Cuffed Oropharyngeal Airway in the Patients Undergoing Short Surgical Procedures

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Abstract

Objective : This study was designed to study the efficacy of Cuffed oropharyngeal airway (COPA) in the patients undergoing short surgical procedures at Siriraj Hospital.

Materials and Method : A prospective study of 65 patients, age 15-65 years, scheduled for elective short surgical procedures under general anesthesia were managed with COPA. Lip-mandibular angle distance was used to indicate the appropriate size of COPA. Demographic characteristics, airway assessments, COPA size, insertion time, airway manipulation, complications during COPA insertion, removal and 2 hour postoperative period were recorded.

Results : Success rate of COPA insertion were 93.8 per cent and 4.6 per cent at 1st attempt and 2nd attempt respectively. Insertion time was 53.27 $\pm$ 20.07 seconds. There were 84.4 per cent of patients who needed airway manipulation during anesthesia. The incidence of complications were 12.3 per cent, 13.8 per cent and 15.4 per cent during insertion, removal and 2 hour postoperatively respectively.

Conclusion : COPA is a new adjunctive airway device designed for direct connection with breathing system with a high success rate of insertion. COPA placement is an easy technique to learn but it usually requires a high incidence of airway manipulations such as head turn, jaw thrust, head tilt, and chin lift, so skill and confidence in its use requires instruction and practice. It would be unwise to use a COPA in an emergency without first having become proficient in its use for routine cases.

Key word : Oropharyngeal Airway, COPA

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Cuffed oropharyngeal airway (COPA) is a new adjunctive airway device modified from Guedel oral airway by Greenberg and Toung in 1992[1]. It is composed of an inflatable cuff at the distal end of a Guedel oral airway which has an inflatation tube with a pilot balloon and inflation valve. At the buccal end of the airway is a standard 15 mm connector which can be connected to an anesthetic breathing system. At present, the COPA is made of polyvinyl chloride (PVC) which is designed for single use only. In the corrected position, the curved portion of the COPA would fit with the anatomy of the tongue and palate. The flange would rest 1 cm above the patient's lips to prevent it from falling back into the mouth and from compression on the lips. After the cuff is inflated with the recommended volume of air, the base of the tongue and epiglottis should be lifted up and the low-pressure seal around the oropharynx making it possible for positive pressure ventilation. The COPA is available in four sizes which have been designated by numbers that give the nominal length in centimeters. The correct size can be estimated by the distance from lips to angle of mandible plus one centimeter. When in place, the recommended volume of air for inflation of the cuff is 25 ml, 30 ml, 35 ml and 40 ml for size 8, 9, 10 and 11 respectively.

The COPA may be inserted in two ways. One method of insertion is made by its concave side toward the upper lip. When the tip has passed the uvula, the airway is rotated 180°, so that the tip lies posterior to the tongue and the cuff should then be inflated. An alternate method of insertion is made by using the tongue blade to depress the tongue. The COPA is held horizontal as the tip is inserted into the mouth. As the airway is advanced, it is rotated to a vertical position. This causes it to slide around behind the tongue. After the cuff is inflated, the COPA should be connected to the breathing system. The airway should be secured with a rubber band around the suboccipu to prevent displacement.

Greenberg RS, et al[2] reported that COPA provided a lot of advantages that it is easy to insert and the insertion technique does not need other equipment. When connected to the breathing system, COPA provides free hands and allows positive pressure ventilation which is better than a face mask[3,4]. It can be connected to tubing for measuring of carbon dioxide[4] and can be used as a guide for fiberoptic laryngoscopy[5-8]. The COPA may be removed in either the operating room or the postanesthesia care unit (PACU). Use of the COPA during transfer to the PACU will maintain a patent airway for the patient, while leaving the anesthesiologist's hands free for other tasks. It can be left in place until protective airway reflexes have returned and the patient is able to swallow his or her secretions.

