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Reflections on the artificial airway

Reflexiones sobre la vía artificial

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This edition of the RAMR includes an interesting retrospective study on "tracheostomy and dysphagia in patients with COVID-19 and their impact on the decannulation process."[1]

The authors show the extremely high incidence of swallowing disorders observed when attempting to decannulate patients who are ventilated for COVID-19 pneumonia. While the observed group included 65 cases of tracheostomized patients, it is known that prolonged intubation can also cause serious injuries to the upper airway.

The possibility of reducing the time spent with a tracheostomy is also important in the prophylaxis of injuries that are "distant" from the airway. Critical tracheal obstructions due to granulomas, narrowing or cartilage injury are not uncommon, requiring dilation with bougies, resection, or "tracheoplasty" with resection of one or more tracheal cartilages.

It is therefore agreed that every effort should be made to reduce the time of connection to the ventilator via an artificial airway.

As shown by the researchers, fiberoptic laryngoscopes are now more accessible and extremely helpful in detecting and monitoring the presence and progression of laryngotracheal injuries secondary to prolonged ventilation. They also allow the visualization of resultant swallowing disorders and the assessment of their potential rehabilitation. Otherwise, the development of aspiration pneumonia would be a serious complication during refeeding or upon discharge, even from the aspiration of the patient's own saliva.

With apologies for exceeding the "limits" appropriately set by the authors, I will briefly refer to some topics related to the experience with artificial airways in the field of critical care.

It is not advisable to prolong the presence of the endotracheal tube beyond 7-10 days. However, this decision will depend on the expected progression, according to the disorder that led to the intervention. The decision will be different for a patient with prospects of rapid improvement compared to those in whom we assume in advance that their progression will not allow for a rapid weaning (neurological disorders), and in such cases, it would be preferable to make an earlier decision to indicate a tracheostomy.[2]

With respect to these procedures, it will always be more comfortable for the patient to tolerate ventilation through a tracheostomy, avoiding the "costly" airflow resistance and subsequent increase in respiratory effort imposed by an endotracheal tube after several days of insertion. This choice will reduce the requirements for central nervous system depressants and facilitate access to physiotherapy, secretion aspiration, important communication with the patient, and will potentially allow for early weaning from mechanical ventilation.

When ventilating patients, we often face the challenge of resolving the "mismatch" between the patient and their ventilator. This means preventing or improving a manifest asynchrony between the patient and the equipment that controls or assists them.

In this situation, reducing the administered doses of central nervous system depressants and/or muscle relaxants will allow for quicker weaning and decannulation processes. This will be the best prophylaxis against complex airway injuries that can later affect swallowing and/or spontaneous ventilation.[3]

In the vast majority of cases, this will depend on factors to be corrected that obviously cannot be

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appropriately solved remotely ("remote control"), and will always require a thorough examination of the patient-ventilator relationship "in situ". This approach drastically reduces the time spent on mechanical ventilation.

It is clear that the indication of deeper sedation, and the potential administration of muscle relaxants under these circumstances will be inappropriate to improve adaptation (in cases where the reason for the mismatch has not been solved), but it will also significantly delay or impede the possibilities of disconnection attempts.

An elementary list of controls in these conditions should include ruling out and/or solving any of the following problems:

- Presence of secretions in the artificial airway, which in the case of the endotracheal tube will excessively increase flow resistance, thus increasing the respiratory work. It will require more frequent and effective aspirations to clear the difficulty. The frequent response of "I just suctioned it" does not mean that the airway is clear. At most, it will mean that it should be aspirated more frequently or more effectively. Always use a well humidified inspired mixture at the proper temperature.
- Fever. The presence of hyperthermia in these patients is a frequent issue: it increases the respiratory rate, facilitates mismatch, and is easy to solve with the administration of antipyretics by central route.
- Sometimes we can detect subcutaneous emphysema or asymmetry during auscultation of vesicular murmur, and this will alert us to the possible presence of a pneumothorax in individuals subjected to positive pressure ventilation. The chest X-ray will either confirm or remove our suspicion, and will allow for the pertinent solutions.
- The system may become less airtight due to an air leak, if the balloon is deflated or displaced. This can be detected just putting our ear close to the patient's mouth. It will be necessary to insufflate the balloon with the minimum amount of air that "seals" this leak. Never exceed pressures over 30 mmHg, which could result in mucosal ischemia. In some more uncomfortable cases, airtightness will not be achieved due to balloon leakage and it will be necessary to replace it with a tube or cannula. Also, an endotracheal tube may have been displaced distally, usually to the right main bronchus for anatomical reasons. This is verified during auscultation of the chest, and is confirmed and resolved by partial removal of the tube.
- Auscultation may show bronchospasm, which can be quickly resolved by administrating bronchodilator aerosols, using the extensible portion of the inspiratory tubing.
- Another alternative is that the patient may no longer tolerate the ventilatory mode being used due to changes in his/her evolution or consciousness, thus requiring changes in the tidal volumes used, an adequate titration of positive end-expiratory pressure (PEEP), or the use of a spontaneous ventilatory mode, such as pressure support, to "manage" his/her own respiratory rate. There is a wide range of alternatives offered by microprocessor controlled ventilators, and finding a more "comfortable" ventilatory mode is not difficult in a patient in whom other causes of asynchrony have been previously excluded.

The recent urge to use various forms of non-invasive ventilation (NIV) in the treatment of patients with acute or chronic pneumopathies is a valuable attempt to avoid the serious complications that artificial airways produce in the larynx and trachea. However, these techniques are not yet applicable to the most severe forms of bilateral pneumonia or "severe distress", such as those observed during the COVID-19 pandemic. In this case, or with other infectious diseases, strict isolation of the expiratory port is also required.[4]

The proper and safe use of this technique requires highly experienced nurses, kinesiologists and physicians.

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