

ETT Vs LMA In Pediatric Patients With URI: A Comparison Of Adverse Respiratory Events

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Citation

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Abstract

Anaesthesiologists are usually conservative in accepting children with URI (Upper Respiratory Tract Infection) for surgery and cases are scheduled for a later symptom free date. This is for fear of airway hyper-reactivity and its associated complications which are a major concern to the anaesthesiologist. It is for this reason that we conducted the present study to see if children with mild URI or those diagnosed by the pediatrician as having allergic rhinitis (with out any symptoms of viral URI or LRTI) can be taken up for surgery with extra vigilance and whether LMA could serve as an appropriate substitute in minimizing the adverse respiratory events associated with URI. 40 children were divided equally in to two groups. In group I (n=20) LMA was used as an airway device. In group II (n=20) endotracheal intubation was done. Results were evaluated statistically by chi-square method and Fisher's exact test and $p < 0.05$ was taken as significant. We found that the incidence of cough, secretions and breath holding was lower in group I but the difference was not statistically significant. The incidence of laryngospasm was equal in both the groups. The difference in incidence of SPO₂ desaturation and broncho spasm was statistically significant with group I showing a lower incidence. From the above we conclude that children with mild URI may be taken up for surgery with a little extra caution and extending the observation of children till the stay in the PACU and LMA definitely offers a suitable alternative to ETT in paediatric patients with URI.

INTRODUCTION

When a child presents with URI (Upper Respiratory Tract Infection) elective procedure requiring general anesthesia is usually cancelled. A pertinent question that arises is why do we fear URI? The anaesthetized state leads to fall in FRC (functional residual capacity) and increased airway resistance. Moreover, smooth muscles extending as far distally as the terminal bronchioles are supplied by the parasympathetic nerves in the vagi and stimulation of these vagal afferents by noxious stimuli e.g. endotracheal intubation and irritant anesthetic gases lead to smooth muscle contraction. Superimposed on this background morphologic damage to respiratory epithelium and mucosa after viral infections leads to exposure and activation of irritant receptors with increased tendency to hyper reactivity, with exaggerated bronchoconstriction. Thus, URI renders a potential for hyper reactivity with its dreaded consequences. It is for this reason anesthesiologists are usually conservative in accepting children with URI for surgery. But because so many children have concurrent URI at the time of scheduled surgery and long term negative outcome have not been demonstrated the decision process is complex. Certain non medical factors that may sway the anesthesiologist in favour

of proceeding with the case are logistic family concerns such as parents taking day off or traveling long distances.

AIM OF STUDY

The current prospective study was undertaken to examine the incidence of peri-operative respiratory complications in children who presented for elective lower abdominal surgery with mild URI and comparison of adverse respiratory events using endotracheal tube (ETT) Vs Laryngeal Mask Airway (LMA).

MATERIAL & METHODS

After taking consent from the ethical committee, we randomly allocated 40 children in to two groups equally.

Group I (n=20) – LMA was used as an airway device
Group II (n=20) – Endotracheal intubation was done

Children presenting with clear rhinorrhoea and mild cough only, without any additional findings were included in the study. Criteria for exclusion was children suffering from viral rhinitis as evidenced by presence of purulent rhinorrhoea, fever, productive cough, copious secretions, presence of LRTI (lower respiratory tract infection), wheeze,

spasm and with history of paternal smoking.

Pre-op preparation – All the children were admitted 24 hrs before surgery. Appropriate antibiotics were allowed to be continued. Triclofos (Syrup pedicloryl– Dr. Reddy's) 75mg/kg given one hour before surgery for sedation. Aerosolised Ipratropium 1puff (20µg) given 20minutes before surgery. On arrival in the operation theatre induction was started with oxygen, nitrous oxide and halothane. Simultaneously IV line was set up and monitors attached. Following loss of eyelash reflex injection rocuronium 1mg/kg administered and after adequate relaxation lubricated size 2 LMA (proseal) was inserted in group I and cuff inflated with 5-10cc of air. After confirming adequacy of ventilation patients were maintained on O₂ : N₂O + halothane + injection tramadol 1mg/kg on Jackson Rees modification of Ayre's T-piece In group II after inducing similarly appropriate size ETT is passed and patient maintained similarly. The monitors attached are ECG, Pulse Oxymeter, NIBP and precordial stethoscope. At the end of the surgery, diclofenac suppository (Justin) was inserted and suctioning done and patient reversed with inj. neostigmine 0.05mg/kg and inj. glycopyrrolate 0.004mg/kg. Deep extubation done and mask ventilation resumed till the return of adequate reflexes. The patients were monitored throughout the peri-operative period till stay in PACU (post anaesthesia care unit). At each point of time lowest SpO₂ any episode of cough, breath holding, secretions, laryngo spasm, broncho spasm and airway obstruction were noted and graded accordingly as shown in table 1.

