet

Rotating Venous Tourniquets

1974

Rotating Venous Tourniquets

1974

Effectiveness of Congesting Cuffs ("Rotating Tourniquets") in Patients with Left Heart Failure

By Philip A. Habak, M.D., Allyn L. Mark, M.D., J. Michael Kioschos, M.D., Donald R. McRaven, M.D., and Francois M. Abboud, M.D.

Rotating Venous Tourniquets

1974

Effectiveness of Congesting Cuffs ("Rotating Tourniquets") in Patients with Left Heart Failure

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SUMMARY

Congesting cuffs or "rotating tourniquets" are often used to treat patients with acute pulmonary edema secondary to left heart failure. The purpose of this study was to evaluate the effectiveness of congesting cuffs in pooling blood in the extremities and decreasing pulmonary congesting pressures in patients with left heart failure and to define optimal congesting cuff pressures. Congesting cuffs on three extremities were inflated to 20, 40, 60 and 80 mm Hg in 16 patients with left heart failure and in 7 normal subjects. The extremities were elevated to collapse the veins before inflating the cuffs. The amount of venous pooling was measured with mercury-in-silastic strain gauge plethysmographs. Inflation of the cuffs produced significantly less venous pooling in patients with heart failure than in normal subjects. Decreases in right atrial pressure during inflation of the cuffs were also significantly less in the patients with heart failure than in the normal subjects. In patients with heart failure, pulmonary congesting pressure (left ventricular diastolic pressure or mean pulmonary arterial wedge pressure) averaged 24.2 ± 1.5 (SE) mm Hg in the control period and 24.6 ± 2.2, 22.9 ± 1.9, 23.2 ± 2.1 and 20.3 ± 1.6 mm Hg during inflation of the cuffs at 20, 40, 60 and 80 mm Hg, respectively. The decreases in pulmonary congesting pressure (PCP) were not significant ($P > 0.05$) at cuff pressures of 20, 40 and 60 mm Hg. Decreases in PCP were statistically significant at a cuff pressure of 80 mm Hg, but only 6 of 16 patients had decreases greater than 4 mm Hg. The results suggest that in patients with heart failure the effectiveness of congesting cuffs is limited by decreases in venous distensibility which are characteristic of heart failure.

