Perianaesthetic Complications Associated With Adenotonsillectomy At The University College Hospital, Ibadan, Nigeria.

A Sanusi, M Akinwale, O Uchendu, A Lasisi

Citation

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Abstract

Adenoidectomy and tonsillectomy are common ear, nose and throat operations in children and are often accompanied by complications. This study assessed the perianaesthetic complications encountered among patients who had adenotonsillectomy in a tertiary hospital through May 2009 to April 2010.The study comprised of 49 subjects made up of 26 (53%) males and 23 (47%) females with a median age 36 (range=8 – 64) months and a median weight of 14kg (range = 5 –76kg). All the patients had general anaesthesia with endotracheal intubation. The procedures included tonsillectomy in 8 (16%) subjects, adenoidectomy in 18 (37%) and adenotonsillectomy in 23 (47%). Of the 49 patients, 24 (49%) had associated OSA, 2 (4%) had sickle cell disease, 1 (2%) patient had Down's syndrome and 1 (2%) had hypertension. The estimated median blood loss was 50ml with a range of 20-200ml. The incidence of critical events and complications was 53.1%. Vomiting was the most common complication, occurring in 16% of the patients, followed by accidental tube dislodgement 14% and tube compression 10%. The use of plastic endotracheal tube was significantly associated with the occurrence of tube compression compared to the reinforced (non-kinkable) tube (Fisher's exact=0.034), in addition, the presence of OSA is significantly associated with delayed post-operative recovery (Fisher's exact = 0.05).We conclude that there is a high incidence of tube compression and dislodgement complicating adenotonsillectomy suggesting the need to modify the method of anchoring the endotracheal tube during the procedure.

INTRODUCTION

Tonsillectomy, adenoidectomy and adenotonsillectomy are commonly performed paediatric Ear, Nose and Throat surgical procedures in our environment[1]; in the USA it constituted more than 530,000 procedures annually in children younger than 15 years[2]. As with most airway surgeries, these procedures are associated with many potential anaesthetic and non-anaesthetic critical incidences and complications.

The tonsils and adenoids are lymphoid tissues forming part of the Waldeyer's ring encircling the pharynx. They appear in the 2 nd year of life, are largest between 4 and 7 years of age and then regress. The surface of the adenoids differs from the tonsils in that adenoids have deep folds and few crypts[3]. Children with adenotonsillar hypertrophy often present with nasal obstruction, recurrent respiratory tract infections, secretory otitis media and deafness (secondary to Eustachian tube dysfunction) and obstructive sleep apnoea (OSA)[4]. Symptomatic adenotonsillar enlargement is what often necessitates surgical intervention.

Other indications for tonsillectomy include recurrent tonsillitis, chronic tonsillitis, peritonsilar abscess and OSA. Adenoidectomy is indicated when there is evidence of enlarged adenoids causing nasal obstruction, OSA and hearing loss. Compared to pharyngitis, sleep disordered breathing is now a leading indication for tonsillectomy in children[5]. In the presence of OSA, adenotonsillectomy has been shown to eliminate obstruction in 85 – 95% of children, with resultant improvement in symptoms and quality of life[4], though it has not been shown to improve neurobehavioural outcomes[6].

Complications after tonsillectomy documented include acute compromise of the airway in 0 – 20%, haemorrhage in 0.1-8%, inadequate oral fluid intake with or without dehydration, pain, vomiting and fever[7, 8]. Although the incidence of complications like fever and infection following tonsillectomy and adenotonsillectomy is reducing[9, 10], gastrointestinal complications, airway problems and

bleeding remain the most common complications[11]. Less common and infrequent complications such as atlanto-axial subluxation, cervical osteomyelitis and meningococcal septicaemia have also been reported[12, 13].

Surgical complications following adenotonsillectomy are well documented but reports of anaesthetic complications during and after these surgical procedures are scanty in our environment. Even though anaesthetic complications have declined with modern anaesthetic techniques, airway problems, aspiration and post obstructive pulmonary oedema may still occur[14].

In this study, we present a prospective observational assessment of perioperative complications in 49 patients who had tonsillectomy, adenoidectomy and adenotonsillectomy through May 2009 to April 2010 at the University College Hospital, Ibadan, Nigeria.

