Nasotracheal Intubation in Children for Outpatient Dental Surgery: Is Fiberoptic Bronchoscopy useful?

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None

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None

Study Protocol

We obtained confirmation from the Inonu University Medical Faculty Hospital Ethics Committee (2015/101) and written informed consent from the guardians of all 80 children. These children, who had a ASA physical status of I-II, had a Mallampati Score of 1-2, were aged 5-15 years, were scheduled to undergo outpatient dental surgery under general anesthesia, and required NTI were included in this prospective and randomized study. Exclusion criteria included the following: the patient's refusal for study consent, active upper respiratory infection, airway abnormalities, nasal mass or nasal injury, bleeding disorders, allergies to anesthetics, uncontrolled hypertension, morbid obesity, hepatic or renal failure, cardiovascular diseases, a history of nasopharyngeal surgery and those who were difficult to intubate. Children were randomly assigned into the DLS group (n = 40) or the FOB group (n = 40) according to a computer-randomized table. General anesthesia was administered to children due to the learning difficulties. The number of models was decided by a statistical power analysis after the conclusions from the pretest were obtained. The general data of the children in the two groups are shown in Table 1.

All children fasted at least for 6 h before surgery, and the oral intake of clear fluids was restricted for 2-3 h. Premedication of midazolam (0.5 mg/kg) was orally administered in apple juice (0.5 mL/kg of body weight) 1 h prior to anesthesia. After being admitted to the operating room, the patient's systolic blood pressure (SBP) and heart rate (HR) were continually monitored with a multichannel physiologic monitor (Dateks Ohmeda F-CU8, Datex Instrumentarium, Helsinki, Finland), and the baseline values for SBP and HR were recorded. Thirty min before the intubation attempt, the nasal mucosa of both nostrils were anesthetized with a topical vasoconstrictor (0.05% xylometazoline spray, and 2% lidocaine 1 mL two times in each nostril) (9) to attenuate cardiovascular responses and adverse events in all children. Anesthesia was induced with 8% sevoflurane with eight deep breaths via a face mask, and the

patient was maintained on 4% end-tidal sevoflurane, fentanyl 2 µr/kg and rocuronium 0.6 mg/kg. NTI was achieved 2 min after rocuronium injection. The more patent nostril was selected for intubation. An experienced anesthetist performed all intubations in the study and an assistant applied the maneuvers (jaw trust) and evaluated the patient during the postoperative visits. All NTIs, both DLS and FOB, were conducted by the same experienced anesthetist (the anesthetist had performed DLS and the FOB nasal intubation in more than 150 patients, including in at least 100 children before the study). A study nurse documented the anesthetic data and timing. In the DLS group, the spiral tube was inserted into the nose and intubated with a Macintosh laryngoscope (Timesco, England) according to conventional procedures using Magill forceps. In the FOB group, NTI was conducted using an FOB with an outer diameter of 3.1 mm (Olympus LF-DP, Tokyo, Japan) through the selected clear nasal passage with a spiral tracheal tube. The appropriate size of the tracheal tube for a child was determined with the following formula (10): ID (mm) = age/3 + 3.5 in both groups. The same type of tube was used in each group. Before intubation, enough lidocaine gel was placed on the tracheal tube, and the FOB was guided into patients with a suitable spiral tracheal tube. All tracheal tubes were cuffed and thermosoftened in warm normal saline and lubricated to reduce mechanic stimuli to airway structures. During the intubation, the head of the patient was the in supine position, and an assistant applied a jaw thrust for opening the nasopharyngeal passage and improved the image in all patients in the FOB group. If indicated (a suboptimal laryngeal view or resistance in passing of the tracheal tube), anterior laryngeal pressure and tongue withdrawal by digital traction was performed to improve the laryngeal field of view, and this procedure was recorded (11). When the glottis was clearly visible, the FOB was advanced through the vocal cords, and jaw thrust movement was released. To prevent the stimulation of the carina, the tube was placed 4 cm below the glottis, sliding over the FOB. Intubation was verified with the FOB, and end-tidal CO2 concentrations at 35-40 mmHg were monitored. A throat pack was inserted by the

anesthetist after the measurements were taken. Anesthesia was maintained with 2% sevoflurane and 50% N20 in oxygen with 1.5 l min-1 fresh gas flow and 35-40 mmHg end-tidal CO2 concentrations. Isolyte-P was administered at rate of 15 mL/kg/h IV, and acetaminophen (15 mg kg-1) was infused for postoperative analgesia in all children.

SBP and HR were recorded at baseline, after induction of anesthesia, at the time of intubation, and 1, 3 and 5 min after intubation. The intubation time (the time from when manual ventilation with a facemask stopped to restarting ventilation via the nasotracheal tube and when carbon dioxide (CO2) was detected by capnography) was recorded by another anesthetist with a digital stopwatch. Nose bleeding after intubation (epistaxis), laryngospasms, bradycardia (HR<65 beat min-1), hypoxic episodes (SpO2<90%) and the surgery type were also recorded. Adverse events (hoarseness, sore throat) were assessed 24 h after surgery. If a sore throat developed, additional analgesics were not administered. If bradycardia or desaturation (SpO2<90%) occurred for more than 2 min, the intubation was interrupted, and patients were ventilated with 100% oxygen and were administered IV atropine (5-10 µg / kg).

Statistical Analysis

The data were expressed as the mean (standard deviation, SD) or frequencies with percentages, depending on the overall variable distribution. Normality was assessed using the Shapiro Wilk test. Normally distributed data were analyzed by the independent samples t-test. Qualitative data were analyzed using the Pearson chi-square test, Yates corrected chi-square test, and Fisher exact test, as appropriate. $P<0.05$ values were considered statistically significant. IBM SPSS statistics version 23.0 for Windows was used for statistical analyses. The number of models was decided by a statistical power analysis after the pretest conclusions were obtained. Power analysis was used to define the minimal clinically important difference in SBP to be 20 mmHg, and the a standard deviation of residuals was anticipated to be 12.5 mmHg. Therefore, a sample size of 26 children in each group was required for an α of 0.05 and a β of 0.2. To define a 30% difference in the incidence of side effects, 40 children in each group were for an α of 0.05 and a β of 0.2.