Demise of venous tourniquets

Demise of venous tourniquets

- Lasix FDA approved July 1966

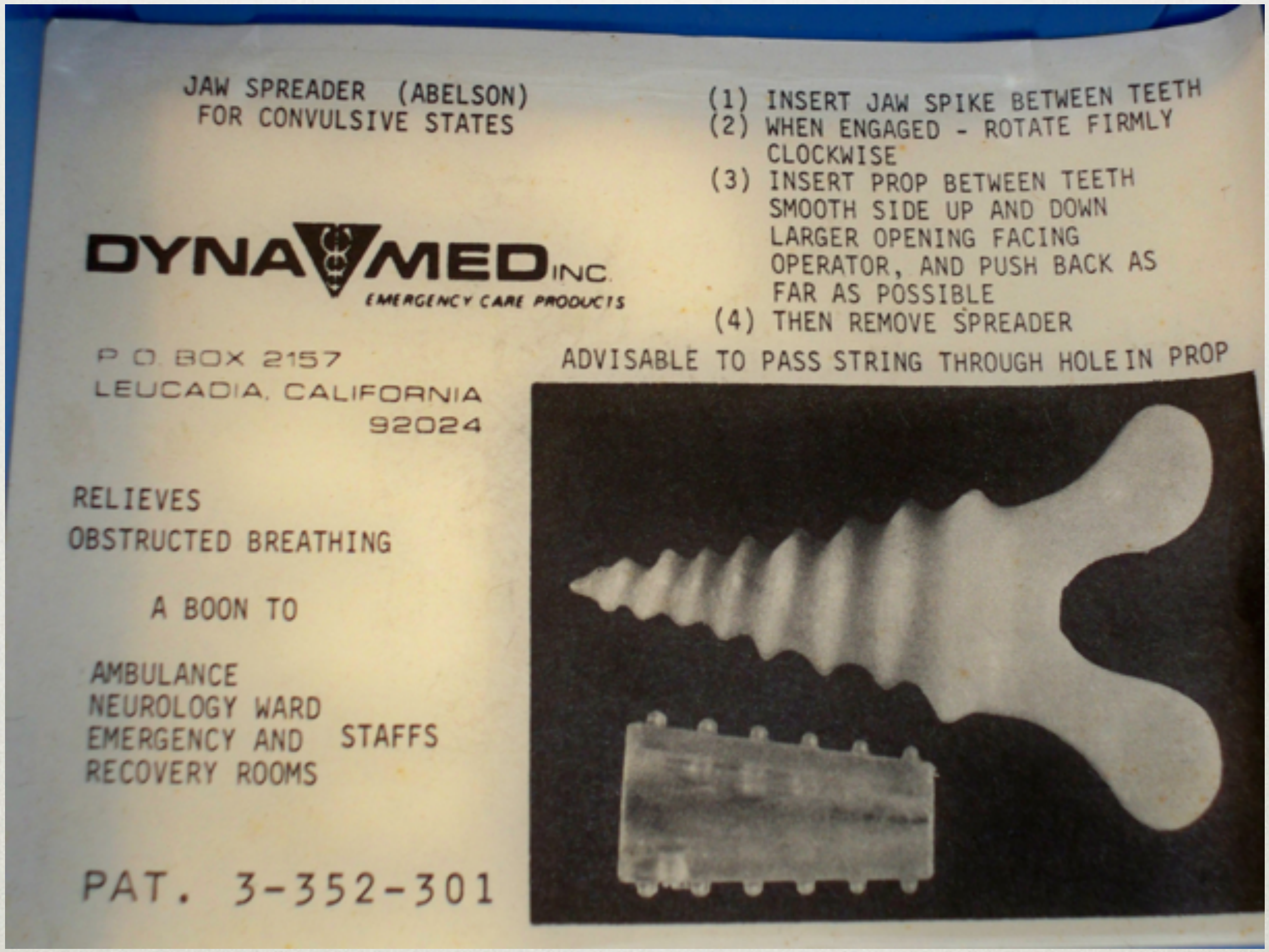
Demise of venous tourniquets

- Lasix FDA approved July 1966
- Lasix in EMS protocols by late 70's

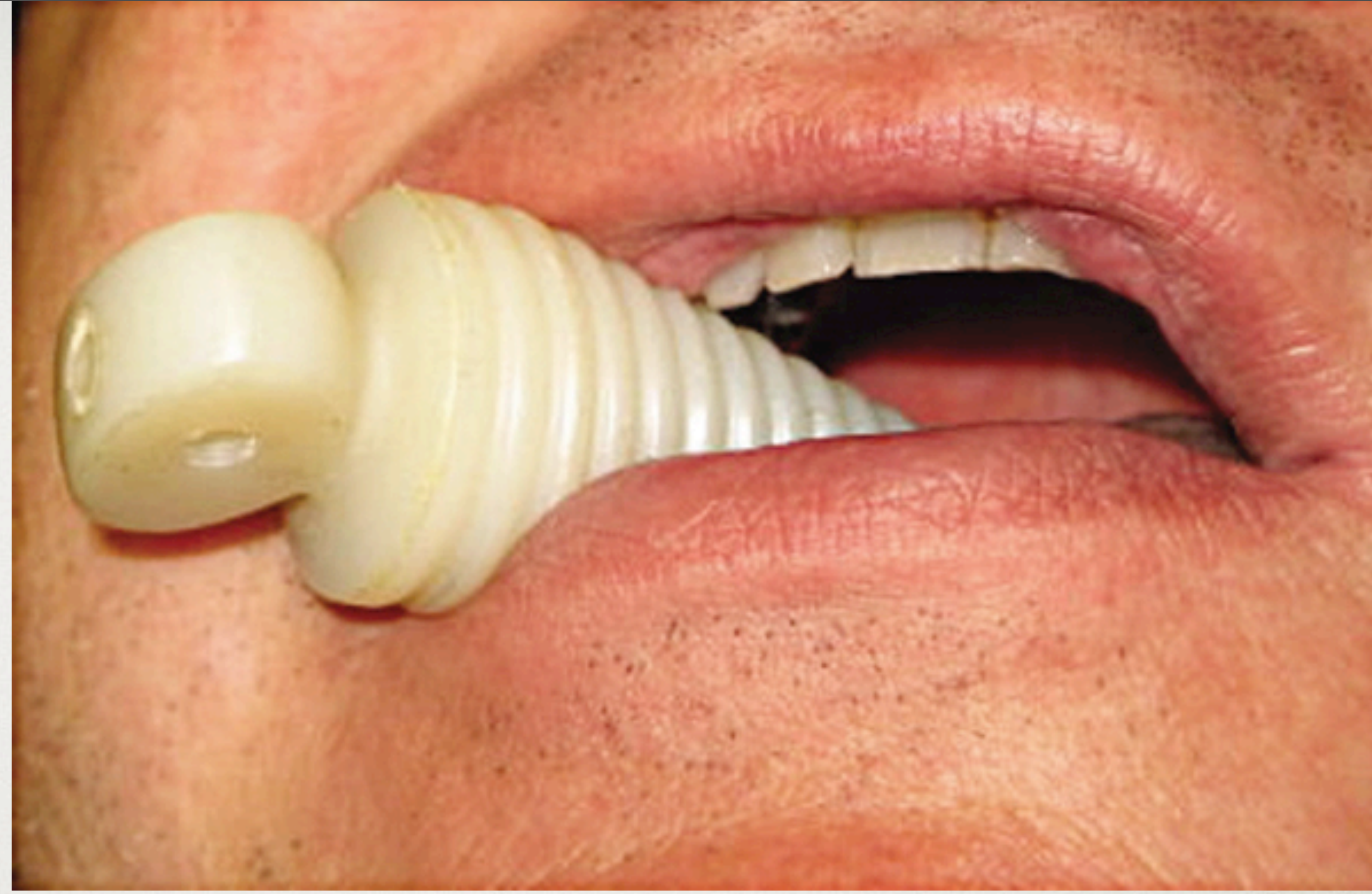
Demise of venous tourniquets

- Lasix FDA approved July 1966
- Lasix in EMS protocols by late 70's
- Studies show tourniquets don't work

WHAT'S THIS?


JAW SPREADER (ABELSON)
FOR CONVULSIVE STATES
DYNAMED INC.
EMERGENCY CARE PRODUCTS
P.O. BOX 2157
LEUCADIA, CALIFORNIA
92024
RELIEVES
OBSTRUCTED BREATHING
A BOON TO
AMBULANCE
NEUROLOGY WARD
EMERGENCY AND STAFFS
RECOVERY ROOMS
PAT. 3-352-301
(1) INSERT JAW SPIKE BETWEEN TEETH
(2) WHEN ENGAGED - ROTATE FIRMLY CLOCKWISE
(3) INSERT PROP BETWEEN TEETH SMOOTH SIDE UP AND DOWN LARGER OPENING FACING OPERATOR, AND PUSH BACK AS FAR AS POSSIBLE
(4) THEN REMOVE SPREADER
ADVISABLE TO PASS STRING THROUGH HOLE IN PROP


Toothette
Oral Care
Disposable
Directions
Reorder No. 4000
SAGE



Bite Blocks

Bite Blocks

- What was the theory?

Bite Blocks

- What was the theory?
  - "swallow their tongue"

Bite Blocks

- What was the theory?
  - “swallow their tongue”
  - Tongue biting

Bite Blocks

- What was the theory?
  - "swallow their tongue"
  - Tongue biting
- Did it work?

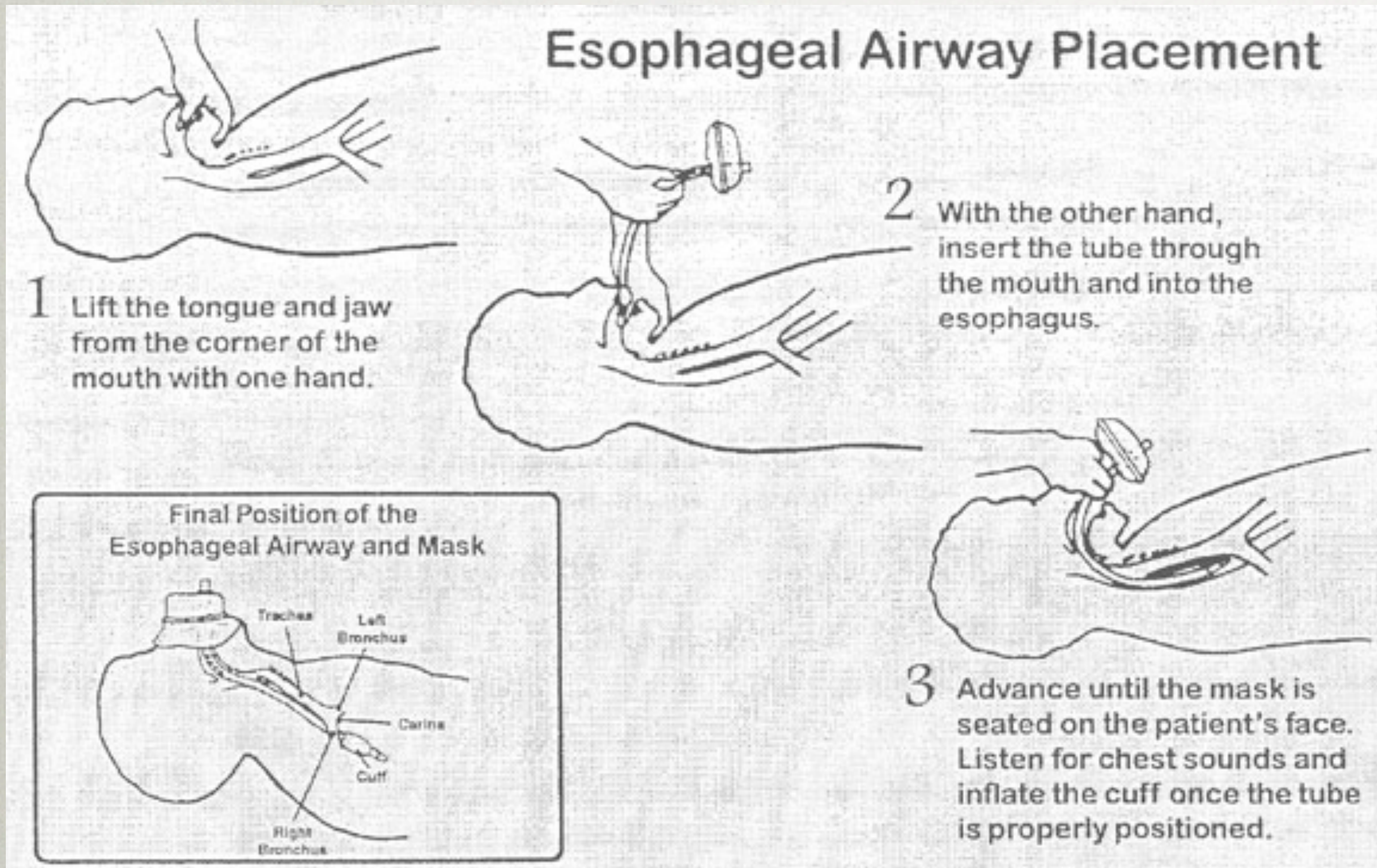
Bite Blocks

- What was the theory?
  - “swallow their tongue”
  - Tongue biting
- Did it work?
- Any uses still?