PATIENTS AND METHODS

The study included all patients routinely admitted for tonsillectomy, adenoidectomy and adenotonsillectomy under general anaesthesia through May 2009 to April 2010 at the University College Hospital, Ibadan.

All patients were reviewed preoperatively on the ward to ensure fitness for anaesthesia. Surgery was deferred in patients who had respiratory infection or fever. The attending anaesthetists were allowed freedom of choice for anaesthesia according to the patient's clinical history. Baseline vital signs including continuous electrocardiogram (ECG), pulse oximetry and non-invasive blood pressure were documented. Children 5 years and below were induced using inhalational technique with halothane 2-3% in 100% oxygen. Intravenous access was then secured and atropine 0.1mg/kg was administered if the heart rate was less than100 beats/min. Thereafter calculated doses of suxamethonium or pancuronium were given to facilitate tracheal intubation. Older patients were induced intravenously with either sodium thiopenthone or propofol and tracheal intubation achieved with either suxamethonium, atracurium or pancuronium. Suxamethonium was used to facilitate intubation only in patients with obstructive sleep apnoea after the ease of ventilation had been confirmed.

Anaesthesia was maintained with 1-1.5 Minimum Alveolar Concentration (MAC) of halothane or isoflurane in 100% oxygen. Pancuronium was administered to maintain muscle relaxation where suxamethonium was previously used for intubation. Analgesia was achieved with paracetamol 15mg kg^{-1} plus fentanyl 1mcg kg^{-1} or morphine 0.1mg kg^{-1}. Ventilation was controlled using Mapleson F breathing circuit for patients who weigh below 20kg and Bain's circuit for those above 20kg. Normal saline was administered at the rate of 2-4mlkg^{-1} hr^{-1} depending on the weight of the patient. All patients were done under general anaesthesia with endotracheal intubation. Thirty three (67%) patients were intubated with non-kinkable ETT while 16 (33%) were done using polyvinyl chloride (portex) ETT. The Boyle Davis' mouth gag was used to keep the mouth open with the lower blade resting against the endotracheal tube (ETT) and the lower lip. The adenoids were removed by curettage and the tonsils were removed by dissection. Introperative monitoring included non-invasive blood pressure, oxygen saturation by pulse oximeter, capnography, ECG and axillary temperature. Forty eight patients (98%) had electrocardiographic monitoring as the ECG cable malfunctioned in one patient. Sixty one percent (30 patients) had axillary temperature monitored while only 31% (15 patients) had end tidal carbondioxide monitored using the capnograph.

At the end of the surgery, the oropharynx was suctioned under direct vision using a soft tip catheter. Neostigmine and atropine were given to reverse the residual neuromuscular block. The volatile anaesthetic agent was discontnued and 100% oxygen was administered. Patients were extubated awake in the lateral position and transferred to the recovery room in the tonsilar position.

In the recovery room, oxygen was administered by face mask at 2-3 litres per minute. The vital signs including non-invasive blood pressure, pulse oximeter and axillary temperature were monitored. Additional doses of morphine or pentazocine were given for analgesia when required.

Data obtained included age, weight, sex, intercurrent medical illness, presence of obstructive sleep apnoea(OSA), American Society of Anesthesiologists'(ASA) classification of physical status. Other data were type of ETT used, duration of anaesthesia and surgery, intraoperative and immediate postoperative complications. The data were analyzed using the SPSS version 16.0 statistical package and Chi square testing was performed as appropriate.

RESULTS

The study comprised of 49 subjects made up of 26 (53%) males and 23 (47%) females with a median age 36(range=8

– 864) months and a median weight of 14kg (range = 5 –76kg). Majority of the subjects, 45 (92 %) were in the paediatric age group (<12 years) while only 4 (8 %) patients were above 12 years. The ASA classification revealed that 20 (41%) subjects were ASA I, 27 (55%) were ASA II while 2 (4%) were ASA III. The mean ± SD duration of anaesthesia was 89.01±30.4 while the duration of surgery was 60.24 ±23.4 minutes (Table1). The procedures included tonsillectomy in 8 (16%) subjects, adenoidectomy in 18 (37%) and adenotonsillectomy in 23 (47%). Of the 49 patients, 24 (49%) had associated OSA, 2 (4%) had sickle cell disease, 1 (2%) patient had Down's syndrome and 1 (2%) had hypertension. The estimated median blood loss was 50ml with a range of 20-200ml.

