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High-flow nasal cannula: A lifesaver for covid 19 patients

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Abstract
Introduction: The high-flow nasal cannula (HFNC) is a novel device used for giving O_2 at high flows. HFNC delivers heated humidified oxygen up to 37°C at high flows of 60 L/min at an adjustable fraction of inspired oxygen (FIO_2) of 0.21 (room air) to 1.0 (100% oxygen) through a nasal cannula. HFNC is utilized as an alternative mode of oxygen supplementation in hospitals. In light of the coronavirus disease 2019 (COVID-19) a global pandemic, HFNC was widely used in patients for airway management in managing patients with respiratory distress. It improves mucociliary clearance and helps in the maintenance of immune function of mucosal surfaces. HFNC humidifies the oxygen before delivering it to the patient, similar to the normal physiology of breathing. Humidification reduces airway resistance, improves mucociliary clearance, and protects the airway mucosa.
HFNC helps in loosening respiratory secretions and thus aids in expelling them easily. It also reduces the incidence of mucus plug formation and atelectasis.
The use of HFNC for the management of COVID-19 has been explored and has increasingly become an important strategy for preventing intubation and mechanical ventilation.
Conclusion: High flow nasal cannula is a novel device used for providing oxygen at high flows. The use of HFNC for adult patients across different clinical settings is increased since few years. With the evidence suggested by studies, HFNC may be considered as an alternative mode of delivering oxygen between conventional oxygen therapy and NIV.
In rising cases of covid 19 and oxygen demand, HFNC was considered as the best choice for delivering oxygen to a patient who has respiratory distress.

Keywords: COVID-19, corona, HFNC, high-flow nasal oxygen

Introduction

Conventional oxygen therapy (COT) devices are used in the hospital for administering oxygen to patients. It is available as fixed and variable flow devices such as nasal prongs, venturi masks, and face masks. Noninvasive ventilation (NIV) devices such as continuous positive airway pressure (CPAP) and bilevel positive airway pressure are the other methods used for giving oxygen in hospitals.
The high-flow nasal cannula (HFNC) a novel device used for giving O_2 at high flows, it is available for the last 20 years. HFNC delivers heated humidified oxygen up to 37°C at high flows of 60 L/min at an adjustable fraction of inspired oxygen (FIO_2) of 0.21 (room air) to 1.0 (100% oxygen) through a nasal cannula. HFNC is utilized as an alternative mode of oxygen supplementation in hospitals.
In light of the coronavirus disease 2019 (COVID-19) a global pandemic, HFNC was widely used in patients for airway management in managing patients with respiratory distress.

Source-
https://medikobazar.com/product/high-flow-nasal-canula-hfnc/

Fig 1

Advantages of High-Flow Nasal Cannula

It improves mucociliary clearance and helps in the maintenance of immune function of mucosal surfaces. HFNC humidifies the oxygen before delivering it to the patient, similar to the normal physiology of breathing. Humidification reduces airway resistance, improves mucociliary clearance, and protects the airway mucosa. HFNC helps in loosening respiratory secretions and thus aids in expelling them easily. It also reduces the incidence of mucus plug formation and atelectasis. It also reduces the inflammation of the airways, therefore protecting the integrity of the airway mucosa. Many times oxygen demand of patients in respiratory distress significantly increases. It is possible to deliver oxygen up to 60 l/min by the use of HFNC devices. Higher flows allow better fulfilment of oxygen demand to the patient and achieve delivery of a more accurate FiO_2 by reducing the entrainment of room air Anatomical dead space which is not involved in oxygen exchange is washed out by the constant high flow of oxygen via HFNC. Rebreathing of expired carbon dioxide can be reduced by it. HFNC also reduces the metabolism needed to warm and humidify inspired oxygen by the patients. It also improves thoracoabdominal synchrony-Together, these factors contribute to reduced work of breathing. Studies support that HFNC is better tolerated by patients because it is applied only to the nostrils hence patients can eat and speak normally. Nursing care such as oral suctioning and serving medication is possible without interrupting the process of oxygenation.