Airway Devices

- EOA
- EGTA
- Robert-Shaw Demand Valve

EOA


Esophageal Airway Placement
1 Lift the tongue and jaw from the corner of the mouth with one hand.
2 With the other hand, insert the tube through the mouth and into the esophagus.
3 Advance until the mask is seated on the patient's face. Listen for chest sounds and inflate the cuff once the tube is properly positioned.
Final Position of the Esophageal Airway and Mask
Trachea
Left Bronchus
Carina
Cuff
Right Bronchus

EOA

EOA

- Blind insertion device

EOA

- Blind insertion device
- ALS skill

EOA

- Blind insertion device
- ALS skill
- Theoretically ventilated the hypopharynx

EOA

- Blind insertion device
- ALS skill
- Theoretically ventilated the hypopharynx
- ?rescue device role

EGTA

EGTA

EGTA

- Similar to EOA but allows for gastric decompression

EGTA

- Similar to EOA but allows for gastric decompression
- Special channel through tube to access stomach

EGTA

- Similar to EOA but allows for gastric decompression
- Special channel through tube to access stomach
- Anyone still use this?

EMS

Medical Treatment Protocols

2009

COLLEGE STATION FIRE DEPARTMENT MEDICAL PROTOCOLS

EGTA / Combitube Intubation		2.02
Issued: 01/31/2009	**Expiration: 01/31/2011**	**Page 1 of 1**

Purpose:
The EGTA and the Combitube are considered an interim form of airway management for those patients who prove difficult to intubate or where endotracheal intubation is not available. Both the EGTA and Combitube are used on adult patients only.

Insertion:
1. Oxygenate the patient.
2. Assemble the necessary equipment
4. Advance the tube until properly positioned.
5. Check for proper placement of the tube by auscultating the lungs and epigastrium. If breath sounds are absent, remove the tube, hyperventilate the patient and reinsert the EGTA/Combitube.
6. Inflate the cuff(s)
7. Ventilate with BVM/100% oxygen.

Removal:
1. The patient must be endotracheally intubated before removal.
2. Have suction available, turn patient's head to the side (or log roll patient) and deflate cuff.
3. Remove the tube from the esophagus in one smooth motion.
4. Continue ventilating through the ET tube and suction as needed.

Notes:
1. If any intubation attempt lasts for greater than 30 seconds, then stop the attempt and hyperventilate the patient and re-attempt intubation. This may be repeated until successful.

Esophageal Obturator Airway (EOA)

and Esophageal Gastric Tube Airway (EGTA)

DESCRIPTION & INDICATIONS

- ✓ The Esophageal Obturator Airway (EOA) is an advanced airway device that ventilates the patient by occluding the esophagus with a balloon and the nasal/oral area with an occlusive mask.
- ✓ The EGTA is functionally similar to the EOA except that it provides an additional lumen for passage of a gastric tube. The EGTA should be utilized in exactly the same manner as described herein for the EOA.
- ✓ Use the EOA only in deeply unconscious patients without a gag reflex. This usually means cardiac arrest, but may occur in other settings of respiratory failure.

CONTRAINDICATIONS & PRECAUTIONS

- ✓ Do not use the EOA for any of the patients listed below:
  - Conscious or semi-conscious patients
  - Children, and adult patients <5 feet tall
  - Patients known or suspected to have swallowed corrosive materials
  - Patients known or suspected to have diseases of the esophagus
  - Patients with inhalation burn injuries
  - Patients with trauma to the head or neck region that may alter airway anatomy or cause hemorrhage into the airway

PROCEDURE

1. **Assemble EOA. Apply water-soluble lubricant to the device as directed by the manufacturer.**
2. **If c-spine trauma is not suspected, flex the head slightly. If c-spine trauma is possible, maintain a neutral head position using manual stabilization.**
3. **Grasp lower jaw and tongue between thumb and index fingers and lift upwards.**
4. **With the mask attached, insert tube into mouth and place so that the curvature of the tube is the same as the curvature of pharynx.**
5. **Advance the tube into the esophagus and seal mask firmly over nose and mouth. It is best to have one EMT hold the mask seal and a second EMT operate the BVM attached to the EOA.**
6. **Ventilate and see if the chest rises.**
   - If the chest does not rise, remove EOA. Ventilate with an alternate method and attempt reinsertion.
   - Once chest rise with ventilation is assured, inflate obturator cuff with 30-35 mL of air.
7. **Ventilate with bag valve mask device to achieve chest rise.**
8. **Confirm placement of EOA as described under General Procedures.**
9. **Ventilate the patient using a BVM or ventilator.**

Robertshaw Demand Valve

Robertshaw Demand Valve

- High pressure oxygen deliver device

Robertshaw Demand Valve

- High pressure oxygen deliver device
- Originally 100-120psi

Robertshaw Demand Valve

- High pressure oxygen deliver device
- Originally 100-120psi
- Downregulated to 40psi

Robertshaw Demand Valve

- High pressure oxygen deliver device
- Originally 100-120psi
- Downregulated to 40psi
- Still a bad idea

Robertshaw®

Arkansas Department of Health

Section of EMS

BASIC LIFE SUPPORT PROTOCOLS

October 2012

SECTION OF EMERGENCY MEDICAL SERVICES
ARKANSAS BASIC EMERGENCY MEDICAL TECHNICIAN SAMPLE PROTOCOLS

101
RESPIRATORY DISTRESS/FAILURE

NOTE: All patients who are in respiratory arrest must have ventilatory assistance unless a valid Arkansas Prehospital DNR Order and/or Form is presented to the crew.

1. Monitor the airway.
2. If an obstructed airway is suspected, **see Protocol #102**
3. Administer oxygen.
4. For patients over one (1) year of age who are experiencing exacerbation of asthma or wheezing, **see protocol #108**
5. Do **NOT** permit physical activity.
6. Request Advanced Life Support assistance if necessary and coordinate and intercept. Do not delay transport waiting for Advanced Life Support assistance
7. Monitor breathing for adequacy.

NOTE: Monitor breathing continuously. Be alert for signs of hypoxia and/or increasing respiratory distress.

8. Place the patient in a Fowler's, semi-Fowler's position, or in a position of comfort.
9. Transport.
10. For the patient with signs of on-going hypoxia, inability to adequately protect their airway, and/or exhibiting signs of inadequate respiration, assisted ventilations may be required. This should be done utilizing the following method:

a. Bag-Valve-Mask and reservoir with flow set at 10-15 liters/minute.

NOTE: Do not use a demand valve resuscitator due to the possibility of causing severe, life-threatening complications

11. Transport to the nearest most appropriate facility.

401

RESPIRATORY DISTRESS/FAILURE

NOTE: All patients who are in respiratory arrest must have ventilatory assistance unless a valid New York State Prehospital DNR Order and/or MOLST is presented to the crew.

1. Monitor the airway.
2. If an obstructed airway is suspected, see Protocol #402.
3. Administer oxygen.
4. For patients over one (1) year of age who are experiencing exacerbation of asthma or wheezing, see protocol #407.
5. Do **NOT** permit physical activity.
6. Request Advanced Life Support assistance.
7. Monitor breathing for adequacy.

   NOTE: Monitor breathing continuously. Be alert for signs of hypoxia and/or increasing respiratory distress.