At present, there is no pediatric size of COPA available. The COPA can not be relied on to protect the tracheobronchial tree from the contents of the gastrointestinal tract. It should not be used in a patient with a high risk of aspiration and a patient who requires high inflation pressure. Intraoperative airway manipulations such as head tilt, chin lift, jaw thrust, etc, may be common with COPA so it is not suitable for surgery of head and neck. A high, large epiglottis may disturb proper positioning of the COPA[6].

The objective of the study is to report on the efficacy of COPA in patients undergoing short surgical procedures under general anesthesia.

MATERIAL AND METHOD

This study protocol was approved by the ethic committee of Siriraj hospital, 65 adult patients, ASA I or II, 15-65 years old, scheduled to undergo short elective surgical procedures under general anesthesia with at least 6 h NPO time provided written, informed consent before being enrolled in this prospective, controlled study. The exclusion criteria were any patient with abnormal airway anatomy, any patient with high risk of pulmonary aspiration, any patient with BMI≥35 kg/m^2, any patient with low lung compliance and any patient with coagulopathy. All patients' airways were evaluated and recorded as Mallampati classification (class I-IV), jaw gliding (grade A, B, C), interincisor distance, thyromental distance, lip-angle of mandible distance, tip of chin-angle of mandible distance, and tip of nose-angle of mandible distance. Baseline reading of heart rate,

Table 1. Demographic data.

Characteristic	Value	%
Sex		
Male	32	49.2
Female	33	50.8
Age (mean ± SD)	35.68 ± 13.59 yr	
ASA classification		
1	54	83.1
2	11	16.9

ASA = American Society of Anesthesiologists.

Table 2. Airway assessment.

Assessment	Value
Mallampati I/II/III/IV	66.2/23.1/9.2/1.5 per cent
Jaw gliding A/B/C	64.6/30.8/3.1 per cent
Interincisor distance (mean ± SD)	4.43 ± 0.8 cm
Thyromental distance (mean ± SD)	8.25 ± 2.0 cm
Lip-angle of mandible (mean ± SD)	9.16 ± 0.80 cm
Tip of chin-angle of mandible (mean ± SD)	9.00 ± 0.87 cm
Tip of nose-angle of mandible (mean ± SD)	10.48 ± 0.82 cm

Table 3. Success rate of COPA insertion.

Attempt of insertion	Number of success	Per cent
First	61	93.8
Second	3	4.6
Fail	1	1.5

COPA = Cuffed oropharyngeal airway

arterial pressure and oxygen saturation were taken prior to the induction of anesthesia. Midazolam 0.03 mg/kg and fentanyl 1 μg/kg were given intravenously as premedication before induction.

After pre-oxygenation for 3 minutes, anesthesia was induced with propofol 1.5-2.5 mg/kg. If unconsciousness or jaw relaxation were not achieved within 1 min the patient then received propofol 10 mg incremental doses. The patients were placed in sniffing position. The COPA was then inserted by anesthetic residents or nurse anesthetists who are skilled with Guedel airway insertion. After the cuff was inflated by the recommended volume of air, the COPA was connected to the breathing system and capnography sampling line. Airway patency and leakage of the air around the cuff were then assessed by squeezing the reservior bag. Auscultation of normal breath sound, observation of normal chest movement, the expired CO_2 waveform, normal excursions of the reservior bag, absence of stridor, tracheal tug or out-of phase respiratory movements of the chest and abdomen indicated correct positioning. If the airway was totally obstructed or oxygen saturation drop below 90 per cent, the COPA was removed and the patient was ventilated with 100 per cent oxygen *via* face mask. If the second attempt failed to maintain the upper airway, anesthesia would go on *via* face mask alone or endotracheal intubation as considerated by the anesthesiologist and the failure of insertion was noted. If the airway was partially obstructed, airway manipulation would be done to achieve correct positioning and airway patency. Anesthesia was maintained with 66 per cent nitrous oxide in oxygen and halothane. At the end of the operation, the COPA was removed when the protective airway reflexes had returned and the patient was able to swallow his or her secretions. Demographic data, attempt of insertion, insertion time, leaked airway pressure and airway manipulation were recorded. Hemodynamic variables were recorded before induction, during insertion; every 1 min for 5 min then every 5 min until the end of operation. Complications occuring during insertion, removal and 2-hour postoperative period were also recorded.

