Open Lung methodology in ARDS patients
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The Kovai Medical Center and Hospital of Coimbatore, India, established in 1990, is a private, super-speciality hospital offering multi-disciplinary care in over 40 medical disciplines. In addition to 10 surgical theaters, the center is also a site for research and education, through the Kovai Medical Research Center and Educational Trust.

The medical ICU of Kovai Medical Center has been utilizing lung recruitment procedures in the interest of lung protection for many years. For the past two years, the ICU has been gaining experience in the use of a tool with a protocol for titration of physiological endpoints and breath-to-breath graphics for lung recruitment in specific patient categories.

Critical Care News spoke with Dr Gopalakrishnan Raman, Chief Consultant of the medical ICU at Kovai Medical Center, and Dr V R Pattabhi Raman, Pulmonologist, about their experiences with the lung recruitment tool.
We heard dramatic results in some patients. Based on this recruitment experience, we heard of inspiratory pressure with Pressure-Infusion Recruitment Maneuver (PiRYM), and continued to use the Open Lung Tool, probably since we can follow the patients’ progress more closely and monitor the respiratory situation in more detail.

What are your opinions of the ARDSnet guidelines and recommendations?

Dr Gopalakrishnan Raman: We have followed the 6 ml/kg tidal volume recommendation, but perhaps deviate somewhat in regard to recommendations for PEEP. We have tried to follow the PEEP recommendations in the ARDSnet protocol, but we felt we had the need to increase it sometimes. Sometimes we will adjust the PEEP according to the blood gas oxygenation, if it would be too low. So we increase the PEEP individually, as each patient needs it.

Dr Pattabhi Raman: We have found that there are some groups that don’t respond. Basically extrapulmonary ARDS and septic patients respond well in our experience, but with more complex pulmonary patients we do not increase the PEEP to high levels, but more moderate levels. At present, you could say that we generally follow ARDSnet, but with variations, we don’t usually go to a respiratory rate of 35, so there are certain deviations we have from ARDSnet.

Dr Gopalakrishnan Raman: To summarize, you could say that we follow ARDSnet recommendations, with some deviations at the present. At least until we get something better, in terms of guidelines.

Dr Pattabhi Raman: Yes – part of the problem today is that we are lumping the whole thing together; in looking at the population of patients, the distinction between pulmonary and extrapulmonary really cannot be made. In general, the intensive care community probably needs more data about etiology, and about certain factors, for example the use of dynamic compliance as a tool. In the past we were looking at tidal volumes and pressures, so dynamic compliance is giving us more specific information in order to set PEEP or adjust PEEP in selected patients. We have found that patients with extrapulmonary ARDS have a much better outcome with the recruitment maneuver using dynamic compliance and the Open Lung Tool, probably since we can follow the patients’ progress more closely and monitor the respiratory situation in more detail.

How and when did you come to use Open Lung methodology in connection with ARDS patients in the hospital?

Dr Gopalakrishnan Raman: We heard about the methodology and tool from the manufacturer, and decided to try it out about two years ago. We had very good results on the first series of 4 patient cases, and continued to use the Open Lung Tool, primarily in ARDS patients.

Which types of procedures were you using for ARDS prior to the Open Lung Tool?

Dr Pattabhi Raman: Prior to that we had read about a procedure with 180 seconds of inspiratory pressure with Pressure Control but we were not brave enough to try that. We then heard about the procedure of recruitment of 40 cm at 40 seconds, and we tried this and saw some dramatic results in some patients. Based on this recruitment experience, we heard about the Open Lung Tool and were interested in trying it out. So our lung recruitment measures have been concentrated primarily in this group.

Have you defined any specific inclusion/exclusion criteria for lung recruitment in ARDS?

Dr Gopalakrishnan Raman: In terms of exclusion criteria, basically we would not recruit any patient with embolisms, as there is too much risk in this patient category. Another exclusion group is hemodynamically compromised patients, which is a category where we would not risk recruitment.

In your experience are parameters such as dynamic compliance and VTCO2 useful in evaluation of the recruitment maneuver?

Dr Pattabhi Raman: Yes, it is very helpful in setting the PEEP to always
surfactant therapy in ARDS patients. I think that once we have data in a more homogenous population, instead of lumping data together, and a more precise global consensus of the definition of ARDS, we will have the possibility to adjust and adapt the guidelines more precisely.

What is your experience and opinion in regard to PEEP levels in connection to lung recruitment?

Dr Pattabhi Raman: Once we have recruited, we generally maintain PEEP levels between 15 and 19; we rarely go over these levels.

