

PedsCases Podcast Scripts

This is a text version of a podcast from PedsCases.com on “**Approach to Pediatric Periorbital Edema.**” These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Approach to Pediatric Periorbital Edema

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Introduction:

Hello, my name is Monique Jarrett. I am a second year medical student at the University of Alberta. This podcast was developed with the help of Dr. Melanie Lewis a Pediatrician and Professor at the University of Alberta and Dr. Catherine Morgan a Pediatric Nephrologist and Associate Professor at the University of Alberta. This podcast will help you develop an approach to a child presenting with periorbital edema.

Objectives

- Determine the key differential diagnoses for the presentation of periorbital edema
- Identify historical aspects, physical exam findings and diagnostic studies that can help determine the etiology of the periorbital edema
- Discuss the key points on history and physical exam that differentiate periorbital cellulitis from orbital cellulitis
- Outline the management of periorbital cellulitis and orbital cellulitis

Cases

Case 1: A 5-year old boy presents with rapid onset bilateral eye swelling. He has had no changes in the quality of his vision. His history includes a recent upper respiratory tract infection 2 weeks ago.

Case 2: A 13-year-old boy presents to the emergency department with his left eye swollen shut. He came in straight from his baseball tournament. Upon examination, there were no changes in the quality of his vision.

Case 3: A 10-month old boy comes in to the emergency department with swelling and redness in his right eye. His eyelid is tender to the touch, droopy and he has a fever of 39°C.

Introduction

Pediatric edema or swelling can come in many forms and in various locations around the body. It also can have a variety of causes. In this podcast, we will focus on periorbital edema. Anatomically, the orbital septum is a thin membrane separating the superficial eyelid from the deeper orbital structures. Any structure anterior to the septum is in the periorbital region and any structure posterior to the septum is in the orbital region. There are 3 common scenarios that will be discussed in this podcast: nephrotic syndrome, insect bite and periorbital cellulitis.

Classifying Pediatric Periorbital Edema

Classifying the edema in a child who presents with periorbital edema is an important initial step. First, you need to determine if the child has bilateral or unilateral edema. If the edema is bilateral and there are systemic symptoms of volume overload you need to start the workup up for nephrotic syndrome. The most common type of nephrotic syndrome in children is Minimal Change Disease. If the edema is bilateral and there are no other major systemic features (for example, edema in the feet, ankles and abdomen), then you need to start thinking about an allergic reaction, possibly allergic conjunctivitis. This can be confirmed during history. If the swelling is unilateral and there is no fever, you need start thinking about an insect bite or eye trauma. If the edema is unilateral and the child is presenting with a fever, you need to start the workup for periorbital or orbital cellulitis. Periorbital cellulitis is a bacterial infection of the eyelid and surrounding soft tissues. It occurs most often in children under 5 years old.

History, Physical and Diagnostic Studies

Nephrotic Syndrome

The most common nephrotic syndrome in children is Minimal Change Disease (MCD). If the diagnosis is nephrotic syndrome, we would expect the child to present with sudden-onset periorbital edema and the onset may follow an upper respiratory tract infection. This is very important. Many children are misdiagnosed with an allergic reaction with their first presentation of nephrotic syndrome resulting in a significant delay in treatment. On examination, there will be gravity-dependent edema in the lower limbs as well. Urinalysis, urine protein-creatinine ratio (PCR), serum chemical analysis and a cholesterol lipid panel are all investigations needed to confirm the diagnosis. The child will have nephrotic range proteinuria (>50mg/kg/d or PCR >200mg/mmol) hypoalbuminemia and hyperlipidemia. Hematuria is not common in cases of MCD.

Children do not need a 24-hour urine collection in order to make a diagnosis. This collection is often inaccurate, therefore PCR is considered the better test. A few other investigations need to be done to ensure the NS is not due to systemic disease. Complement (C3 and C4) as well as screening labs for lupus should be done. The child should have no other signs of systemic disease.

Insect Bite or Eye Trauma

If the diagnosis is an insect bite or eye trauma, we would expect that the history provided by the patient should be able to confirm the diagnosis. We would expect the physical examination to be normal other than the unilateral periorbital swelling. Specifically, if this is an insect bite, the area of erythema should not be painful rather the child will likely complain of itchiness to the affected area. If the area is painful you should consider cellulitis and trauma in your differential diagnosis. Clinical diagnosis can usually be made without investigations.

Periorbital Cellulitis

Children with periorbital cellulitis usually present unilaterally with erythema, rapid-onset swelling, ptosis (drooping eyelid), warmth and tenderness of the affected eyelid. Fever and systemic signs of toxicity may also be present. Important questions to ask when taking a history are about recurrent sinus infections, recent head or neck trauma, recent insect bite and immunization history. All of these scenarios can introduce bacteria to the periorbital region. There is a close relationship between periorbital cellulitis and sinus and upper respiratory tract infections so there may be increased incidences in the winter months.

