

# DAY CASE ADENOTONSILLECTOMY IN CHILDREN: HOW USEFUL ARE ROUTINE PRE-OPERATIVE BASIC INVESTIGATIONS IN A PRIVATE HOSPITAL SETTING?

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## ABSTRACT

### Background:

Safe day-case surgery depend on proper pre-operative investigations besides safe anaesthesia and general health of the patients. In an attempt to ensure safety, investigations such as full blood count, electrolyte and urea are often carried out routinely while other investigations like electrocardiogram and chest x-rays are sometimes requested based on the presentations of these patients. These investigations are routinely requested as the minimum requirement prior to day case surgery, but how useful are these investigations?

The aim of this paper is to highlight the usefulness of these baseline investigations vis-à-vis the complications of day case surgery (tonsillectomy, adenotonsillectomy) in children in a private hospital setting in a developing country.

**Methodology:** This is a 30-month (January 2008 – April, 2010) retrospective review of adenoid and tonsillar surgeries carried out in a private ENT surgical centre, in Jos, Nigeria. The biodata, investigation results of full blood count and electrolyte and urea, were retrieved and analyzed using Epi info version 2012. The result is presented in simple descriptive figures and tables.

**Result:** A total of 117 patients were seen in this hospital within the study period. Forty (34.2%) patients had benign tonsillar diseases. Thirty three (82.5%) were tonsillar hypertrophies with obstructive symptoms while the remaining seven (17.5%) were cases of recurrent tonsillitis.

There were 25 males and 15 females giving an overall male to female ratio of 1.7:1. The youngest patient was 1 year while the oldest was 16 years.

Ninety percent of the patients had normal pack cell volume (30–46%) while 10% had mild anaemia (PCV; 27–29%). About 97.5% had normal serum potassium level while one (2.5%) patient had mild hypokalaemia. Normal serum chloride and serum urea levels occurred in 80% of cases. All patients had normal white cell count with minor derangements in differential counts. Derangements in electrolytes and full blood count were generally mild and were not associated with complications encountered during surgery or postoperatively.

**Conclusion:** Routine electrolyte investigation and full blood count in children without risk factors such as history of vomiting and diarrhoea is not so necessary before tonsillar surgeries but we recommend that a pack cell volume be carried out in all patients. Few complications which were often not life threatening were noticed in our patients during surgery. These complications were unrelated to the pre-operative basic investigations.

**Keywords:** Day case adenotonsillectomy, Routine, Pre-operative, investigations, Children.

### Introduction:

Safe day-case surgery depend on pre-operative investigations besides safe anaesthesia and general health of the patients.<sup>[1]</sup> Adenoidectomy, tonsillectomy or adenotonsillectomy are common day case surgeries in childhood otolaryngologic

practice<sup>[2-3]</sup>. To ensure safety, baseline investigations such as full blood count and electrolyte and urea are carried out routinely while other investigations such as electrocardiogram and chest x-rays are requested based on the

presentations of these patients<sup>[4]</sup> Inconsistencies in ordering laboratory investigations are very common. The recommendations are mainly empirical, and vary in different hospitals. Routine requests are made without consideration for the patient or actual clinical indication; and when indicated the request are often not made. Sixty percent of preoperative tests could be eliminated without adversely affecting the patient care<sup>[5]</sup>. Unnecessary investigations drain financial resources, cause inconveniences to patients and should therefore take into consideration the economy, efficiency, consumer satisfaction and more so the history and physical examination findings.<sup>[5-9]</sup> Some of these investigations are often routinely requested as the minimum requirement prior to day case surgery, but how useful are these investigations?

The aim of this study is to highlight the usefulness or otherwise of these baseline investigations prior to day case surgery (tonsillectomy, adenotonsillectomy) vis-à-vis the complications in a private hospital setting in a developing country.

**Methodology:** This is a retrospective study of all paediatric surgical cases for adenoidectomy, tonsillectomy or both who presented to Salem Clinic, Jos, Nigeria from January 2008 to April 2010. The biodata, investigation results of full blood count and electrolyte and urea, were retrieved and analyzed using Epi info version 2012. The result is presented in simple descriptive figures and tables. The surgical procedures and perioperative complications were also noted.

**Inclusion criteria:** Children below 16 years of age. American society of Anesthesiology (ASA I and ASA II) cases that satisfy the criteria for selection for day case adenoidectomy, tonsillectomy or adenotonsillectomy under general endotracheal anaesthesia e.g. patients with no bleeding disorder, co-existing cardiovascular disease or intercurrent fever or sickle cell trait in the family. No history of vomiting, diarrhoeal diseases or both.