8. Place the patient in a Fowler's, semi-Fowler's position, or in a position of comfort.
9. Transport.
10. For the patient with signs of on-going hypoxia, inability to adequately protect their airway, and/or exhibiting signs of inadequate respiration, assisted ventilations may be required. This should be done utilizing one of the following methods:
    a. Pocket mask with supplemental oxygen set at 10-15 liters/minute.
    b. Bag-Valve-Mask and reservoir with flow set at 10-15 liters/minute.

    NOTE: Do not use a demand valve resuscitator due to the possibility of causing severe, life-threatening complications

11. Transport.

Hyperventilation-Induced Hypotension During Cardiopulmonary Resuscitation

Tom P. Aufderheide, MD; Gardar Sigurdsson, MD; Ronald G. Pirrallo, MD, MHSA;
Demetris Yannopoulos, MD; Scott McKnite, BA; Chris von Briesen, BA, EMT;
Christopher W. Sparks, EMT; Craig J. Conrad, RN; Terry A. Provo, BA, EMT-P; Keith G. Lurie, MD

Circulation. 2004;109:1960-1965;

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Circulation. 2004;109:1960-1965;

Excess Ventilation with Oxygen-powered Resuscitators

HAROLD H. OSBORN, MD,* DAVID KAYEN,† HOWARD HORNE, BA,† WALTER BRAY†

Massive subcutaneous emphysema developed in three patients following ventilation with an oxygen-powered, positive pressure resuscitator used by an urban emergency medical service. A faulty valve regulator was identified as the source of the problem. Following this discovery, an extensive field test of all oxygen-powered resuscitators used by the emergency service was carried out. Sixty resuscitators were tested, 15 of which (25%) were found to be deficient on at least one of the test criteria. It is strongly recommended that all personnel using these devices be trained to recognize equipment malfunction and that periodic performance evaluations be carried out on all such equipment. The results of this field test, and other performance tests done previously, raise questions about the use of positive pressure resuscitators in the emergency setting. (Am J Emerg Med 1984;2:408–413)

MAST Pants

MAST Pants

- Brought to you by the US Military

MAST Pants

- Brought to you by the US Military
- Military Anti-shock trousers / PASG

MAST Pants

- Brought to you by the US Military
- Military Anti-shock trousers / PASG
- Derived from fighter pilot G-Suit

MAST Pants

- Brought to you by the US Military
- Military Anti-shock trousers / PASG
- Derived from fighter pilot G-Suit
- Theory of “auto-transfusion”


© R.L. Huckstep 1997

EMSWORLD

EMS Myth #1: Medical Anti-Shock Trousers (MAST) autotransfuse a significant amount of blood and save lives.

BRYAN E. BLEDSOE, DO, FACEP, EMT-P

CREATED: DECEMBER 1, 2003

MAST History

The concept of the MAST was first described in 1903 by famed surgeon George W. Crile as a "pneumatic rubber suit" to decrease postural hypotension in neurosurgical patients.[1,2] During World War II, Crile's suit was used to prevent blackout in pilots who were subjected to high G forces while flying combat aircraft. The National Aeronautics and Space Administration (NASA) claimed responsibility for developing the medical anti-shock trousers at their Ames Research Center in the 1960s.[3] MAST were introduced into medical practice during the war in Vietnam and called "Military Anti-Shock Trousers."[4] The value of MAST in the military setting was documented when soldiers with massive trauma, previously considered fatal, were able to survive a 45-minute helicopter ride to a definitive care hospital.[5] MAST were introduced into civilian EMS in the 1970s.[6]

Mechanisms of action

Mechanisms of action

- Increases peripheral Vascular Resistance

Mechanisms of action

- Increases peripheral Vascular Resistance
- Tamponades Intra-abdominal Bleeding

Mechanisms of action

- Increases peripheral Vascular Resistance
- Tamponades Intra-abdominal Bleeding
- Autotransfuses blood to upper trunk

Randomized Trial of Pneumatic Antishock Garments in the Prehospital Management of Penetrating Abdominal Injuries

Experimental data have suggested that pneumatic external counterpressure improves outcome in intra-abdominal hemorrhage by either a tamponade effect and/or elevation in central systemic blood pressure. As a result, the empiric use of the pneumatic antishock garment (PASG) has become a standard of care, even to the point where the device has been legislated as required equipment on emergency medical rescue vehicles. However, the effect of the PASG on intra-abdominal hemorrhage has not been evaluated in randomized clinical trials. The purpose of this study was to evaluate the effect of the PASG on the survival of hypotensive patients with penetrating abdominal injuries. During a 2½-year period, 201 consecutive patients presenting with penetrating anterior abdominal injuries and an initial prehospital systolic blood pressure of 90 mm Hg or less were entered into the study. All prehospital care was delivered by the same municipal emergency medical services system, and all patients subsequently were transported to the same regional trauma facility. The patients were randomized into control and pneumatic external counterpressure groups by an alternate-day assignment of PASG use. The resulting study populations (control, n = 104; PASG, n = 97) were found to be well matched for survival probability indices, prehospital response and transport times, and the volume of IV fluids received. The results demonstrated no significant difference in the survival rates of the control and PASG treatment groups (81 of 104 vs 67 of 97). From these data we conclude that, contrary to previous claims, the PASG provides no significant advantage in improving survival in the urban prehospital management of penetrating abdominal injuries. [Bickell WH, Pepe PE, Bailey ML, Wyatt CH, Mattox KL: Randomized trial of pneumatic antishock garments in the prehospital management of penetrating abdominal injuries. Ann Emerg Med June 1987;16:653-658.]

William H Bickell, MD*
Paul E Pepe, MD†
Mark L Bailey, MD*
Charles H Wyatt, MD*
Kenneth L Mattox, MD*
Houston, Texas

From the Departments of Surgery* and Medicine,† Baylor College of Medicine; Ben Taub General Hospital;*† City of Houston Fire Department Emergency Medical Services,† Houston, Texas.

Presented at the Annual Meeting of the University Association for Emergency Medicine, in Portland, Oregon, May 1986.

Supported in part by a grant from the United States Army Contract No. DAND17-86-C-6097.

Computational assistance was provided by the CLINIFO Project funded by the Division of Research Resources of the NIH under grant number PR-00353.

Received for publication December 15, 1986. Accepted for publication February 20, 1987.

THE VERDICT

Conclusion

Based on available data, in 1997 the National Association of EMS Physicians issued a position paper on use of MAST/PASG in modern EMS.[18] The association concluded that MAST are definitely beneficial in ruptured abdominal aortic aneurysm and possibly beneficial in hypotension due to pelvic fracture, anaphylactic shock refractory to standard therapy, otherwise uncontrollable lower extremity hemorrhage and severe traumatic hypotension (palpable pulse, no blood pressure).[19] Even considering these possibilities, any benefit from application of the MAST may be accomplished through rapid transport to a trauma center. Many EMS services have kept MAST for use in possible pelvic and lower extremity fractures. Patients with femur fractures are best treated with traction splints, while patients with pelvic fractures can be treated with a long backboard or similar device. Furthermore, the MAST are expensive (approximately $500 per pair) and take up valuable storage space on the ambulance. MAST are a relic of our past and belong in EMS museums, not on modern ambulances or rescue vehicles.

