Digital tracheal intubation in newborns

Emilja Juretić, Krešimir Perković

Clinical Hospital Centre Zagreb,
University of Zagreb, School of Medicine
Department of Obstetrics and Gynecology, Division of Neonatology
Petrova 13, Zagreb, Croatia
History of neonatal ventilation

The death of newborns has been recognized since ancient times.

- Description of mouth-to-mouth resuscitation in the Old Testament
- Hippocrates (400 BC) intubation of the trachea to support pulmonary ventilation
- Galen (129-199 AD) used bellows to inflate the lungs of dead animals
- Avicenna inserted gold or silver cannula in the trachea (1000 AD)
- Paracelsus (1493-1541) reported the use of bellows and an oral tube

In the early 1800s interest in resuscitation of newborn infants flourished and on occasions ventilatory support was carried out with tubes passed into trachea
History of neonatal ventilation

In 1806, Chaussier described the intubation and resuscitation of asphyxiated and stillborn infants

In 1879 the device - aerophore pulmonaire

In 1828, Billard – Pulmonary diseases in newborn infants

Benjamin Pugh’s Air-Pipe*

*Galiral (late 1800’s) first mechanical device for artificial ventilation (‘aerophore pulmonaire’)

Figure 1-1. The aerophore pulmonaire of Galiral. (From DePaul, Dictionnaire Encyclopédique, Vol. xii, 13th Series)
I pass the fore-finger of my left hand down upon the root of the tongue and into the rima glottidis, and then using the tube with the right hand, I slide it along the surface of the finger, used as a director, till reaching the rima I insert the tube at the moment when the finger is with-drawn from it, afterwards feeling on the front of the neck whether the instrument is lying in the trachea or the oesophagus. This done, you may take the child into your hands, and from your own lungs you may inflate the lungs....

James Blundell, MD, was born in 1790. He graduated in Edinburgh in 1813 and from 1814 until 1836 he taught midwifery at Guy's Hospital where he became Professor of Obstetricy.

Blundell J. *Principles and practice of obstetricy*. Edited by T Castle. London, 1834
Blind digital endotracheal intubation did not gain widespread acceptance and was regarded in the 20th century as an alternative lifesaving method when conventional laryngoscopic intubation failed or was not possible because of a lack of equipment or in emergency clinical situations in which direct visualization of the glottis could not be performed.
Digital endotracheal intubation was described anew in notable medical literature:

- in neonatology
- in anesthesia
- in emergency medicine,
- in prehospital care
Advantages of digital intubation

• speed and ease of tube placement
• little movement of the infant
• reduced trauma
• can be learned easily

It is a relatively simple technique requiring no equipment except an endotracheal tube.

When performed with experience and skill
• the success rate at the first attempt of intubation is high
• intubation time is shorter than with laryngoscopy
Complications of digital intubation

are minimized by gentle manipulation and controlled palpation of anatomic landmarks

- trauma to the upper airway
- esophageal misplacement

**Caution** - in cases when airway pathology is suspected

Endotracheal tube should **never be advanced forcefully** against resistance!
Intubation proficiency is required in emergency situations

Although ventilation can be accomplished using a bag and mask – there are many instances when neonatal tracheal intubation is required.

Intubation skill
• Initial training using plastic manikins, courses and practice
• Simulation training (interactive neonatal simulator)
• Without regular practice individual intubation skill level decreases over time
Box plot showing median, interquartile range, outliers, and extremes of duration of successful intubation attempts by grade of doctor.

Moura and da Silva. Neonatal laryngoscope intubation and the digital method: A randomized controlled trial

- A total of 45 intubations on 34 newborns were analyzed
- The time was measured from the insertion of the finger or the laryngoscope blade into the oral cavity.
# Neonatal laryngoscope intubation and the digital method


Results in relation to the neonatal intubation method

<table>
<thead>
<tr>
<th>Variables</th>
<th>Digital intubation (N = 21)</th>
<th>Laryngoscope intubation (N = 24)</th>
<th>Statistical analysis (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success rate</td>
<td>90.5% (19/21)</td>
<td>50% (12/24)</td>
<td>.004</td>
</tr>
<tr>
<td>Intubation time (sec)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean time ± SD</td>
<td>8.2 ± 4.0</td>
<td>13.1 ± 4.4</td>
<td>.007</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bleeding</td>
<td>57.1% (12/21)</td>
<td>54.2% (13/24)</td>
<td>1.0</td>
</tr>
<tr>
<td>Trauma</td>
<td>4.8% (1/21)</td>
<td>25% (6/24)</td>
<td>.1</td>
</tr>
</tbody>
</table>
At our institution finger intubation has been a preferable way of intubation for decades.

We find the method very valuable especially

• when meconium aspiration is present in term newborns
• in small premature infants
• in various emergency situations
• during transport
• when there is inability to see secondary to blood and secretions
Naslov originala

OBSTETRICS

From the original text of Joseph B. De Lee, M.D.

by

J. P. GREENHILL, M. D., F.A.C.S., F.I.C.S. (HON.)

Senior Attending Obstetrician and Gynecologist, The Michael Reese Hospital,
Obstetrician and Gynecologist, Associate Staff, The Chicago Lying-in Hospital;
Attending Gynecologist, Cook County Hospital; Professor of Gynecology, Cook
County Graduate School of Medicine

Twelfth edition

W. B. Saunders Company

Philadelphia — London
Plastic manikin with anatomically realistic airway
Newborn with prenatal diagnosis of congenital diaphragmatic hernia
Technique of finger intubation

- Insert the index finger into the oral cavity and slide along the surface of the tongue, over the epiglottis and place the finger tip in the hypopharynx touching the arytenoid cartilage.

- Insert the endotracheal tube in the mouth, glide under the volar surface of the finger and advance slowly into the trachea.

- The finger serves as a backstop and guides the tube into the trachea.

- "Tip to lip" distance: $6 + \text{infant’s weight in kg}$

*Look for chest-wall movements,*
*listen for breath sounds,*
*take a chest-XR*

*CO$_2$ detector*
Conclusions

• Digital intubation is a relatively simple technique that can be learned easily.

• It is a valuable skill that gives the confidence of being able to perform a quick intubation in every situation.

• It has the potential to be the method of first choice in securing the airway when meconium aspiration is present.