Statistical analysis

Discrete variables were described as frequency and percentage. Continuous variables were described as median (interquatile range) or mean ± SD depended on the distribution of the data.

RESULTS

Sixty-five patients of mean age 35.68 years, ASA I-II were studied. Thirty-two of the subjects were men and 33 were women (Table 1). The results of airway assessments are shown in Table 2. The success rate of 1st attempt and 2nd attempt insertion were 93.8 per cent and 4.6 per cent respectively (Table 3). The insertion time was 53.27 ± 20.07 seconds and the leaked airway pressure was 17.16 ± 3.17 cmH_2O. Sixty-four patients with success COPA insertion needed airway manipulation 84.4 per cent consisted of head turn 39.06 per cent, jaw thrust 26.56 per cent, head tilt 17.18 per cent head tilt plus chin lift 15.63 per cent, and chin lift 9.38 per cent. Complications during COPA insertion were coughing 3.13 per cent, and bucking 7.81 per cent (Fig. 1). Eighty-

six per cent of patients had no complication during COPA removal (Fig. 2). Complications at 2-hour postoperative period were sore throat 10.8 per cent, sore throat and neck pain 3.1 per cent, and vomiting 1.5 per cent (Fig. 3). Hemodynamic variables are shown in Fig. 4.

DISCUSSION

COPA is a new supraglottic airway device with few reported studies compared to laryngeal mask airway (LMA)[2,9-11]. Most of the studies reported a high success rate of insertion of both COPA and LMA with higher success rate for COPA[10]. The

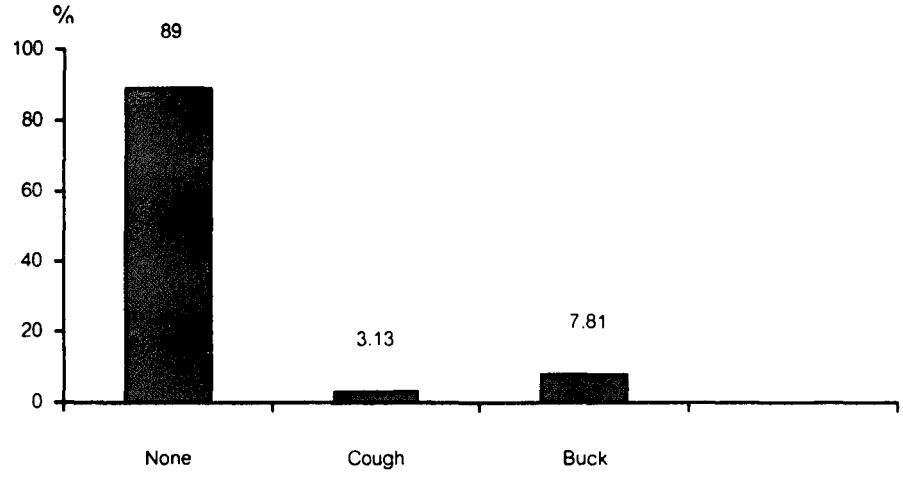

Fig. 1. Complications of COPA insertion.