Critical incidences and perioperative complications were 26/49 (53.1%). The predominant complications were vomiting 8, accidental tube dislodgement 7 (14%), tube compression 5 (10%) and delayed recovery 5 (10.2%), the others are as shown in table II.

The study showed that the use of portex endotracheal tube was significantly associated with higher incidence of tube compression, as 4/16 (25%) with portex ETT experienced tube compression compared to 1/33 (3%) with the non-kinkable ETT, (Fisher's exact = 0.034), table III. Table IV shows that presence of OSA is significantly associated with delayed post-operative recovery as 4(16%) with OSA had delayed recovery while none of the patients without OSA had delayed recovery (Fisher's exact = 0.05).

Figure 1

Table I: Demographic and Clinical Characteristics (N=49)

Variable	Frequency	%
Age (Yrs): < 12	45	92
> 12	4	8
Median age (Range), months	36 (8 -864)	
Gender: Male	26	53
Female	23	47
ASA Classification I	20	41
II	27	55
III	2	4
Median weight (Range), kg	14 (5 – 76)	
Mean duration of surgery (±SD), mins	60.2 ± 23.4	
Mean duration of anaesthesia (±SD), mins	89.0 ±30.4	
Median Estimated blood loss (Range), ml.	50 (20 – 200)	

Figure 2

Table II: Perioperative Critical Incidences/Complications

Critical incidents/complications	No of patients	Percentage
Accidental tube dislodgement/extubation	7	14.3
Tube decompression/kinking	5	10.2
Laryngospasm	1	2
Delayed recovery	4	8.2
Postoperative vomiting	8	16.3
Post-tonsillectomy bleeding	1	2
No complication	23	46.9
Total	49	100

Figure 3

Table III: Association between the types of ETT and tube compression

Variables	TUBE COMPRESSION		TOTAL	FISHER'S EXACT
	Yes	No		
Portex	4(25%)	12(75%)	16(100%)	0.034
Non-Kinkable	1(3%)	32(97%)	33(100%)	

Figure 4

Table IV: Association between Delayed Recovery and Obstructive Sleep Apnoea (OSA)

Variable	DELAYED RECOVERY		TOTAL	FISHER'S EXACT
	Yes	No		
OSA	4(16.7%)	20(83.3%)	24(100.0%)	0.050
No OSA	0(0.0%)	25(100.0%)	25(100.0%)	

DISCUSSION

The main finding in this study is the critical incidence of post-adenotonsillectomy anaesthetic complication which is 53.1%. The most common airway complications in our series were tube dislodgement (14%) and kinking (10%). Anaesthesia for these procedures requires an airway device which is resistant to compression, accidental tube dislodgement or extubation from the Boyle Davis' gag and other surgical manoeuvres[8]. In our institution, the Boyle Davis gag is used to keep the mouth open. Initially, when polyvinyl chloride tubes were used, it was the practice to anchor it at the angle of the mouth to prevent tube compression. Invariably, this required shifting the tube from one side to the other or adjustment of the gag position. These periods accounted for cases of accidental dislodgement of the endotracheal tube. The incidents were detected

immediately and the patients were quickly reintubated without adverse effects. Using a Boyle Davis' gag with a slot in the midline for the endotracheal tube is a reliable method to prevent tube movement and dislodgment. The reinforced laryngeal mask airway is an alternative airway device that could be used during tonsillectomy. It has the advantages of being less invasive and is better tolerated during emergence in spontaneously breathing patients. The main drawback is the ease of dislodgement, so there must be good communication between the surgeon and anaesthetist[15, 16]. Other airway complications such as laryngospasm or bronchospasm have been reported following tonsillectomy or adenoidectomy, however in this study laryngospasm was encountered in 1 patient.

