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INTRODUCTION — The primary function of swallowing is the ingestion, preparation, and transport of nutrients to the digestive tract. Secondary functions of swallowing are the control of secretions, clearance of respiratory contaminants, protection of the upper airway, and equalization of pressure across the tympanic membrane through the eustachian tube.

The differential diagnosis and evaluation of dysphagia in children are reviewed here.

DEFINITIONS

- Dysphagia – Dysphagia is defined as any difficulty or abnormality of swallowing. Dysphagia is not a specific disease entity but is a symptom of other conditions and may be life-threatening.
- Odynophagia – Odynophagia refers to pain on swallowing and may also be present in the dysphagic child.
- Sialorrhea – Sialorrhea (drooling) may accompany dysphagia and often indicates oropharyngeal, upper airway, and/or esophageal infection or obstruction.

DIFFERENTIAL DIAGNOSIS — The table provides a listing of life-threatening, common, and other conditions associated with dysphagia in children (table 1).

Life-threatening conditions — Life-threatening etiologies of dysphagia may cause airway compromise, pulmonary aspiration, serious local or systemic infection, and inflammatory disease.

Esophageal foreign body — Patients of any age with an esophageal foreign body may present with inability or refusal of oral fluids or solids (dysphagia), drooling, or respiratory symptoms, including wheezing, stridor, or choking. The majority of foreign body ingestions occur in children between the ages of six months and three years. Most children with esophageal foreign bodies are brought to medical attention by their parents because the ingestion was witnessed or reported to them.

When symptoms do occur, they are often related to the location of the foreign body. Older children may localize the sensation of something "stuck" in the neck or lower chest, suggesting irritation in the upper or lower esophagus, respectively. Foreign bodies lodged in the esophagus at the cricoid cartilage or the tracheal bifurcation can compress the airway causing partial airway obstruction (image 1). It is also possible that an esophageal foreign body will become dislodged into the upper airway. (See "Emergency evaluation of acute upper airway obstruction in children".)

Esophageal perforation from ingested sharp objects or erosion from retained smooth foreign bodies, particularly "button" batteries, may cause serious sequelae, including death (picture 1 and picture 2). Children with suspected foreign body or “button” battery ingestion should have prompt anterior-posterior and lateral radiographs performed to identify possible esophageal or gastrointestinal retention, since batteries in particular can cause severe esophageal injury within two hours of ingestion. Evidence of a double-ring or halo on the AP view (image 2), or step-off of the foreign body on the lateral view (image 3), indicates presence of a battery rather than a coin, and requires immediate removal. (See "Foreign bodies of the esophagus and gastrointestinal tract in children" and "Emergency evaluation of acute upper airway

obstruction in children" and "Button and cylindrical battery ingestion: Clinical features, diagnosis, and initial management", section on 'Esophageal impaction'.)

Impacted meat or other food bolus is the most common esophageal foreign body in adults but is relatively rare in children. It usually presents as dysphagia beginning acutely while eating. In children presenting with a food impaction, there is a higher incidence of underlying esophageal pathology (strictures, achalasia, eosinophilic esophagitis, or esophageal motility disorders) as compared to children with other esophageal foreign bodies [1]. Children who are in acute distress or unable to swallow oral secretions following food impaction require immediate attention and removal of the impaction. If the patient is comfortable and able to handle oral secretions, endoscopic intervention can be delayed, as many food impactions will pass spontaneously. (See "Foreign bodies of the esophagus and gastrointestinal tract in children", section on 'Esophageal food impaction'.)

Stevens-Johnson syndrome — Stevens-Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), and SJS/TEN overlap syndrome represent disorders of uncertain etiology that are characterized by desquamative lesions of the skin and mucous membranes (picture 3 and picture 4 and picture 5 and picture 6). Drooling and dysphagia commonly accompany severe oropharyngeal mucosal sloughing. Cases with less than 10 percent epidermal involvement are classified as SJS; those with 30 percent or more involvement are classified as TEN; cases with between 10 and 30 percent involvement are considered overlap SJS/TEN.

TEN is almost invariably drug-induced, while SJS is associated with infections, as well as drug administration. SJS and TEN begin with a prodrome of fever and influenza-like symptoms one to three days before the development of mucocutaneous and skin lesions. Characteristic vesicular and bullous skin lesions then appear and progress over several days, followed by sloughing (picture 7 and picture 8 and picture 9 and picture 3 and picture 5). Multiorgan involvement, including tracheobronchitis, may occur. (See "Stevens-Johnson syndrome and toxic epidermal necrolysis: Pathogenesis, clinical manifestations, and diagnosis".)

Caustic ingestion — Dysphagia is the most common symptom of caustic oropharyngeal and esophageal injury (picture 10). Patients may also present with drooling, oral burns, retrosternal or abdominal pain, hematemesis, and features suggesting upper airway injury, such as stridor, hoarseness, nasal flaring, and retractions. Caustic ingestion may also cause a chemical epiglottitis or an esophageal perforation with mediastinitis. (See "Caustic esophageal injury in children" and "Epiglottitis (supraglottitis): Management" and 'Esophageal perforation' below.)

Retropharyngeal abscess — Retropharyngeal abscess occurs most commonly in children between the ages of two and four years. Retropharyngeal abscess often is a polymicrobial infection. The predominant bacterial species are Streptococcus pyogenes (group A streptococcus), *Staphylococcus aureus* (including methicillin-resistant *S. aureus*), and respiratory anaerobes (including *Fusobacteria*, *Prevotella*, and *Veillonella* species).

Early in the disease process, the findings may be indistinguishable from those of uncomplicated pharyngitis. With disease progression, symptoms related to inflammation and obstruction of the upper aerodigestive tract develop. Children with retropharyngeal abscess eventually appear ill with moderate fever. Symptoms may include dysphagia, odynophagia, drooling, pain on neck extension, torticollis, and/or muffled or "hot potato" voice. In addition, respiratory distress, stridor, and/or neck swelling, mass, or lymphadenopathy may be present. (See "Retropharyngeal infections in children".)

Epiglottitis — Suspected epiglottitis, which occurs rarely among children immunized against Haemophilus influenza, type B, is a medical emergency. To minimize morbidity and mortality, prompt recognition and treatment is critical (table 2). (See "Epiglottitis (supraglottitis): Clinical features and diagnosis" and "Epiglottitis (supraglottitis): Management".)

Abrupt onset and rapid progression (within hours) of dysphagia, drooling, and distress ("the three D's") are hallmarks of epiglottitis in children. Sudden onset of high fever (between 38.8 and 40.0ºC), odynophagia, and severe sore throat are also characteristic of infectious epiglottitis. Non-infectious epiglottitis may also occur in children who ingest caustic substances or hot liquids.

Children with epiglottitis usually appear "toxic" (picture 11) and may assume a sitting position with the trunk leaning forward, neck hyperextended, and chin thrust forward in an effort to maximize the diameter of the obstructed airway (the "tripod" posture) (picture 12). They may be reluctant to lie down. Although many patients have minor antecedent upper respiratory tract symptoms, the usual duration of notable illness before hospitalization is <24 hours and frequently <12 hours. (See "Epiglottitis (supraglottitis): Clinical features and diagnosis".)

Central nervous system infection — Children with meningitis, encephalitis, or cerebral abscess may have impaired consciousness (lethargy, obtundation, or coma) with loss of the gag reflex and dysphagia. They may also rarely exhibit bulbar signs with difficulty swallowing due to infection of the components of the swallowing pathway (eg, cortical motor stripe, vagus nerve nucleus). Fever is usually present and may be of variable elevation.

Most patients with bacterial meningitis also present with fever and with clinical findings of meningeal inflammation (nausea, vomiting, irritability, anorexia, headache, confusion, back pain, and nuchal rigidity). However, the clinical manifestations of bacterial meningitis are variable and nonspecific; no single sign is pathognomonic. (See "Bacterial meningitis in children older than one month: Clinical features and diagnosis", section on 'Clinical features'.)

Children with encephalitis often have fever, altered mental status, seizures, and/or focal neurologic signs. (See "Acute viral encephalitis in children: Clinical manifestations and diagnosis", section on 'Clinical features'.)

Impairment of swallowing — A diverse group of neurologic conditions associated with poor coordination of swallowing may lead to dysphagia with pulmonary aspiration of saliva or food. Etiologies include cerebral palsy, traumatic brain injury, demyelinating diseases (eg, Guillain-Barré syndrome with bulbar weakness [Miller Fisher syndrome]), botulism, congenital myopathies, mitochondrial myopathies, spinal muscular atrophy, and neurodegenerative diseases (eg, metachromatic leukodystrophy, Alexander disease, Krabbe disease, juvenile amyotrophic lateral sclerosis) [2]. (See separate topic reviews.)

These patients often present with respiratory distress and clinical findings of aspiration pneumonia (eg, hypoxia, fever, tachypnea, cyanosis, rales). Empiric treatment of aspiration pneumonia is discussed separately. (See "Pneumonia in children: Inpatient treatment", section on 'Aspiration pneumonia'.)

