

Novel Use of a Nasal Pharyngeal Airway during Shared Airway Deep Sedation Procedures: A Case Series report.

Ravi Piryani, Christopher Heard, Jonathan Malinovsky.
Department of Anesthesiology, University @ Buffalo.

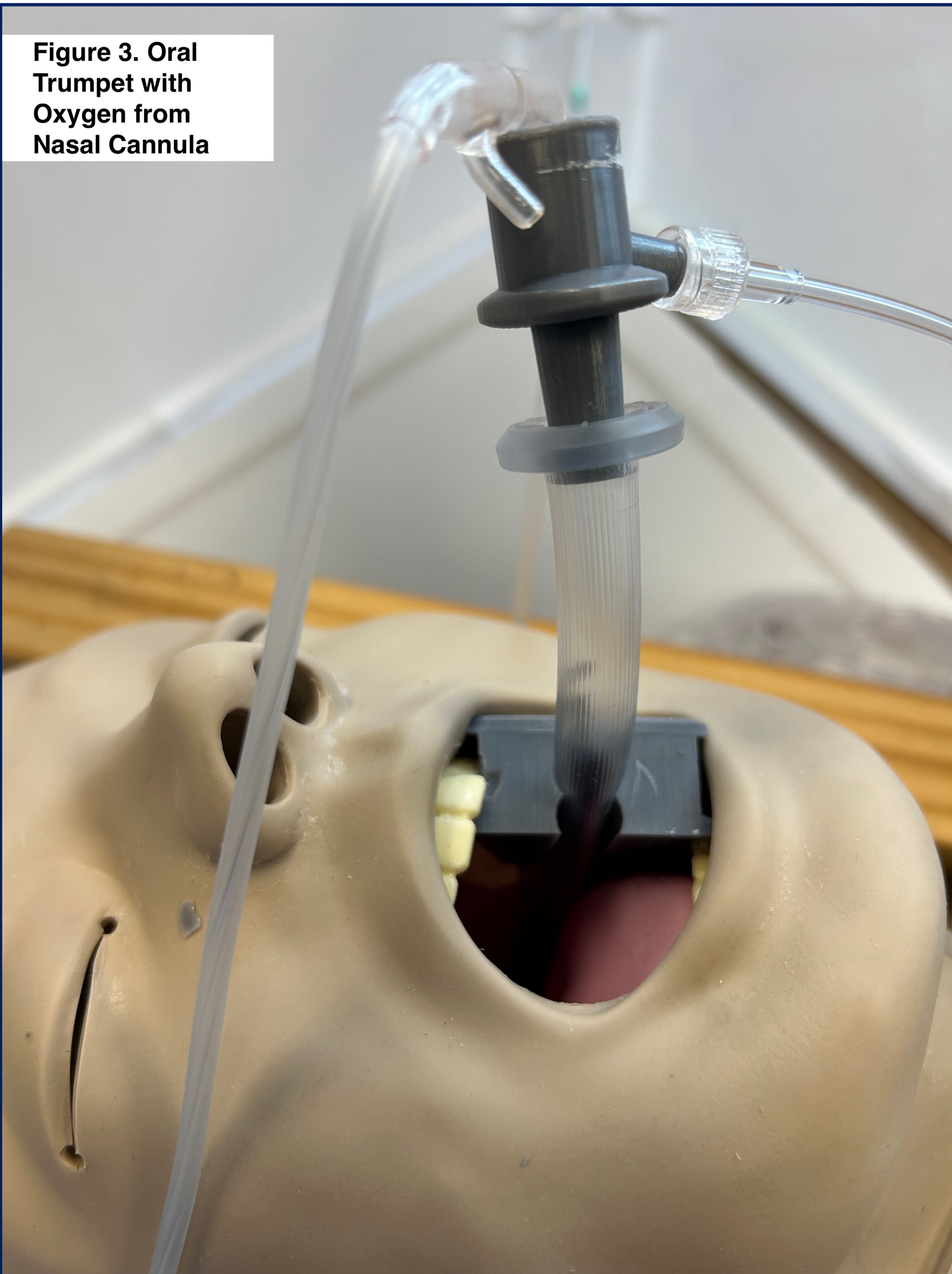
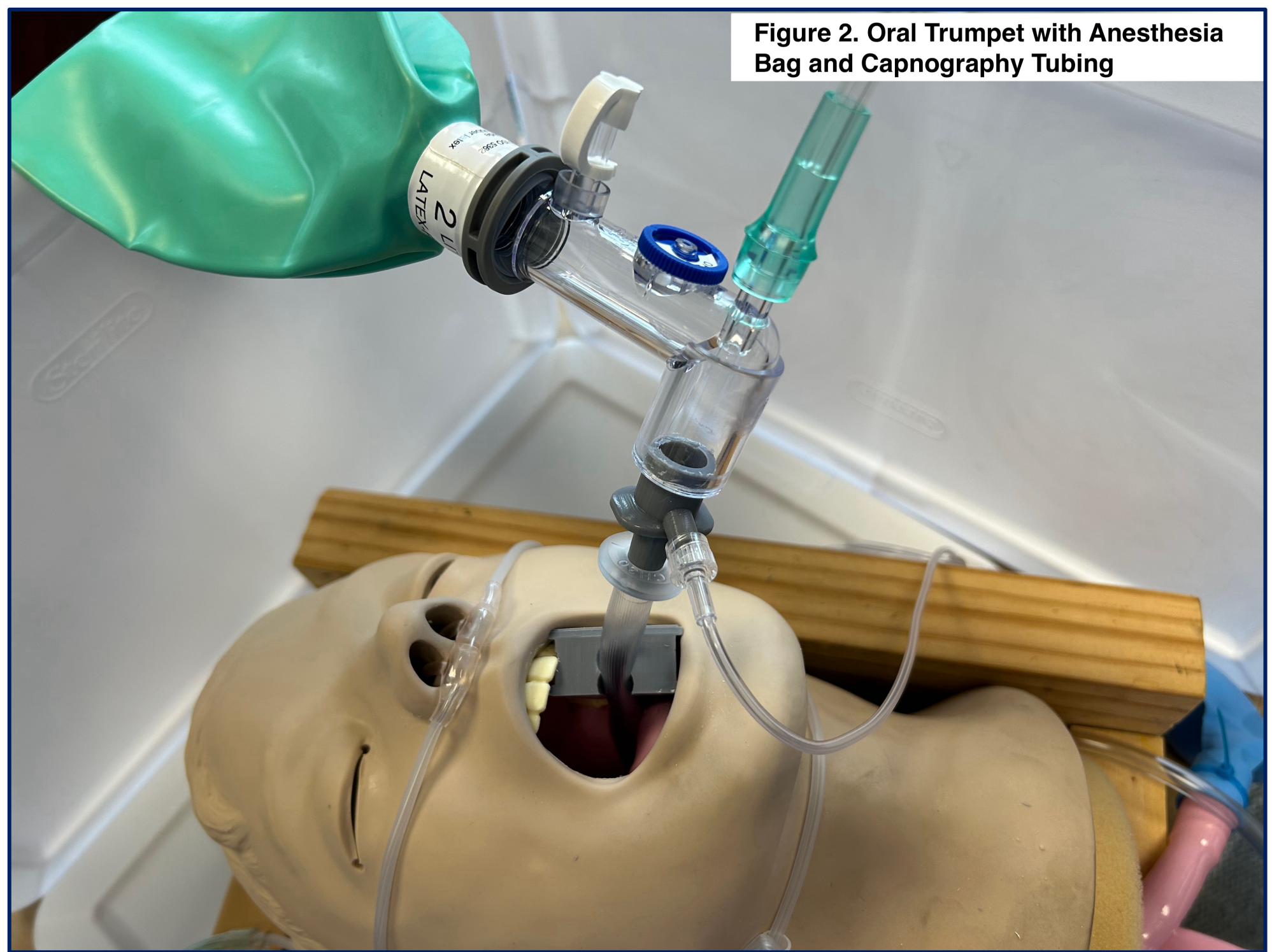
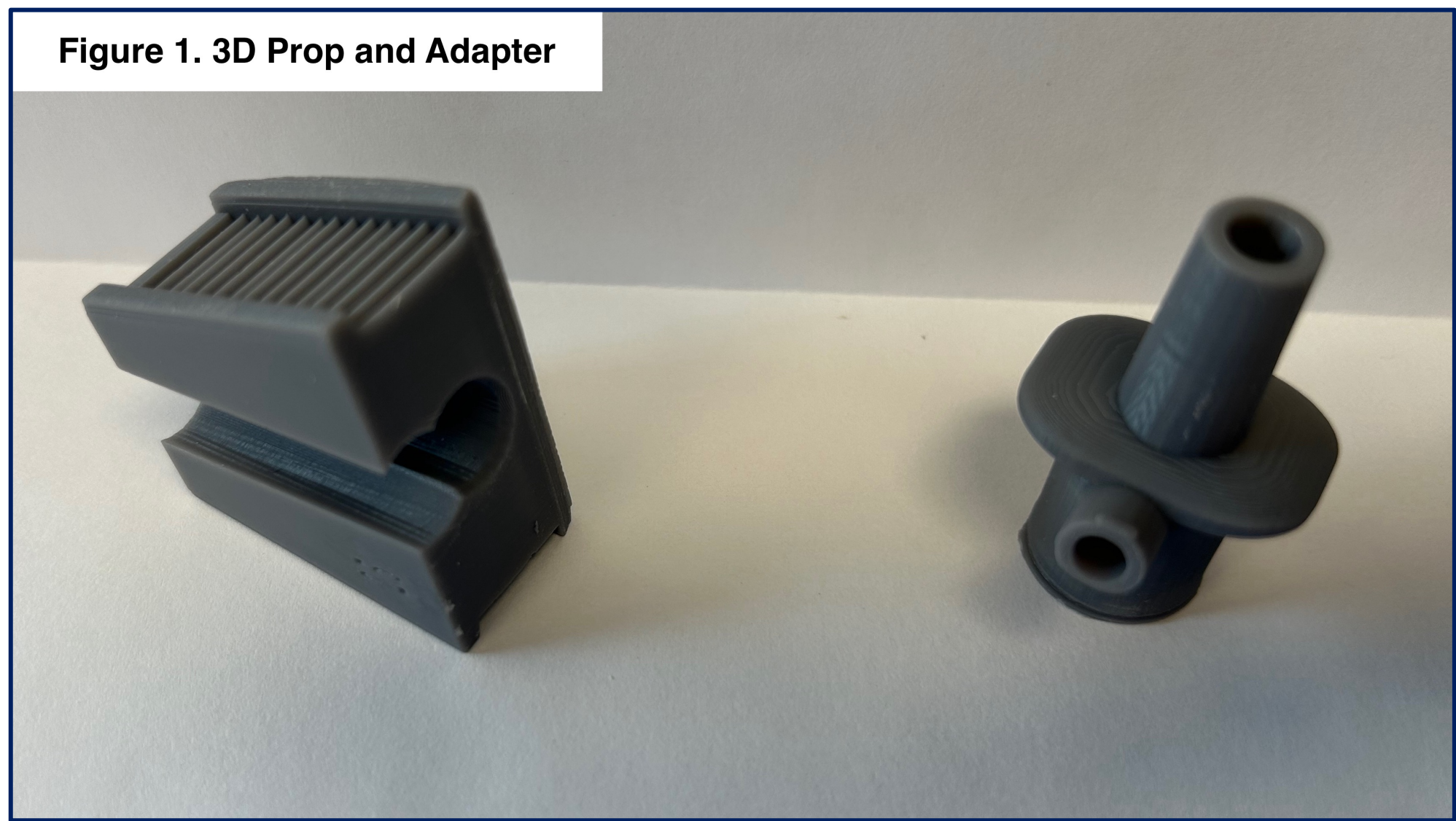
INTRODUCTION