Figure 1

Table 1: Adverse Respiratory Events

	Grade 1	Grade 2	Grade 3
Cough	1-3 episodes	4-6	> 6
Breath Holding	None	< 6 Sec	> 6 Sec
Laryngospasm	None	Partial	Complete
Secretions	Minimal (requiring only suctioning once)	Moderate (more than 1 suctioning)	Copious
SpO ₂ Desaturation	95-90 %	89-85%	< 85 %
Bronchospasm	+	-	

RESULTS

There were twenty patients in each group. All the data was compared using Chi square test, except the incidence of bronchospasm which was evaluated by Fisher's Exact Test. P value < 0.05 was significant. Both the groups were evenly matched in terms of age, weight, sex and duration of surgery

as shown in table 2.

Figure 2

Table 2: Comparison of Demographic Profile in both the Groups

	Type of surgery	No. of Patients	AGE	WEIGHT	Duration of surgery
Group-I	Herniotomy, Orchidopexy	18 2	3.86± 0.69	15.01±1.56	45±10
Group-II	Herniotomy, Orchidopexy	16 4	3.71± 0.64	14.56±1.90	47±6 min.
P Value (< 0.05 significant)			0.498	0.427	P = 0.357

In our study we found that in group I, one patient had grade 2 breath holding while in group II, two patients had grade 2 and one patient had grade 3 breath holding after removal of the airway device, where saturation dropped till 88% (as shown in Figure 1). Similarly, one patient in group I had grade 2 secretion (required tracheal suctioning) while two patients in group II had grade 2 secretions (as shown in Figure 2). The incidence of cough was also not much different in both the groups (as shown in Figure 3). The incidence of all these three parameters i.e cough, breath holding and secretions is statistically not significant in both the groups.

The incidence of laryngo spasm was similar in both the groups i.e one patient in each group (as shown in Figure 4). The patient in group II developed laryngo spasm in the PACU. Both the patients were effectively managed with chin lift and positive pressure ventilation. The minimum SpO₂ recorded at this time was 83% in group II and 87% in group I.

The difference in SpO₂ de-saturation observed was statistically significant in both the groups (as shown in Figure 5). In group I, one patient had grade 1 and 1 patient had grade 2 desaturation, the minimum recorded was 87%. In group II, four patients had grade 1, two had grade 2 and one patient had grade 3 desaturation (minimum recorded was 83%).

The incidence of bronchospasm was strikingly high in group II while no patient in group I developed bronchospasm. But all the complications irrespective of the groups were effectively and aggressively managed.

If we compare the incidence of major complications i.e SpO₂ de-saturation, bronchospasm and laryngospasm in the two

groups, we find the total incidence to be 20% in group I and 60% in group II as shown in Figure 7.

Figure 3

Figure 1 : Comparison of Breath Holding in two groups.

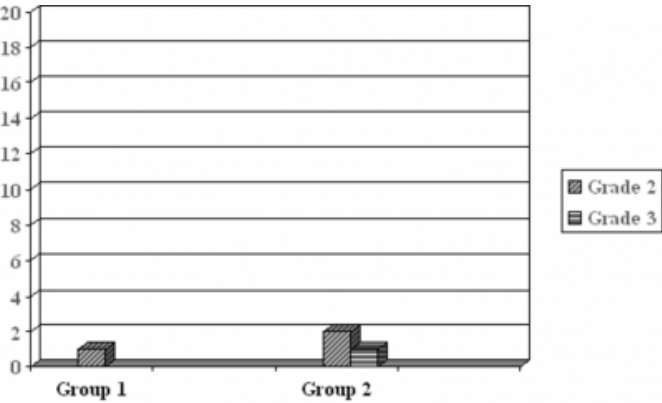


Figure 6

Figure 4 : Comparison of Laryngospasm in two groups.