Tetanus — Tetanus is a nervous system disorder characterized by muscle spasms that is caused by the toxin-producing anaerobe, Clostridium tetani. While tetanus is now rare in the developed world, the disease remains a threat in developing countries. Dysphagia and trismus are common presenting symptoms in patients with generalized tetanus. Other clinical findings may include stiff neck, opisthotonos, and risus sardonicus (sardonic smile). (See "Tetanus".)

Patients with generalized tetanus characteristically have tonic contraction of their skeletal muscles and intermittent intense muscular spasms. Since patients with tetanus have no impairment of consciousness or awareness, both the tonic contractions and spasms are intensely painful. Tetanic spasms may be triggered by loud noises or other sensory stimuli, such as physical contact or light.

Diphtheria — Diphtheria occurs rarely in developed countries but remains a serious disease throughout much of the world. It is an acute, communicable disease caused by the Gram-positive bacillus, *Corynebacterium diphtheriae*. Respiratory diphtheria has a gradual onset of symptoms with sore throat, odynophagia, malaise, and low grade fever being the most common. In a significant percentage of patients, toxin elaborated locally induces the formation of a coalescing pseudomembrane which can extend to any

portion of the respiratory tract from the nasal passages to the tracheobronchial tree and cause odynophagia.

Neurologic toxicity with uncoordinated swallowing, dysphagia, upper airway obstruction, and/or pulmonary aspiration is unusual in mild disease but develops in up to three-fourths of patients with severe diphtheria.

Poliomyelitis — Although polio no longer poses the public health threat in the United States that it once did, areas of endemic wild-type poliovirus still exist in other areas of the world. Up to one-third of patients may develop bulbar involvement with dysphagia, dysarthria, and difficulty handling secretions. (See "Polio and infectious diseases of the anterior horn".)

Central nervous system tumor — Cranial neuropathies with drooling, dysphagia, diplopia, impairment of ocular movements, and/or facial palsy, suggest underlying brainstem pathology. These findings represent common localizing signs of central nervous system tumors. (See "Clinical manifestations and diagnosis of central nervous system tumors in children", section on 'Cranial nerve palsies'.)

Esophageal perforation — Esophageal perforation and mediastinitis occur rarely in children. Caustic ingestions, erosive esophageal foreign bodies (ie, button batteries), and esophageal procedures (eg, endoscopy, dilation of esophageal strictures) are the most frequent causes [3,4]. Clinical findings of esophageal perforation include:

- Dysphagia
- Neck pain (cervical esophageal perforation)
- Chest pain (thoracic esophageal perforation)
- Dyspnea

In addition, hematemesis may occur if the foreign body erodes into adjacent vascular structures. (See "Button and cylindrical battery ingestion: Clinical features, diagnosis, and initial management", section on 'Esophageal impaction'.)

Esophageal perforation progresses to mediastinitis when oral and gastric fluids contaminate the mediastinal space. Mediastinitis typically presents with fever and subcutaneous emphysema and rapidly progresses to septic shock within hours if not rapidly detected and treated. This infection is usually polymicrobial and is caused by mouth flora, including Staphylococcus species, Streptococcus species, anaerobic bacteria, and Gram-negative bacteria [4].

Laboratory evaluation of these patients should include a complete blood count, blood culture, electrolytes, and type and screen.

Plain radiographs of the chest (AP and lateral) and neck (soft tissue lateral and AP) will detect esophageal perforation in 90 to 95 percent of patients [3]. Findings depend on the location of the perforation. Neck films demonstrate air in the prevertebral fascial planes of the retropharynx and subcutaneous emphysema in patients with cervical esophageal perforations. Findings associated with more distal esophageal perforations on chest radiograph include pneumomediastinum, subcutaneous emphysema, pleural effusion, hydrothorax, hydropneumothorax, and subdiaphragmatic air (upright film).

When suspected, esophageal perforation warrants emergent consultation with a surgeon with pediatric thoracic surgery expertise.

Contrast esophagography or computed tomography may identify the specific site of esophageal perforation and are confirmatory studies [3]. The choice of confirmatory test is best guided by a surgical consultant.

Management priorities are as follows:

- Aggressive treatment of hypovolemia and shock as determined by the patient's circulatory status (algorithm 1) (see "Initial management of shock in children")
- Administration of a broad spectrum antibiotic regimen that provides coverage for Gram-positive cocci (including methicillin-resistant Staphylococcus aureus), anaerobic bacteria, and Gram-negative bacteria (eg, ceftazidime and clindamycin)
- Surgical drainage, ideally within 24 hours of esophageal perforation
- In patients with active bleeding, endotracheal intubation, hemodynamic stabilization, and emergent thoracotomy in the operating room

Mortality from esophageal perforation varies from approximately 0 to 10 percent in patients who undergo drainage procedures within 24 hours to as high as 31 percent in patients where definitive drainage is delayed beyond 24 hours [5,6].