Medical Anti-Shock Trousers

Advisory No. 97-04

Date Approved: August 7, 1997

New York State Department of Health Bureau of Emergency Medical Services

Medical Anti-Shock Trousers

Advisory No. 97-04

Date Approved: August 7, 1997

New York State Department of Health Bureau of Emergency Medical Services

The literature cited supports the conclusion that the role of MAST (PASG) in the prehospital emergency medical care of adult and pediatric patients is extremely limited. The State Emergency Medical Advisory committee agrees with the National Association of EMS Physicians that the weight of the evidence favors the usefulness and efficacy of MAST (PASG) only for adult major blunt trauma with severe hypotension (systolic blood pressure < 50 mm Hg) and hypotension (systolic blood pressure < 90 mm Hg) associated with unstable pelvic fracture, a position which is consistent with the 1997 Edition of the Advanced Trauma Life Support Course of the American College of Surgeons.

The State Emergency Medical Advisory Committee (SEMAC) therefore recommends their use under these circumstances, although Regional Emergency Medical Advisory Committees (REMAC) may prescribe their use under other circumstances to address specific local conditions. The *Statewide Basic Life Support Adult and Pediatric Treatment Protocols* are being modified to reflect this change, and Regional Emergency Medical Advisory Committees, and regional, system, and service medical directors are advised to modify local protocols, policies, and procedures accordingly.

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MAST (PASG) are "usually indicated, useful, and effective" (Class I evidence) for:

- None.

MAST (PASG) are "acceptable, of uncertain efficacy, [although the] weight of evidence favors usefulness and efficacy" (Class IIa evidence) for:

- "Hypotension due to suspected pelvic fracture;
- Severe traumatic hypotension (palpable pulse, blood pressure not obtainable). *"

Hyperventilation

Hyperventilation

- Advocated as treatment for increased ICP starting in the 70's

Hyperventilation

- Advocated as treatment for increased ICP starting in the 70's
- Caused vasoconstriction

Hyperventilation

- Advocated as treatment for increased ICP starting in the 70's
- Caused vasoconstriction
- improved cerebral autoregulation

Hyperventilation

- Advocated as treatment for increased ICP starting in the 70's
- Caused vasoconstriction
- improved cerebral autoregulation
- Early studies showing decreased mortality

Cerebral perfusion

Principles

Cerebral Perfusion Pressure

CPP = MAP – (CVP or ICP)

(whichever is highest)

The Data

J Neurosurg 75:731–739, 1991

Adverse effects of prolonged hyperventilation in patients with severe head injury: a randomized clinical trial

J. Paul Muizelaar, M.D., Ph.D., Anthony Marmarou, Ph.D., John D. Ward, M.D., Hermes A. Kontos, M.D., Ph.D., Sung C. Choi, Ph.D., Donald P. Becker, M.D., Hans Gruemer, M.D., and Harold F. Young, M.D.

Division of Neurological Surgery, Medical College of Virginia, Richmond, Virginia

Effect of hyperventilation on regional cerebral blood flow in head-injured children

Peter Skippen, FANZCA; Michael Seear, FRCP; Ken Poskitt, FRCP; John Kestle, FRCSC; Doug Cochrane, FRCSC; Gail Annich, FRCP; Jeffrey Handel, MRCP

Hyperventilation in Severe Traumatic Brain Injury

Advisory No. 97-03

Date Approved: August 7, 1997

New York State Department of Health Bureau of Emergency Medical Services

Hyperventilation in Severe Traumatic Brain Injury

Advisory No. 97-03

Date Approved: August 7, 1997

New York State Department of Health Bureau of Emergency Medical Services

Current *Statewide Basic Life Support Adult and Pediatric Treatment Protocols* stipulate that hyperventilation, at a rate of 20 breaths per minute in an adult and 25 breaths per minute in a child, should be employed in major trauma whenever a head injury is suspected, the patient is not alert, the arms and legs are abnormally flexed and/or extended, the patient is seizing, or has a Glasgow Coma Scale of less than 8. The State Emergency Medical Advisory Committee has reviewed these protocols, and concludes, on the basis of recent scientific evidence, that in the patient with severe traumatic brain injury (Glasgow Coma Scale score < or = to 8) following open or closed head injury, **aggressive hyperventilation should be avoided in the prehospital setting**, unless there are active seizures or signs of transtentorial herniation.

Hyperventilation in Severe Traumatic Brain Injury

Advisory No. 97-03

Date Approved: August 7, 1997

New York State Department of Health Bureau of Emergency Medical Services

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Thus, normal ventilation is now recognized as the appropriate standard of care for initial management of severe traumatic brain injury. Yet, it is difficult for prehospital personnel to know whether they are achieving normal ventilation, particularly when using a bag and mask. To avoid this problem, prehospital personnel are advised to utilize strategies that maximize oxygen delivery and minimize inadequate ventilation. The State Emergency Medical Advisory Committee believes that these goals can best accomplished by utilizing ventilatory rates that are likely to avoid both hyperventilation and hypoventilation, hence to assure adequate ventilation, an approach which is consistent with the 1997 Edition of the Advanced Trauma Life Support Course of the American College of Surgeons.

Is hyperventilation dead?

Is hyperventilation dead?

- Uncontrolled hyperventilation is dead

Is hyperventilation dead?

- Uncontrolled hyperventilation is dead
- $EtCO_2$ to target 30-35

Is hyperventilation dead?

- Uncontrolled hyperventilation is dead
- $EtCO_2$ to target 30-35
- Mild hyperventilation helpful for the right patients

Is hyperventilation dead?

- Uncontrolled hyperventilation is dead
- $EtCO_2$ to target 30-35
- Mild hyperventilation helpful for the right patients
- signs of herniation

521

HEAD INJURIES

In patients with head trauma with a Glasgow Coma Scale (GCS) score of 13 or lower

1. Begin Basic Life Support Head and Spine Injuries procedures.
2. Perform Advanced Airway Management* in patients for whom the Glasgow Coma Scale score is less than 8 AND if less invasive methods of airway management are not effective.
3. Begin Cardiac Monitoring, record and evaluate EKG rhythm.
4. Begin an IV infusion of Normal Saline (0.9% NS) to keep vein open, or a Saline Lock.
5. If a seizure is witnessed:
   a. Administer Lorazepam 2 mg, IV/Saline Lock bolus, or, if IV access is unavailable, IN or IM. A single repeat dose of Lorazepam 2 mg, may be given after 5 minutes if seizure activity persists or recurs.

      OR

   b. Administer Diazepam 5 mg, IV/Saline Lock bolus. A single repeat dose of Diazepam 5 mg, IV/Saline Lock bolus, may be given if seizure activity persists or recurs. (Rate of administration may not exceed 5 mg/min.)

      OR

   c. Administer Midazolam 10 mg, IM or IN, if IV access is unavailable.
6. If the Glasgow Coma Scale (GCS) score is less than 8, and active seizures or one or more of the following signs of brain herniation are present, hyperventilate the patient to maintain a continuous end-tidal waveform capnography value between 30-35mmHg:
   a. Fixed or asymmetric pupils
   b. Abnormal flexion or extension (neurologic posturing)
   c. Hypertension and bradycardia (Cushing's Reflex)
   d. Intermittent apnea (periodic breathing)
   e. Further decrease in GCS score of 2 or more points (neurologic deterioration)
7. If seizure activity persists, contact Medical Control for implementation of one or more of the following MEDICAL CONTROL OPTIONS:

LASIX?

LASIX?

- Introduced in the 70's

LASIX?

- Introduced in the 70's
- In most ALS treatment protocols by the 80's

LASIX?

- Introduced in the 70's
- In most ALS treatment protocols by the 80's
- Gone now or being removed

LASIX?

- Introduced in the 70's
- In most ALS treatment protocols by the 80's
- Gone now or being removed
- Why?

Lasix

Lasix

- Loop Diuretic

Lasix

- Loop Diuretic
- Vasodilatory effect

Lasix

- Loop Diuretic
- Vasodilatory effect
- All CHF patients are volume overloaded aren't they?