**Exclusion criteria:** Age greater than 16 years, History of vomiting, diarrhoea diseases or both and other conditions that did not meet the inclusion criteria. History of cardiovascular or respiratory disease.

Preoperative investigations included full blood count, electrolyte, urea, chest x-ray, soft tissue neck x-ray, and electrocardiogram when indicated by

history. Full blood count and electrolyte and urea were carried out routinely in all patients.

The patients used for the study met the criteria for inclusion and the same consultant performed all the surgeries under general endotracheal (oro-tracheal) anaesthesia using halothane. The pharynx was packed with moist gauze. The tonsils and adenoids were bluntly dissected out and curetted respectively without leaving any remnants or tags. Haemostasis was achieved using mainly adrenaline 1 in 200,000 dilutions soaked in gauze with occasional ligation of bleeding vessels under clear vision. The period of postoperative management ranged from 12 to 16 hours. Prophylactic antibiotics and analgesics administered postoperatively comprised mainly of ampiclox and acetaminophen orally after full recovery from anaesthesia given up to the fifth postoperative day. Intraoperative analgesia was with intravenous pentazocine or acetaminophen. Postoperatively the vital signs were monitored alongside the occurrence of nausea and vomiting and analgesic was administered. Parents' views about the level of disruption, vomiting and pain control were sorted. Preoperative investigation results were reviewed vis-à-vis the intra and postoperative course in the patients.

**Criteria for Discharge and Follow up:** Stable vital signs for at least one hour before discharge, adequate pain control, oral feeding with cold ice cream or cold food tolerated without nausea and vomiting, and absence of pallor, excessive swallowing or abdominal distension. The patients were monitored for bleeding, excessive swallowing, cough difficulty in respiration and pyrexia. The first post operative review after discharge was on the 5th post operative day and subsequently by phone contact if any complaint.

Patients were advised to remain within reach until 14th post operative day.

**Results:** A total of 117 patients underwent surgery in the hospital within the study period out of which 40 (34.2%) patients in the paediatric age group had combined adenoid and tonsillar diseases. Thirty three (82.5%) were tonsillar hypertrophies while seven (17.5%) were cases of recurrent tonsillitis. There were 25 males and 15 females giving an overall male to female ratio of 1.7:1. The ages ranged from one to 16 years with a mean of 5.1 years. Age group 3 years and below constituted the highest cases of 16(40%) followed by age group 4-7 years in 11(27.5%) and 8-11 years constituting

8(20%) cases respectively. The rest is depicted in table 1.

The patients' pack cell volume ranged from 27-46%. The pack cell volume range of 35-39% in 18(40%) cases constituted the highest frequency followed by 30-34% in 11(27.5%) cases. Four (10%) cases of anaemia were noted with pack cell volume of 27-29%. 36(90%) cases had normal pack cell volume of 30-46%. See table 2.

Potassium (K<sup>+</sup>) level in the patients ranged from 3.1-5.1 mmol/l. The highest frequency of 4.7mmol/l was observed in 5 cases (12.5%), hypokalaemia of 3.1mmol/l in 1(2.5%) case. Normal potassium of 3.5-5.5mmol/l occurred in 39(97.5%). One (2.5%) had deranged result.

Chloride (Cl<sup>-</sup>) in the patients ranged from 95-122 mmol/l. The highest level of 106mmol/l was observed in 14 cases (35%). Hypochloremia of 95 mmol/l in one (2.5%) case, hyperchloraemia of 108-122 mmol/l in seven (17.5%) cases. Normal chloride of 96-106mmol/l occurred in 32(80%) cases. Seven patients (17.5%) had deranged results.

Bicarbonate (HCO<sub>3</sub><sup>-</sup>) ranged from 16-29 mmol/l. The highest level of 25mmol/l was observed in six cases (15%). Low serum bicarbonate of 16-20mmol/l was found in seven (17.5%) cases. Normal serum bicarbonate of 21-29 mmol/l occurred in 33(82.5%) patients. Seven (7.5%) had deranged results.

Urea levels in the patient ranged from 1.4-6.3 mmol/l. The highest level (6.3mmol/l) was observed in four cases (10.3%). Low urea level of 1.4-2.0 mmol/l was seen in eight (20%) cases. Normal serum urea of 2.2-6.3mmol/l was seen in 32(80%) patients. Eight (20%) had deranged result as depicted in Tables 1 and 2.