The disadvantage of High-Flow Nasal Cannula

It delays intubation when clinically indicated, This is the most significant criticism of HFNC. Another issue with HFNC is the financial burden, the cost of HFNC is more than Conventional Oxygen Therapy devices and that's way, less accessible in resource-poor countries.

HFNC Nasal Cannula and COVID-19

Coronavirus disease (COVID-19) is an communicable disease caused by the SARS-CoV-2 virus. The first covid case (COVID-19) was found in Wuhan City, Hubei Province, China, and has emerged as a global outbreak and significant public health issue by the world health organization. Globally, on 21 October 2021, 24,14,11,380 have been affected by COVID-19 infection, and 49,12,112 people died due to covid 19. In India, on 21 October 2021, 3,41,26,707 people were affected by SARS-COV-2 and 4,52,844 people died due to SARS-COV-2 infection. The disease from the infection is termed COVID-19. Patients with COVID-19 often present with acute respiratory symptoms of variable severity. Some patients may be completely asymptomatic or have symptoms of minor upper respiratory tract infection, others may develop viral pneumonia requiring oxygen supplementation. A proportion of patients may even progress to acute respiratory distress syndrome requiring ICU admission and trial of NIV, HFNC, or mechanical ventilation. As COVID-19 mainly affects the respiratory system, oxygenation and ventilation strategies have become a topic of interest. The use of HFNC for the management of COVID-19 has been explored and has increasingly become an important strategy for preventing intubation and mechanical ventilation. The primary mode of viral transmission is via respiratory droplets; hence there is significant concern over using HFNC due to its potential for aerosol generation. Other AGPs(aerosol-generating procedure) like intubation, NIV, and bag-mask ventilation has been reported to increase the risk of transmission, whereas HFNC did not. An earlier study also showed that air dispersion is limited if the nasal cannula fits well. It has conducted a bioaerosolisation study and concluded that the risk of generation and dispersion of aerosols is similar between HFNC and standard face masks. Another study suggested that HFNC use should be treated as an AGP requiring airborne precautions. Another criticism for its use in patients with COVID-19 is its inability to address the progression of the disease process and may delay intubation There have been case reports highlighting the success of HFNC therapy in preventing intubation. In fact, the Surviving Sepsis Campaign guidelines for COVID-19 have recommended HFNC over NIV for acute hypoxaemic respiratory failure after a failed trial of COT, However, the World Health Organisation interim guidelines acknowledge the lacking of evidence-based guidelines for HFNC and its potential for aerosolization. It is therefore advised that healthcare workers take precautions against airborne particles during HFNC use, which can be logistically challenging in a climate of constrained healthcare resources. Standard personal protective equipment (PPE) used by healthcare workers in the clinical setting cuts down the risk of aerosol spread.

Nursing and monitoring

- Nurses should Continous monitor patients' respiratory status, SPO2, heart rate, Haemodhyamnic Parameters.
- Nurses should ensure the proper disposal of the waste generated by the procedure as per Covid 19 protocol.
- Assess the nutritional status of the patient and provide supplementation as per need.
- Patients positions should be changed frequently to reduce the risk of bedsore.
- Oral and nasal care must be performed every 4th hour.
- Nurses should Suction the airway as required and ensure nasal prongs is in the correct positions.
- Within 2 hours of use, it should be possible to reduce the FiO2 (where required) and signs of clinical stabilization should be seen. FiO2 required to maintain SpO2 in the target range should decrease to <40%. If there is a rapid deterioration of oxygen saturation or marked increased work of breathing.
- A chest x-ray should be done to exclude a pneumothorax.
- Always covid-19 protocol should be kept in mind while doing any procedure.

Conclusion

High flow nasal cannula is a novel device used for providing oxygen at high flows. The use of HFNC for adult patients across different clinical settings is increased since few years. With the evidence suggested by studies, HFNC may be considered as an alternative mode of delivering oxygen between conventional oxygen therapy and NIV. In rising cases of covid 19 and oxygen demand, HFNC was considered as the best choice for delivering oxygen to a patient who has respiratory distress.

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