Case Presentation

Two parents have brought their 4-year-old daughter to the emergency room.

She had a sudden onset of difficulty breathing, fever, and painful swallowing.

You are the emergency room physician, click through the module to treat this patient.
“This morning we noticed that she feels warm and was not quite herself. She started complaining about a sore throat about 2 hours ago.

We also noticed that she started drooling for the past hour, saying it hurts too much to swallow. But it’s the breathing that is really worrying us... it sounds really noisy. It’s been like that for about 15 minutes now.

She is generally healthy. She has never been in the hospital. I think she has had all of her vaccinations, but I’m not sure. We travel overseas quite often for work, so she may have missed a vaccination. She has no medical diagnoses to date.”
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

- Vascular
- Infectious
- Traumatic
- Neoplastic
- Autoimmune/Allergic
- Degenerative
- Congenital
- Iatrogenic

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

- Infectious
- Neoplastic
- Degenerative
- Traumatic
- Endocrine/Metabolic
- Congenital
- Autoimmune/Allergic
- Iatrogenic
- Vascular – Unlikely

Why not?
Age, acute presentation

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

- Vascular
- Neoplastic
- Degenerative
- Traumatic
- Endocrine/Metabolic
- Congenital
- Iatrogenic
- Autoimmune/Allergic

Infectious

Why?
Acute presentation, vaccination history unclear.

DDx:
- Laryngitis
- Peritonsillar abscess
- Retropharyngeal abscess
- Epiglottitis
- Sepsis
- Bacterial tracheitis
- Croup

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

Vascular

Infectious

Degenerative

Traumatic

Endocrine/Metabolic

Autoimmune/Allergic

Congenital

Iatrogenic

Neoplastic – Unlikely

Why not?
Age, acute presentation

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

- Vascular
- Infectious
- Traumatic
- Neoplastic
- Autoimmune/Allergic
- Congenital
- Iatrogenic

Degenerative – Unlikely
Why not?
Age, acute presentation

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

- Vascular
- Infectious
- Traumatic
- Neoplastic
- Endocrine/Metabolic
- Degenerative
- Autoimmune/Allergic
- Congenital

Iatrogenic – Unlikely

Why not?
Unlikely based on history

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

Vascular
Endocrine/Metabolic
Infectious
Traumatic
Neoplastic
Degenerative
Iatrogenic

Congenital – Unlikely

Why not?
The patient is 4 years old with no previous respiratory issues. However, contributory congenital issue cannot be excluded at this time.

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

- Vascular
- Infectious
- Neoplastic
- Degenerative
- Traumatic
- Endocrine/Metabolic
- Congenital
- Iatrogenic
- Autoimmune/Allergic

**Why?**
Acute presentation

**DDx:**
- Acute angioedema
- Allergic reaction

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?

Think VINDICATE! (Click on heading to test yourself)

- Vascular
- Infectious
- Neoplastic
- Degenerative
- Endocrine/Metabolic
- Congenital
- Iatrogenic
- Autoimmune/Allergic
- Traumatic

Why?
Acute presentation

DDx:
- Foreign body aspiration
- Thermal injury
- Caustic ingestion

With your DDx in mind, proceed to focused physical exam.
What diagnoses are coming to mind?  
*Think VINDICATE! (Click on heading to test yourself)*

- **Vascular**
- **Infectious**
- **Neoplastic**
- **Degenerative**
- **Traumatic**
- **Congenital**
- **Iatrogenic**
- **Autoimmune/Allergic**

**Endocrine/Metabolic – Unlikely**

*Why not?*

Age, acute presentation

With your DDx in mind, proceed to focused physical exam.
Physical Exam

Click on the appropriate physical examinations.

- General inspection
- Vitals
- Oral Cavity Exam
- Laryngoscopy
- CVS Exam
- Respiratory Exam

Proceed to investigations
Physical Exam  Click on the appropriate physical examinations.

- General inspection
- Vitals
- Oral Cavity Exam
- Laryngoscopy
- CVS Exam
- Respiratory Exam

She is having labored breathing and drooling. She looks unwell with inspiratory stridor.
Physical Exam

Click on the appropriate physical examinations.

- General inspection
- Vitals: Temperature: 39.2 °C, BP: 100/65, HR: 140, RR: 28
- Oral Cavity Exam
- Laryngoscopy
- CVS Exam
- Respiratory Exam

Proceed to investigations
Deferred for fear of agitating a child with urgent airway concern.
While nasopharyngoscopy can be used to visualize the airway, given this particular pediatric clinical situation with significant stridor, you’re worried that doing so may provoke anxiety, agitation, and in turn airway obstruction.
Physical Exam  Click on the appropriate physical examinations.