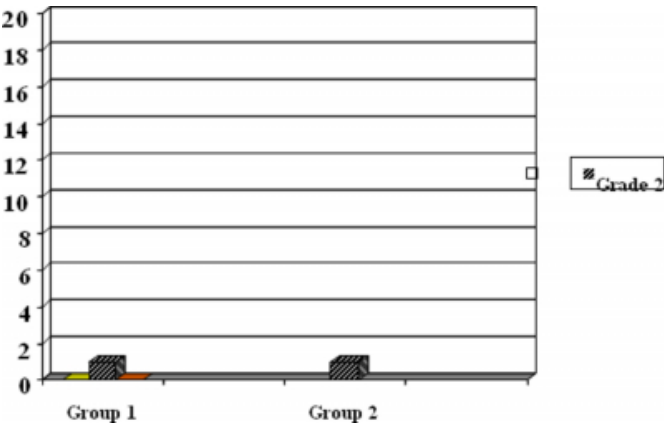


Figure 7

Figure 5 : Comparison of SO de-saturation in two groups.

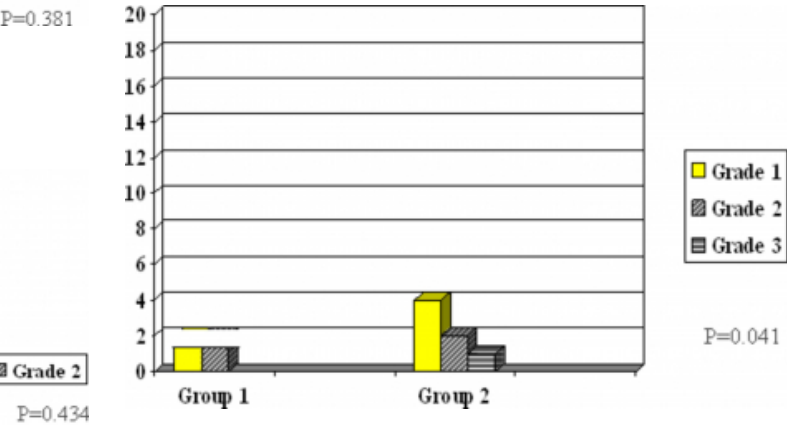


Figure 4

Figure 2 : Comparison of Secretions in two groups.

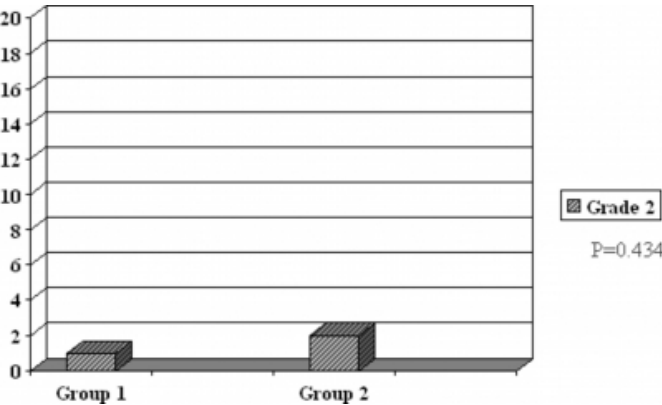


Figure 8

Figure 6 : Comparison of bronchospasm in two groups.

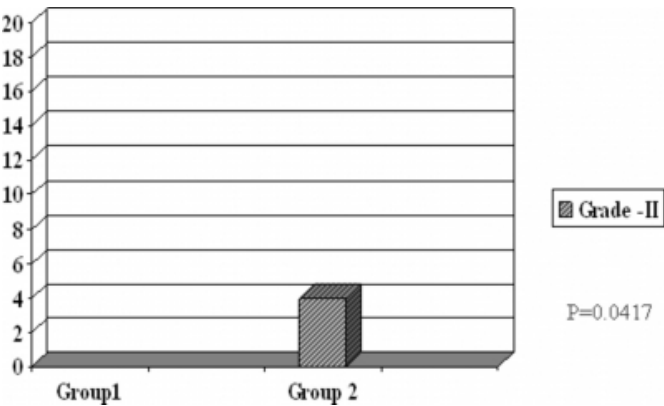


Figure 5

Figure 3 : Comparison of Cough in two groups.