It is extremely important to differentiate periorbital cellulitis and orbital cellulitis which is a medical emergency. Both will have periorbital edema and redness and the patient might complain of recent rhinorrhea, difficulty opening eye and excessive tearing. Patients with orbital cellulitis might also present with proptosis, fever and may look systemically unwell. Other red flags when examining a child with suggestive orbital cellulitis includes reduced visual acuity, limited, painful or reduced eye movements, impaired colour vision and relative pupillary defects. The diagnosis of periorbital cellulitis can often be made clinically without any further testing. However, it can be difficult to examine children with swollen eyes and thus difficult to make a definitive diagnosis. Radiologic imaging is often required and is necessary if orbital cellulitis is suspected. CT scans of the orbits and sinuses need to be done. Sinusitis is the most common predisposing factor to orbital cellulitis and abscess formation. CT imaging allows rapid and accurate clinical staging of the condition and guides treatment. MRI can also be used, but it is practically difficult for younger children and is not always available in

smaller centres. Imaging can show where the infection is and its severity. Blood tests are often performed but they have limited diagnostic value. However, tests can be used to monitor patient progress. High white blood cell count, C-reactive protein or positive ESR may suggest orbital cellulitis. Blood cultures and eye swabs can also be done, but do not always yield microbiologically diagnostic results.

Management

Nephrotic Syndrome- MCD

Treatment of MCD involves corticosteroids (most commonly prednisone). Initially, 2mg/kg/day (to a max of 60mg/d) for 6 weeks, followed by a taper dose for another 2 to 5 months. Some children will relapse with tapering the dose, at which point they will be returned to higher dose of prednisone. If there is no improvement, or children continue to relapse, they may be given immunosuppressive drugs. Two other important components of management are fluid restriction (until they are in remission) and salt restriction (until they are off steroids). Remission is defined as protein-free urine for 5 days.

Insect Bite or Eye Trauma

There is no specific treatment for a mosquito bite other than symptomatic relief and waiting for it to heal. One can apply hydrocortisone or calamine lotion to the bite for some relief. If there seems to be an allergic process going on, antihistamines can be given. Second generation antihistamines like Reactine, Alerius or Claritin come in pediatric formulations and are appropriate in this situation.

Periorbital Cellulitis

If there is suspected periorbital cellulitis or orbital cellulitis, children should be referred for a comprehensive assessment and management with input from ophthalmology and ENT specialists. An urgent CT scan is indicated if orbital cellulitis or any of its complications are suspected. Antibiotics are needed to treat both orbital and periorbital cellulitis. Eye swabs might help decide antibiotic coverage, however treatment should not be delayed waiting on swabs or cultures. *Haemophilus influenzae* type b (Hib) was historically one of the most common pathogens associated with orbital cellulitis and hematogenously spread periorbital cellulitis, however with the introduction of the Hib conjugate vaccine, incidences of Hib infections have gone down dramatically. *Streptococcus pneumoniae* infections have also gone down due to the pneumococcal conjugate vaccine. Currently, the usual pathogens responsible for periorbital infections secondary to paranasal sinusitis are *S. aureus*/MRSA, Group A streptococci, *S. pneumoniae*, and *H. influenzae*. If the cellulitis is secondary to skin trauma, the usual

pathogens are *S. aureus*/MRSA, Group A streptococci, and anaerobes. When orbital cellulitis secondary to paranasal sinusitis, the usual pathogens are *S. pneumoniae*, *M. catarrhalis*, *H. influenzae*, *S. aureus*/MRSA, Group A streptococci, and anaerobes. When orbital cellulitis is secondary to trauma, the usual pathogens are *S. aureus*, Group A streptococci, *Bacillus* sp, and anaerobes.

The recommended empiric treatment for the various types of periorbital and orbital cellulitis is outlined clearly in the “ophthalmic infections” section of Bugs and Drugs. The following information was taken from the 2012 edition of “Bugs and Drugs: An Antimicrobial/Infectious Disease Reference”.

