Lower Airway Anomalies in Infants with Laryngomalacia

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ABSTRACT

Objective. To study the prevalence of associated airway anomalies in infants presenting with moderate to severe laryngomalacia.

Methods. Eighty three symptomatic infants with recurrent respiratory symptoms including wheeze and cough diagnosed as moderate to severe laryngomalacia based on their clinical and direct laryngoscopic findings were subjected to fiberoptic bronchoscopy (FOB) during the period March 2007 to February 2009 in the Department of Pulmonology, Institute of Child Health and Hospital for Children, Chennai, India. Analysis of the clinical features, radiological findings and associated lower airway anomalies by FOB was done.

Results. Lower airway anomalies were demonstrated in 40 (48%) infants of the study population. Tracheomalacia was the most common lower airway anomaly 24(29%) followed by bronchomalacia 8(10%) and tracheobronchomalacia 6 (7%). (4:1:1).

Conclusion. Infants with moderate and severe laryngomalacia should be evaluated with flexible fibreoptic bronchoscopy to rule out associated lower airway lesions. [Indian J Pediatr 2010; 77 (4) : 403-406] E-mail : Vijsekar@hotmail.com

Key words: Fiberoptic bronchoscopy (FOB); Infants; Laryngomalacia; Lower airway anomaly

Laryngomalacia is the commonest congenital laryngeal anomaly in children and is considered as a benign cause of inspiratory stridor. It is characterized by collapse of arytenoids, epiglottis, and aryepiglottic folds during the inspiratory phase. It accounts for more than 75% of all laryngeal problems in infancy and may possibly represent a certain phase of normal development of the larynx as symptoms usually disappear by two year of age. Typically children with laryngomalacia have intermittent noisy breathing which worsens with agitation, crying and feeding. Symptoms may worsen while sleeping because of reduced neuromuscular tone. The symptoms usually become apparent at about 10 day of age, worsen during first few months, then generally resolve by 12 to 18 months of age. Infants (15 to 60%) with laryngomalacia are associated with synchronous airway anomalies and it has been recommended that complete evaluation with bronchoscopy may be advised for infants with laryngomalacia with features of obstruction, but reports from India are very scarce. The present study was undertaken to find out the prevalence of associated lower airway anomalies in infants with moderate and severe laryngomalacia.

MATERIAL AND METHODS

Eighty three infants who were diagnosed to have as moderate to severe laryngomalacia based on their clinical symptoms and confirmed by direct laryngoscopy were subjected to fibreoptic bronchoscopy (FOB). Those who had signs and symptoms suggestive of underlying cardiac lesions were also subjected to echocardiography. Special investigations like USG abdomen were done in cases with associated congenital malformations. Cases of mild laryngomalacia (mild stridor but not symptomatic) were not included in the present study. Bronchoscopic, radiographic findings were analyzed in addition to clinical presentations.

Cases were classified as moderate laryngomalacia if they had frequent noisy breathing while asleep and awake, feeding difficulty, recurrent respiratory tract illness (RRTI) and demonstrating laryngoscopic findings of omega-shaped epiglottis, significantly shortened aryepiglottic folds and excess mucosa over cartilages causing markedly reduced laryngeal introitus. In addition to the above findings, infants who had presented with
chronic retractions, failure to thrive, periods of apnea, cyanosis requiring supplemental oxygen were designated as severe laryngomalacia.  

After informed consent, two pediatric pulmonologists performed all the procedures with mutual verification with the assistance of the pediatric residents and a trained nurse. Airway malacia was diagnosed when there was a 50% reduction in luminal diameter during expiration. Bronchoscopy was done transnasally after 4% lidocaine was applied locally to the nasopharynx. During the procedure 2% lignocaine in the dose of 5 mg/kg diluted with equal volume of normal saline was instilled by “Spray and Proceed technique” through the working channel. Supplemental humidified oxygen was administered by keeping the oxygen catheter closer to the other nostril and saturation was monitored by pulse oximetry.

Statistical analysis: Proportions of various outcome measures in percentages arrived at.

