

## HISTORY OF NEONATAL RESUSCITATION WITH SPECIAL REFERENCE TO *PRANA PRATYAGAMANA*

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### ABSTRACT

The main aim and objective of this article is to explore the ancient neonatal resuscitation method used in ancient period by various physician of that time. Since ancient times many different methods have been used to revive newborns. Most strategies for resuscitation focused on adults until the early 1800s. The most promising techniques and strategies for neonatal resuscitation were developed during the latter part of the twentieth century. There is, however, little evidence to support current recommendations, which are largely based on expert opinion. The challenge for neonatologists today is to gather robust evidence to support or refute these recommendations, thereby refining this common and important intervention. The term *Prana pratyagamana* (first textual reference) used in *Charak Samhita* is very much similar to resuscitation. The word “*Prana*” besides breath (respiration), the “*pratyagamana*” is “Coming Back or arrival” overall the word “*Prana pratyagamana*” of *Ayurveda* much beyond the establishment of respiration only. It is defined as reappearance of *Prana* by respiratory effort, heartbeat, body movements in apparently death baby.

**Keywords:** Artificial respiration, history, resuscitation, *Prana pratyagamana*

### INTRODUCTION

Birth asphyxia alone accounts for one-fifth of the total 5 million neonatal deaths occurring worldwide each year<sup>1</sup>. Resuscitation of the newly born infant presents a different set of challenges than resuscitation of the adult or even the older infant or child. The transition from dependence on placental gas exchange in a liquid-filled intrauterine environment to spontaneous breathing of air presents dramatic physiologic challenges to the infant within the first minutes to hours after birth. Approximately 5% to 10% of the newly born population requires some degree of active resuscitation at birth and approximately 1% to 10% born in the hospital is reported to re-

quire assisted ventilation<sup>2,3</sup>. The International Liaison Committee on Resuscitation (ILCOR), formed in 1992, has addressed many important resuscitation issues including an advisory statement on pediatric resuscitation, and recommendations in the areas of pediatric basic life support (BLS), pediatric advanced life support (ALS), and BLS for the newly born<sup>4,5</sup>.

*Ayurvedic* physician *Vagbhatta* describe birth asphyxia symptoms that such type of babies may be manifested with deep unconsciousness, generalized body temperature, i.e. fever, unable to cry as per the intensity of body pain (Dog like cry). His *Rasa, Rakta Mamsa*, etc *Dhatus* are unstable due increased and disturbed metabolism and

these *Dhatus* unable to attain maturity i.e. *Dhatu* does not reach up their final normal metabolites which keep the body in normal state. On touching the baby's body by the hand, clothes or bed initiate the pain full state as it is being cut by saw (suggestive of increase intracranial pressure). Other parameters are abnormal continuous and involuntary body part movements and frequently show the sign of apparent death. All these signs and symptoms are in newly born baby occur due to obstruction the fetus in *Yoni* (Vaginal canal) and compressed by the uterine mussels (*Yoni-putavapidit*) simultaneously.<sup>6</sup>

To revive the asphyxiated newborn baby *Prana pratyagamana* was described by ancient physician of *Ayurveda*, which include striking to stone near the ear of baby, sprinkling with hot and cold water over the face of baby as per season and light stimulation. All this description shows that since ancient period birth asphyxia was a common problem at birth. Many complication of birth asphyxia along with their treatment have been mention in *Ayurvedic* classics.<sup>7</sup>

### Ancient History

Death of newborns from respiratory failure was recognized in ancient times. Chinese emperor and philosopher Hwang-Ti (2698–2599 BC) noted that this occurred more commonly among infants born prematurely<sup>8</sup> Increased mortality among premature infants was also reported in Descriptions of artificial breathing for newborn humans and reviving a newborn lamb by inserting a reed through the trachea are contained in the Talmud (200BC–400AD)<sup>9</sup> and Hippocrates (460–380BC) described intubation of the trachea of humans to support ventilation. Soranus of Ephesus (98–138AD) described “how to recognize the

newborn that is worth rearing”<sup>10</sup> and criticized “the majority of barbarians” for the practice of immersion of the newborn baby in cold water. Galen (129–199AD) inflated the lungs of dead animals via the trachea with a bellows and concluded that air movement caused chest “arises”. The significance of his finding was not appreciated, however, as further work on ventilation did not occur for centuries.<sup>11</sup>

### 1700–1850

Before the mid-1700s, divine intervention was credited for most cases of successful resuscitation. However, a presentation to the Royal Society of London by surgeon William Tossach in 1745 aroused interest<sup>11</sup>. He reported the successful revival of James Blair, a coal miner overcome by smoke, using mouth to mouth resuscitation (a technique apparently used at that time by midwives to revive stillborn infants).<sup>9</sup> The Royal Society were not impressed however, maintaining that “life ends when breathing ceases”. Swiss naturalist Antoine Réamur (1683–1757) presented further reports of successful mouth to mouth resuscitation in Paris.<sup>11</sup>

