Sometime in the future.....

67 yr old Male
- 911 called by family for agonal respiration
- Pt with BMI > 70 (~280 kg)
- Found with agonal respirations going into CA
- CPR and one defib for VF to Pea/asystoli
- BVM attempted with little success
- Video Laryngoscopy: intubation with ongoing CPR one attempt 34 sec
- Pt returned to VF and shocked to rhythm
- Transported but died in ED

"To Tube or Not to Tube that is the Question?"*
Does Video Laryngoscopy Change the Playing Field?

*with apology to William Shakespeare

Disclosure:
- Received equipment for research from Verathon Medical (Glidescopes and recorders)
- No financial interest
- No direct funding

What is Known in the Age of Change?

- Witnessed Cardiac arrest – outcomes superior to non witnessed.
  - rates as high as 53%
- Immediate defibrillation is superior to delayed.
  - ROC studies
- Continuous CPR is superior to interrupted.
  - 2010 AHA Guidelines
- Mechanical CPR may be more effective in sustaining cardiac output.
  - LUCAS*, Auto Pulse* (some equal, some better)

What is Known in the Age of Change?

- CPR can be effective for 90 minutes
  - Case studies, Minnesota pt. for several hours
- VF and VT is better than PEA /Asystoli.
  - Unwitnessed arrest survival 5X greater
- Therapeutic Hypothermia is beneficial.
  - ROSC patients not waking up
  - Outcomes as good as 55% with good CPC scores
Intubated patients have poorer results – But why?
- DL – "gold standard" more difficult?
  - Often requires cessation of CPR
  - Multiple attempts
  - Prolonged anoxia/misplaced tubes
- San Diego – Prolonged intubation times and desaturation in "Easy Airways".*
  - Dunford, et al...

High rate of complications – Lyon et al
- Multiple attempts, anoxia, misplacement
- Technique, devices, monitoring?

Japanese Study compared SGA vs. ETT
- 1700 ETT vs. 3700 SGA
- Outcomes identical at one month
- Time to insertion longer with SGA

But is that the real answer?
- Soiled airways are bad.
  - Vomit, aspiration, and debris common
  - BVM poorly done, fills stomach with air
  - Supraglottic airway may not be so super
  - Hyperventilation is bad ! CO
  - Aufderheide et al
- Devices such as ITD with timing light.
  - Improve CO and control ventilatory rate
  - Best done with ETT

Maybe it’s the device?
- Original Direct Laryngoscope–Babington 1830
- Kirstein added light 1895
- More modifications, Miller, McIntosh etc.
- Line of sight with poor views 10–20 % of the time
- Requires significant force

What about Supraglottic airways?
- LMA
- Combitube/Easytube
- King LTD
- Others
  - Some easy, some harder to master.
    - Variable on aspiration prevention
    - Efficacy data varies
    - Still valuable as rescue airway
  - Fiber optic – not widely used.
    - Expensive
    - Difficult to master
What is needed to make change?

- Goals
  - Reduce multiple attempts at intubation
  - Prevent:
    - Dental, mouth & airway trauma
    - Desaturation
    - Intracranial hypertension
    - Pneumothorax
    - Pulmonary aspiration
    - Unrecognized esophageal placement

Does Video make that change?

- Attributes:
  - Camera lens in handle or blade
  - Image of larynx/glottis on monitor
  - Monitor attached or separate
  - Recording capabilities
  - Ruggedized for field/ED use
  - Easy to clean and maintain

Does Video make that change?

- Attributes:
  - Provide full view of glottic opening even in difficult patients
  - Easy to learn and master – even if used infrequently
  - Useful to monitor and as a teaching tool

Video Advantages

- 99% Grade 1–2 view
- Confirms tube in airway and depth
- Video event recording–documentation
- Education – multiple viewer/training videos

Training is enhanced

- Real time critique of procedure
- “ETT can be carried out without interruption of CPR?”

Video Laryngoscopes

These and many more now on market

What is Known in the Age of Change?

- So big Question…?
  - If arrest in ED/Hospital would patient be intubated?
    - Why there but not elsewhere?
    - Stopping CPR bad everywhere
    - Misplaced tubes bad everywhere
    - Good training not limited to physicians

- Can non–physicians do as well?
  - Out of hospital environment difficult but not impossible
  - Training can be enhanced by technology
  - Technology allows video review for education and QM
### Intubation with continuous CPR does video change the playing field?

<table>
<thead>
<tr>
<th>Video Laryngoscopy</th>
<th>Direct Laryngoscopy</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>101</td>
<td>388</td>
</tr>
<tr>
<td>Age</td>
<td>58 (23-90)</td>
<td>60 (20-90)</td>
</tr>
<tr>
<td>Age</td>
<td>58 (23-90)</td>
<td>58 (20-90)</td>
</tr>
<tr>
<td>Sex</td>
<td>M 66 vs. F 35</td>
<td>66 vs. 35</td>
</tr>
<tr>
<td>Standard CPR</td>
<td>48</td>
<td>35</td>
</tr>
<tr>
<td>Mechanical</td>
<td>53</td>
<td>10</td>
</tr>
<tr>
<td>VT/VF</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>PEA/ASOS</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>Misplaced</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Non-ventilated</td>
<td>37 sec</td>
<td>23 sec</td>
</tr>
</tbody>
</table>

### Intubation with continuous CPR

- 23 yo M tossing FB with friend with sudden collapse.
- Long time for friend to get phone and call 911.
- Telephone CPR, EMS, EMS supervisor, EMS MD.
- Continuous CPR with intubation and defib.
- Transport to ED, Cath Lab Th Hypothermia
- Stimulant induced VF.
- Now works with drug prevention program.

### A lot more than just CPR

- Is tube in right place?
- Foreign body removal.
- Airway burns.
- Can’t intubate can’t ventilate...hope you never see this one again!
Video Laryngoscopy as an Airway Resource

- 99% grade 1 and 2 views are attained.
- Why struggle with line of sight DL with poor views 10–20% of the time?
- Improved use of PEEP, ITD, etc.
- Event recording of all airway placements possible.
- Conclusion: Video will replace standard laryngoscopy.

Unanswered Questions?

- Will expeditious intubation have any positive effect on outcomes?
- Can we now safely intubate kids?
- How much “effective ventilation” comes from: Manual CPR vs Machine CPR?
- Does the Airway matter at all?

Conclusions

- Video Laryngoscopy provides the means for ETT during uninterrupted CPR.
- ETT will prevent ongoing aspiration more effective ventilation than without.
- There are more options with an ETT in place (ITD, PEEP, ETCO2).
- However, no proof that these measures can or do affect outcome – YET!

“Nothing endures but change.”

Heraclitus
540 BC – 480 BC