RESULTS

Eighty three infants with moderate (78) to severe (5) laryngomalacia were analysed for lower airway anomaly by FOB. Male infants constituted 83% and the mean age was 5 months. 26% of infants were below three month of age, 40% were in the age group 4-6 month, 17% in 7-9 month and 17% were 10 month and above. All the infants (83) had noisy breathing/stridor as a universal presenting complaint. Other complaints were recurrent wheeze in 47 (56%), recurrent respiratory tract infection in 25 (30%) and recurrent / persistent cough in 25 (30%). Most infants presented with a combination of these symptoms. Atelectasis 15 (18%), pneumonia 14 (17%) and obstructive emphysema 2 (2%) were the common radiographic findings while 52 (63%) had a normal chest X-ray. CLE 1 and cardiomegaly 2 were the other abnormalities noted in three cases who also had pneumonia. FOB showed associated lower airway anomalies in 40 (48%) infants. 26 (66%) infants with lower airway anomaly were less than six month of age and the male female ratio was 3 : 1.

Among the airway anomalies (40), tracheomalacia was the commonest 24 (29%), followed by bronchomalacia 8 (10%) and tracheobronchomalacia 6 (7%). Tracheomalacia involving mid third of trachea was seen in 12 infants. 12 infants had tracheomalacia involving both the middle and lower thirds of the trachea. Bronchomalacia was observed in 8 cases (10%) which were bilateral in 2 and unilateral in 6. Unilateral bronchomalacia involved the left side more frequently 5 (83%) than right side 1 (17%). In contrast, of the six 6 (7%) with tracheobronchomalacia, 5 had bronchomalacia on right side while there was only one on the left side. The other abnormalities observed were carinal widening (2%) and agenesis of lung (2%).

All the 24 infants with tracheomalacia had presented with recurrent wheeze (100%) and chronic cough in 12 (50%) and recurrent respiratory infections in 10 (42%). Whereas 15 (62%) presented with normal chest skigram, 4 (17 %) had collapse and 5 (21%) had bronchopneumonia. Tracheomalacias were associated with congenital heart diseases namely VSD in 2 cases, ASD in 2 cases and hypoplastic lung in one case. Endobronchial tuberculosis was diagnosed in one case with tracheomalacia who had RRTI on presentation, confirmed microbiologically.

All the 8 infants with bronchomalacia had recurrent respiratory tract infection (100%), in addition to recurrent wheeze in 5 (63%) and chronic cough in 3 (38%). Atelectasis of lung was seen in chest radiography in 5 (63%) followed by pneumonia in 2 (25%) and unilateral hyperaeration in one case (12%). Bronchomalacia was

<p>| Table 1. Clinical, Radiographic and Bronchoscopic Features of Infants with Moderate and Severe Laryngomalacia n: 83 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Bronchoscopic findings</th>
<th>Chronic/ Recurrent cough</th>
<th>Recurrent wheeze</th>
<th>No significant complaint</th>
<th>Radiographic findings</th>
<th>Associated problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>No anomaly (laryngomalacia only)</td>
<td>6 (14)</td>
<td>4 (9)</td>
<td>11 (26)</td>
<td>22 (51)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Tracheomalacia (24%)</td>
<td>12 (50)</td>
<td>10 (42)</td>
<td>24 (100)</td>
<td>0</td>
<td>4 (17)</td>
</tr>
<tr>
<td>Bronchomalacia (8%)</td>
<td>3 (38)</td>
<td>8 (100)</td>
<td>5 (63)</td>
<td>0</td>
<td>5 (63)</td>
</tr>
<tr>
<td>Tracheobronchomalacia (6%)</td>
<td>6 (100)</td>
<td>2 (34)</td>
<td>5 (83)</td>
<td>0</td>
<td>4 (66)</td>
</tr>
<tr>
<td>Other anomalies (2%)</td>
<td>0</td>
<td>1 (50)</td>
<td>2 (100)</td>
<td>0</td>
<td>1 (50)</td>
</tr>
<tr>
<td>TOTAL (83)</td>
<td>25 (30)</td>
<td>25 (30)</td>
<td>47 (56)</td>
<td>22 (27)</td>
<td>15 (18)</td>
</tr>
</tbody>
</table>

Figures in parentheses denote percentage.

*All cases had noisy breathing at presentation and more than one complaint
** VSD = 2 cases, ASD = 2 cases, hypoplastic lung = 1 case, endobronchial tuberculosis 1 case
# Dextrocardia = 1 case, TOF = 1 case, hypoplasia of lung = 1 case,
$ Aplasia of lung right side = 1 case, situs inversus totalis = 1 case, and Scimitar syndrome 1 = case
@ Carinal widening 1 case, agenesis of lung 1 case
## Situs inversus totalis 1 case