INTERESTING CASES
FROM THE PEDIATRIC ER

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Year up for POLL Everywhere - Trial Poll - What's your favorite color?

- Red
- Yellow
- Blue
- Purple
- Green

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CASE 1:
“OW MY ARM!”
HPI

• 23mo F with unrepaired single ventricle physiology presents with left arm pain
• 2-3 episodes of clutching left shoulder and saying “ow”
• No known trauma or injury

• ROS:
  • Preceding congestion and cough x 2-3days
  • Decreased PO intake
  • Tactile fevers x2day
  • Emesis x1
HPI

• PMH: Single ventricle: common atrium, AV septal defect with dominant RV and DORV with moderate pulmonary stenosis

• PSH: No cardiac surgeries

• Meds: None
INITIAL EC VISIT

• Normal strength and ROM in extremities
• Discussed with Cardiology
• Discharged home
RETURN EC VISIT

• Continued emesis, fever, poor PO
• New left leg pain and refusal to bear weight
• Generally fussy

• Exam:
  • Refuses to bear weight on left leg
  • No obvious joint tenderness or pain
  • Full ROM left leg
  • Normal strength
## LABS AND IMAGING

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
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<tr>
<td>CRP</td>
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**Xray left lower extremity: Normal**
following, what is the most likely cause of this patient's refusal to bear weight on her left leg given her exam and lab findings?

- Transient synovitis
- Septic arthritis
- Fracture
- Osteomyelitis

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DIFFERENTIAL DIAGNOSIS

• Toxic/transient synovitis with URI
• Myalgias with viral illness
• Septic arthritis
• Fracture
• Myocardial infarction
• Ischemic stroke
• Seizure followed by Todd’s paralysis
HOSPITAL COURSE

- Admitted for fever and refusal to bear weight
- Started having seizure like episodes
- Subsequent left arm and leg weakness
What would be the next most appropriate test?

- EEG
- Brain MRI with and without...
- CT head

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HOSPITAL COURSE

- CT head: large parenchymal hematoma R frontal lobe and left posterior thalamic lesion concerning for hemorrhagic stroke
- Received antiepileptics and antibiotics
- No initial anticoagulation due to hemorrhage
- Stroke workup: thrombophilia risk factors (elevated factor 8 and fibrinogen)
Obstructive heart disease is a risk factor for both thrombotic and hemorrhagic stroke.
PEDIATRIC STROKE

• Statistics:
  • 3,000 cases in 2004; 50% ischemic
  • 10-25% morbidity, ≤ 60% with complications (persistent neurological deficits, seizure disorder, developmental problems)

• Stroke and Congenital Heart Disease
  • 11% of pediatric TIAs; 25% of ischemic strokes
  • Increased risk for
    • Thrombosis: abnormal blood flow (shunts, pulmonary vasculature, stenosis), coagulopathy abnormalities, endothelial injury
    • Bleeding: hyperviscosity and polycythemia, platelet dysfunction
If the following is a common presenting symptom in both hemorrhagic and ischemic pediatric stroke?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Headache</td>
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<tr>
<td>Focal neurologic deficit</td>
<td>/</td>
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<tr>
<td>Seizure</td>
<td>/</td>
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<tr>
<td>Vomiting</td>
<td>/</td>
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<tr>
<td>Irritability</td>
<td>0%</td>
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</table>
CLINICAL DIAGNOSIS

• Symptoms:
  • Acute ischemic stroke: focal neurologic deficit (hemiplegia 94% of cases)
  • Hemorrhagic strokes: headaches, altered mental status, or vomiting
  • Seizures common with both (50% of strokes)

• Age based:
  • Neonates: seizures, apnea, lethargy
  • Toddlers: increased crying/sleepiness, irritability, feeding difficulty, vomiting, sepsis-like with cold extremities
  • Older children: focal neurologic symptoms
TREATMENT

• Safety and efficacy of thrombolysis for acute stroke in children have not been established (American Heart Association)

