



THE USE OF INNOVATIVE NON-INVASIVE VENTILATION MASK WITH AN INBUILT FEEDING PORT (NIV-IFP MASK) IN PATIENTS REQUIRING PROLONGED VENTILATION

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Problem statement

- Nutrition in patients on long term NIV support
- Feeding breaks on NIV are ultrashort as disconnections desaturates the patients
- Malnourished patients become ventilator dependant, difficult to wean or progress to Invasive Mechanical ventilation (IMV) with poor outcome
- For adequate delivery of nutrition, a gastric tube is inserted from the nose or the mouth that passes out through the margin of the NIV causing significant leak and inadequate ventilation to the patient thereby causing hypoxia and hypercapnia

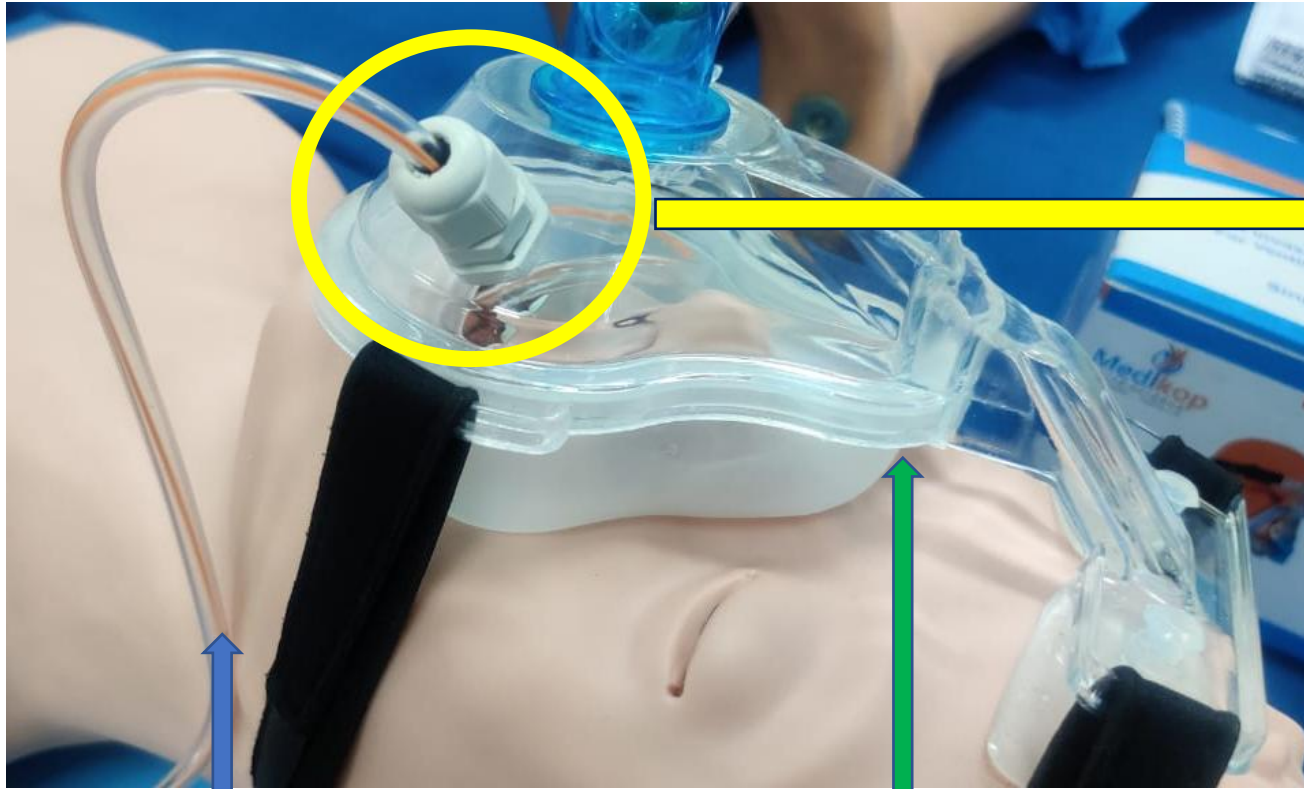


Disadvantages of the Existing Solution

- This proprietary design by a renowned company is very expensive (Rs 4,000-Rs 5,000)
- As NIV causes dehydration: For patients on intermittent NIV, this opening cannot support a straw or a modified feeding tube for drinking water or other fluids
- RT can get kinked, pressure marks on skin during long term ventilation
- Causes mild discomfort to the patient