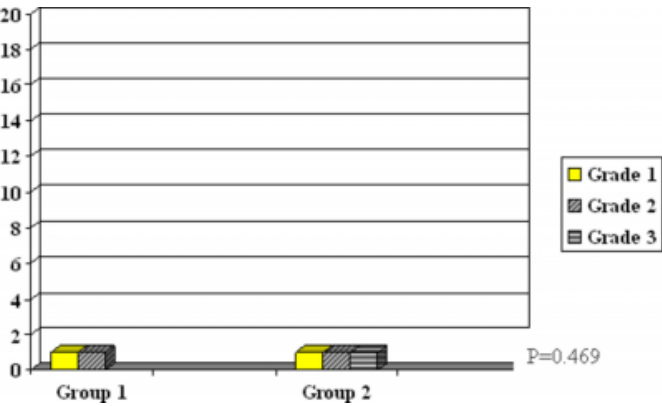
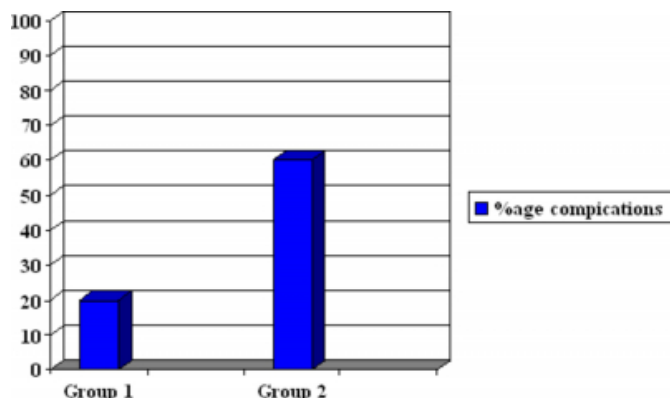


Figure 9

Figure 7 : Percentage Comparison of Major Complications in two groups.



DISCUSSION

When a child presents with URI, elective surgery is usually cancelled. A period of 4 – 6 weeks is necessary before increased airway reactivity associated with URI dissipates₂ as the risks of pulmonary complications may be increased during this period₃. Clearly, there are children who have 6 – 10 episodes of URI/year making it impossible to schedule surgery when they are free from recent URI. Some parents complain that their child is always with a runny nose. The challenge to have an asymptomatic period of 4 – 6 weeks after acute URI may be quite overwhelming to the family, child and the physician. The decision to proceed or delay becomes a controversial issue₄. But cancellation may not be practical or feasible at times.

At the same time one has to assess the severity of illness and distinguish allergic from viral rhinitis. The key is to make an exact diagnosis of the symptoms and the risk associated with proceeding with anaesthesia. Children with allergic rhinitis present with clear rhinorrhoea, mild cough and may have close relatives with history of atopy. Patients with viral URI (occurring especially during winter months) present with purulent rhinorrhoea, congestion, productive cough, fever, LRTI and one or other family member may be ill with URI₅. Subclinical manifestations may include increased respiratory tract secretions and bronchial irritability. Studies have shown that children with URI are 2-7 times more likely to experience respiratory related adverse events_{6,7}. Endotracheal intubation has been suggested to increase incidence of post operative airway complications₈.

The mechanism for these perioperative respiratory complications associated with URI is not clear as apnoeic anaesthetized children decreased their saturation to 95% in a

shorter time than similar group who did not have URI, suggesting URI has effect on FRC/Closing Volume₉.

Children with pure allergic rhinitis do not pose an additional risk for surgery as our results have shown is consistent with findings of Tait et al₁₀. It has been pointed out by Knight PR₁₁ that children with uncomplicated URI who are scheduled for myringotomy, a procedure which takes less than 10min and does not require endotracheal intubation are at no increased risk for general anaesthesia ..

We have tools to deal with common problems—oxygen to treat hypoxaemia, albuterol and inhaled anaesthetics to treat bronchospasm, muscle relaxants to treat laryngospasm and methods to avoid endotracheal intubation₁₂.

Then compared with ETT, LMA has been found to be associated with less laryngeal stimulation and reduced airway complications in children with URI₁₃.

Yet heightened awareness of respiratory complications is indicated and the anaesthesiologist should be prepared to treat complications aggressively₁₄ and treating the children as if they have “Reactive Airway Disease” which they probably have.

CONCLUSION

Patient with mild URI may be safely anesthetized as the complications which occurred are easily managed by a vigilant anesthesiologist without any adverse sequelae. Anaesthetic management should aim at reducing the stimulation of potentially irritable airway and since LMA has been found to be associated with less laryngeal stimulation, it definitely offers a suitable alternative to endotracheal intubation. Blanket cancellation has become a thing of the past. At the same time anaesthesiologist need to be aware of the fact that the observation of the child should not end in the operation theatre but it be extended to PACU too, since majority of the complications occur either at extubation or in PACU.

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