Airway Management by Cuffed Nasopharyngeal Tube (CNPT)

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Abstract

Difficult intubation has always been a problem for anesthesiologist especially during maxillofacial surgeries with limited mouth opening.

A technique of nasopharyngeal airway has been applied in 45 cases. This method has been completely successful in relieving upper airway obstruction and allowing normal ventilation. This technique is simple, quick and absolutely free from untoward reaction.

Key words: Difficult intubation, cuffed pharyngeal tube CPT, cuffed nasopharyngeal tube

Introduction

Many new devices have been designed for pharyngeal airway management (e.g. LMA, COPA, AMD) but none of them is applicable through the nasal pathway.1 In 1998, the author introduced the cuffed pharyngeal tube (CPT) for oro-pharyngeal ventilation 2,14 and SUPA Company in Iran produced the sizes 8.5-9mm CPT which were used successfully in adult patients. It was predictable that the device, thanks to its narrow diameter and its tubular configuration, is suitable for nasal application. In June 2001, SUPA produced the first sample of CPT size 7mm, 24 cm long with a 60ml volume cuff (Figure 1). It was named cuffed nasopharyngeal tube (CNPT).

This device has been used successfully in 45 patients and the only handicap was the thickness of its P.V.C. cuff. So it was decided to try the conventional tubes for this purpose too. It was noticed that the cuff of the Willy Rüschi rubber-latex tube. It can be inflated up to 100ml of air without bursting and for portex transparent tube this range was around 50ml. Their cuffs are thin retractable and pliable being appropriated for nasal intubation. The Rüschi tube (Figures 2 and 3) due to its shorter distal portion might be obstructed by epiglottis when its cuff is inflated so, it is not always recommended as a substitute for CNPT (Figures 2 and 3).

Method

The following steps are suggested:

• Induce IV anesthesia (preferably with propofol), start inhalation anesthesia and give 10-20mg of atracurium.

• Prepare nostrils with phenylephrine nose drops. Use a suction catheter for cleaning and finding the larger cavity.

• Immerse CNPT or conventional portex tube in hot water. Choose size 7-7.5mm for men and size 6.5-7mm for women.

• Insert the well lubricated tube nasally for length of 20cm where usually resistance is felt. Head must be in sniffing position.

• Inject 50-70ml of air into the cuff (45ml in case of portex tube).

• Now, feel the patency of manual ventilation while pulling the CNPT back for 1-2cm. At this time, the tongue protrudes between incisors (Figures 3 and 4) and area under the chin bulges.

• CNPT is connected to the anesthetic machine. Ventilate the patient manually or by ventilator.

• Correct leakage or increased respiratory resistance by moving the device to and fro – and injecting more air.

• To prevent gastric inflation during laparoscopic procedures it is advisable to pass a nasogastric tube before CNPT insertion orally.11,12

• Corrugated tubes should be held 20cm above the operating table.

Results

45 cases of CNPT usage have been evaluated. 100 percent success has been obtained without any untoward reaction. Air leakage occurred in 40% of cases but it was not significant. There was no case of hoarseness or sore throat post operatively. In 3 cases, CNPT was used as a primary dedicated airway to maintain anesthesia and oxygenation during long period of fiberoptic aided tracheal intubation with brilliant result (Fig.5).

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Discussion
The problem of difficult intubation still remains inspite of many new designs and lot of proposed techniques. When the mouth has limited opening, this problem will be aggravated because in some occasion blind nasal or even fiberoptic aided intubation fails. CNPT seems to be a good choice in these cases. CNPT has been used successfully in 45 different kinds of surgeries including maxillofacial, orthopedics, tongue, mouth, lower abdominal surgeries and laparoscopic procedures without failure. No untoward reaction has been observed. Small air leakage existed in 40% of patient with no impact on ventilation. In addition CNPT has been used to maintain anesthesia and oxygenation when fiberoptic aided tracheal intubation takes a long duration (Fig. 5).4

After injection of 50ml diluted urographin into the cuff of CNPT, it stands at the level of C2-C3 and far away from laryngeal inlet. So, it avoids irritating the laryngeal structures. The inflated cuff elevates the base of the tongue and epiglottis (Figures 2 and 4) providing a patent airway. In regard to the problems of difficult intubation, to own a cheap disposable-cuffed airway is always appreciated. In addition of securing a patent airway, this device is an efficient tool as a "dedicated airway".

In 1990 Feldman designed a cuffed nasopharyngeal airway.7 He suggested 20ml inflation of the cuff in the pharynx and then withdrawing the tube against soft palate to seal the nose and then simply closing the mouth. Later on, this device was used for technique of "dedicated airway". The term of "dedicated airway" can now be defined as an upper airway device dedicated to the maintenance of airway patency while other major airway interventions are anticipated or are in progress.8,9 Besides it provided a safe conditions for training fiberoptic in general.

Ralston and Charters have used successfully Feldman naso-pharyngeal device to achieve dedicated airway in 5 patients.10 Charters believes the device had a bad publicity in the UK (portex discontinued its production) because less skilled anesthesiologists used it badly and blame the device for causing obstruction. Both the laryngeal mask airway (LMA) and cuffed oropharyngeal airway (COPA) have been used as dedicated airway but none of them are applicable through the nasal pathway.

First inflate the cuff (25ml) then, withdrawing CNPT into the nasopharynx (Figure 5). It may serve the function of dedicated airway for performing fiberoptic aided intubation orally or through the same CNPT or other nostril. But in order to maintain the airway patency it is mandatory to lift the chin and hold the jaw

![Figure 1: Scheme of nasopharyngeal ventilation tube (CNPT). Note the cuff is inflated preferentially from anterior surface.](image)

![Figure 2: CNPT in situ. 50ml of diluted urographin has been injected into the cuff. The cuff stands at the level of C2 to C3.](image)

Indications
- Ankylosis of temporomandibular joint, deformity of mandible and immobile cervical vertebra.
- Difficult intubation due to trauma, cysts, edema, infection and mouth abnormalities.
- In burns and oral surgeries.
- CPR procedures especially when trained personnel and essential equipments is not available.
- During minor surgeries to avoid sore throat of LMA or ETT.
- To relieve anesthesiologist from the handicaps of holding mask airway system.
- As a dedicated airway for eventual insertion of ETT by means of fiberoptic especially for training the novice.
- Prior to perform tracheostomy.
Contraindications
- Coagulation abnormalities
- High blood pressure
- Nasal obstruction, fractured nose
- Laryngeal obstruction
- Acute sinusitis and mastoiditis
- Full stomach, there is threat of aspiration.
- C.O.P.D., there is threat of gastric inflation.

Conclusion
This paper presents the simplest technique for restoring ventilation whenever it is compromised by difficult intubation due to trauma, edema, infection, tumor and maxillofacial deformities. Based on author’s evaluation it is a safe, harmless and life saving method and it does not require either especial expertise or sophisticated equipment.

Figure 3: Conventional trache tube inserted as CNPT. Note the protrusion of tongue after inflating the cuff.

Figure 4: CNPT in relation to the pharyngeal structure.

Figure 5: CNPT in situ for oral fiberoptics and fiberoptics aided intubation (dedicated airway). In order to prevent tongue-glosus obstruction chin lift and jaw thrust must be kept continuously.
References