Periorbital/Pre-septal cellulitis secondary to paranasal sinusitis	
Mild/afebrile	Amoxicillin-clavulanate 40mg/kg/d PO div tid AND TMP/SMX 8-12mg TMP/kg/d PO div bid 7-10 days
Moderate-Severe	Cefuroxime 100-150mg/kg/d IV div q8h 7-10 days OR Ceftriaxone 50-75mg/kg IV q24h 7-10 days **switch to PO when clinically improved If MRSA is suspected ADD Vancomycin 60mg/kg/d IV divided q6h
Periorbital/pre-septal cellulitis secondary to skin trauma	
Mild-moderate	Amoxicillin-clavulanate 40mg/kg/d PO div tid AND TMP/SMX 8-12mg TMP/kg/d PO div bid 7-10 days
Severe	Vancomycin 60mg/kg/d IV div q6h AND Ceftriaxone 50-75 mg/kg IV q24h AND Metronidazole 30mg/kg/d IV/PO div q12h 7-10 days
Orbital cellulitis secondary to paranasal sinusitis or trauma	
All	Cloxacillin 200mg/kg/d IV div q6h AND Ceftriaxone 100mg/kg/d IV div q12h AND/OR Metronidazole 30mg/kg/d IV div q8h

	10-14 days **stepdown to oral therapy when clinically improved
Orbital cellulitis secondary to trauma	
All	Vancomycin 60mg/kg/d IV div q6h AND Ceftriaxone 100mg/kg/d IV div q12h AND Metronidazole 30mg/kg/d PO/IV div q8h 10-14 days

Please refer to the script of this podcast for specific dosing information.

Discharge Planning/Instructions

Nephrotic Syndrome- MCD

The child with Minimal Change Disease can normally be managed from home, unless they have complications from fluid overload, associated acute kidney injury, hyperkalemia, or anticipated noncompliance with fluid restriction. The children require close monitoring of their weight, home urine dipstick tests to monitor the effectiveness of the corticosteroids and need to watch for the signs and symptoms of relapse. They also need support from a dietician or another individual knowledgeable about sodium restriction.

Insect Bite or Trauma

Treatment for an insect bite is symptomatic and can include antihistamines as needed. Continue with hydrocortisone or calamine lotion if desired. A cold pack may relieve some discomfort but the bite will heal over time.

Periorbital Cellulitis

The child diagnosed with periorbital cellulitis needs to complete the course of oral antibiotics prescribed. There should be improvement before the child is discharged to ensure correct diagnosis and antibiotic coverage.

Conclusion

Case 1

Upon examination of the 5-year-old boy in Case 1, you notice that in addition to the bilateral periorbital edema, he also has bilateral edema in his legs. From the history, you

confirm that he had an upper respiratory tract infection 2 weeks ago. You order a urinalysis, urine PCR, a cholesterol lipid panel and a serum chemical analysis. The following results were found:

Test	Results	Normal range
Serum Albumin	20 g/L	30-50 g/L
Total Cholesterol	13.9mmol/L	<5.2mmol/L
Protein (urine)	>40mg/m ² /h	<4mg/m ² /h
Protein-Creatinine Ratio	>250mg/mmol	<20mg/mmol

You conclude that the child has hypoalbuminemia, hyperlipidemia and nephrotic range proteinuria. You look for anything else in the presentation that would be inconsistent with your suspected diagnosis and do not find anything. You conclude that the child has Minimal Change Disease, that was most likely sparked by the recent URTI. Next, you consult nephrology for guidance in ongoing management and possible renal biopsy. With MCD being the most common nephrotic syndrome in children, you and the nephrologist decide to proceed with treatment without doing a renal biopsy. The boy is average weight for a 5-year old (22.4kg) so you decided to treat him with 44mg/d of prednisone (2mg/kg/d) for 6 weeks, followed by 33mg/d (1.5mg/kg) of prednisone every other day for 3 months with tapering. Following initiation of treatment, the child's lab values (including the absence of proteinuria) return to normal and his edema continues to improve.

Case 2

You take a complete history on the 13-year-old boy from Case 2 and learn that he plays in the outfield for his baseball team. He did not get hit in the eye by a ball or bat, but the boy does recall there being many mosquitoes around the baseball diamond. There is a bit of redness localized on the lower eyelid, even though there is large area of swelling. The boy does not have a fever and does not have any other systemic symptoms. On palpation, there is no pain to the erythematous area. You conclude that the boy is having a reaction from an insect bite and you send him home with antihistamine treatment.

Case 3

You are concerned about the 10-month old boy in Case 3 who has come into the emergency department. He is very irritable with a fever of 39°C. When taking the history, you learn that the eye swelling occurred rapidly over the past 24 hours. The eyelid is very red and the child is withdrawing whenever you go to touch the swelling indicating that it is painful. The child is still able to open his eye, but there is definite ptosis (drooping of the eyelid). It is difficult to determine visual acuity and painful eye

movements because the child is so young. You decide to do an eye swab, a CBCD, CRP, and blood culture and arrange a CT scan of the orbit and sinuses. You also decide to page ophthalmology for a consult on the case. The CT scans confirm periorbital cellulitis with no indication that there has been spread to the orbital region in the eye. Ophthalmology concludes there is no damage to the eye itself and the child's vision is fine. The child does not have a penicillin allergy so you decide to start the boy on IV cefuroxime and keep him in hospital for 48 hours monitoring him closely especially for neurological and eye symptoms. The child improves during this time period and he is discharged home on oral cefuroxime for 7 days.

- 1) When attempting to classify periorbital edema, look for bilateral or unilateral edema and other systemic features.
- 2) Common causes of periorbital edema include nephrotic syndrome, allergic reactions, insect bites, eye trauma, and periorbital and orbital cellulitis.
- 3) Minimal change disease is the most common nephrotic syndrome in children and it classified by systemic signs of edema (including bilateral periorbital edema), proteinuria, hypoalbuminemia, and hyperlipidemia. The treatment is a long course of corticosteroids, most commonly prednisone.
- 4) Insect bites and allergies can be treated with antihistamines for symptomatic relief if necessary. Remember to always consider nephrotic syndrome as it is often misdiagnosed as an allergic reaction on first presentation.
- 5) Periorbital cellulitis presents with rapid onset unilateral periorbital edema, redness, pain, and fever. It must be differentiated from the more serious orbital cellulitis. This is usually done through CT imaging. Untreated periorbital cellulitis can progress to orbital cellulitis.
- 6) The most common pathogens responsible for periorbital infections are *S. aureus*/MRSA, Group A Streptococci, *S. pneumoniae*, *H. influenzae*
- 7) Antibiotic therapy is needed initially for periorbital cellulitis. IV antibiotics are not always necessary. For orbital cellulitis, IV antibiotics must be given.
- 8) The patient needs to be closely monitored for 24-48 hours to ensure clinical improvement.

There is a flow chart included in the script that summarizes the different classifications of periorbital edema. Please feel free to use this chart as a reference.

Thank you for listening!

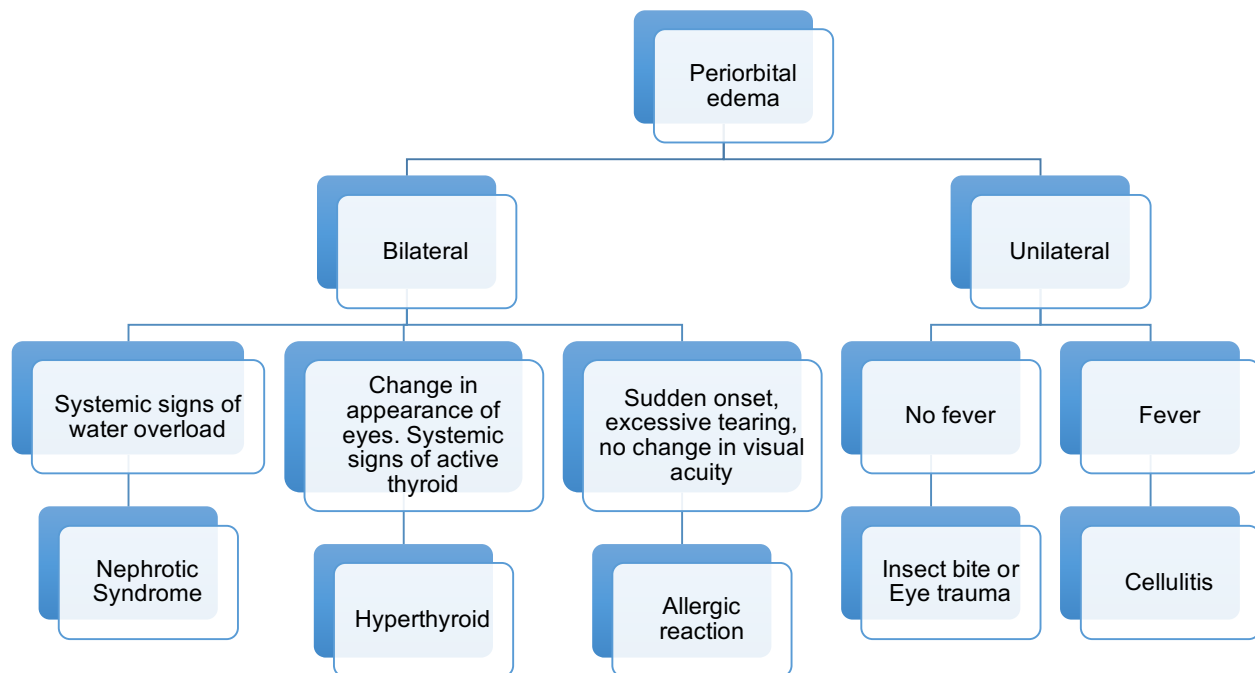


Figure 1: Periorbital edema flow chart.

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