Miller Laryngoscope Blade: An Aid to Pediatric Laryngeal Surgery

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Abstract Pediatric upper airway disorders are a major cause of morbidity and mortality. They can be congenital or acquired and provide diagnostic and therapeutic challenge to the paediatrician and otolaryngologists. Though fiberoptic laryngoscopy or bronchoscopy is the initial mode of assessing the pathology, detailed assessment and therapeutic intervention can only be done combining both direct laryngoscopy and bronchoscopy. Any kind of intervention routinely requires rigid direct laryngoscope with suspension. Identifying the potential use of Miller laryngoscope blade for pediatric airway surgery is the aim of the study. We have included pediatric patients from new born to 12 years of age in our clinical study. We have been using Miller laryngoscope blade for approaching till the level of subglottis for diagnostic laryngoscopy along with Hopkins 0 degree endoscope and performing surgical procedures like supraglottoplasty, vallecular cysts, subglottic stenosis etc. Miller laryngoscope blade can be used as an aid to upper airway surgery for the otolaryngologists with minimal operating time and effort.

Keywords Upper airway · Stridor · Laryngoscope · Endoscope

Introduction

Pediatric upper airway disorders are a major cause of morbidity and mortality. They can be congenital or acquired and provide diagnostic and therapeutic challenge to the paediatrician and otolaryngologists. Though fiberoptic laryngoscopy or bronchoscopy is the initial mode of assessing the pathology, detailed assessment and therapeutic intervention can only be done combining both direct laryngoscopy and bronchoscopy. Any kind of intervention routinely requires rigid direct laryngoscope with suspension.

In our clinical practice, we have been using Miller laryngoscope blade for approaching till the level of subglottis for diagnostic laryngoscopy and performing surgical procedures like supraglottoplasty, vallecular cysts, subglottic stenosis etc.

Methods and Result

We have included patients in pediatric age group from new-born to 12 years of age who required upper airway assessment for diagnostic and therapeutic purposes.

All the patients who required upper airway assessment were taken under general anaesthesia with or without endotracheal intubation. Intermittent bag and mask ventilation was preferred in the patients who required a shorter procedure except for those who were intubated in the emergency room in view of an unstable airway or required endotracheal intubation in view of severe respiratory distress. In tracheotomised patients the inhalational anaesthesia was used through the tracheotomy tube.

After induction of anaesthesia, the assistant introduces the appropriate size Miller's laryngoscope blade in the oral cavity and lifts the base of tongue to expose the vallecula.

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Fig. 1 Endoscope introduced through the groove of the Miller blade to visualise the larynx

Fig. 2 The instrument assembly

If required, the epiglottis was elevated to provide optimal exposure of the glottis and subglottis. Following optimal exposure, the primary surgeon introduces the Hopkins rod 0° endoscope (Karl Storz, GmbH Germany) with camera attached through the groove adjacent to the light carrier of laryngoscope blade as shown in Fig. 1. This gave a direct access to the site. After inspecting the supraglottis and glottis, the endoscope is negotiated through the glottis to

Table 1 Showing average time taken in each surgical procedure

Procedure	Number	Average time (s)
Upper airway assessment	30	54
Supraglottoplasty	5	164
Vallecular cyst	2	72
Laryngotracheal stenosis	14	214

inspect the subglottis and trachea till the level of bifurcation to look for any synchronous airway lesions. The instrument assembly has been shown in Fig. 2. For therapeutic purposes we use Coblation (Smith and Nephew) which is based on the principle of ablating the tissues by forming plasma using normal saline as a medium [1]. The coblation wand is held in right hand and introduced along the scope to the lesion site. This technique was successfully used in 51 pediatric patients between 1 month and 12 years of age presenting with upper airway pathologies (Table 1).

Discussion

Pediatric airway assessment is in the armamentarium of both paediatrician and otolaryngologists. Fibreoptic laryngoscopy and bronchoscopy is the initial modality to diagnose upper airway [2]. Rigid laryngoscopy and bronchoscopies are conventional techniques and are gold standard of care for intervention. Direct laryngoscopes are used in exposing the larynx and requires suspension to hold the laryngoscope in situ. This requires mandatory endotracheal intubation and also consumes more operating time.

In 1941 Robert Miller described a new laryngoscope blade which gives better exposure by free anterior movement of mandible [3]. We have used Miller laryngoscope blade along with Hopkins 0° endoscope which gives adequate exposure to the larynx. We have used this technique in those patients where anticipated operating time is less to minimise the cycles of intermittent bag and mask ventilation. Such procedures include upper airway assessment before decannulation, supraglottoplasty, vallecular cyst and stenosis release in low grade laryngotracheal stenosis. The average operating time is shown in Table 1. In cases where the operating time exceeded the stipulated time or patient required multiple bag and mask ventilation, we have used the rigid pediatric laryngoscope.

Our technique as compared to direct laryngoscope is simple and takes lesser time, does not require mandatory endotracheal intubation and early reversal of anaesthesia preserves our operating time. Moreover the upper airway relief obstruction can be immediately assessed by the anaesthesiologist on table. Suspension used with Kleinsasser rigid direct laryngoscope if tightened excessively can cause tongue

oedema, dental injuries and pain postoperatively preventing early feeding. This whole technique is generally time consuming and necessitates securing the airway with an endotracheal tube [4]. Our technique in comparison causes less pain as the time taken for instrumentation is less which prevents deeper anaesthesia. This article is the first article which demonstrates the use of Miller blade as a diagnostic and therapeutic aid to upper airway surgery.

We recommend Miller laryngoscope blade as an aid to upper airway surgery for the otolaryngologists with minimal operating time and effort. Direct laryngoscope though can be used and should be reserved for prolonged surgery and those with synchronous airway lesions. Our study is an observational study which is a limitation of the study. Nonetheless future studies can be done by comparing both the modalities of laryngoscopy.

Conclusion

Pediatric upper airway surgery is challenging and sometimes requires multiple sittings of treatment. Miller laryngoscope blade is an efficient and effective way to aid in

assessment of upper airway lesions and its treatment. Our technique takes lesser amount of time and subsequently avoids prolong anaesthesia exposure.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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