Sodium ranged from 124-136 mmol/L. Hypernatraemia of 146-149 mmol/l in 9(20%) cases,

The white blood cell ranged from 4,100-14,400/mm<sup>3</sup> with an average value of 7,660/mm<sup>3</sup>. Normal values of neutrophils, eosinophils and lymphocytes were seen in 18(87.5%), 20(95.2%) and 12(57.0%) patients respectively while neutropenia was noticed in 3(14.3%) patients, eosinophilia in one (4.8%) patient and nine (42.9%) patients had relative lymphocytosis.

The patients had adenoidectomy, tonsillectomy or adenotonsillectomy. The duration of hospital stay was between 12 and 16 hours. Seven patients

(17.5%) had chest infections pre-operatively. They were placed on antibiotics and their surgeries were rescheduled.

The most common complications were postoperative nausea and vomiting in four (10%) patients and mild postoperative pain and (dysphagia) in four (10%) patients. The episodes of vomiting were all single and resolved without treatment with the patients not requiring admission overnight. Two (5%) patients had arrhythmia intra-operatively which was successfully managed by reducing the amount of halothane administered and increasing the inspired oxygen. One (2.5%) patient aspirated breast milk. This was managed by oral reintubation and suctioning of the tracheobronchial tree. Oxygen was then administered and the patient admitted for observation. Three (7.5%) patients had mild-moderate laryngeal spasm which was successfully managed with brief ventilation under pressure using oxygen and face mask.

There were no reactionary or secondary haemorrhages. Thirty nine (97.5%) of the 40 patients were discharged home as day cases, One (2.5%) patient who aspirated was observed overnight and discharged home the following day. They were all stable at discharge. The histologic reports were consistent with tonsillitis, tonsillar and adenoid hypertrophies respectively. There were no reports of serious incidences after discharge.

**Table 1.** Age group by Frequency distribution

Age group (years)	Frequency	Percentage (%)
≥ 3	16	40.0
4-7	11	27.5
8-11	8	20.0
12-15	4	10.0
16-18	1	2.5
<b>Total</b>	<b>40</b>	<b>100.0</b>

**Table 2.** The Frequency distribution of Pack Cell Volume (PCV)

PCV (%)	Frequency	Percentage
25-29	4	10.0
30-34	11	27.5
35-39	18	45.0
40-44	6	15.0
45-49	1	2.5
<b>Total</b>	<b>40</b>	<b>100.0</b>

*Haematology reference range: Pack cell Volume (30-50%)*

**Table 3.** Frequency distribution of different white blood cell count (n=21)

Neut	F	%	Eosi	F	%	Baso	F	%	Lymp	F	%	mono	F	%
11	1	4.8	0	8	38.1	0	20	95.2	25	1	4.8	0	15	71.4
16	1	4.8	1	1	4.8	1	1	4.8	30	1	4.8	1	2	9.5
23	1	4.8	2	5	23.8	-	-	-	34	1	4.8	2	1	4.8
30	4	19.0	3	1	4.8	-	-	-	39	1	4.8	4	1	4.8
36	1	4.8	4	1	4.8	-	-	-	40	2	9.5	6	1	4.8
43	1	4.8	5	1	4.8	-	-	-	42	3	14.3	7	1	4.8
46	1	4.8	6	3	14.3	-	-	-	47	1	4.8	-	-	-
48	1	4.8	12	1	4.8	-	-	-	48	1	4.8	-	-	-
49	1	4.8	-	-	-	-	-	-	50	1	4.8	-	-	-
50	1	4.8	-	-	-	-	-	-	57	1	4.8	-	-	-
52	1	4.8	-	-	-	-	-	-	58	1	4.8	-	-	-
53	1	4.8	-	-	-	-	-	-	64	1	4.8	-	-	-
54	1	4	-	-	-	-	-	-	67	1	4.8	-	-	-
58	1	4.8	-	-	-	-	-	-	70	1	4.8	-	-	-
59	1	4.8	-	-	-	-	-	-	76	1	4.8	-	-	-
66	1	4.8	-	-	-	-	-	-	84	1	4.8	-	-	-
67	1	4.8	-	-	-	-	-	-	87	1	4.8	-	-	-
68	1	4.8	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>21</b>	<b>100</b>	<b>21</b>	<b>100</b>	<b>21</b>	<b>100</b>	<b>21</b>	<b>100</b>	<b>21</b>	<b>100</b>	<b>21</b>	<b>100</b>	<b>21</b>	<b>100</b>