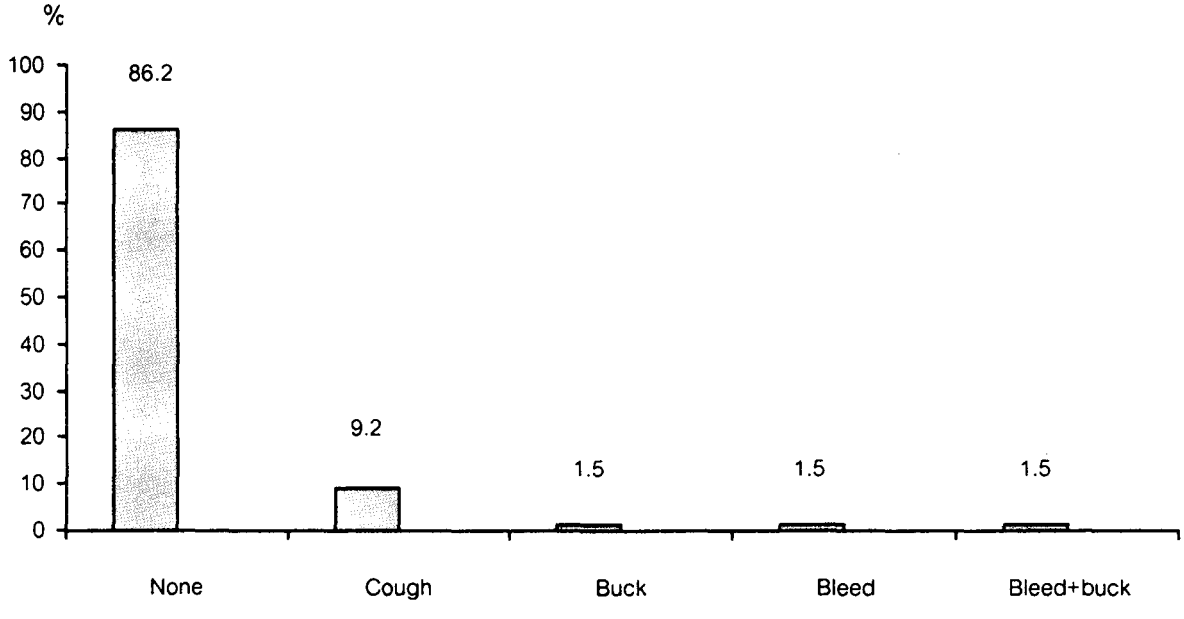

Fig. 2. Complications of COPA removal.

