CASE REPORTS

Coblation tonsilloadenoidectomy - treatment of choice for very small children

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ABSTRACT

Tonsillectomy is one of the most common operative procedures in childhood. According to the Croatian national guidelines for the treatment of sore throat (ISKRA guidelines), apsolute indications for tonsillectomy are recurrent tonsillitis (>4 per year) and sleep disordered breathing (including snoring and obstructive sleep apnea). Most children in Croatia undergo conventional cold steel tonsillectomy with bipolar diathermy coagulation using reusable surgical accessories. Estimated blood loss during this type of surgery is about 10% of complete blood volume. That is why, tonsillectomy is performed mostly in children 3 years of age and above because their weight and blood volume. Coblation tonsillectomy results in less postoperative blood loss and less postoperative morbidity and is therefore the method of choice for operating on very small children.

We present the case of a 3-year-old girl with somatic retardation (height 92 cm, weight 9,280 kg) who underwent coblation tonsilloadenoidectomy. As far as we now, this procedure has never been performed in a child of lower weight.

Key words: tonsillectomy, body weight, obstructive sleep apnea, weight gain

Introduction

Tonsillectomy is one of the most common operative procedures in childhood. (1) At the Ear Nose and Throat (ENT) Department, Mayo Clinic, Rochester, Minnesota, USA, 4662 tonsillectomies were performed during a 12-year period; at the Department of ENT, Head and Neck Surgery, University Hospital of Split, Split, Croatia, 3619 tonsillectomies were performed during a four-year period. (2) Tonsillectomy has been practiced for more than 2000 years (Celsus, 30 B.C.). (1,3)

Although indications for tonsillectomy have included a large number of conditions over the years, most procedures have traditionally been performed to address infection, either recurrent or chronic. More recently, a trend towards airway obstruction as a common indication for tonsillectomy has emerged because of increasing information about the causes and sequelae of obstructive sleep apnea (OSA). That is why there are more and more very small children undergoing tonsilloadenoidectomy in the first 3 years of life. Frequently, patients under 3 years of age are considered higher risk patients. This higher risk status is generally based on one of two premises: 1. that young children are at increased risk of having postoperative problems; or 2. that these young children have such little hemodynamic reserve that complications become more dangerous. (4)

A number of operative methods have been investigated in terms of less intraoperative bleeding, less postoperative pain, infection or postoperative hemorrhage, however, none yielding satisfactory results in all respects. (2,5-8)

Coblation surgery, one of several types of radiofrequency surgery, is a novel surgical technique that was first introduced in ENT practice in the late 1990s for the operation of head and neck soft tissues. (6) The operative technique of coblation tonsillectomy is based on the standard technique of dissecting in the relatively bloodless tonsil-muscular plane, with the tonsillectomy hand piece tip directed toward the tonsil in order to avoid damage to tonsillar arches and tonsillar fossa. (2,6) A previous study conducted by Roje et al. proved that coblation tonsillectomy results in lower intraoperative blood loss, which is a particular advantage in children, especially those with homeostasis disorders, anemia and children under 3 years of age. (2)

Thanks to much better antenatal, intrapartal and neonatal monitoring and therapy, a large number of children with chronic diseases, become candidates for tonsilloadenoidectomy at a very early age. This trend implicates more efforts from otorhinolaryngologists and anesthesiologists in order to achieve the best possible result for the operated child and his parents. (9) One of these children is the child in this case report.

Case report

A 3.3-year-old Caucasian girl was referred to an ENT specialist because of recurrent tonsillitis, otitis media and sleep breathing disorders (snoring and obstructive sleep apnea).

On arrival, was 82 cm tall (height-standard deviation score or H-SDS - 2,67; ct <1) and weighed 9280 g, with a body mass index of 12,78 kg/m^2 (BMI-SDS - 3,08; ct <1). The girl was born prematurely by C-section in 35th gestational week because of intrauterine growth retardation. The mother suffered from gestational diabetes. At birth, the girl weighed 1770 g (birth weight or BW-SDS – 1.7; ct 4.35) and was 42 cm long (birth length or BL-SDS – 1.8; ct 3.63). Apgar score after the 1st minute was eight. She was treated in the neonatal intensive care unit for 42 days. During that time she developed sepsis (Klebsiella pneumoniae). An atrial septal defect was detected by ultrasound. After discharge from hospital she showed additional somatic retardation with very poor weight and height gain. DNA analysis for celiac disease and cystic fibrosis was undertaken, but no pathology was found. Due to her short stature she was referred to a pediatric endocrinologist at the chronological age 1.48 years, height was 71.5 cm (H-SDS – 2.92; ct <1), midparental target height 169 cm (TH-SDS -1.16, ct 87.7), weight 7.1 kg, BMI 1.89 kg/m^2 (BMI-SDS – 3.08 ct <1), predicted target height comparing with the midparental height fell significantly below the target height range. On regular follow-up sessions anthropological parameters were measured and notified. Throughout this period she was below the 1st centile for both investigated parameters. Skeletal age was similar to chronological. Growth hormone deficiency was not proven by the stimulation test. No neurological or intellectual problems were noted. Atrial septal defect closed at one year of age.