What sort of outcomes are you experiencing with use of Open Lung Tool in ARDS patients? How is the situation compared to the previous procedures you were using in this patient group?

Dr Gopalakrishnan Raman: We initially started using the Open Lung Tool two years ago in lung recruitment in a series of 4 or 5 patients, with very positive results. These first positive experiences were the reason why we have continued to use the recruitment tool.

Dr Pattabhi Raman: We do not have any data or studies at this point, but on an observational level we have definitely experienced a distinct difference, and we know more about what is happening in this recruitment process as you get more information by means of using this tool. Our perception is that outcome is definitely better in terms of inflection point and getting down to the levels of PEEP where we want to be, with more confidence than we had before.

Dr Gopalakrishnan Raman: It is a more objective way of applying the procedure, in a more scientific manner than in the past, in terms of recruiting the patient and adjusting the PEEP level, by means of adjusting PEEP according to lung mechanics rather than gas exchange. And it also allows us to track the changes that have been made or occurred during the course of recruitment, which provides us with more information in order to further tailor the treatment.

Are you using any protocol for weaning when patients are improving after lung recruitment procedures? What is the average weaning time for ARDS patients who have been undergoing Open Lung recruitment maneuvers?

Dr Pattabhi Raman: We follow a standard weaning procedure, where we use CPAP or Pressure Support on a spontaneous breathing trial, and checking them, prior to extubation. The average weaning time for ARDS patients from
start of Pressure Support to extubation usually ranges between 2 to 5 days.

Which types of staff members are involved in applying or monitoring the recruitment maneuvers with the Open Lung Tool?

Dr Gopalakrishnan Raman: The physicians are in charge, but the respiratory therapists are conducting the recruitment maneuvers. There is no hard and fast training, but we teach them by doing the procedure, and monitoring their recruitment maneuvers as they learn and become more experienced. We have dedicated respiratory therapists who look after the ventilators, under direction of the physicians.

Is there delegation for re-recruiting after suctioning/disconnection?

Dr Pattabhi Raman: As a rule for ARDS patients, suctioning is not a routine process. We try to avoid suctioning and only conduct it when it is absolutely required. Following suctioning, we repeat the recruitment maneuver to re-establish the values accordingly. If the requirement of PEEP is heavy, we use closed suctioning systems, which are more expensive here.

Will you be expanding or modifying the procedure in future, or modifying it for other patient categories or outcome endpoints? If so, which endpoints are of interest and which changes will be made?

Dr Pattabhi Raman: Based on the two-year experience we have, we have seen some patients do well, and some do extremely well. Since we cannot be really dogmatic about anything, we would like to continue concentrating on the subgroups, and identifying which of the subgroups that are responding most positively, and examining how the recruitment procedure is benefitting these patients. We have a lot of findings and observations at this point, but it would be nice to conduct a controlled clinical trial to postulate on why some of the subgroups, such as extrapulmonary ARDS and sepsis, do so well with the procedure.

Biographies

Dr Gopalakrishnan Raman attended Calicut Medical College, receiving his degree in 1991. He obtained his MD in Anesthesiology from King Edward VII Memorial Hospital in Bombay in 1995 and passed his National Board Examination the same year.

He worked as a lecturer at King Edward VII Memorial Hospital during 1994-1995, and was Senior Resident in Cardiac and Anesthesiology at the prestigious Sree Chitra Tirunal Institute for Medical Sciences and Technology in 1996. In 1997 he worked in various training posts in the United Kingdom, becoming Staff Anaesthetist and Intensivist at the University Hospitals of Hartlepool and North Tees. After working for several years in the U.K, Dr Gopalakrishnan Raman returned to India to assume the position of Chief Consultant Intensive Care Medicine at the Kovai Medical Center and Hospital in Coimbatore.

Dr V R Pattabhi Raman received his MBBS degree from Tirunelveli Medical College and obtained his MD and Diploma in National Board in Respiratory Medicine from Madras Medical College. He was awarded 3 gold medals in MD for academic excellence in pulmonology. He has presented papers in national and international congresses, and is a member of the Indian Chest Society, the American College of Chest Physicians – Indian Chapter, the Indian Medical Association and the Indian Society of Critical Care Medicine.

After gaining experience in respiratory and critical care medicine in Chennai, and sleep medicine in Sydney, Australia, Dr Pattabhi Raman returned to India to assume the position of Consultant in Pulmonology, critical care and sleep medicine at the Kovai Medical Center and Hospital in Coimbatore.

References:


