Radiography in predicting clinical outcomes in croup.

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Description

Croup is a common respiratory disease common in children between 6 months and 6 years usually caused by a human parainfluenza virus incriminated in up to 75% of all cases. In croup patients, anteroposterior of the soft tissue on neck radiograph may reveal a steeple sign while the lateral view of the soft tissue on neck radiograph may demonstrate over distention of the hypopharynx during inspiration and blurring of tracheal air shadow by subglottic edema.

Radiography of the neck's soft tissue is not often recommended in children with croup, although it plays an important role in distinguishing croup from other upper airway obstruction diseases and evaluating its severity. We conclude that soft tissue neck radiography may be considered in children with croup and when they present with either a frontal ratio <0.23 or a lateral ratio <0.45; this may indicate longer hospitalization for further treatment if needed. Conversely, children presenting with a frontal ratio 0.65 or a lateral ratio >0.6 may be discharged from emergency department after initial treatment.

Croup (Laryngotracheobronchitis) is one of the most common upper airway obstruction disease in children, typically occurs in the fall and winter months, and frequently preceded by 1 to 3 days of rhinorrhea, nonspecific cough, coryza, rhinorrhea, and fever, with abrupt onset of barking cough, hoarseness, and inspiratory stridor [1]. In the North America, the average annual incidence of Croup is about 3%, and less than 5% of all children with croup are admitted to hospital. Croup usually presents in children aged 6 months to 6 years, with the peak in the 2nd year of life, but it is uncommon in children over six years old. Croup is more common in boys than in girls and with the male: female sex ratios. The most important diagnoses to differentiate from croup include bacterial tracheitis, epiglottitis, retropharyngeal abscess, congenital airway anomaly, anaphylaxis, and the inhalation of a foreign body. Diagnosis of croup is clinical and is based on a comprehensive history and physical examination. However, neck X-ray (anteroposterior and lateral airway radiographs) may be recommended to help distinguish croup from other etiologies resulting in upper airway obstruction. Furthermore, there may be some correlation between findings on neck radiographs and outcomes of croup patients.

Croup is usually caused by viral infections; human parainfluenza virus (type 1 most common) being the most common and accounts for up to 75% of all cases. Infection caused by parainfluenza virus type 4 is less likely to be associated with stridor and croup. Other viruses that cause croup include respiratory syncytial virus, metapneumovirus, rhinovirus, influenza A and B, adenovirus, human bocavirus, enterovirus, and coronavirus. Coronavirus disease 2019 can also cause croup in pediatric patients, but it is rarely reported. Additionally, bacterial infection may occur secondarily, and the most common pathogens consist of Mycoplasma pneumoniae, Staphylococcus aureus, Streptococcus pyogenes, and Streptococcus pneumoniae.

Viral invasion of the laryngeal mucosa leads to inflammation, hyperemia, edema, and then causes narrowing of the subglottic region. Classic symptoms and signs of croup usually begin with upper respiratory tract infection such as nasal discharge, congestion, and coryza followed by fever, barking cough, hoarse voice, and various degrees of respiratory distress (e.g., nasal flaring, respira¬tory retractions, and stridor). However, clinicians must remain vigilant because other diseases can present with upper airway obstruction [2]. Therefore, differentiating croup from other acute illnesses can be challenging. Croup is usually a self-limited illness, and the symptoms of croup are usually short-lived. The barking cough generally resolves within 48 to 96 hours, and only few children will continue to have symptoms for more than 1 week. Croup symptoms often become worse at night or early morning and can fluctuate quickly depending on whether the child is agitated or calm. Recurrent croup may be associated with allergy and having underlying abnormalities such as congenital or acquired subglottic stenosis and gastroesophageal reflux disease.

Croup is a benign condition with a good prognosis, and the mortality is rare. The hospital admission rates are less than 5% of all children of croup, and only 1% to 3% of those will require intubation. The current treatment methods have reduced the mortality rates in intubated children to less than 0.5%. Complications of croup are rare and commonly related to the respiratory tract such as the middle ear, the terminal bronchioles, or the pulmonary parenchyma. Approximately 15 percent of patients experience a complication including otitis media and dehydration. Pneumonia, pulmonary edema, and bacterial tracheitis are uncommon complications.

Croup is a clinical diagnosis, and radiographic confirmation is not needed in the overwhelming majority of children with croup [3]. However, Anteroposterior (AP) and lateral soft tissue neck film may be advantageous for clarifying the diagnosis in children with croup-like symptoms or condition does not respond to usual treatment for croup.

Conversely, when a child presents with frontal ratio >0.65 or lateral ratio >0.6, it may indicate that who is low risk in croup and can be discharged from the emergency department. The measurement of frontal ratio, steeple shaped angle, and lateral ratio. Radiographic factors associated with tracheal width were significantly correlated with clinical severity and outcomes in patients with croup treated in a pediatric emergency room [5]. No significant correlation between the presence of steeple signs

and severity of croup were observed. It is also important to know that the steeple sign represents subglottic edema and can present in other inflammatory conditions of the upper airway such as epiglottitis, thermal injury, angioneurotic edema, and bacterial tracheitis.

References

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