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Original Article

Body temperature management during pediatric full mouth rehabilitation surgery under general anesthesia

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KEYWORDS
Full mouth rehabilitation;
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Abstract *Background/purpose:* It was found that body temperature would be gradually increased during pediatric full mouth rehabilitation surgery. Although the etiology is unknown, here, we introduced an effective method to maintain normothermia during this kind of surgery.
Materials and methods: Following IRB approval, the medical records of pediatric patients who received full mouth rehabilitation surgery from Jan. 2014 through Jun. 2016 were collected. All the patients included were managed by a "tent-like draping" with a forced-air warmer (Life-Air 1000, Progressive Dynamics Inc.). The temperature of the forced-air was changed from 38 °C to cool ambient temperature when the body temperature higher than 36 °C. The body temperatures (preoperative, periodic during operation, and postoperative) and the maximum body temperature changes during operation were recorded. The data was compared with the results of a previous report.
Results: Total 37 patients were enrolled. The maximum temperature change during operation was 2.08 ± 0.6 °C. The incidence of body temperature higher than 37.5 °C during operation was 10.8% (4/37). Compare to the previous report in which the patients received the same operation with ordinary surgical draping, the maximum temperature change and the incidence of body temperature higher than 37.5 °C during operation were significantly lower in patients received "tent-like draping" (2.08 ± 0.64 °C vs 2.50 ± 1.17 °C, $p < 0.001$; and 10.8% (4/37) vs 32.4% (11/34), $p < 0.05$, respectively)
Conclusion: The increase of body temperature during pediatric full mouth rehabilitation surgery can be effectively controlled by ambient forced-air cooling using tent-like draping.

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Introduction

A lengthy general anesthesia is required for full mouth rehabilitation surgery in children. Avoid hypothermia during operation is a general rule of thumb for pediatric patients. However, gradual increase of body temperature during pediatric full mouth rehabilitation surgery was found.[1] The etiology is still unknown. Regarding the relations between body temperature changes and pediatric full mouth rehabilitation surgery, postoperative hyperthermia has been reported in two studies.[2,3] Several factors have been examined for the causes of the postoperative hyperthermia in these two studies, such as patient's oral hygiene, gingival condition, soft tissue trauma and bacteremia, however, no significant relation was found. In this retrospective charts review study, we introduce a method to maintain normothermia during pediatric full mouth rehabilitation surgery.

Materials and methods

Institutional review board approval was obtained (TSGHIRB 1-105-05-149). The medical records of pediatric patients who received full mouth rehabilitation surgery from Jan. 2014 through Jun. 2016 were collected. The included patients were free of upper respiratory infection and no atropine administration. The cases with operation time less than 4 h were excluded. All of the included patients received a "tent-like draping". The total number of the included medical records is 37.

All patients received a standard anesthetic protocol. The operating room temperature was set around 25—26 °C. Intravenous fluid was administered with 2—3 ml/kg/hr since the night before operation day. Arriving at operation room, electrocardiogram, pulse oxemetry and non-invasive blood pressure monitoring were applied. General anesthesia was induced by intravenous thiamylal (3—5 mg/kg), then nasotracheal intubation was facilitated by intravenous cisatracurium 0.15 mg/kg. Anesthesia was maintained by sevoflurane, fentanyl and cisatracurium, controlled mechanical ventilation was applied to maintain end-tidal CO_2 between 35 and 40 mmHg. 0.33% glucose saline was administered by 3—5 ml/kg/h during operation. Foley catheter was inserted for urine output monitor and the urine was maintained more than 1 ml/kg/hr during operation. A temperature probe was placed in axillary region for continuous body temperature monitoring. The "tent-like draping" was applied as follow (Fig. 1). Two screen frames were used, one was toward head side as usual preparation and the other was toward feet side. The feet-side screen frame was positioned at 30 cm in height at the knee's level. Only one piece of surgical drape was covered over the patient's body. The air duct of a forced-air warmer (Life-Air 1000, Progressive Dynamics Inc.) was placed between two knees. The following surgical preparations were as usual. If the body temperature lower than 35 °C, warm forced-air with temperature of 38 °C was given. When the body temperature increased up to 35.5 °C, the warm forced-air was discontinued. A cool forced-air with ambient temperature was started when the body temperature higher than 36 °C. If the temperature further increased to more than 37.5 °C, ice packs were placed over groin region. Rectal diclofenac suppository was administered if body temperature higher than 38.5 °C. Tracheal extubation was performed after eye opening with spontaneous regular breathing when the operation finished. Then the patient was sent to post-anesthesia care unit for postoperative care.

The body temperatures (preoperative, periodic during operation, and postoperative) were recorded. The preoperative and postoperative temperatures were measured by tympanic membrane thermometry. The maximum temperature changes during operation for each patient were also calculated. The operation times were recorded. All the recorded data were compared with the corresponding results of a previous report. A p-value less than 0.05 was considered significantly different.

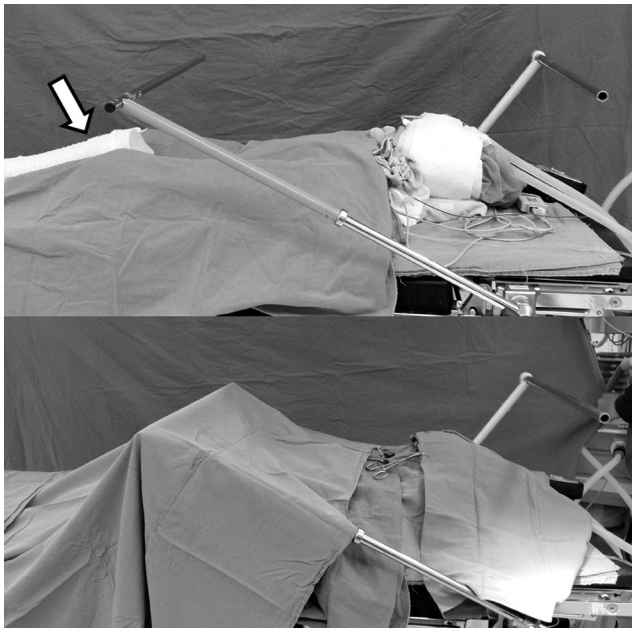

Figure 1 View of the tent-like draping. One screen frame was toward head side and the other was toward feet side. The feet-side screen frame was positioned at 30 cm in height at the knee's level. Only one piece of surgical drape was covered over the patient's body. The air duct of a forced-air warmer (white arrow) was placed between two knees.

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