Monitoring is important to be able to detect cardio-respiratory complications early. Pulse oximeter was used in all patients as this is in line with the world health organization (WHO) global oximetry initiative. Monitoring of O_2 saturation is particularly imperative during airway surgeries like tonsillectomy and adensitonsillectomy because of the risk of hypoxia in cases of airway dislodgement and kinking. End tidal carbon dioxide ($ETco_2$) monitoring is also very important whenever a patient has an invasive airway device in place. This was not available in about 2/3 rd of our patients; however meticulous clinical monitoring ensured that no patient came to any harm. Of the seven patients (14%) who had accidental tube dislodgement/extubation, four of the incidents were detected by a sudden disappearance of capnographic tracing. The five cases (10%) of tube compression were also detected by increase in end-tidal capnograhic values. In the absence of pulse oximeter and end-tidal CO_2 monitoring, the above complications were detected clinically by vigilance of the anaesthetists who quickly detected absent chest movement. In addition to the use of electronic monitoring devices, emphasis must be placed on continuous presence of the anaesthetist as well as clinical monitoring of patients[17].

Delayed recovery occurred in 8% of the patients. This was not unexpected because halothane (the available inhalational agent) was used to maintain anaesthesia. Halothane is a potent inhalational agent with a minimum alveolar concentration (MAC) of 0.75 compared to isoflurane with MAC of 1.15 and sevoflurane with MAC of 1.8. However, halothane is associated with some undesirable side effects. Due to its higher solubility and increased metabolism of up to about 20%, halothane anaesthesia is associated with prolonged effect and delayed recovery even after discontinuation of the agent. Inhalational agents such as isoflurane and sevoflurane are particularly favoured for short procedures like tonsillectomy and adenotonsillectomy. Avoidance of opioid analgesic may also quicken recovery time. Uysal and colleagues showed that in comparison to tramadol(an opioid drug) ,intravenous administration of paracetamol had comparable analgesic properties and that paracetamol was associated with early recovery[18].

The incidence of postoperative vomiting of 16.8% could be attributed to the perioperative use of opioid drugs. Morphine and fentanyl were used intraoperatively while pentazocine was given postoperatively. In addition, tonsillectomy and adenotonsillectomy are surgical procedures associated with significant incidence of postoperative nausea and vomiting[3,8] Perioperative administration of Dexamethasone have been shown to reduce the incidence of postoperative vomiting following tonsillectomy. Karaman and others found that a single of 0.7mg/kg intravenous dexamethasone given intraoperatively effectively decreased the incidence of postoperative vomiting following tonsillectomy and adenotonsillectomy[19].

The three patients admitted into the ICU postoperatively could be regarded as high risk patients. One patient had sickle cell disease; he required oxygen therapy and close monitoring to prevent complications such as sickling crisis. The patients with Down's syndrome and Crouzon's disease were at risk of postoperative airway complications and obstructive sleep apnoea, hence they required elective admission into the intensive care unit. Tweedie et al showed significantly higher chance of admission into the paediatric intensive care unit in children with comorbities such as obesity, Down's syndrome, craniofacial anomalies, haemoglobinopathy, cardiac diseae, cerebral palsy and mucopolysaccharidoses[20]. Life threatening anaesthetic complications in children with obesity and OSAS undergoing adenotonsillectomy are well documented. These often necessitate elective admission into the intensive care unit.[21, 22].

There was one case of post tonsillectomy bleeding which responded to conservative management and did not require blood transfusion. Post operative bleeding is one of the most dreaded complications of tonsillectomy and adenoidectomy. Various modalities have been suggested in the prevention and management of this complication.

We conclude from this study that there is a high incidence of tube dislodgement. This suggests a need to modify the anchoring of the endotracheal tube preferably using a mouth gag that incorporates a slot for the tube. In addition, vigilance coupled with adequate patient monitoring of oxygen saturation and end tidal carbondioxide are imperative.

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Author Information

Arinola A. Sanusi
Department of Anaesthesia, College of Medicine, University of Ibadan

Mukaila O. Akinwale
Department of Anaesthesia, University College Hospital

Obioma C. Uchendu
Department of Community Medicine, College of Medicine, University of Ibadan

Akeem O. Lasisi
Department of Otorhinolaryngology, College of Medicine, University of Ibadan