- General inspection
- Vitals
- Oral Cavity Exam
- Laryngoscopy
- CVS Exam
- Respiratory Exam

Not warranted given clinical picture.

Proceed to investigations
Physical Exam  
Click on the appropriate physical examinations.

- General inspection
- Vitals
- Oral Cavity Exam
- Laryngoscopy
- CVS Exam
- Respiratory Exam

Deferred for fear of agitating a child with urgent airway concern.
Investigations

(Click on appropriate investigations.)

- CT scan
- MRI
- Ultrasound of neck
- Lateral neck X-ray
- Nasopharyngeal swab
- Biopsy
Contraindicated in this case due to the emergent nature of the diagnosis.
Contraindicated in this case due to the emergent nature of the diagnosis.
Investigations  
(Click on appropriate investigations.)

- CT scan
- MRI
- Ultrasound of neck
- Lateral neck X-ray
- Nasopharyngeal swab
- Biopsy

Not warranted given clinic picture.
A portable X-ray was arranged to avoid transport to radiology suite.
Investigations  
(Click on appropriate investigations.)

CT scan
MRI
Ultrasound of neck
Lateral neck X-ray
Nasopharyngeal swab
Biopsy

Contraindicated at this time, due to the emergent nature of the diagnosis.
Investigations  *(Click on appropriate investigations.)*  

- CT scan
- MRI
- Ultrasound of neck
- Lateral neck X-ray
- Nasopharyngeal swab
- Biopsy

*Not applicable to this case.*
Summary of findings

Chief complaints:
• Difficulty breathing (15 min), painful swallowing (2 hours), drooling (1 hour), anxious

General inspection:

Vitals:
Temperature: 39.2 °C
BP: 100/65
HR: 140
RR: 28

Based on your findings, choose the most likely diagnosis:

a. Peritonsillar abscess
b. Epiglottitis
c. Foreign body
d. Allergic reaction
e. Caustic ingestion
f. Croup
Correct! The is a case of *epiglottitis* (more accurately called supraglottitis). It is a cellulitis of the supraglottic structures associated with profound edema, most noticeably of the epiglottis.

On further question of vaccination history, this child was not immunized against *Haemophilus Influenza B*, a bacterial cause of epiglottitis.

Now that you have made the correct diagnosis, choose the best treatment for this patient.
Incorrect. The patient’s fever, lack of coughing, and findings on the lateral neck X-ray make a foreign body unlikely. There was also no mention of a choking episode or coughing on patient history.
Incorrect. The clinical picture does not match peritonsillar abscess. The findings on the X-ray points to another diagnosis.
Incorrect. Allergic reaction can cause dyspnea and laryngeal edema. However, there are no other typical signs of allergic reaction in this patient (hives, pruritis, facial edema, etc.). Further, the patient’s fever and findings on the lateral neck X-ray point to a more likely diagnosis.
Incorrect. Caustic ingestion could cause drooling, dysphagia, and laryngeal edema. However, the fever, lack of mouth pain or evidence of caustic ingestion, and history do not support this diagnosis.
Incorrect. Croup can cause a low-grade fever, voice changes, and stridor. However, the sudden onset, drooling, high-grade fever, and lack of “barking” cough make this diagnosis unlikely. The history and findings on the lateral neck X-ray point to another diagnosis.
Choose the best initial treatment for this patient.

- **Discharge with antibiotics**
- **Treatment with corticosteroids**
- **Immediately transfer to OR for airway management**
- **Watchful waiting**
Discharge with antibiotics

Incorrect. A child who presents with epiglottitis is at immediate risk of obstructing their airway. Intravenous antibiotics, such as ceftriaxzone, would be important in management of epiglottitis, but it is not the initial treatment. Please choose again.
Incorrect. A child who presents with epiglottitis is at immediate risk of losing their airway. Corticosteroids have a role in management of epiglottitis, but are not the initial treatment. Please choose again.
Immediate transfer to OR for airway management

Management of a child with epiglottitis requires immediate cooperation between otolaryngology, anesthesiology, and pediatrics critical care. Primarily, avoid aggravating the child, as anxiety may precipitate complete obstruction of the airway. The child must be transferred to the OR, and given inhalational anesthesia. Various airway adjuncts (including preparation for possible tracheostomy) should be readied in event of difficult airway. Under anesthesia, the supraglottis is inspected for erythema and edema, which confirm diagnosis (see picture). The child is given endotracheal intubation. After the airway has been secured, blood cultures, and swabs of the epiglottis may be obtained. The child is started on parenteral antibiotics. Parenteral corticosteroids may also be used. Often, epiglottitis responds quickly to treatment, and the child may be considered for extubation in 2-3 days.

Normal larynx on nasopharyngoscopy  Epiglottitis on nasopharyngoscopy
Watchful waiting

Incorrect. A child who presents with epiglottitis is at immediate risk of losing their airway. Please choose again.
Anatomy Review

Superior View of Larynx

View of larynx on nasopharyngoscopy

- Epiglottis
- True vocal fold
- Arytenoid cartilage
- Esophageal inlet
- Base of tongue
- False vocal fold
- Piriform sinus
- Trachea

Anatomy Review Continued
Anatomy Review

Lateral Neck X-ray

Epiglottitis “thumbprint sign”
A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

Which of the following can cause epiglottitis?

a. *Streptococcus pneumoniae*
b. Foreign object
c. Caustic ingestion
d. Trauma
e. *Haemophilus influenzae b*
f. *A and E*
g. All of the above
A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

1. Which of the following can cause epiglottitis?
   
   a. *Streptococcus pneumoniae*
   b. Foreign object
   c. Caustic ingestion
   d. Trauma
   e. *Haemophilus influenzae b*
   f. *A and E*
   g. All of the above

Incorrect. *Streptococcus pneumoniae* can cause epiglottitis, however it is not the only correct answer.
A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

1. Which of the following can cause epiglottitis?

   a. *Streptococcus pneumoniae*
   b. Foreign object
   c. Caustic ingestion
   d. Trauma
   e. *Haemophilus influenzae* b
   f. A and E
   g. All of the above

Incorrect. Trauma from a foreign body can cause epiglottitis, however it is not the only correct answer.

Please Try Again
A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

1. Which of the following can cause epiglottitis?

   a. *Streptococcus pneumoniae*
   b. Foreign object
   c. *Caustic ingestion*
   d. Trauma
   e. *Haemophilus influenza b*
   f. *A and E*
   g. All of the above

Incorrect. Caustic ingestion can cause epiglottitis, however it is not the only correct answer.

Continue
Try Again
Quiz

A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

1. Which of the following can cause epiglottitis?

a. *Streptococcus pneumoniae*  
Incorrect. Trauma can cause epiglottitis, however it is not the only correct answer.

b. Foreign object  
c. Caustic ingestion  
d. Trauma  
e. *Haemophilus influenza b*  
f. *A and E*  
g. All of the above
A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

1. Which of the following can cause epiglottitis?

   a. *Streptococcus pneumoniae*
   b. Foreign object
   c. Caustic ingestion
   d. Trauma
   e. *Haemophilus influenza b*
   f. *A and E*
   g. All of the above

Incorrect. *Haemophilus influenza b* can cause epiglottitis, however it is not the only correct answer.
Quiz

A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

1. Which of the following can cause epiglottitis?

   a. *Streptococcus pneumoniae*
   b. Foreign object
   c. Caustic ingestion
   d. Trauma
   e. *Haemophilus influenzae b*
   f. *A and E*
   g. All of the above

Incorrect. *Streptococcus pneumoniae* and *haemophilus influenza b* can cause epiglottitis, however they are not the only correct answers.

Please Try Again
Quiz

A 5-year-old boy presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

1. Which of the following can cause epiglottitis?

   a. *Streptococcus pneumoniae*
   b. Foreign object
   c. Caustic ingestion
   d. Trauma
   e. *Haemophilus influenza b*
   f. A and E
   g. All of the above

Correct! All of the options listed can cause epiglottitis. Prior to widespread vaccination, *Haemophilus influenza B* (Hib) was the most common cause of epiglottitis. Currently, the predominant causative organisms are *Streptococcus pneumoniae, S. pyogenes, Staphylococcus aureus*, and other *H. influenzae* serotypes.
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

2. What is/are the most appropriate initial investigations?

a. CT scan
b. Ultrasound
c. MRI
d. Lateral Neck X-ray
e. Nasopharyngeal Swab
f. A and E
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

