A Review of the Anaesthetic Management in a Tertiary Paediatric Centre of Children Undergoing Adenotonsillectomy for Obstructive Sleep Apnoea

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Background

Adenotonsillar hypertrophy is a common cause of obstructive sleep apnoea (OSA) in the paediatric population. As an ENT tertiary referral centre our institution anaesthetises the majority of children with moderate/severe OSA from Greater Manchester and Lancashire. This is based upon the guidance of the consensus statement published by the Royal College of Surgeons. We currently do not operate day case surgery for children with obstructive sleep apnoea and it has become evident that most of these children have an uneventful perioperative course. We performed a retrospective notes review to assess current practice and complications and the potential for day case OSA Adenotonsillectomy surgery.

Method

We performed a search of our theatre database searching for the key word “adenotonsillectomy” resulting in 189 results, between October 2015 and March 2016. Notes were reviewed and data collected on an audit proforma by members of the anaesthetic and otolaryngology teams. Results were collated and statistics performed using microsoft excel. We were unable to get 13 sets of notes resulting in 176 patients reviewed. OSA severity was defined by the ODI 4% and comorbidities using those laid down by national guideline (box 1).

Results

Basic Demographics

The average age of child was 4.27 years, weight 20.3 kg and it was mainly male children (116 male, 55 female and 5 not documented). The principal indication for surgery was for obstructive sleep apnoea (79.5%) followed by OSA and recurrent infection (13.1%). The main surgical operation was adenotonsillectomy (93%). 32.4% of the children had at least one comorbidity with many having (more than 1).

Definitions of severity of OSA based on ODI RL:

- No OSA (0-5.5)
- Mild 6.5-10.5
- Moderate >10
- Severe >10

Comorbidity Classification:

- Age < 5 yrs
- Craniofacial abnormality
- Other airway abnormality
- Morbid obesity
- Significant cardio/pulmonary disease
- Significant neurological/musculoskeletal disease
- Syndromic Status (our Proforma)

Table 1: Postoperative complications by ODI grade.

| No Comorbidity (n=65) | (+1 Co-Morbidity (n=73) |
|-----------------------------------------------|
| Desaturations Requiring Oxygen | 0 | 3 |
| i + V | 0 | 1 |
| Primary Bleed | 3 | 0 |
| Secondary Bleed | 1 | 0 |
| Secondary Bleed and requiring oxygen | 0 | 1 |
| Desaturation self correcting | 1 | 0 |
| Rescue Oramorph | 0 | 1 |
| Other | 0 | 1 |

Table 2: Postoperative complications by comorbidity.

Intraoperative Anaesthetic Management

LMAs we used in 124 cases (70.5%), ET tubes in 43 cases (24.4%) and an LMA was converted to an ET tube in 9 cases (5.1%). Intraoperative complications occurred in 15 children, predominantly obstruction on an LMA and conversion to a endotracheal tube (graph 2). The principle analgesic regimen was a combination of paracetamol/morphine (62.5%) followed by paracetamol/lidocaine (10.8%), paracetamol/morphine/NKAID (10.8%) and paracetamol/fentanyl/morphine (10.2%). Graph 3 demonstrates the intraoperative morphine and fentanyl doses by OSA category.

Postoperative Complications and Location

Postoperative complications occurred in 12 children (table 1) predominantly in the severe OSA group. However, all respiratory complications occurred in children with at least one comorbidity (table 2). Severe sleep apnoea and no comorbidities accounted for one case of rescue analgesia and 2 primary bleeds. The majority of children went to a standard ward (68.7%), followed by PHDU (18.8%), an in-recovery high care unit (11.4%) and PICU (1.2%). There was little difference in hospital stay between those in PHDU (20.4 hours) and the ward (20.3 hours). 33% of all HDU discharges to the ward were on the day of surgery, the remainder the following morning.

Obstructive Sleep Apnoea

54% of children had a sleep study (overnight oximetry) with categorization of the degree of sleep apnoea based on the ODI 4% (graph 4). There was poor correlation between the ODI and time spent less than 88% (r=0.62), ODI and mean saturations d1p (r=0.453) and ODI and minimum saturations d1p (r=0.54). There were no significant differences in age and weight between severity of sleep apnoea. Those children with comorbidities were predominantly in the severe OSA group (graph 5).

Graph 3a: Average Intraoperative Morphine Dose for Different Degrees of Sleep Apnoea

Graph 3b: Average Intraoperative Fentanyl Dose for Different Degrees of Sleep Apnoea

Discussion

We have demonstrated that:

- Currently used overnight oximetry indices correlate poorly with one another.
- Complications are more common in those with severe sleep apnoea.
- However, respiratory complications are more related to the presence of a comorbidity

Our results agree with the findings of a recent systematic review finding that using clinical markers accurately predicts postoperative major respiratory complications and polysomnography has a poor predictive yield. Equally, we utilise overnight oxygenometry with a 4% cut off, which has recently been shown to be poor at excluding and diagnosing OSA in children, compared to polysomnography (PSG) the gold standard (Suzuki et al., 2017).

It is apparent that from the data the presence of comorbidities and clinical risk factors is a better predictor of postop complications than overnight oximetry and it would be safe to perform day case adenotonsillectomies in children without comorbidities without a sleep study.

Graph 4: Proportion of the population with different degrees of OSA

Graph 5: Number of children with differing degrees of OSA with and without comorbidity