Common conditions

Stomatitis — Stomatitis, the inflammation of the mucous lining of the mouth and throat, is one of the most common causes of dysphagia in children and is typically associated with viral infection (eg, enterovirus or herpesvirus infection).

- Enteroviruses cause the hand, foot, and mouth syndrome which is characterized by fever, oral vesicles on the buccal mucosa and tongue, and peripherally distributed small, tender cutaneous lesions on the hands, feet, buttocks, and (less commonly) genitalia.
- The enterovirus, Coxsackie A virus, is also the etiologic agent of herpangina, a vesicular enanthem of the tonsillar fauces and soft palate that principally affects children 3 to 10 years of age. Oropharyngeal symptoms of sore throat are accompanied by fever and odynophagia. Most disease occurs during summer outbreaks. (See "Hand, foot, and mouth disease and herpangina", section on 'Herpangina' and "Hand, foot, and mouth disease and herpangina", section on 'Hand, foot, and mouth disease' and "Hand, foot, and mouth disease and herpangina".)
- Herpetic gingivostomatitis is caused by herpes simplex virus type 1 and typically occurs in children between six months and five years of age. Clinical features of HSV-1 stomatitis include a prodrome of fever and constitutional symptoms, followed by oral and extraoral lesions. The lesions begin as vesicles, which coalesce to form painful ulcers (picture 13). Associated findings include fever, bad breath, odynophagia, anorexia, and submandibular or cervical lymphadenitis.

Treatment of viral stomatitis caused by enterovirus is primarily supportive and consists of administration of appropriate oral pain medications (eg, ibuprofen 10 mg/kg every six hours as needed) and encouragement of adequate fluid intake. Topical therapy (eg, equal parts of aluminum hydroxide and magnesium hydroxide [eg, Maalox]) and diphenhydramine may be effective in some patients. Topical viscous lidocaine or benzocaine should be avoided in young children because of the risk for toxicity from mucosal absorption or ingestion. In severe cases, oral opiates may be required for pain control. On occasion, children will refuse to drink and require intravenous treatment for dehydration. (See "Treatment of hypovolemia (dehydration) in children".)

The management of herpetic gingivostomatitis is discussed in greater detail separately. (See "Herpetic gingivostomatitis in young children", section on 'Management'.)

Infectious pharyngitis — Patients with dysphagia and clinical evidence of infectious pharyngitis are managed according to the infectious etiology (algorithm 2). Common pathogens include enterovirus, adenovirus, Epstein-Barr virus, Group A Streptococcus, and Neisseria gonorrhoeae. On occasion, children with pharyngitis have such severe pain with swallowing that they refuse fluid intake and become dehydrated. The approach to the diagnosis of infectious pharyngitis and the treatment of dehydration in

children is discussed in greater detail separately. (See "Group A streptococcal tonsillopharyngitis in children and adolescents: Clinical features and diagnosis" and "Treatment of hypovolemia (dehydration) in children".)

Peritonsillar abscess — Children with peritonsillar abscess (PTA) have a severe sore throat (usually unilateral), fever, and a "hot potato" or muffled voice. Pooling of saliva or drooling may be present. Trismus, related to irritation and reflex spasm of the internal pterygoid muscle, occurs in nearly two-thirds of patients and helps to distinguish PTA from severe pharyngitis or tonsillitis. Although most children with PTA are adolescents, at times, it may present in younger children and be difficult to differentiate from retropharyngeal abscess or epiglottitis, especially if drooling and trismus are present. (See "Peritonsillar cellulitis and abscess", section on 'Evaluation'.)

Examination findings consistent with PTA include an extremely swollen and fluctuant tonsil often with deviation of the uvula to the opposite side (picture 14). Alternatively, there may be visible swelling or bulging of the posterior soft palate near the tonsil, with palpable fullness and/or fluctuance.

Drainage, antimicrobial therapy, and supportive care are the cornerstones of management for peritonsillar abscess. (See "Peritonsillar cellulitis and abscess", section on 'Management'.)

Esophagitis — Esophageal injury with inflammation and dysphagia most commonly occurs as a complication of gastroesophageal reflux (picture 15). Medication-induced esophagitis (or "pill esophagitis"), esophageal infection, and eosinophilic esophagitis (picture 16) are additional etiologies to consider and are more likely in children with dysphagia and odynophagia. (See "Clinical manifestations and diagnosis of gastroesophageal reflux disease in children and adolescents", section on 'Clinical manifestations'.)

The typical patient with medication-induced esophagitis does not have a history of prior esophageal disease. Patients will often present with the sudden onset of odynophagia and retrosternal pain; the pain may be so severe that swallowing saliva is difficult. An adolescent with acute onset of heartburn or odynophagia in association with ingestion of tetracyclines (doxycycline or minocycline) that are frequently used for treatment of acne is a common scenario. In such cases, a clinical diagnosis may be made without the requirement for confirmatory endoscopy. (See "Medication-induced esophagitis".)

Infectious esophagitis is most commonly found in immunocompromised patients with human immunodeficiency virus or hematologic malignancies, although it may occasionally occur in immunocompetent hosts. Candidal esophagitis is most frequently identified. Other etiologies include Herpes simplex virus (type 1), Mycobacterium tuberculosis, Cryptosporidium, and Pneumocystis carinii [7]. (See "Candida infections in children", section on 'Esophagitis' and "Herpes simplex virus infection of the esophagus".)

Upper endoscopy provides the best means to definitely diagnose children with suspected esophagitis other than those with uncomplicated medication-induced esophagitis. Unlike esophageal pH monitoring studies, endoscopy permits visualization of the esophageal epithelium, histologic evaluation to establish the presence of other disorders (eg, eosinophilic or infectious esophagitis), and identification of the presence and severity of esophagitis as well as complications, such as strictures (picture 17) or Barrett's esophagus. (See "Clinical manifestations and diagnosis of eosinophilic esophagitis" and "Clinical manifestations and diagnosis of gastroesophageal reflux disease in children and adolescents", section on 'Endoscopy and histology'.)

Dystonic reaction — Dysphagia may occur as part of a dystonic reaction to certain medications, including typical antipsychotics (eg, Thorazine, haloperidol), anticonvulsants (eg, carbamazepine, phenytoin), and antiemetics (eg, metoclopramide, promethazine). The reaction causes acute spasm of multiple muscle groups, including oropharyngeal muscle spasm. Patients may also manifest a fixed upper gaze (oculogyric crisis), neck twisting, grimace, clenched jaw, and dysarthria. Dystonic reactions that are drug-induced can be treated with diphenhydramine or benztropine. (See "First generation (Typical) antipsychotic medication poisoning", section on 'Acute extrapyramidal syndromes'.)

Oropharyngeal trauma — Penetrating oropharyngeal wounds in children typically result from low force mechanisms and usually heal spontaneously with no sequelae. Rarely, internal carotid artery (ICA) injury with neurologic deficit or deep space neck infection with drooling and dysphagia may complicate oropharyngeal trauma involving the lateral aspect of the palate. (See "Oropharyngeal trauma in children".)

Intentional trauma to the posterior oropharynx of a nonverbal child by the caregiver to induce hematemesis has been described as a form of Munchausen syndrome by proxy. (See "Medical child abuse (Munchausen syndrome by proxy)".)

Achalasia — Dysphagia for solids (91 percent) and liquids (85 percent) is the primary clinical feature of achalasia (image 4). An association with adrenal glucocorticoid deficiency and alacrima (triple A syndrome or Allgrove syndrome) has been described in children with achalasia. (See "Causes and clinical manifestations of primary adrenal insufficiency in children", section on 'Triple A syndrome'.)

A contrast swallow is the primary screening test when achalasia is suspected on clinical grounds. The diagnostic accuracy of contrast swallow for achalasia is approximately 95 percent. Patients who have clinical and radiographic findings suggestive of achalasia require manometric and endoscopic evaluation to confirm the diagnosis. (See "Achalasia: Pathogenesis, clinical manifestations, and diagnosis".)

Other conditions

- **Rheumatic disease** – Gastrointestinal involvement is found in 30 to 74 percent of children with juvenile systemic sclerosis (scleroderma [JSSc]). Radiological and functional studies of the GI tract often demonstrate abnormalities, such as gastroesophageal reflux and esophageal dysmotility, even in the absence of symptoms. Manometry and intraesophageal 24-hour pH monitoring are sensitive indicators of diminished lower esophageal sphincter tone and gastroesophageal reflux. (See "Juvenile systemic sclerosis (scleroderma)", section on 'Organ involvement' and "Gastrointestinal manifestations of systemic sclerosis (scleroderma)".)

  In children with juvenile dermatomyositis, weakness of the palate and cricopharyngeal muscle may result in dysphagia, a nasal voice, tracheal aspiration, and reflux of food into the nasopharynx. Involvement of the upper esophagus can lead to dysphagia for solids and liquids. Dysphagia may also result from weakness of striated muscle in the lower third of the esophagus with esophageal reflux and esophageal dysmotility [8]. (See "Juvenile dermatomyositis and polymyositis: Epidemiology, pathogenesis, and clinical manifestations", section on 'Muscle weakness'.)

  Children with juvenile idiopathic arthritis may rarely develop dysphagia caused by cricoarytenoid arthritis [9].

- **Myasthenia gravis** – Myasthenia gravis occurs very rarely in older children and adolescents. Although most patients with myasthenia gravis present with ocular symptoms of ptosis and/or diplopia, about 15 percent of patients demonstrate bulbar symptoms, including dysphagia. Imminent risk of aspiration may produce a "myasthenic crisis." Nasal regurgitation, particularly of liquids, may occur due to palatal weakness. (See "Clinical manifestations of myasthenia gravis" and "Myasthenic crisis".)

- **Crohn disease** – In children with Crohn disease, esophageal involvement is present histologically in 18 to 43 percent of patients and may cause dysphagia and odynophagia. This condition is primarily seen in children with advanced ileocolonic disease. Acid suppression therapy (eg, omeprazole) may provide symptomatic relief. Corticosteroid therapy may temporarily resolve inflammation. However, recurrence of disease after tapering of corticosteroid therapy commonly occurs [10].

- **Thyroid enlargement** – Enlarging thyroid lobes usually grow outward because of their location in the anterior neck in front of the trachea, covered only by thin muscles, subcutaneous tissue, and skin. As a result of this outward growth, even very large goiters may not compress the trachea or impinge on the great vessels lateral to the lobes. However, in patients with substantial enlargement of one lobe or

asymmetric enlargement of both lobes, the trachea, esophagus, or blood vessels may be displaced or, less often, compressed. Bilateral lobar enlargement, especially if the goiter extends posterior to the trachea, may cause either compression or concentric narrowing of the trachea or compression of the esophagus or jugular veins. Dysphagia is less common than respiratory distress because of the posterior position of the esophagus relative to the trachea. (See "Clinical presentation and evaluation of goiter in adults", section on 'Obstructive symptoms'.)

Among the various causes of thyroid enlargement in children, acute suppurative thyroiditis is most commonly associated with dysphagia. (See "Congenital and acquired goiter in children", section on 'Acute suppurative thyroiditis'.)

- **Esophageal tumor** – Adenocarcinoma or leiomyoma of the esophagus are extremely rare causes of dysphagia for solids greater than liquids in children [11,12].

- **Vascular ring or extrinsic compression** – Vascular anomalies of the aortic arch with an encircling ring around the esophagus may rarely cause dysphagia in children. These anatomic anomalies usually present as respiratory distress in an infant less than one year of age. Dysphagia, vomiting, and feeding difficulty are also common. (See "Vascular rings and slings", section on 'Clinical manifestations'.)

  Extrinsic compression from mediastinal or chest tumors (eg, lymphoma) may rarely compromise esophageal motility. However, these tumors are most notable for causing respiratory distress, stridor, wheezing, and/or anxiety, especially when the patient is in a supine position, and for complicating airway management in patients with respiratory failure. Patients with stridor, obstructive upper airway swelling, or cerebral edema caused by superior vena cava syndrome warrant emergency radiotherapy and/or vascular stenting. (See "Malignancy-related superior vena cava syndrome", section on 'Treatment'.)

- **Globus sensation** – Globus sensation is defined as an intermittent feeling of a lump or foreign body in the throat that occurs between meals, has lasted for at least six months, and is not associated with gastroesophageal reflux or esophageal motility disorders. In addition, patients with globus sensation do not have true dysphagia. Although common in adults, globus sensation is rare in children and warrants appropriate diagnostic evaluation to exclude the presence of a true foreign body or other esophageal pathology. (See "Globus sensation", section on 'Diagnosis'.)

EVALUATION — The initial evaluation of children with signs and symptoms of dysphagia must begin with a rapid assessment of respiratory status to identify those who need resuscitation.

Conditions that require immediate intervention include the following:

- Complete upper airway obstruction
- Rapidly progressing partial airway obstruction
- Respiratory failure
- Mediastinal mass with tracheal impingement

Priorities for these patients include providing supplemental oxygen, support of breathing, and definitive airway management. (See "Basic airway management in children" and "The difficult pediatric airway" and "Emergency endotracheal intubation in children".)

History — An accurate and complete history should suggest the diagnosis in the majority of patients. Key historical information includes:

- Witnessed foreign body ingestion (or missing small foreign bodies or button batteries)
- Known or suspected caustic ingestion

- Aphonia
- Presence of fever, especially with oral lesions, drooling, sore throat, trismus, or stiff neck
- Erythema multiforme rash or desquamation with mucous membrane changes in patients with risk factors for Stevens-Johnson syndrome or toxic epidermal necrolysis (picture 3 and picture 4 and picture 5 and picture 6) (see 'Stevens-Johnson syndrome' above)
- Type of dysphagia:
  - Dysphagia for solids more than liquids suggests some degree of esophageal obstruction (eg, foreign body, food bolus, esophageal tumor [rare], vascular ring [rare])
  - Dysphagia that is equal for solids and liquids suggests esophageal dysmotility
- Pain exacerbated by eating suggesting gastroesophageal reflux and/or esophagitis
- Substernal pain after taking an oral medication, especially tetracycline antibiotics (eg, doxycycline)
- Symptoms of cranial nerve weakness, including vision changes, ptosis, nasal regurgitation of food or liquid with swallowing
- Prior history of rheumatic disease, Crohn disease, or chronic neurologic impairment (eg, cerebral palsy, traumatic brain injury)

Physical examination — The child with dysphagia should undergo a thorough general physical examination, initially focusing on the patient's cardiopulmonary status. Signs suggesting upper airway obstruction and/or serious respiratory distress include:

- New onset of drooling
- Stridor
- Suprasternal retractions
- Inability to speak (aphonia)
- Hot potato voice
- Tachypnea
- Cyanosis or low oxygen saturation by pulse oximetry
- Worsening respiratory status in the supine position indicating a mediastinal mass

Evidence of respiratory distress should be treated promptly. Assurance of a secure and stable airway should precede attempts to examine the oropharynx or to remove a foreign body (algorithm 3 and algorithm 4).

In the stable dysphagic patient, inspection of the oral cavity, pharynx, and neck may reveal a cyst, mass, localized infection, or inflammatory cause for dysphagia. Specific findings are discussed in the conditions described above.

The pulmonary examination may also detect signs of aspiration, including rales, rhonchi, decreased breath sounds, expiratory wheezing, or hoarse voice.

Neurologic examination may reveal an altered level of arousal from an underlying brain injury or depressed sensorium from drugs or infection that may limit effective swallowing. Examination of the cranial nerves, particularly V, VII, IX, X, and XII, may reveal deficits that negatively impact swallowing.

Evaluation of muscle tone, strength, and reflexes is important to identify other neuromuscular causes of dysphagia.

Ancillary studies — The older child with an acute onset of dysphagia requires an urgent approach to diagnosis. In most patients, a history and physical examination will identify the most likely etiology. Additional studies provide confirmation of the clinical diagnosis.

Laboratory studies — The clinician should obtain a complete blood count and appropriate cultures based on the suspected infectious etiology in the febrile child with dysphagia.

Whether or not to obtain other studies (eg, electrolytes, blood gas measurements) depends on the respiratory and hydration status of the individual patient.

Imaging — Radiographic evaluation of the dysphagic child typically includes:

- AP and lateral plain films of the airway and soft tissues of the neck, looking for evidence of a foreign body, mass, airway impingement, air in the retropharyngeal region or subcutaneous tissues, epiglottitis, tracheitis, or other abnormality.
- AP and lateral chest radiograph to identify signs of aspiration pneumonia, congenital heart disease, subcutaneous air from mediastinitis, mediastinal mass, or, as in the patient with achalasia, dilated esophagus with air-fluid levels.
- In addition to plain radiographs, children with witnessed or highly suspected radiolucent foreign bodies and dysphagia should undergo fluoroscopic contrast studies (eg, barium swallow) or endoscopy. Once identified, timing of esophageal foreign body removal depends on the location of obstruction and degree of symptoms. (See "Foreign bodies of the esophagus and gastrointestinal tract in children", section on 'Approaches for specific types of foreign bodies' and "Emergency evaluation of acute upper airway obstruction in children", section on 'Determining the cause of upper airway obstruction'.)

Computed tomography (CT) scan of the neck or chest provides confirmation of diseases, such as retropharyngeal abscess and mediastinitis, suggested by clinical evaluation and plain radiographs.

Patients with evidence of increased intracranial pressure or focal neurologic signs suggesting a brain abscess or tumor should receive a head CT.

Although cervical ultrasonography has been used to identify abnormalities with the tissues and function of the palate, tongue, and floor of the mouth, it is less useful than contrast studies for assessing airway problems and aspiration.

Ultrasound of the chest in an upright position can identify whether a mediastinal mass is solid or liquid and avoids patient decompensation associated with the supine position necessary for chest CT in patients with superior cava syndrome. However, US often does not provide a definitive diagnosis.

Other diagnostic studies — Upper endoscopy is an essential procedure in patients who have ingested a caustic agent or have evidence of an obstructing foreign body. Optimal timing of endoscopy depends on the clinical setting. (See "Caustic esophageal injury in children", section on 'Initial evaluation' and "Airway foreign bodies in children", section on 'Evaluation'.)