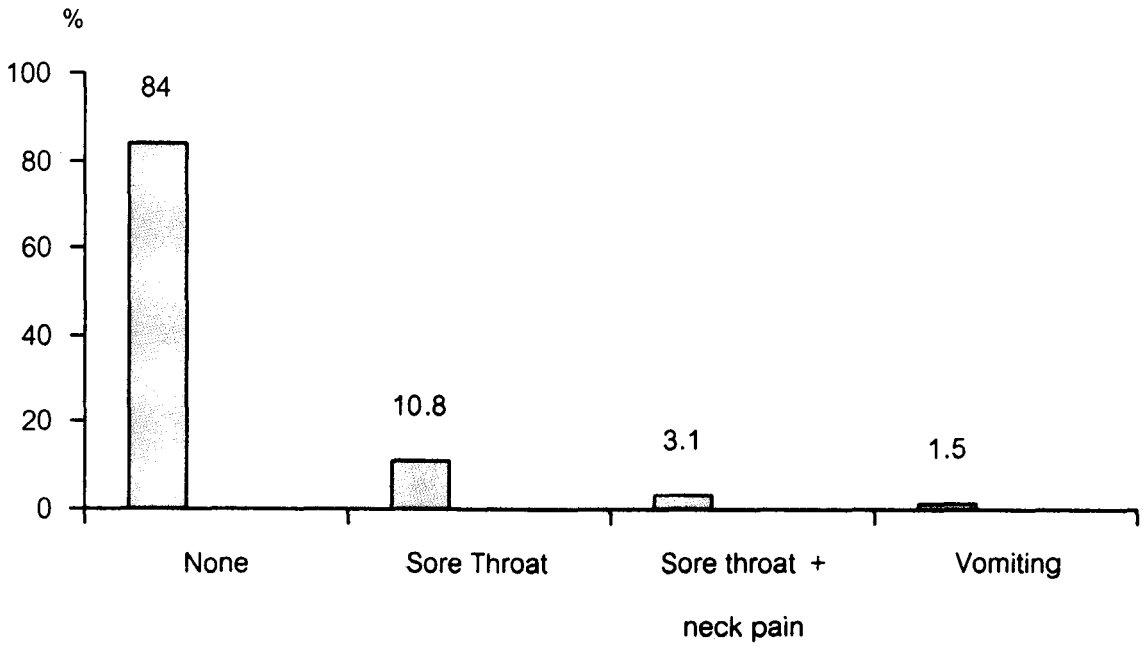

Fig. 3. Postoperative complications.

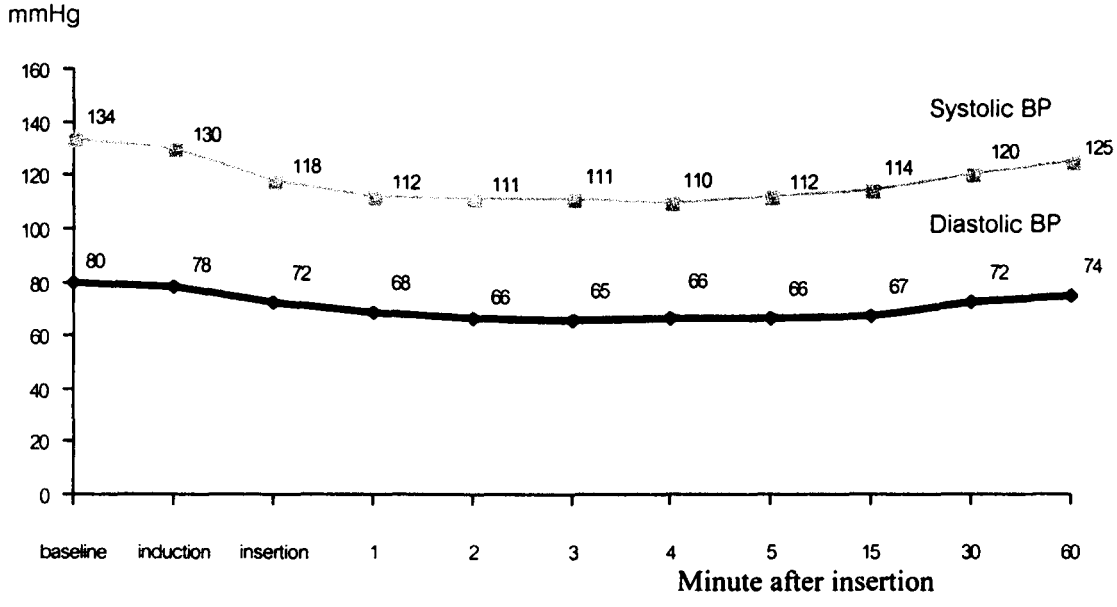

Fig. 4. Hemodynamic variables.

success rate of COPA insertion at 1st attempt in the study by Vlymen JM, et al.[10] was 92 per cent compared to 93.8 per cent in our study. In our study, one patient who failed for COPA insertion was found to have interincisor distance less than 2.5 cm with Mallampati class II. The failure was due to limited mouth opening and sizes of COPA availability in the market which are designed for normal adult anatomy that require mouth opening at least 3 cm. Ezri T, et al.[11] used COPA compared to LMA for patients undergoing urologic procedures. Forty per cent of patients in the COPA group needed airway manipulation compared to five per cent in LMA group. When in place, LMA cuff fits in the muscular structure of distal hypopharynx while COPA cuff fits in proximal hypopharynx which is wide and long causing easy displacement and small margin of proper positioning. The incidence of patients who needed airway manipulation in our study was 84.4 per cent and most were successfully managed with head turn and jaw thrust. There were no hemodynamic responses during COPA insertion in Casati A, et al. study[12] and our study. COPA may be an alternative choice in situations needed to avoid hemodynamic responses from endotracheal intubation. Voyagis GS, et al.[13] reported the COPA leak pressure 18 ± 4 cmH_2O compare to 17.16 ± 13.17 cmH_2O in our study. Postoperative complications in our study were 15.4 per cent and the highest incidence of complication was 13.9 per cent sore throat. Ezri T, et al.[11] also reported 10 per cent incidence of sore throat in patients who had COPA insertion and 20 per cent incidence of sore throat in patients who had LMA insertion.