Haematology reference range: Neutrophils (35-75%), lymphocytes(20-45%), Monocytes (2-1%), Eosinophils (1-6%), Basophils(0-2%)

**Table 4.** Distribution of Electrolytes and Urea in mmol/L

Na <sup>+</sup>	F	%	K <sup>+</sup>	F	%	Cl <sup>-</sup>	F	%	HCO <sub>3</sub> <sup>-</sup>	F	%	Urea	F	%
130	2	5.0	3.3	1	2.5	95	1	2.5	16	1	2.5	1.4	2	5.0
132	1	2.5	3.5	1	2.5	96	1	2.5	18	1	2.5	1.6	1	2.5
134	2	5.0	3.6	1	2.5	97	5	12.5	19	2	5.0	1.8	1	2.5
135	1	2.5	3.8	1	2.5	98	1	2.5	20	3	7.5	1.9	3	7.5
136	6	15.0	3.9	2	5.0	100	2	5.0	21	4	10.0	2.0	1	2.5
138	3	7.5	4.0	1	2.5	102	5	12.5	22	2	5.0	2.2	1	2.5
140	4	10.0	4.1	1	2.5	104	1	2.5	23	5	12.5	2.4	2	5.0
141	2	5.0	4.2	1	2.5	105	4	10.0	24	5	12.5	2.5	1	2.5
142	2	5.0	4.3	4	10.0	106	14	35.0	25	6	15.0	2.6	4	10.0
143	3	7.5	4.4	4	10.0	108	1	2.5	26	3	7.5	2.7	3	7.5
144	4	10.0	4.5	1	2.5	109	3	7.5	27	2	5.0	2.8	4	10.0
145	2	5.0	4.6	2	5.0	114	1	2.5	28	4	10.0	2.9	1	2.5
146	5	12.5	4.7	5	12.5	122	1	2.5	29	2	5.0	3.0	3	7.5
148	2	5.0	4.8	3	7.5	-	-	-	-	-	-	3.1	2	5.0
149	1	2.5	4.9	3	7.5	-	-	-	-	-	-	3.2	1	2.5
-	-	-	5.0	4	10.0	-	-	-	-	-	-	3.6	2	5.0
-	-	-	5.1	1	2.5	-	-	-	-	-	-	3.7	1	2.5
-	-	-	5.2	2	5.0	-	-	-	-	-	-	3.9	2	5.0
-	-	-	5.5	2	5.0	-	-	-	-	-	-	4.0	1	2.5
-	-	-	-	-	-	-	-	-	-	-	-	4.3	1	2.5
-	-	-	-	-	-	-	-	-	-	-	-	4.6	1	2.5
-	-	-	-	-	-	-	-	-	-	-	-	5.6	1	2.5
-	-	-	-	-	-	-	-	-	-	-	-	6.3	1	2.5
<b>Total</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>100</b>

Chemical pathology reference range in mmol/L: Sodium (Na<sup>+</sup>)-(134-145) Potassium (K<sup>+</sup>)-(3.5-5.5) Bicarbonate (Hco<sub>3</sub><sup>-</sup>)-(21-31) Chloride (Cl<sup>-</sup>)-(96-106), Urea-(2.2-6.6)

**Discussions:** The age range of our patients was similar to that in the study by Alcântara et al<sup>9</sup> in Sao Paulo but in contrast they had equal gender ratio of 1:1 compared to 1:1.7 in our study with age range

of one to 16 years. In the study by Ikram et al<sup>111</sup> on the other hand the youngest patient was four years old with an age range of 4 to 49 years. They also had a male preponderance just like in our study..

The pack cell volume of 30-49% was seen in 36 (96%) patients. White blood cell count and the differentials were essentially normal in most of the patients. Mild anaemia (PCV of 25-29%) was noted in 4(10%) cases with a case of eosinophilia (4.8%), relative lymphocytosis in 9(42.9%) and 3(14.3%) cases of neutropenia were observed. Derangements were generally mild and occurred in few of these patients. The mild derangements in PCV and differential counts may be due to reasons like iron deficiency, allergic or parasitic infestations and viral infections affecting the respiratory tract of some of these patients<sup>[12-15]</sup>. These are common occurrence among children in this part of the world. Although higher incidence of anaemia do occur in infants, there is little evidence that this affects management or outcome of healthy children undergoing day-case procedures as collaborated by Meneghini and co workers<sup>[16]</sup>. In our study all the mild derangements noted did not affect our patients in the short term as they were discharged home and followed up on haematinics without any sequelae. This is in contrast to the findings by Lee<sup>[17]</sup> who noted that mild anaemia is of consequence in percutaneous cardiac surgery in children. The difference is probably as a result of the different types of procedures in the two groups. While our patients had adenotonsillectomy, the patients in Lee's study had cardiac surgery.