Upper endoscopy and bronchoscopy are emergently indicated in patients with mediastinitis. (See 'Esophageal perforation' above.)

Elective upper gastrointestinal endoscopy and manometry are typically performed to confirm achalasia and esophagitis.

APPROACH — The approach to children with dysphagia is provided in the algorithms (algorithm 5A and algorithm 5B). Evaluation and management is strongly determined by the presence of respiratory

compromise, fever, and clinical findings.

Respiratory compromise — Children with cyanosis or respiratory distress should receive 100 percent oxygen, and receive no oral intake until fully evaluated and clinically stable.

Children with life-threatening upper airway obstruction require assessment and treatment as presented in the algorithms (algorithm 3 and algorithm 4).

Children with evidence of respiratory failure should receive support of breathing with bag-valve-mask ventilation and undergo endotracheal intubation (table 3). (See "Emergency endotracheal intubation in children" and "Rapid sequence intubation (RSI) outside the operating room in children: Approach".)

Dysphagia with fever — The clinician should evaluate these patients for oropharyngeal, parapharyngeal, and upper airway infection, in particular (algorithm 5A). Other diagnoses, such as mediastinitis, are also possible.

- Epiglottitis manifests as aphonia, drooling, and severe respiratory distress with signs of upper airway obstruction.
- Trismus and unilateral peritonsillar swelling with a hot potato (muffled, hypernasal) voice identifies peritonsillar abscess.
- Drooling, lateral neck pain and/or pain with neck extension suggests retropharyngeal or parapharyngeal infection.
- Fever, severe substernal pain, crepitus, and/or shock after a caustic ingestion, chronic esophageal foreign body, or esophageal procedure are manifestations of esophageal perforation with mediastinitis.
- Severe trismus, opisthotonos, and myotonia worsened by loud noise in an unimmunized or under-immunized child is diagnostic for tetanus. The presence of fever may be variable.
- The presence of a pseudomembrane on oropharyngeal examination suggests diphtheria.
- Exudative tonsillitis with pain on swallowing indicates acute pharyngitis.
- Painful mucosal ulcers are characteristic for stomatitis or Stevens-Johnson syndrome. The presence of fever may be variable.
- Acute thyroid enlargement with respiratory compromise is seen in patients with acute suppurative thyroiditis. The presence of fever may be variable.

Infections, such as poliomyelitis, meningitis, encephalitis, or cerebral abscess, may cause neurologic dysfunction (cranial nerve palsy or altered mental status) with impairment of swallowing.

Patients with impaired swallowing from a chronic neurologic disorder (eg, cerebral palsy, traumatic brain injury) require assessment for aspiration pneumonia.

Dysphagia without fever — Although typically evident from the history, an acute onset of dysphagia in an otherwise healthy child should raise suspicion for an esophageal foreign body, caustic ingestion, or thermal esophageal burn (algorithm 5B). Clinical features that identify other etiologies in the afebrile child with dysphagia include:

- Oral bleeding, puncture wound, or laceration (oropharyngeal trauma).
- Intermittent dysphagia in association with oculogyric crisis, dysarthria, trismus, or torticollis (dystonic reaction).
- Odynophagia exacerbated by eating or certain oral medications (eg, doxycycline) (esophagitis).

- Skin changes, arthritis, and rash characteristic of rheumatic disease (juvenile systemic sclerosis, dermatomyositis).
- Ptosis, bulbar weakness exacerbated by eating (eg, botulism, myasthenia gravis).
- Cranial nerve dysfunction in association with visual disturbance, ataxia, and/or headache (central nervous system tumor).
- Dysphagia for solids more than liquids in association with an esophageal obstruction (eg, foreign body, food bolus, esophageal tumor [rare], vascular ring [rare]).
- Dysphagia for solids and liquids in association with abnormal esophageal motility on barium swallow and/or manometry (achalasia).
- Dysphagia with no apparent anatomic or physiologic cause (globus sensation).

SUMMARY

- The initial evaluation of children with signs and symptoms of dysphagia must begin with a rapid assessment of respiratory status to identify those who need resuscitation. Conditions that require immediate intervention include the following (see 'Evaluation' above):
  - Complete upper airway obstruction
  - Rapidly progressing partial airway obstruction
  - Respiratory failure
  - Mediastinal mass with tracheal impingement

  Priorities for these patients include providing supplemental oxygen, support of breathing, and definitive airway management (algorithm 3 and algorithm 4).
- An accurate and complete history should suggest the diagnosis in the majority of patients (table 1). (See 'History' above and 'Differential diagnosis' above.)
- Evaluation and management is strongly determined by the presence of respiratory compromise, fever, and clinical findings as shown in the algorithms (algorithm 5A-B). (See 'Approach' above.)

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