Resuscitative Thoracotomy

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• No conflicts of interest to declare
Aims

- Background / Definition
- Indications
- Procedure
- Training
Resuscitative Thoracotomy - Definition

- Part of patient resuscitation
- Emergency department thoracotomy “EDT”
- Prehospital thoracotomy
  - London
  - Hampshire
  - Spain
  - Brazil
  - Australia
  - USA
Definitions

- Cardiac Arrest
  - Asystole
- Circulatory Arrest
  - No signs of life
  - ECG / Cardiac activity
Background

- 30 years subject of much debate
  - Where should it happen
  - Who should carry it out
  - Which pts groups
- Economic evaluations
- Assessments of risk to operators
- Difficulty interpreting papers eg loss of VS
Indications

- Blunt trauma
- Penetrating trauma
Blunt Injury – When to perform EDT
Traditional Teaching

- Loss of vital signs in / on arrival at ED

Termination of resuscitative efforts: medical futility for the trauma patient

Eckstein, Curr Opin in Crit Care, 2001
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<th>Author</th>
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<td>Espoito</td>
<td>1991</td>
<td>J Trauma</td>
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<td>Mazzorana</td>
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Survival for blunt pts with loss of vital signs at scene
Branney et al, 1998 J Trauma

- 23 years, 868 thoracotomies
- Loss of VS at scene EDT not effective
- 385 blunt injury
- 2 pts surviving from blunt injury
- Neurologically abnormal ? extent

Resuscitation may be withheld if:

- Injuries ‘incompatible with life’
- Evidence of rigor mortis
- Trauma, apnoea, pulseless, no ECG activity @ scene
- EMS witnessed arrest & 15 minutes of unsuccessful CPR
- Arrest and 15 minutes transport time to ED

¹. National Association Emergency Medical Service Physicians American College Surgeons Committee on Trauma
Fialka et al, J Trauma 2004

- OCCPR for blunt trauma
- < 20 mins CCCPR
- Confirmed signs of bleeding
  - 4 / 38 survivors (10%)
  - 3 single system injury
    - Liver laceration, Pelvis, Trachea
  - 1 multi-system
    - Pelvis, abdo, legs, ribs, bladder

All neurologically intact
Penetrating Injury – When is EDT unproductive

- Monitored asystole on arrival at ED with non thoracic wounds

Termination of resuscitative efforts: medical futility for the trauma patient

Eckstein, Curr Opin in Crit Care, 2001
ED thoracotomy - penetrating

- Chest wounds
- Loss of VS at scene
- Presents in asystole
- Short < 10 mins transport time
Where should EDT be performed?
Who should perform it?

- Fully trained cardiothoracic surgeon?
- Others:
  - Emergency physicians
  - Anaesthetists
  - General surgeons
- When should they step in?
- How should they be trained?
Emergency / Prehospital Thoracotomy: Indications

1. Penetrating injury to:
   1. Chest or
   2. Upper abdomen
2. Absence of vital signs
Points to remember / reassure

- The patient is dead
- It can't get worse!
- We are only looking for one simple pathology

“Single ventricular wound with an obstructive tamponade”
Human Factors Approach

- Equipment
- Incision
- Approach to incision
Human Factors – The Equipment
Human Factors – The best incision

- Books = L lateral
- No light
- Anatomy obscure
- Needs dexterity
Clamshell Incision
Inside the pericardium

Remove the clot with your hands
Once in pericardium

Heart will need restarting

Heart will beat spontaneously

Deal with wound
Restarting the heart

- Flick it
- Volume load
- 2 handed massage
- Ventricular adrenaline
Top Tips

- Quality of your massage is everything

- Third hand - occlude the descending aorta

- Don’t deliver the heart
What if’s

- Internal mammary arteries bleed
  - Clip them

- Patient goes into VF
  - Close chest and defib as normal

- Patient wakes up
  - Anaesthetise
  - Midazolam 1 mg aliquots
  - Ketamine 30 mg aliquots
Dealing with the wound

- Put your finger over it
- Stitch it
- Foley catheter

Spray wound edges with betadine
Irrigate wounds
Key points for success

- ‘Everything to gain’ situation
- Recognise the problem early – decision <15secs
- Rapid access (<60secs) to pericardium
- Extend wound to posterior axillary lines
- Good quality massage essential
- Aortic occlusion vs. spinal column
Efficacy - Prehospital Thoracotomy

- 71 stab wounds
- Loss of vital signs
- 13 survivors
- 11 neurologically normal
- 18% survival rate from no signs of life

EDT for tamponade with loss of vs in ED survival rate 74%
Training

- Educate
- Video
- Mannequin
- Talk through
- Tutorial / slide show
Summary

• What it is
• When you might perform it
• How you might perform it
• How might train for it
• How successful it can be
Thank you?