Lasix

- Loop Diuretic
- Vasodilatory effect
- All CHF patients are volume overloaded aren't they?
- I can always tell the difference between CHF and pneumonia

ORIGINAL CONTRIBUTIONS

Evaluation of Prehospital Use of Furosemide in Patients with Respiratory Distress

2006, Vol. 10, No. 2 , Pages 194-197 (doi:10.1080/10903120500541282)

Results. Of the 144 included patients, a primary or secondary diagnosis of CHF was reported in 42% and17% patients, respectively. The initial BNP was > 400 in 44% of the 120 patients in which this lab test was obtained. Sixty patients (42%) did not receive a diagnosis of CHF, 30 (25%) patients had a BNP < 200, and33 (23%) had an order for IV fluid hydration. A diagnosis of sepsis, dehydration or pneumonia without a diagnosis of CHF or a BNP > 400 occurred in 17% of patients. Seven of the 9 deaths did not receive a diagnosis of CHF. Furosemide was considered appropriate in 58%, inappropriate in 42% andpotentially harmful in 17% of patients.
Conclusions. In this EMS system, prehospital furosemide was frequently administered to patients in whom its use was considered inappropriate, andnot uncommonly to patients when it was considered potentially harmful. EMS systems should reconsider the appropriateness of prehospital diuretic use.

clinical investigations

Comparison of Nitroglycerin, Morphine and Furosemide in Treatment of Presumed Pre-hospital Pulmonary Edema

Jerome R. Hoffman, M.D.; and Susan Reynolds, Ph.D., M.D.†*

CHEST / 92 / 4 / OCTOBER, 1987

2009

State of the Science

Meds Under Scrutiny

The Declining Roles of Furosemide, Morphine & Beta Blockers in Prehospital Care

By Jared McKinney, MD; Jeremy Brywczynski, MD; & Corey M. Slovis, MD

Is Lasix Done?

Is Lasix Done?

- pretty much yes

Is Lasix Done?

- pretty much yes
- we have better treatments

Is Lasix Done?

- pretty much yes
- we have better treatments
  - CPAP

Is Lasix Done?

- pretty much yes
- we have better treatments
  - CPAP
  - Nitro

Is Lasix Done?

- pretty much yes
- we have better treatments
  - CPAP
  - Nitro
- Doesn't work acutely

The Near Future

Soon to be obsolete?

Soon to be obsolete?

- Routine high flow oxygen

Soon to be obsolete?

- Routine high flow oxygen
- Backboards

Soon to be obsolete?

- Routine high flow oxygen
- Backboards
- Prehospital Intubation

Soon to be obsolete?

- Routine high flow oxygen
- Backboards
- Prehospital Intubation
- ALCS Meds

High flow oxygen

High flow oxygen

- All BLS protocols have...

High flow oxygen

- All BLS protocols have...
  - administer high concentration oxygen via NRFB

High flow oxygen

- All BLS protocols have...
  - administer high concentration oxygen via NRFB
  - Initiate transport

High flow oxygen

- All BLS protocols have...
  - administer high concentration oxygen via NRFB
  - Initiate transport
- Not anymore

Isn't Oxygen Harmless?

Isn't Oxygen Harmless?

- Free radicals

Isn't Oxygen Harmless?

- Free radicals
- worse outcomes for many disease states

Isn't Oxygen Harmless?

- Free radicals
- worse outcomes for many disease states
  - AMI

Isn't Oxygen Harmless?

- Free radicals
- worse outcomes for many disease states
  - AMI
  - Post arrest

Isn't Oxygen Harmless?

- Free radicals
- worse outcomes for many disease states
  - AMI
  - Post arrest
  - COPD

Isn't Oxygen Harmless?

- Free radicals
- worse outcomes for many disease states
  - AMI
  - Post arrest
  - COPD
- Can you saturate beyond 100%?

BMJ

RESEARCH

Effect of high flow oxygen on mortality in chronic obstructive pulmonary disease patients in prehospital setting: randomised controlled trial

Michael A Austin, honorary associate,[1] emergency medicine registrar,[2] wilderness helicopter, intensive care paramedic,[3] Karen E Wills, biostatistician,[1] Leigh Blizzard, senior biostatistician,[1] Eugene H Walters, professorial fellow,[1] Richard Wood-Baker, honorary fellow,[1] director[2]

Accepted: 19 August 2010

Cardiac Patients

Cardiac Patients

- AHA/ACC Guidelines

Cardiac Patients

- AHA/ACC Guidelines
- UA/NSTEMI/STEMI

Cardiac Patients

- AHA/ACC Guidelines
- UA/NSTEMI/STEMI
    - "No evidence to support the routine use of supplemental oxygen"

Cardiac Patients

- AHA/ACC Guidelines
- UA/NSTEMI/STEMI
  - "No evidence to support the routine use of supplemental oxygen"
  - Titrate to SpO2 of >94%

Cardiac Patients

- AHA/ACC Guidelines
- UA/NSTEMI/STEMI
  - "No evidence to support the routine use of supplemental oxygen"
  - Titrate to SpO2 of >94%
- Post-ROSC care

Practical Implications

Practical Implications

- Take a history

Practical Implications

- Take a history
- Vomiting patients

Practical Implications

- Take a history
- Vomiting patients
- D-cylinder at 15LPM?

Practical Implications

- Take a history
- Vomiting patients
- D-cylinder at 15LPM?
- No improved outcome and possible harm

Backboards

Backboards

- Are you kidding?

Backboards

- Are you kidding?
- We board and collar everyone

Backboards

- Are you kidding?
- We board and collar everyone
- What's the evidence?

Backboards

- Are you kidding?
- We board and collar everyone
- What's the evidence?
- Changing paradigm

Table 1. Potential harmful effects of immobilization

- Airway compromise
- Aspiration
- Increased intracranial pressure
- Cutaneous pressure ulcers
- Iatrogenic pain
- Increased difficulty of patient handling
- Combativeness in intoxicated patients
- Increased cost

Why We Need to Rethink C-Spine Immobilization

BY KARL A. SPORER, MD, FACEP, FACP (/CONTACT/10813749/KARL-A-SPORER-MD-FACEP-FACP)

CREATED: NOVEMBER 1, 2012

EMSWORLD

Why We Need to Rethink C-Spine Immobilization

BY KARL A. SPORER, MD, FACEP, FACP (/CONTACT/10813749/KARL-A-SPORER-MD-FACEP-FACP)
CREATED: NOVEMBER 1, 2012

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Home > Patient Care > Research Suggests Time for Change in Prehospital Spinal Immobilization > Research Suggests Time for Change in Prehospital Spinal Immobilization

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Research Suggests Time for Change in Prehospital Spinal Immobilization

Tuesday, March 19, 2013
Jim Morrissey, MA, EMT-P

PRELIMINARY REPORTS

Out-of-hospital Spinal Immobilization: Its Effect on Neurologic Injury

Mark Hauswald, MD, Gracie Ong, MBBS, Dan Tandberg, MD, Zaliha Omar, MBBS

Spinal immobilisation for trauma patients (Review)

Kwan I, Bunn F, Roberts IG

THE COCHRANE
COLLABORATION®

Position Statement

EMS Spinal Precautions and the Use of the Long Backboard

National Association of EMS Physicians and American College
of Surgeons Committee on Trauma

Intubation?