After starting kindergarten, upper respiratory infections occurred monthly. She had five courses of antibiotics in less than four months. At the same time, sleep disorders became more serious with significant obstructive sleep apnea. All this time she was not able to swallow hard textured food.

ENT examination revealed enlarged tonsils (Friedman gradus IV), angular lymphadenopathy bilaterally, slightly retracted eardrums and hypertrophic mucosa in the nasal cavities with a great amount of mucous-purulent discharge. Polisomnography recorded apnea/hypopnea index (AHI) =11.

Because of all these problems she had very poor quality of life and was physically backward compared with other children of her age.

That is why we decided to perform adenotonsillectomy even through we were aware that she was a high risk patient due to her small weight (<10 kg) and potential intraoperative blood loss of more than 10% of her blood volume. Thanks to our study from 2008 when we compared intraoperative blood loss during so called “classic” tonsillectomy and coblation tonsillectomy we knew that intraoperative blood loss during coblation is less then 10 ml and concluded that this was the method of choice for our patient.

The operation was done under general anesthesia with the ArthroCare ProCize wand (ArthroCare, Sunnyvalle, California, USA). Surgery lasted 10 minutes with no intraoperative complications.

After EMLA (Eutectic Mixture of Local Anesthetics) application, intravenous access was established on the ward. Anesthesia was induced with midazolam 1mg, fentanyl 2μg/kg, propofol 3 mg/kg and vecuronium 0,1 mg/kg. Paracetamol 15 mg/kg was given as a slow intravenous infusion immediately after induction and dexamethasone 2 mg. Anesthesia was maintained with continuous infusion of propofol (150-200 μg/kg/min). The child was ventilated with a mixture of oxygen and air (40%:60%) in the pressure-controlled mode of ventilation to keep end-tidal CO_2 between 30 and 35 mmHg. During anesthesia the child was stable. Reversal of neuromuscular blokade was performed with atropin/neostigmin (0,02/0,07 mg/kg). Extubation was uneventful and the child was transferred to the post-anesthesia care unit (PACU). After 2 hours in PACU, the child was transferred to the ward.

No postoperative complications occurred and she was discharged on day three.

Her night breathing became normal (no snoring, no apnea) and she started to eat hard textured food for the first time in her life.

Seven months after surgery at age 4.01 years her height was 92.3 cm (H-SDS - 1,89; ct 2,95), weight 12 kg, BMI 14,09 kg/m^2 (BMI-SDS - 1,38, ct 8,48) and height velocity was excellent -11,42 cm/year (HV-SDS + 3,46, interval 0,63 year). We confirmed great progress in linear growth (H-SDS from -2,67 to -1,89, Δ H-SDS 0,78) and body composition (BMI-SDS from - 3,08 to - 1,38, Δ BMI-SDS 1,7).

Discussion

Even though there are some data about tonsilloadenoidectomy in very small children (< 2 years old) we could not find data showing that any of those children weighed less than 10 kg. (9) Berkowitz et al. published their study of 190 children with an average age of 2 years and 4 months and average weight of 12.8 kg. (10) That is why we believe that this is a unique case of tonsilloadenoidectomy in such a small weight child. Performing surgery on such small children is a challenge for every ENT specialist and anesthesiologist: in choosing the best operative technique and pre- and postoperative care. The surgeon is not only concerned about the very small operative field (small mouth), intraoperative blood loss, but also about postoperative morbidity including pain, postoperative

primary or secondary hemorrhage and infection in order to prevent more weight loss after surgery.

According to Berkowitz et al. tonsilloadenoidectomy in very small children has to be done as an inpatient procedure with intensive postoperative monitoring including pulse oxymetry because those children are prone to postoperative airway obstruction and oxygen desaturation. (10) Other postoperative complications (postoperative hemorrhage and dehydration) have similar rates like in older children. On the contrary, Shapiro et al., Helmus and Wiatrak et al. found that small children more often have delayed oral fluid intake and bleeding. They have emphasized that younger children have less 'reserve' when considering these important hemodynamic variables. As such, they are more likely to have poor outcomes from complications which would be less serious in older children and adults. (4,11,12)

Apart from the paper by Werle et al., published in 2003, all data on tonsilloadenoidectomy in small children are more than fifteen years old. (9) During that time only two tonsillectomy techniques were introduced: electrocautery and cold-steel technique. Neither of them is very friendly for small children: electrocautery because of intensive postoperative pain and cold-steel technique because of more intraoperative blood loss. In the last decade, several new techniques have been introduced which offer better intraoperative blood loss control and less postoperative pain (radiofrequency, harmonic scalpel) which can be crucial for very small children. (5-8,13,14) Less postoperative pain means better postoperative fluid-intake, less dehydration and readmissions to hospital. (12)

That is why every ENT surgeon has to be informed and trained for various tonsillectomy techniques, their advantages and disadvantages in every specific situation. Here are a few reasons why we advocate coblation as the method of choice for tonsilloadenoidectomy in very small children:

1. less intraoperative blood loss
2. less postoperative pain
3. no increased risk for postoperative hemorrhage.

It allows operated children faster postoperative recovery and a quicker return to normal dietary habits and activities of daily living. (2,6,13)

All of this was confirmed in our case: improved weight and height gain and better quality of life for this little girl. (2,6,13,15)

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