In conclusion, COPA is a new airway adjunctive device with high success rate of insertion. The incidence of airway manipulation is high with COPA so that skill and confidence in its use are required.

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การใช้ cuffed oropharyngeal airway ในผู้ป่วยที่มารับการผ่าตัดอย่างสั้น

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วัตถุประสงค์ : เพื่อศึกษาประสิทธิภาพของ cuffed oropharyngeal airway (COPA) ในผู้ป่วยที่มารับการผ่าตัดอย่างสั้นในโรงพยาบาลศิริราช

วิธีการศึกษา : ศึกษาในผู้ป่วย 60 คน อายุ 15-65 ปี ASA I-II ที่มารับการผ่าตัดอย่างสั้นภายใต้เทคนิคการระงับความรู้สึกแบบทั้งตัว เมื่อผู้ป่วยได้รับยา propofol บริหารเข้าหลอดเลือดดำจนหลับและมีการหย่อนของกล้ามเนื้อที่ควบคุมขากรรไกรผู้ป่วยแล้วจึงใส่ COPA โดยแพทย์ประจำบ้านวิสัญญี หรือวิสัญญีพยาบาลที่มีประสบการณ์การใส่ Guedel oral airway มาก่อน ขนาดของ COPA ที่เหมาะสม ดูจากระยะจากริมฝีปากถึงมุมขากรรไกรบวกด้วย 1 เซ็นติเมตร บันทึกข้อมูลอายุ เพศ ASA การตรวจทางหายใจ ระยะเวลาที่ใช้ในการใส่ COPA การจัดท่าเพื่อเปิดทางหายใจ ภาวะแทรกซ้อนที่เกิดขึ้นขณะใส่ ขณะเอาออกและ 2 ชั่วโมงหลังผ่าตัด

ผลการศึกษา : ความสำเร็จในการใส่ COPA ได้ในครั้งแรกพบร้อยละ 93.8 และความสำเร็จในการใส่ได้ในครั้งที่สองพบร้อยละ 4.6 เวลาที่ใช้ในการใส่ COPA โดยเฉลี่ย คือ 53.27 $\pm$ 20.07 วินาที ผู้ป่วยร้อยละ 84.4 ต้องการจัดท่าเพื่อให้ทางหายใจเปิดโล่งหลังการใส่ COPA อุบัติการณ์ของภาวะแทรกซ้อนขณะใส่พบร้อยละ 12.3, ขณะถอด COPA ออกร้อยละ 13.8 และที่ 2 ชั่วโมงหลังผ่าตัดร้อยละ 15.4

สรุป : COPA เป็นอุปกรณ์เปิดทางหายใจอย่างง่ายที่ออกแบบเพื่อให้สามารถต่อกับระบบนำก๊าซเข้าสู่ผู้ป่วยโดยตรง เพื่อเพิ่มความสะดวกให้แก่วิสัญญีแพทย์ โดยพบความสำเร็จในการใส่ในอัตราที่สูงแต่ผู้ป่วยส่วนมากต้องการการจัดท่าของศีรษะเพื่อให้ทางหายใจเปิดโล่งได้ดี ได้แก่การหันศีรษะและการดึงคางไปด้านหน้า ดังนั้นการใช้ COPA ให้เกิดประโยชน์และปลอดภัยสูงสุดควรต้องมีการฝึกฝนทักษะในการใส่และการจัดท่าให้ถูกต้องด้วย

คำสำคัญ : Oropharyngeal Airway, COPA

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