Prehospital Endotracheal Intubation: Rationale for Training Emergency Medical Personnel

Endotracheal intubation by emergency medical services (EMS) personnel in the prehospital setting decreases morbidity and helps to improve the outcome of critically ill patients, especially those with cardiac or respiratory arrest, multiple injuries, or severe head trauma. The endotracheal tube facilitates better oxygenation and ventilation because it enhances lung inflation and protects the lungs from aspiration. No other alternative modality is as efficacious. Compared to physicians in general, properly instructed, well-supervised paramedics can be trained to perform this procedure safely and more efficiently in the emergency setting. The use of the endotracheal tube in the prehospital setting should be strongly encouraged and the training of EMS personnel in this skill should be given high priority. [Pepe PE, Copass MK, Joyce TH: Prehospital endotracheal intubation: Rationale for training emergency medical personnel. Ann Emerg Med November 1985;14:1085-1092.]

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Michael K Copass, MD†
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Houston, Texas
Seattle, Washington

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The Journal of TRAUMA® Injury, Infection, and Critical Care

The Impact of Prehospital Endotracheal Intubation on Outcome in Moderate to Severe Traumatic Brain Injury

Daniel P. Davis, MD, FACEP, Jeremy Peay, MS4, Michael J. Sise, MD, FACS, Gary M. Vilke, MD, FACEP, Frank Kennedy, MD, A. Brent Eastman, MD, Thomas Velky, MD, and David B. Hoyt, MD, FACS

Background: Although early intubation to prevent the mortality that accompanies hypoxia is considered the standard of care for severe traumatic brain injury (TBI), the efficacy of this approach remains unproven.

Methods: Patients with moderate to severe TBI (Head/Neck Abbreviated Injury Scale [AIS] score 3+) were identified from our county trauma registry. Logistic regression was used to explore the impact of prehospital intubation on outcome, controlling for age, gender, mechanism, Glasgow Coma Scale score, Head/Neck AIS score, Injury Severity Score, and hypotension. Neural network analysis was performed to identify patients predicted to benefit from prehospital intubation.

Results: A total of 13,625 patients from five trauma centers were included; overall mortality was 22.9%, and 19.3% underwent prehospital intubation. Logistic regression revealed an increase in mortality with prehospital intubation (odds ratio, 0.36; 95% confidence interval, 0.32–0.42; $p < 0.001$). This was true for all patients, for those with severe TBI (Head/Neck AIS score 4+ and/or Glasgow Coma Scale score of 3–8), and with exclusion of patients transported by aeromedical crews. Patients intubated in the field versus the emergency department had worse outcomes. Neural network analysis identified a subgroup of patients with more significant injuries as potentially benefiting from prehospital intubation.

Conclusion: Prehospital intubation is associated with a decrease in survival among patients with moderate-to-severe TBI. More critically injured patients may benefit from prehospital intubation but may be difficult to identify prospectively.

Key Words: Prehospital intubation, Traumatic brain injury, Outcome, Mortality, Hypoxia.

J Trauma. 2005;58:933–939.

CLINICAL PRACTICE

The Association Between Prehospital Endotracheal Intubation Attempts and Survival to Hospital Discharge Among Out-of-hospital Cardiac Arrest Patients

Jonathan R. Studnek, PhD, NREMT-P, Lars Thestrup, MD, Steve Vandeventer, EMT-P, Steven R. Ward, NREMT-P, Kevin Staley, MPA, EMT-P, Lee Garvey, MD, and Tom Blackwell, MD

Abstract

Objectives: The benefit of prehospital endotracheal intubation (ETI) among individuals experiencing out-of-hospital cardiac arrest (OOHCA) has not been fully examined. The objective of this study was to determine if prehospital ETI attempts were associated with return of spontaneous circulation (ROSC) and survival to discharge among individuals experiencing OOHCA.

Methods: This retrospective study included individuals who experienced a medical cardiac arrest between July 2006 and December 2008 and had resuscitation efforts initiated by paramedics from Mecklenburg County, North Carolina. Outcome variables were prehospital ROSC and survival to hospital discharge, while the primary independent variable was the number of prehospital ETI attempts.

Results: There were 1,142 cardiac arrests included in the analytic data set. Prehospital ROSC occurred in 299 individuals (26.2%). When controlling for initial arrest rhythm and other confounding variables, individuals with no ETI attempted were 2.33 (95% confidence interval [CI] = 1.63 to 3.33) times more likely to have ROSC compared to those with one successful ETI attempt. Of the 299 individuals with prehospital ROSC, 118 (39.5%) were subsequently discharged alive from the hospital. Individuals having no ETI were 5.46 (95% CI = 3.36 to 8.90) times more likely to be discharged from the hospital alive compared to individuals with one successful ETI attempt.

Conclusions: Results from these analyses suggest a negative association between prehospital ETI attempts and survival from OOHCA. In this study, the individuals most likely to have prehospital ROSC and survival to hospital discharge were those who did not have a reported ETI attempt. Further comparative research should assess the potential causes of the demonstrated associations.

ACADEMIC EMERGENCY MEDICINE 2010; 17:918–925

Keywords: death, sudden, intubation, intratracheal, emergency medical services, epidemiology

Intubation

Intubation

- List of negative outcome studies growing

Intubation

- List of negative outcome studies growing
- good alternatives exist

Intubation

- List of negative outcome studies growing
- good alternatives exist
- hard to maintain proficiency

Intubation

- List of negative outcome studies growing
- good alternatives exist
- hard to maintain proficiency
- may be removed soon

ACLS Meds

ACLS Meds

- No single study showing benefit of ACLS meds

ACLS Meds

- No single study showing benefit of ACLS meds
- 2 recent negative Epi studies

ACLS Meds

- No single study showing benefit of ACLS meds
- 2 recent negative Epi studies
  - Japan, Australia

ACLS Meds

- No single study showing benefit of ACLS meds
- 2 recent negative Epi studies
  - Japan, Australia
- Atropine removed recently

ACLS Meds

- No single study showing benefit of ACLS meds
- 2 recent negative Epi studies
  - Japan, Australia
- Atropine removed recently
- Others to follow soon?

The Ontario Prehospital Advanced Life Support (OPALS) Study: Rationale and Methodology for Cardiac Arrest Patients

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Justin P Maloney, MD, FRCPC[||]
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Roxanne Ward, RN[§]
Valerie J DeMaio, BSc[§]
For the OPALS Study Group

The Ontario Prehospital Advanced Life Support Study represents the largest prehospital study yet conducted, worldwide. This study will involve more than 25,000 cardiac arrest, trauma, and critically ill patients over an 8-year period. The study will evaluate the incremental benefit of rapid defibrillation and prehospital Advanced Cardiac Life Support measures for cardiac arrest survival and the benefit of Advanced Life Support for patients with traumatic injuries and other critically ill prehospital patients. This article describes the OPALS study with regard to the rationale and methodology for cardiac arrest patients.

[Stiell IG, Wells GA, Spaite DW, Lyver MB, Munkley DP, Field BJ, Dagnone E, Maloney JP, Jones GR, Luinstra LG, Jermyn BD, Ward R, DeMaio VJ, for the OPALS Study Group: The Ontario Prehospital Advanced Life Support (OPALS) Study: Rationale and Methodology for cardiac arrest patients. *Ann Emerg Med* August 1998;32:180-190.]

Current Opinion in Cardiology:
January 2013 - Volume 28 - Issue 1 - p 36–42
doi: 10.1097/HCO.0b013e32835b0979
ARRHYTHMIAS: Edited by Anthony Tang

Epinephrine for cardiac arrest

Callaway, Clifton W.

Abstract

Purpose of review: Epinephrine is the primary drug administered during cardiopulmonary resuscitation (CPR) to reverse cardiac arrest. Epinephrine increases arterial blood pressure and coronary perfusion during CPR via alpha-1-adrenoceptor agonist effects. However, the dose, timing and indications for epinephrine use are based on limited animal data. Recent studies question whether epinephrine provides any overall benefit for patients.