My Innovation- NIV Mask with Feeding Port



**RYLE'S TUBE
(RT)**

**REGULAR NIV
MASK**

ADVANTAGES

1. A 3-D Printed nut mechanism admits RT of all possible sizes (smaller RT prevents minimal gastric insufflation during NIV)
2. No air leak, no kinking of RT, no discomfort to patient
3. RT can be modified into a straw for consuming water during the course of NIV administration
4. Price – only Rs 600/- to Rs 700/- all inclusive

Use of the NIV-IFP mask in Clinical Trials



Fig: a) Prototype NIV mask placed on mannequin b) Gland nut mechanism for feeding port



Fig: a) modified NIV mask on patient b) Feeding port with Ryle's tube in situ
c) Ryle's tube entering nose under direct vision

For patient trials, Institutional ethical clearance for use of this mask was received via no IEC/2022.03 dated 15th Mar 2022

Assessment of the device

The NIV mask was tested on patients. The air leak observed was minimal. The functioning of the RT was not affected. There was no discomfort to the patient or the healthcare workers taking care of the patient

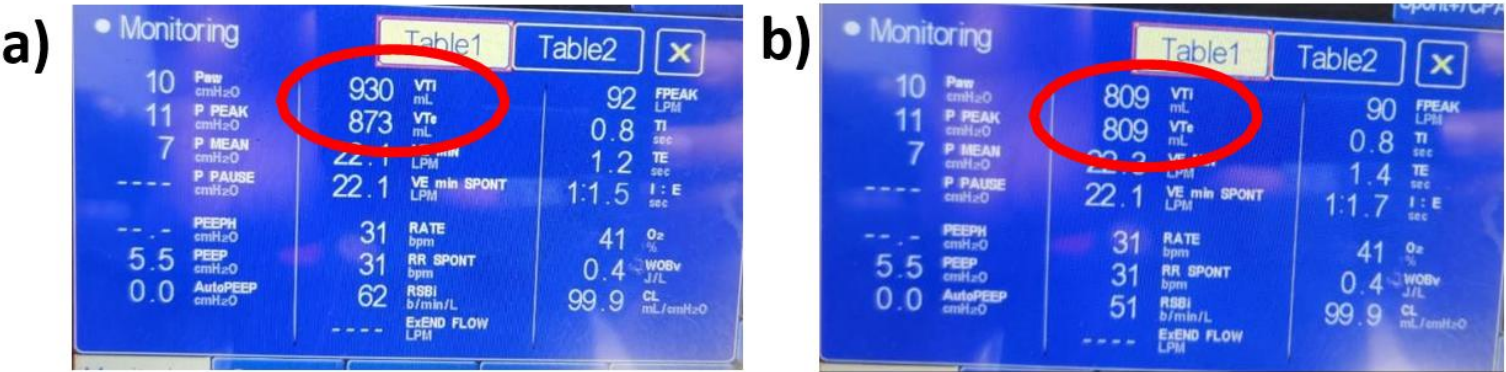


Figure: Leak during NIV a) minimal leak of 63 ml b) No leak

PATIENT	NIV LEAK (ml)	NIV-IFP LEAK (ml)	NIV RT feed (Kcal/24 hrs)	NIV- IFP RT feed (Kcal/24 hrs)
Patient 1	150-200	56	650	2500
Patient 2	100-200	No leak	750	2000
Patient 3	150-250	75	800	2200

Table: Comparison in the leak and nutrition delivered between both masks

Conclusion

- Poor nutrition is associated with longer stay in the hospital, higher rate of conversion from NIV to invasive ventilation and poorer outcomes
- Also associated with a high morbidity and
- The NIV mask with feeding port achieves this aim at an affordable cost
- When compared to other available technologies in this field, it can be concluded that this NIV mask with the feeding port is:
 - very economical and can be a boon in third world countries
 - The placement of this unique mechanism in the mask was instrumental in weaning off patients from NIV and avoided Invasive ventilation
- It was proved beyond doubt that addition of this gland nut assembly was extremely effective in delivering adequate nutrition to our patients without compromising on the ventilation.