Serum sodium and potassium concentrations were the most frequently requested preoperative biochemical investigations. Serum potassium concentration is important, as hyperkalaemia can predispose to cardiac arrest. This is more so when suxamethonium is used during anaesthesia and hypokalaemia can also lead to cardiac arrhythmias. Our potassium levels were normal in 39 (97.5%) of cases with only one (2.5%) case slightly below normal in our healthy patients. This finding agrees with that by Barnard and co worker<sup>[4]</sup> in England and a conclusion had been drawn that a result like this without associated symptoms can be ignored by the attending surgeon<sup>[18]</sup>. Some of the derangements noted might be due to false positives or false negatives or laboratory errors whose consequence is usually further investigations that often lead to further expenditure on investigations that may never be required by the patient for that particular surgery.<sup>[19]</sup> In our study though two patients had arrhythmia, their potassium levels were not deranged and the arrhythmias were thought to be as a result of

infiltration with adrenaline during halothane anaesthesia.

The most common complications were nausea and vomiting, and mild post operative pain and these were not enough to warrant admission of the patients. This was similar to the findings in the two studies mentioned above.<sup>[11,20]</sup> The episodes of nausea and vomiting resolved without intervention and all the patients took ice cold drinks or food without vomiting before discharge. These had no relation with the preoperative derangements in electrolytes. The occurrence of arrhythmias in two patients was probably as a result of sensitization of the heart by halothane to the effect of adrenaline since this was adequately taken care of by reducing the concentration of halothane and increasing the inspired oxygen. The use of other agents like isoflurane or sevoflurane rather than halothane would have prevented this complication. It is important to use low concentrations of adrenaline of not greater than 1:200,000 in the presence of halothane which is a precaution we took. Like Hotchkiss<sup>[20]</sup> and Ikram<sup>[11]</sup> we found that the histology of our samples were consistent with tonsillitis, tonsillar and adenoid hypertrophy.

A good selection criterion and trained professionals are necessary to avoid unwarranted complications. In our cases, all patients were ASA I or II. Patients with ongoing tonsillitis or chest infections should be treated until they are well enough to undergo safe anaesthesia and prevent complications. Seven (17.5%) of our patients had chest infections and were operated after adequate antibiotic treatment. Similar precautions were taken by Kernavaa<sup>[21]</sup>, Gupta<sup>[22]</sup> and Vander Walt and co workers<sup>[23]</sup> respectively. The reasons why patients may not go home immediately include the type of anaesthesia used, post operative vomiting and haemorrhage.<sup>[24]</sup> The use of anaesthetic agents like isoflurane and sevoflurane apart from avoiding arrhythmias associated with adrenaline will hasten recovery and ensure quicker discharge of the patient.

Adequate preoperative assessment and counseling would also help in ensuring that patients adhere to the fasting guidelines. This is important in avoiding incidences of regurgitation and aspiration. In our series, 4(10%) cases had an episode of vomiting each; this may be due to the pentazocine that was used because it has emetic effect. Pentazocine is also contraindicated in patients with obstructive sleep apnoea because of its respiratory depressant effects.<sup>[25]</sup> As a result of these issues associated with the use of pentazocine we subsequently decided to use parenteral acetaminophen instead for

perioperative analgesia in our patients. It has the advantage of being non-sedating, a non respiratory depressant and does not induce nausea and vomiting.

The most common complications among our patients were nausea and vomiting and mild-moderate postoperative pain which did not necessitate admission as they were easily resolved. These complications were not related to the baseline investigations. We noticed that electrolytes were constantly within the normal range in these patients though low pack cell volume levels were noticed in some cases but this could not explain the nausea and vomiting.

In conclusion, the few complications associated with tonsillar surgeries in otherwise healthy children were unrelated to the pre-operative basic investigation findings. Therefore the value of routine testing before day care adenotonsillectomy is unclear, as most abnormalities in laboratory values can be predicted from the patient's history and findings of the physical examination. In addition, abnormalities discovered on laboratory testing often do not necessarily lead to changes in perioperative care since they are usually not severe derangements. We therefore suggest that only pack cell volume need to be carried out routinely for children going in for day case adenoidectomy, tonsillectomy or both. Other investigations may be conducted according to clinical findings.

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