Recent findings: A randomized controlled trial indicates that epinephrine for out-of-hospital cardiac arrest increases return of pulses, but does not significantly alter longer-term survival. Very large, well-controlled, observational studies suggest that, despite increases in return of pulses, epinephrine reduces long-term survival and functional recovery after CPR. Detrimental effects were greatest in patients found in ventricular fibrillation. Laboratory data suggest that harmful epinephrine-induced reductions in microvascular blood flow during and after CPR may offset the beneficial epinephrine-induced increase in arterial blood pressure during CPR.

Summary: The available clinical data confirm that epinephrine administration during CPR can increase short-term survival (return of pulses), but point towards either no benefit or even harm of this drug for more patient-centred outcomes (long-term survival or functional recovery). Prospective trials are needed to determine the correct dose, timing and patients for epinephrine in cardiac arrest.

Prehospital Epinephrine Use and Survival Among Patients With Out-of-Hospital Cardiac Arrest

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Manabu Hasegawa, MD
Takeru Abe, MA
Takashi Nagata, MD
Yoshifumi Wakata, MD
Shogo Miyazaki, PhD

Context Epinephrine is widely used in cardiopulmonary resuscitation for out-of-hospital cardiac arrest (OHCA). However, the effectiveness of epinephrine use before hospital arrival has not been established.

Objective To evaluate the association between epinephrine use before hospital arrival and short- and long-term mortality in patients with cardiac arrest.

Design, Setting, and Participants Prospective, nonrandomized, observational propensity analysis of data from 417 188 OHCAs occurring in 2005-2008 in Japan in which patients aged 18 years or older had an OHCA before arrival of emergency medical service (EMS) personnel, were treated by EMS personnel, and were transported to the hospital.

Main Outcome Measures Return of spontaneous circulation before hospital arrival, survival at 1 month after cardiac arrest, survival with good or moderate cerebral performance (Cerebral Performance Category [CPC] 1 or 2), and survival with no, mild, or moderate neurological disability (Overall Performance Category [OPC] 1 or 2).

Results Return of spontaneous circulation before hospital arrival was observed in 2786 of 15 030 patients (18.5%) in the epinephrine group and 23 042 of 402 158 patients (5.7%) in the no-epinephrine group ($P<.001$); it was observed in 2446 (18.3%) and 1400 (10.5%) of 13 401 propensity-matched patients, respectively ($P<.001$). In the total sample, the numbers of patients with 1-month survival and survival with CPC 1 or 2 and OPC 1 or 2, respectively, were 805 (5.4%), 205 (1.4%), and 211 (1.4%) with epinephrine and 18 906 (4.7%), 8903 (2.2%), and 8831 (2.2%) without epinephrine (all $P<.001$). Corresponding numbers in propensity-matched patients were 687 (5.1%), 173 (1.3%), and 178 (1.3%) with epinephrine and 944 (7.0%), 413 (3.1%), and 410 (3.1%) without epinephrine (all $P<.001$). In all patients, a positive association was observed between prehospital epinephrine and return of spontaneous circulation before hospital arrival (adjusted odds ratio [OR], 2.36; 95% CI, 2.22-2.50; $P<.001$). In propensity-matched patients, a positive association was also observed (adjusted OR, 2.51; 95% CI, 2.24-2.80; $P<.001$). In contrast, among all patients, negative associations were observed between prehospital epinephrine and long-term outcome measures (adjusted ORs: 1-month survival, 0.46 [95% CI, 0.42-0.51]; CPC 1-2, 0.31 [95% CI, 0.26-0.36]; and OPC 1-2, 0.32 [95% CI, 0.27-0.38]; all $P<.001$). Similar negative associations were observed among propensity-matched patients (adjusted ORs: 1-month survival, 0.54 [95% CI, 0.43-0.68]; CPC 1-2, 0.21 [95% CI, 0.10-0.44]; and OPC 1-2, 0.23 [95% CI, 0.11-0.45]; all $P<.001$).

Conclusion Among patients with OHCA in Japan, use of prehospital epinephrine was significantly associated with increased chance of return of spontaneous circulation before hospital arrival but decreased chance of survival and good functional outcomes 1 month after the event.

JAMA. 2012;307(11):1161-1168 www.jama.com

Epinephrine is widely used in cardiopulmonary resuscitation (CPR) for patients with out-of-hospital cardiac arrest (OHCA).[1-3] However, its effectiveness in CPR has not been established. Epinephrine is associated with increased myocardial oxygen consumption and ventricular arrhythmias during the period after resuscitation.[4] Concern has been raised regarding increased myocardial dysfunction[5,6] and disturbed cerebral microcirculation after cardiac arrest.[7] Findings in support of epinephrine use include animal studies that show a beneficial short-term effect of epinephrine,[8,9] and evidence of increased cerebral and coronary perfusion by redirected peripheral blood flow has been reported.[10,11]

To verify the effectiveness of epinephrine in CPR, the influences of other factors, such as patients, bystanders, CPR by bystanders, life support by emergency medical service (EMS) personnel, and time from call to the scene or hospital arrival, need to be con-

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Clinical paper

Effect of adrenaline on survival in out-of-hospital cardiac arrest: A randomised double-blind placebo-controlled trial☆

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ABSTRACT

Background: There is little evidence from clinical trials that the use of adrenaline (epinephrine) in treating cardiac arrest improves survival, despite adrenaline being considered standard of care for many decades. The aim of our study was to determine the effect of adrenaline on patient survival to hospital discharge in out of hospital cardiac arrest.

Methods: We conducted a double blind randomised placebo-controlled trial of adrenaline in out-of-hospital cardiac arrest. Identical study vials containing either adrenaline 1:1000 or placebo (sodium chloride 0.9%) were prepared. Patients were randomly allocated to receive 1 ml aliquots of the trial drug according to current advanced life support guidelines. Outcomes assessed included survival to hospital discharge (primary outcome), pre-hospital return of spontaneous circulation (ROSC) and neurological outcome (Cerebral Performance Category Score – CPC).

Results: A total of 4103 cardiac arrests were screened during the study period of which 601 underwent randomisation. Documentation was available for a total of 534 patients: 262 in the placebo group and 272 in the adrenaline group. Groups were well matched for baseline characteristics including age, gender and receiving bystander CPR. ROSC occurred in 22 (8.4%) of patients receiving placebo and 64 (23.5%) who received adrenaline (OR – 3.4; 95% CI 2.0–5.6). Survival to hospital discharge occurred in 5 (1.9%) and 11 (4.0%) patients receiving placebo or adrenaline respectively (OR – 2.2; 95% CI 0.7–6.3). All but two patients (both in the adrenaline group) had a CPC score of 1–2.

Conclusion: Patients receiving adrenaline during cardiac arrest had no statistically significant improvement in the primary outcome of survival to hospital discharge although there was a significantly improved likelihood of achieving ROSC.

CARDIAC ARREST

CARDIAC ARREST

- It's BLS!

CARDIAC ARREST

- It's BLS!
- CPR

CARDIAC ARREST

- It's BLS!
- CPR
- Defibrillation

CARDIAC ARREST

- It's BLS!
- CPR
- Defibrillation
- Intubation no good

CARDIAC ARREST

- It's BLS!
- CPR
- Defibrillation
- Intubation no good
- Meds no good

Summary

Summary

- Throw it on the bus doesn't work anymore

Summary

- Throw it on the bus doesn't work anymore
- The World of EBM

Summary

- Throw it on the bus doesn't work anymore
- The World of EBM
- Outcomes driven care

Summary

- Throw it on the bus doesn't work anymore
- The World of EBM
- Outcomes driven care
- Be willing to change