2. What is/are the most appropriate initial investigations?

a. CT scan
b. Ultrasound
c. MRI
d. Lateral Neck X-ray
e. Nasopharyngeal Swab
f. A and E

Incorrect. Epiglottitis is an emergency, a CT scan would be inappropriate.
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

2. What is/are the most appropriate initial investigations?

a. CT scan
b. Ultrasound
   Incorrect. Epiglottitis is an emergency, an ultrasound would be inappropriate.
c. MRI
d. Lateral Neck X-ray
e. Nasopharyngeal Swab
f. A and E
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

2. What is/are the most appropriate initial investigations?

a. CT scan
b. Ultrasound
c. MRI

d. Lateral Neck X-ray
e. Nasopharyngeal Swab
f. A and E

Quiz

Incorrect. Epiglottitis is an emergency, an MRI would be inappropriate.
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

2. What is/are the most appropriate initial investigations?

a. CT scan
b. Ultrasound
c. MRI
d. Lateral Neck X-ray
e. Nasopharyngeal Swab
f. A and E

Correct!
A lateral neck X-ray can be used to quickly diagnose epiglottitis via a positive “thumbprint sign”.
Need for radiograph should be based on acuity of disease. *If symptoms are severe, patient should proceed directly to OR.*
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

2. What is/are the most appropriate initial investigations?

a. CT scan
b. Ultrasound
c. MRI
d. Lateral Neck X-ray
e. Nasopharyngeal Swab
f. A and E

Incorrect. Epiglottitis is an emergency, a nasopharyngeal swab wouldn’t be an appropriate initial investigation. However, after the patient’s airway is secured, a nasopharyngeal swab can aid in determining the cause of the epiglottitis.
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

2. What is/are the most appropriate initial investigations?

a. CT scan
b. Ultrasound
c. MRI
d. Lateral Neck X-ray
e. Nasopharyngeal Swab
f. A and E

Incorrect. Epiglottitis is an emergency, a CT scan and nasopharyngeal swab would be inappropriate initial investigations. However, after the patient’s airway is secured, a culture swab can aid in the diagnosis of the cause of epiglottitis.
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

3. What is the initial management for epiglottitis?

a. Antibiotics  
b. Watchful Waiting  
c. Steroids  
d. Immediate transfer to the OR
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

3. What is the initial management for epiglottitis?

- **a. Antibiotics**
  Incorrect. A child who presents with epiglottitis is an airway emergency, therefore the airway must be secured first. Intravenous antibiotics, such as ceftriaxzone, would be an important secondary management in cases of bacterial epiglottitis.

- **b. Watchful Waiting**

- **c. Steroids**

- **d. Immediate transfer to the OR**
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

3. What is the initial management for epiglottitis?

a. Antibiotics
b. Watchful Waiting
   Incorrect. Watchful waiting could be fatal, as a child who presents with epiglottitis is an airway emergency
c. Steroids
d. Immediate transfer to the OR
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

3. What is the initial management for epiglottitis?

a. Antibiotics
b. Watchful Waiting
c. Steroids
d. Immediate transfer to the OR

Incorrect. A child who presents with epiglottitis is an airway emergency. Corticosteroids can be used as secondary management.
A 5-year-old girl presents to the ER with fever, muffled voice, and stridor. You suspect epiglottitis.

3. What is the initial management for epiglottitis?
   a. Antibiotics
   b. Watchful Waiting
   c. Steroids
   d. Immediate transfer to the OR

Correct! A child who presents with epiglottitis is an airway emergency. As such, they must be immediately transferred to the OR in order to properly secure their airway.
Congratulations! You have finished the airway obstruction module.

Key points to remember:

- Epiglottitis is a potential life-threatening medical emergency that can affect children and adults. Prodromal symptoms may be absent in pediatric presentations.

- Causes: bacterial, burns from hot or caustic liquids, direct trauma

- Presenting signs and symptoms may include:
  - Sudden onset high-grade fever
  - Stridor
  - Drooling
  - Dysphagia
  - Dyspnea
  - Sore throat
  - Anxious, restless behaviour
  - Greater comfort when sitting up or leaning forward

- In children, suspected supraglottitis should undergo airway management in the OR with appropriate anesthesia, otolaryngology staff, and airway adjuncts
  - Avoid aggravating the patient with unnecessary examinations and investigations
Module Authors

• Kylen Van Osch, Meds 2020 & Peng You MD
• Module adapted from: Jason Beyea, MD PhD FRCSC