Editorial

ASSISTED VENTILATION IN NEONATES: THE INDIAN PERSPECTIVE

Assisted ventilation is provided to a neonate who develops respiratory failure. Such assistance can be provided with a resuscitation bag through a face mask or an intra-tracheal tube. However, when such an assistance is required for an extended period of many hours or days, one takes the help of a ventilator. Frequent arterial blood gas measurements are essential in these cases. However, there are inherent dangers of mechanical ventilation (MV), resulting in complications, some of which can be immediately fatal and others can lead to long term morbidity and even brain damage. Expert nursing, specialized monitoring by clinical, electronic and laboratory means, frequent imaging and supervision by specially trained doctors significantly reduces the incidence of such complications. Survival rates following MV during neonatal period nearly doubled between 1970's and 1980's(1-3); so much so that the current survival rates reported from well developed neonatal intensive care units in USA for babies weighing above 1000 g have been close to 97% and for infants with hyaline membrane disease (HMD) weighing above 1000 g has been 95%(3). Almost 80-90% of such babies had intact survival(3).

The efficacy and safety of MV during neonatal period having been established, it is being more liberally used these days even during relatively earlier stages of the disease and almost routinely in some centers for infants weighing less than 1000 g. This is largely done to reduce the work of breathing. Common illnesses for which MV is often required during the neonatal period are HMD, birth asphyxia, meconium aspiration syndrome (MAS), sepsis, pneumonia, recurrent apnea of prematurity, persistent pulmonary hypertension of the newborn (PPHN), tetanus and various surgical conditions.

Application of continuous positive airway pressure (CPAP) alone is often adequate for many cases of HMD or apnea of prematurity and is often helpful in other conditions like PPHN, MAS, patent ductus arteriosus, congenital heart disease and in repaired omphalocele and gastroschisis(4). However, in case CPAP fails, one will have to go in for controlled mandatory ventilation (CMV). Hence really speaking, no patient should die on CPAP alone unless modalities for CMV are not available.

While MV during neonatal period in the developed countries was started nearly thirty years ago (l), it got started in India only 6-7 years ago (5,6). Hence the current Indian experience on MV at the best may be compared with the experience of developed countries during 1970's. Although the survival rates among neonates treated with MV in various centers of India are now available(5-10), yet no followup data on intact survival of these babies has been

published. Based on the published and unpublished reports we compiled some gross data early this year on 1183 neonates treated with MV in 14 centers in our country. (5-10; personal communications). The mean (range) distribution of common illnesses requiring MV during neonatal period as observed in our survey was HMD: 36% (16-70%) BA: 25% (12-35%) and septicemia: 15% (5-30%). Infants weighing below 1500 g (VLBW) comprised 45% (30-67%) of such neonates. While some centers catering to relatively better-off population had higher proportion of cases of HMD in their series, others from Government hospitals looking after poor and malnourished population with suboptimal antenatal and intranatal care had a larger proportion of cases of birth asphyxia and sepsis among their series of MV. Many centers were reluctant to provide MV to neonates weighing less than 1000 g, while one center had a cut-off below 1250 g.

The mean survival rate in our survey data was 47% with a wide range of 23-67% among various centers. A large number of centers recorded lower survival rates in ventilated VLBW neonates and among those ventilated for asphyxia and septicemia. The mean survival rates in ventilated HMD and apnea of prematurity were 50% (25-84%) and 65% (33-100%) respectively.

Data from our center showed lower survival rates among ventilated neonates whose mothers had no antenatal care (unbooked) as compared to booked cases(5). Some centers have emphasised high survival rates among those ventilated after the first 24 hours of life than those ventilated earlier (10). This is understandable since this group will exclude cases of severe birth asphyxia, PPHN due to MAS and severe HMD in whom the mortality is high.

The mean incidence of common complications during MV, reported in our survey, was sepsis 29% (5-67%), intraventricular hemorrhage (IVH) 25% (15-52%), pneumothorax 11 %(6-20%). The data on intraventricular hemorrhage was compiled only from those centers where cranial ultrasonography is a routine in all babies receiving MV. Bronchopulmonary dysplasia was reported rather infrequently (0-14.5%) largely because of lower survival rates among the vulnerable group of ventilated neonates. The incidence of IVH and pneumothorax in our survey data is quite comparable with the published data from western centers(11,12). However, the high incidence of sepsis with a wide center to center variation warrants a candid analytical discussion among various teams providing MV in our country. Similar discussion is warranted to find out reasons for center to center variation in the survival rates of MV in our country. It may well reflect the overall quality of perinatal care as well as the work load of neonates needing MV, *e.g.,* if facilities to provide MV are available only for 50% of the babies who need it, the sickest among them will receive the treatment and the survival rates among them are going to be relatively poor. Such a situation often exists in many Government run free hospitals having limited facilities, work load far exceeding the facilities available and a relatively larger proportion of patient population from lower socio-economic status with poor nutrition and sub-optimal antenatal and intranatal care.

Poor nursing support is an important factor contributing to inadequate care during MV in our country. Only one out of 10 centers surveyed could boast of having the recommended nurse: patient ratio of 1:1 during the night shift; 1:3 or higher ratio was reported from 60% of the centers.

What is the work load of neonates requiring MV in our country? From our survey data, about 10 per 1000 live births require MV. The ratio may be higher in referral units delivering disproportionately more high risk mothers and lower where MV is provided more selectively and to higher weight babies or else the population catered is well nourished with optimal facilities for perinatal care.

All inclusive cost of MV as charged by various private hospitals included in our survey varied between Rs. 1800-3000 per day. However, 'considering the cost of equipment, investigations, medicines, disposable material, used and the manpower, the daily cost of MV should work out to be higher than this. It seems, most such hospitals are subsidising these charges.

It is quite clear that MV during the neonatal period is quite expensive and very demanding to achieve good intact survival rates. Hence hospitals should plan to start such a facility only when they have good infrastructure both for neonatal intensive care as well as for ventilation. Details about requirements are available in the excellent publications of National Neonatology Forum (13,14). This can be supplemented with information provided by other publications (3,15).

From the experience of various centers in our country, the development of facilities for MV may be divided into various stages. -During the initial stages, MV is used only in neonates weighing above 1250-1500 g and suffering from HMD, apnea or birth asphyxia. As more experience is gained, infants weighing between 1000-1500 g and suffering from other illnesses are also given MV. The indication for MV should be firm and attempt should be made to lower the complication rates so as to make MV safe. At this stage MV may be provided to neonates less than 1000 g in weight and on relatively softer indications *e.g.,* in earlier stages of the disease.

Success in MV of neonates has to be assessed in terms of intact survival. For this we need to analyze our followup data and discuss our results more informally, In the light of such information, we may like to review our protocols and develop a policy on neonatal ventilation suitable for the cultural background and resources of our country. We have met the challenge of providing MV successfully to our neonates, we now face the challenge of doing it better.

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