In 1752 Scottish obstetrician, William Smellie, outlined the standard approach to apparently lifeless newborns which included “... the head, temples and breast rubbed with spirits; garlic, onion or mustard applied to the mouth and nose”<sup>12</sup> advocated a form of artificial respiration and described a straight endotracheal tube for resuscitating newborns, while, in 1754, Benjamin Pugh related his experiences of resuscitating infants using mouth to mouth and an endotracheal tube. Between 1774 and 1776, the Royal Humane Society in London advocated mouth to mouth resuscitation of stillborn infants. Influential Scottish obstetrician,

William Hunter (1781–1783), however, denounced it as “the method practiced by the vulgar to restore stillborn children”. Hunter subsequently designed a bellows for inflating the lungs, and, by 1782, the Royal Humane Society recommended the use of bellows rather than mouth to mouth. This method remained popular for the next 50 years, although mouth to mouth and mouth to endotracheal tube were still advocated by both François Chaussier (1746–1828), Professor of Obstetrics at the Academy of Science in Paris, and James Blundell (1790–1878), obstetrician at Guy's Hospital, London. In 1827 Leroy d'Etiolles described the association between ventilation and pneumothoraces in a lecture in Paris.<sup>8</sup> Subsequently, both mouth to mouth and bellows inflation fell out of favour and remained so for more than a hundred years.

### 1850–1950

Techniques advocated and used to resuscitate newborns during this period included: swinging the infant upside down (the Schultze method; )<sup>8,9,13</sup> squeezing the chest (Prochownich method, among others); raising and lowering the arms while an assistant compressed the chest (the Sylvester method)<sup>9</sup> rhythmic traction of the tongue (the Laborde method); tickling the chest, mouth, or throat; yelling; shaking dilating the rectum using a raven's beak<sup>14</sup> or a corn cob (a technique allegedly also used by anesthetists to help initiate breathing on recovery from anesthesia) immersion in cold water, sometimes alternating with immersion in hot water<sup>15</sup> rubbing, slapping, and pinching electric shocks<sup>9</sup> nebulization of brandy mist; insufflations of tobacco smoke into the rectum.<sup>8</sup>

Interest in respiratory support also continued. In 1879, Gairal, a French obste-

trician, described the “aerophore pulmonaire” (a rubber bulb connected to a J-shaped tube placed in the infants' upper airway) for positive pressure ventilation. In 1887, use of the Fell-O'Dwyer device, a foot operated bellows attached to a bulb like implement, for longer term ventilation in a large series of infants was reported.<sup>8,9</sup> Alexander Graham Bell described a negative pressure ventilator in 1889. In 1914, Von Reuss described the use of continuous positive airways pressure for resuscitation of newborn infants. In the United States in 1928, Henderson advocated positive pressure ventilation with a T-piece via a mask, and Flagg recommended endotracheal intubation for positive pressure ventilation using described equipment similar to that in use today.<sup>8,17</sup> <sup>16</sup>Blaikely and Gibberd<sup>8,17</sup> subsequently recommended endotracheal intubation and positive pressure ventilation in the United Kingdom in 1935. In 1949, Julius Hess and Evelyn Lundeen published their textbook *the premature infant: medical and nursery care*.

### 1950–1999

Insufflations of oxygen into the stomach of asphyxiated newborns were recommended in the 1950s.<sup>18</sup> However, the popularity this technique enjoyed during this decade waned over the following one, after evaluation suggested it was ineffective.<sup>19</sup>

Observing that more infants required resuscitation after caesarean section than vaginal delivery, Allan P Bloxson (1901–1991) introduced his positive pressure air lock in 1950. Infants placed in this metal device were subjected to 60% oxygen and cyclical increases in pressure of 1–3 psi at one minute intervals to simulate uterine contractions during labour. Bloxson re-

ported that only 11 of the 55 infants “processed in the lock in an attempt to habituate them to extra uterine conditions” had died<sup>20</sup> and editorials in leading journals strongly advocated the use of the chamber. In 1956, a randomized trial comparing the Bloxsum air lock with standard care in an incubator was reported.<sup>21</sup> No difference in mortality or relief of respiratory distress was found, and use of the air lock declined. Pressure chambers were used for neonatal resuscitation in the United Kingdom during the 1960s; of note, a trial comparing their use with endotracheal ventilation found them equally effective.<sup>22</sup>

Advances in artificial respiration for adults occurred at this time. In 1949 and 1950, Archer Gordon evaluated the most popular methods of respiratory support (arm lift and chest pressure) and concluded they were of marginal benefit. Between 1954 and 1957, James Elam and Peter Safar performed experiments in Baltimore on volunteers from their medical and nursing colleagues.<sup>23</sup> Sedating and paralyzing subjects, they demonstrated that airway opening maneuvers (head tilt, chin lift) and mouth to mouth resuscitation were effective. Dwindling compressed gas supplies caused by a Danish lorry drivers' strike prompted Henning Ruben to invent a self inflating resuscitation bag in 1954. His original device consisted of bicycle spokes welded together and fitted inside an anesthesia bag. He later modified and described it in 1957.<sup>24</sup>

Virginia Apgar (1909–1974), an obstetric anesthesiologist at Columbia, New York, presented a method of assessing newborns in 1952 and published it the following year.<sup>25</sup> Its purpose was “the re-establishment of simple, clear classification or ‘grading’ of newborn infants which can be used as a ba-

sis for discussion and comparison of the results of obstetric practices, types of maternal pain relief and the effects of resuscitation”. Her score prompted new focus on the newborn infant in the delivery room and is still assigned almost universally today. In 1963 Herbert Barrie again described equipment similar to that in use today and recommended guidelines for resuscitation. These included the oral administration of Vandid (vanillic acid *N,N*-diethylamide, a strychnine derivative) if apnoea persisted for more than three minutes.

