Fiberoptic flexible bronchoscopy via the laryngeal mask airway in children

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The laryngeal mask airway (LMA) is a new device for controlling the airway during many procedures. Aside from its use in different kinds of surgical procedures, fiberoptic flexible bronchoscopy can also be performed easily with this mask in children under sedation. This procedure was performed via LMA in 36 children (aged 2-16 years) who suffered from different kinds of respiratory diseases and were seen at Hacettepe University İhsan Doğramacı Children's Hospital, Pediatric Chest Disease Unit, during a seven-month period. The procedure was performed with success and no complications occurred. To the best of our knowledge, this is the first report from Turkey on flexible bronchoscopic evaluation via LMA in children with different kinds of respiratory diseases. We suggest that this technique can be used safely.

Key words: laryngeal mask airway, fiberoptic flexible bronchoscopy.

The laryngeal mask airway (LMA) is a relatively new device developed during the 1980s by Archie Brain in England[1]. Although it has been used in adults for upper airway management since 1983, this mask has become available for children only in the last 10 years[2-5].

The LMA is a simple small inflatable mask that forms a low pressure seal around the laryngeal inlet (Fig. 1). It consists of a silicone rubber tube connected at a 30° angle to a shallow bowl-shaped mask with an inflatable rubber cuff. This silicone tube opens through the center of the cuff and has two small bars traversing its aperture to prevent the epiglottis from occluding its lumen. After positioning, the rubber cuff is inflated through a pilot balloon to provide a seal over the laryngeal opening. The silicone tube has a standard 15 mm adaptor for connection to the anesthesia circuit.

The LMA is passed without visualization into the patient's hypopharynx unless there is resistance. When it is correctly placed its distal end lies directly over the glottis, thus providing a direct guide for passage of the bronchoscope and through the nose avoiding the possibility of trauma. This is a particular concern in small children and especially in those with congenital upper airway abnormalities and coagulation problems[6].

Fig. 1. Laryngeal mask airway.

Here we report 36 children in whom flexible bronchoscopy was performed easily and successfully via LMA under sedation. With this technique, full examination of the larynx, trachea and bronchial tree was completed without serious complication. To the best of our knowledge, this is the first report from Turkey on flexible bronchoscopic evaluation via LMA in children with different kinds of respiratory diseases.

Material and Methods

Flexible fiberoptic bronchoscopy using an Olympus BF type P200 Evis bronchovideoscope was performed via LMA in 36 children at

Hacettepe University İhsan Doğramacı Children's Hospital, Pediatric Chest Disease Unit, during a seven-month period. All patients had an adequate period of fasting essential for this procedure. LMAs sized between 1 and 2 were used according to the age and weight of the patients. Prior to insertion of the LMA, propofol (1-1.5 mg/kg) was administered intravenously. Arterial oxygen saturation of the patients was monitored by 4500 Scout mini oxygen saturation monitor, and their electrocardiogram (ECG) and blood pressure by Sein Patient Monitor (SE-485) throughout the whole procedure. The LMA was inserted when sedation was adequate; it was inflated with 10 ml air and then connected to the T-piece system via a 15 mm Portex connector. Sedation was maintained with propofol and fentanyl (1-2 μg/kg). Spontaneous ventilation was maintained throughout the procedure permitting bronchoscopic evaluation of airway structures.

Results

The size 1-2 LMA was used in 36 patients (20 girls, 16 boys) whose ages ranged from two to 16 years (mean age: 10.3 years) and whose weights ranged between 13 and 65 kg. Demographic data and duration of insertion of the mask are summarized in Table I. The LMA was correctly inserted on the first attempt in 30 cases. Among the remaining six patients, the LMA was inserted on the second attempt due to tonsillary hypertrophy in two patients and to unexplained factors in three patients, and on the third attempt in one patient again for unknown reasons. The LMA was removed with ease in all patients. No serious complications were observed after the procedure.

Discussion

The LMA is a relatively new device and innovative means to control the airway during many procedures. Aside from its use for different kinds of surgical procedures, flexible bronchoscopy can also be performed easily with this mask in children under sedation[5,6]. The LMA provides a totally patent airway, so a full examination of the larynx, trachea and bronchial tree can be completed with this technique without potential trauma in the upper respiratory tract. Furthermore, no paralyzing agent is required during this procedure. Spontaneous ventilation, which is needed for evaluation of airway structures, is also maintained, which is particularly important for diagnosing laryngomalacia, tracheomalacia and tracheal obstruction in children[7]. Connection directly to a T-piece system provides additional