We routinely provide deep sedation using midazolam, fentanyl and propofol infusion for office based pediatric dental procedures. This involves a non-instrumented airway with supplemental oxygen via nasal cannula. As is expected with deep sedation, there is often depression of airway reflexes that may require the need for airway intervention (1). When sharing the airway with the dentist it sometimes becomes difficult, if not impossible to maintain a patent airway with formal airway instrumentation for the procedure. This then requires a deepen plane of sedation, akin to general anesthesia as well as more specialized equipment. We do provide general anesthesia with a LMA in certain cases using a customized 3D printed LMA-Prop that we designed and printed. Using an earlier version of this LMA-Prop, we have utilized a nasal pharyngeal airway (NPA) as a laterally placed oral airway held in position using this LMA-Prop. This case report briefly describes the details of these 3 cases.

METHODS

All three of the cases were children undergoing elective dental restorative procedures under deep propofol sedation. The sedation dosing algorithm is designed to mitigate the risk of apnea as much is possible, by using a carefully timed titration of midazolam and fentanyl dosing practice. Also a pharmacokinetic based (Paedfusor model) propofol infusion protocol was used. This is designed to maintain a clinically appropriate (based upon each patient’s clinical response) steady state propofol level, avoiding propofol boluses unless necessary. Data was obtained from a retrospective review of the sedation record. Patient demographics, vital signs, sedation dosing and Procedure details, outcome and airway interventions were noted. When it became apparent that the case was not possible using our routine airway management strategies (Table 1) for the shared airway, a 30F NPA (Oral trumpet) was placed and secured in the lateral position using the LMA-Prop (Figure 1). A specially designed nasal capnography attachment (adapter figure 1) was 3D printed to connect to the nasopharyngeal airway to allow capnography. Oxygen was administered either using a Mapleson C bag, n=1 (Example Figure 2) or the nasal cannula, n=2 (Example figure 3) with O2 set at 5L/min.

Table 1. Interventions that are used for Airway Management Guidance, part of our Airway Score				
AIRWAY MANAGEMENT PLAN	Initial	-----	-----	Late
OXYGEN USE	ADDED	3-5L or ≥ 30% O2	6-10L ≥ 50% O2	10L+ 100 % O2 /
CHIN / JAW MANEUVERS	OCCASIONAL CHIN LIFT	REPEATED CHIN LIFT, or LIGHT JAW LIFT	FORCEFUL JAW THRUST or FORCEFUL CHINLIFT	REPEATED FORCEFUL JAW THRUST
COUGH MANAGEMENT	PRE-DOSE GLYCOPYRROLATE	SUCTION	GLYCOPYRROLATE	EXTRA SEDATION FOR COUGH
INTRA-ORAL DEVICES / ASSISTANCE	ADJUST	CHANGE	REMOVE	ATTENDING INTERVENTION ANY REASON
AIRWAY MANEUVERS	REPOSITION HEAD	TONGUE PULL	ORAL / NASAL AIRWAY / BMV / VENT ASSIST	UNPLANNED ETT / LMA
SEDATIVE USE AND AIRWAY	MILD STIMULATION / HOLD INITIAL SEDATION DOSE	PAINFUL STIM. / STOP SEDATION ADMINISTRATION	DEEPER SEDATION FOR LARYNGOSPASM	SUX FOR LARYNGOSPASM OR REVERSAL



RESULTS

The average age, weight and BMI were 5.7 years, 18.8 kg and 14.5 respectively. The Mallampati range was 1 to 2 and Tonsil size range 0 to 2. The average total midazolam, total fentanyl and total propofol were 2.5 mg, 41.7 mcg and 120 mg respectively (within the expected total dose range). All of the cases required continues chin lift, repeated jaw thrusting, increased oxygen to 10L/min+ and attending intervention before the Oral trumpet was placed (Table 1. outlines our airway management plan for the non-instrumented airway). All cases were successfully completed with the Oral trumpet in place. Capnography monitoring with detectable ETCO2 recorded ~ 72% of the time during trumpet use. The trumpet depth required adjustment in all three cases due to being too deep. In the case using the Mapleson C, assisted ventilation using the oral trumpet was possible, however not required.

CONCLUSION

Using non-instrumented airway deep sedation for a shared airway case can have a “risk” of case non-completion or cancellation due to airway patency issues. Usually there are potential red flags for these cases such as enlarged tonsils, poor Mallampati score or a large BMI, that increase the risk for airway obstruction under deep sedation. These cases may be scheduled for the more invasive LMA sedation type. However, cancelling a case midway is inconvenient for the patient and parent and having the option of a rescue airway maneuver (the oral trumpet) may be useful in allowing a safe completion of the case. The NPA can be placed nasally but this does cause significant placement discomfort and more concerning, may result in bleeding, especially in the age range of patients we sedate, due to adenoidal hypertrophy. An oral airway could also be considered, but it "gets in the way" and the patient will often try and dislodge it, more so than a NPA which once placed appears to be better tolerated. This short case report suggests that re-purposing the nasopharyngeal airway may be a valid option in such cases. The lateral position of the Prop allows the dentist access and secures the oral trumpet. Of note we did not change our sedation dosing and the cases were all completed satisfactorily. We now keep a "ready packet" for using the oral trumpet in each room (Figure 4).

1. American Society of Anesthesiologists. Position on Monitored Anesthesia Care. Last amended on October 17, 2018.