The 1960s and 1970s saw a flood of new technology and methods of care for acutely ill adults and children. In the United States in 1966, the National Academy of Sciences recommended standardized guidelines for adult resuscitation. In the 1970s, the American Heart Association (AHA) and American Academy of Pediatrics (AAP) recognized the need to improve the care of the compromised newborn. The National Institute of Health funded projects to provide education on neonatal care to community hospitals. Ron Bloom and Catherine Cropley from Los Angeles developed the curriculum for these programmes, which they called the Neonatal Education Program (NEP). In 1985 a joint AHA/AAP committee was convened, which developed the Neonatal Resuscitation Program (NRP) based on the NEP. Published in 1987, the first NRP textbook was based on a consensus of US opinion leaders in neonatology as to what was “accepted” practice. To date, this program has been taught to over 1.4 million healthcare providers in the United States alone<sup>26</sup> In the United Kingdom in 1980, Edmund Hey wrote a booklet to help midwives, nurses, and doctors caring for newly born infants. This booklet complemented a course in neonatal resuscitation

taught in the Northern Health Region of the United Kingdom. Further editions were subsequently published by the Northern Neonatal Network, and formed the basis for the Newborn Life Support Course developed by the Resuscitation Council UK and published in 2001.<sup>27</sup>

The International Liaison Committee on Resuscitation (ILCOR) was formed in 1992 to provide a forum for liaison between resuscitation organizations in the developed world<sup>28</sup> and led to publication of consensus international advisory statements on resuscitation in 1997.<sup>29</sup> The advisory statement on pediatric resuscitation made recommendations for basic and advanced pediatric life support and for basic life support for the newly born.<sup>30</sup>

### **1999–2005**

IN 1999 ILCOR published an advisory statement summarizing international consensus on resuscitation of the newly born infant at the time.<sup>28</sup> The Neonatal Subcommittee of ILCOR reconvenes approximately every five years to evaluate available evidence that may support a change in the recommendations. This large concerted effort has resulted in the publication of updated guidelines in 2000<sup>31</sup> and December 2005.<sup>32</sup> The recommendations on the management of infants born through meconium stained liquor, oxygen use, and measures to prevent hypothermia in very preterm infants have been updated in the light of the findings of randomized controlled trials.

Neonatal resuscitation is among the most important and commonly performed medical interventions worldwide. The recent international collaboration in seeking and evaluating the evidence underpinning current practice has been a great and important advance. A major finding of this process is,

however, a cause for serious concern: there is little evidence to evaluate. With the exceptions of suctioning for meconium,<sup>33</sup> polyethylene wrapping to prevent hypothermia,<sup>35,36</sup> and oxygen administration.<sup>37</sup>

### **DISCUSSION**

So long the child in uterus, its nutrition, respiration etc, are affected through placenta, once it is born it has to lead an independent existence and show the more vital function like respiration should be activated immediately without losing time, for, the Ambar Peeyoosham stands responsible for life by re-entering the body each time. The lungs of a newborn are in atelectatic state, which becomes opened up with each successive cry along with the establishment of respiration. While the child is born the amniotic membrane rupture the phlegm in throat gets cleared and Vayu enters inside. So the child starts crying. One should assist such a child in getting the throat cleared. There is a centre for respiration in the brain which receives relay fibers from all the sensory nerves. So the second aspect of revival consists of stimulating the sensory organ so as to stimulate the respiratory centre, when it remains depressed in child tormented by way of labour.<sup>38</sup> The challenge for neonatologists today is to produce robust evidence to support or refute these recommendations. In this era of evidence based medicine we must explore *Prana pratyagamana* of ancient *Ayurvedic* physician by means of modern justification that the striking to stone near the ear of baby, sprinkling with hot and cold water over the face of baby as per season and light stimulation, stimulate Respiratory as well as cardiovascular system by stimulating the concern center after getting stimulation from sense organs such as skin, ear and eye. Now a day's resuscitation has become advanced

by available sophisticated equipments and continues research in field of neonatology.<sup>39</sup>

## CONCLUSION

It is hoped that, by examining the historically overlooked development of neonatology through the lens of newborn resuscitation, this article will contribute to the growing literature on late twentieth-century medicine. The history of newborn resuscitation after *Samhita* period reflects the emerging intimate relationship between science and medicine in the twentieth century which resulted in the emergence of biomedicine. It includes not only the successful collaborative partnerships between scientists and clinicians and the changing role of the clinician, but also reflects on the tensions and conflicts which emerged as medicine was transformed by biomedicine and also the rise of clinical research.

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