Table I. Demographic Details of Patients and Indications for Bronchoscopy

Case number	Initials	Age (years)	Sex	Weight (kg)	LMA size	Indication for bronchoscopy
1	D.Ö.	8	F	25	2.5	Chronic obstructive pulmonary disease
2	H.K.	11	M	35	2.5	Bronchiectasis, atelectasis
3	E.B.	7	F	21	2	Kartagener syndrome, atelectasis
4	S.D.	12	F	32	2.5	Intrabronchial mass, tuberculosis (?)
5	N.K.	16	F	55	3	Castleman disease, lymphoma (?)
6	S.S.	2	M	13	2	Atelectasis
7	N.A.	9	F	23	2.5	Bronchiectasis, atelectasis
8	C.Y.	11	M	26	2.5	Primary ciliary dyskinesia, atelectasis
9	İ.A.	15	M	56	3	Atelectasis
10	B.A.	12	F	42	3	Hemoptysis
11	E.A.	9	M	20	2	Bronchiectasis
12	Ö.A.	11	F	29	2.5	Bronchiectasis, atelectasis
13	İ.C.	15	M	48	3	Non-Hodgkin's lymphoma, atelectasis
14	L.C.A.	8	M	22	22.5	Bronchiectasis
15	T.B.	11	M	36	2.5	Atelectasis
16	K.D.	6	F	21	2	Kartagener syndrome
17	M.D.	12	M	32	2.5	Kartagener syndrome, atelectasis
18	H.Ç.	3	M	13	2	Recurrent pneumonia
19	M.B.Ü.	11	M	31	2.5	Atelectasis
20	Y.K.	8	M	27	2.5	Bronchiectasis, atelectasis
21	D.M.	10	F	30	2.5	Atelectasis
22	Y.Ç.	7	F	19	2	Pulmonary alveolar microlithiasis

Table I. Continued

Case number	Initials	Age (years)	Sex	Weight (kg)	LMA size	Indication for bronchoscopy
23	N.M.	6	F	65	3	Bronchiectasis
24	Z.K.	14	F	47	3	Kartagener syndrome, bronchiectasis
25	L.Ü.	9	F	23	2.5	Bronchiectasis
26	S.Y.	15	F	40	3	Bronchiectasis
27	T.P.	9	F	30	2.5	Bronchiectasis
28	Z.K.	16	M	44	3	Bronchiectasis
29	K.K.	16	M	56	3	Bronchiectasis
30	Y.K.	9	F	21	2	Bronchiectasis, primary ciliary dyskinesia (?)
31	M.A.O.	7	M	22	2	Bronchial asthma, atelectasis
32	E.Y.	13	M	35	2.5	Cystic fibrosis (?), bronchiectasis, atelectasis
33	A.A.	14	F	49	3	Bronchiectasis
34	S.A.	8	F	23	2.5	Bronchiectasis
35	Y.Ç.	11	F	31	2.5	Bronchiectasis
36	G.D.	12	F	33	2.5	Bronchiectasis

LMA: laryngeal mask airway.

advantages for aspiration or for delivering oxygen to the patient when necessary. Other advantages are its ease of insertion and the absence of contact with the vocal cords. It also avoids the possibility of trauma while passing the bronchoscope through the nose as it lies above the glottic opening and provides a direct guide. This is a particular concern in small children and also in patients with coagulation problems. Despite its many advantages, it should be kept in mind that the LMA does not protect the larynx and, therefore, should not be used in patients who are at high risk of regurgitation as it does not protect the airway from aspiration.

We used size 1 and 2 LMAs in our patients and no complications were seen. All but one patient tolerated size 2 very well.

Although Gürsoy[8] reported use of the LMA in children from Turkey who underwent surgical procedures, our report is the first report on using the LMA for flexible fiberoptic bronchoscopy in children in our country.

Our impression is that the LMA is considerably less stressful for the pediatric pulmonologist when first performing flexible fiberoptic bronchoscopy, especially in children under six years of age because it prevents the risk of nasal trauma and bleeding.

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REFERENCES

1. Brain AJ. The laryngeal mask. A new concept in airway management. Br J Anaesth 1983; 55: 801-804.
2. Springer DK, Jahr JS. The laryngeal mask airway. Safety, efficacy and current use. Am J Anesthesiol 1995; 22: 65-69.
3. Maekawa N. Mikawa K, Tanaka O, Goto R, Obara H. The laryngeal mask may be a useful device for fiberoptic airway endoscopy in pediatric anesthesia. Anesthesiology 1991; 75: 169-170.
4. Theroux MC, Kettrick RG, Khine HH. Laryngeal mask airway and fiberoptic endoscopy in an infant with Schwartz-Jampel syndrome. Anesthesiology 1995; 82: 605.
5. Mason DG, Bingham RM. The laryngeal mask airway in children. Anaesthesia 1990; 45: 760-763.
6. Badr A, Tobia JD, Rasmussen GE, Stokes DC, Neblett WW. Bronshosopic airway evaluation facilitated by the laryngeal mask airway in pediatric patients. Pediatr Pulmonol 1996; 21: 57-61.
7. McNamee CJ, Meyns B, Pagliero KM, Flexible bronchoscoopy via the laryngeal mask: a new technique. Thorax 1991; 46: 141-142.
8. Gürsoy F, Algren JT, Skjonsby BS. Positive pressure ventilation with the laryngeal mask airway in children. Anesth Analg 1996; 82: 33-38.