• Perinatal stroke: ventricular drainage for hydrocephalus caused by IVH, vitamin K, platelets

• Sickle Cell: hydration and exchange transfusion

• Vasculitis: Corticosteroids and cytotoxic agents
CASE 2:
“ONE RING TO RULE THEM ALL...”
Special thanks to Joseph Allen, MD
PRESENTATION

16 year old male who presents to the office after dropping a can of vegetables on the 3rd finger. Findings include:

- Small laceration (1/2 cm) to the dorsal surface without active bleeding
- Swelling at the PIP joint
- Ring that cannot be easily removed with gentle traction
One Ring To Rule Them All Question #1

Apply a hot pack

Have the patient hold the extremity below the waist

Transfer the patient by EMS to the nearest ER

Use ice 10 minutes on/10 minutes off
INITIAL INTERVENTIONS

• Ice to decrease swelling (ice cubes in a glove)
• Elevate the extremity to prevent dependent edema
• Try lubrication with KY
SURGICAL GLOVE TECHNIQUE – MAY USE WITH LACERATION
ELASTIC TAPE METHOD – MAY USE WITH LACERATION
OTHER METHODS FOR RING REMOVAL WITHOUT SPECIAL EQUIPMENT

• Double penrose technique – may use with laceration
• String wrap technique – do not use with laceration
• String pull technique – do not use with laceration
• Many demonstration videos available on Youtube
AFTER MULTIPLE ATTEMPTS, YOU ARE UNABLE TO REMOVE THE RING AND THE PATIENT SEEKS CARE AT THE ER.
One Ring to Rule Them All Question #2

Tylenol with Codeine

Digital block

Versed

Conscious sedation with propofol
REMOVAL ATTEMPTS CONTINUE…

The ER staff attempts to remove the ring and break two ring cutters…
Question #3

Cost to patient

Operator must be specially trained physician only

Laceration

Family Heirloom

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**Question #4** -- After more extensive questioning, you and the teenage patient remember that the ring was purchased because it was unique. What substance would be most resistant to the ring cuts?

<table>
<thead>
<tr>
<th>Choice</th>
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<tbody>
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<tr>
<td>Tungsten</td>
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<tr>
<td>Titanium</td>
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<tr>
<td>Stainless steel</td>
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### Table 1. Ring Cutting Tools and Times

<table>
<thead>
<tr>
<th></th>
<th>Gold</th>
<th>Silver</th>
<th>Platinum</th>
<th>Titanium</th>
<th>Stainless Steel</th>
<th>Tungsten Carbide</th>
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<td>3:10</td>
<td>0:47</td>
<td>4:40</td>
<td>10:24</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Electric Ring Cutter</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>3:10</td>
<td>0:28</td>
<td>***</td>
</tr>
<tr>
<td>Dremel (Carrot)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>2:07</td>
<td>1:22</td>
<td>***</td>
</tr>
<tr>
<td>Dremel (Finger)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>6:30</td>
<td>2:58</td>
<td>***</td>
</tr>
</tbody>
</table>

Times are represented in mm:ss format

*** = the metal was unaffected by cutting after 15 minutes

--- = no cut was attempted for this type of metal as the standard method was known to be effective

➢ Tungsten Carbide was not affected by any method; however, it was shattered with a hammer and by vice grips

POST REMOVAL CONSIDERATIONS

• Wound care
• Tetanus prophylaxis
• Consider x-rays for possible fracture
• Prevention

QUESTIONS?
CASE 3:
NEVERENDING FEVER
HPI

• 3 year old girl with 15 days of daily fever (102-104°F)
• Improving cough and congestion
• Recently treated with amoxicillin for acute otitis media finished 5 days ago
• Otalgia resolved with antibiotics but not fever
• 1 lb weight loss since ill
• “Many” malaria flairs in past
• Born in Burundi
• Moved to US 1.5 years ago, no travel since then
• Negative PPD
• Immunizations: on catch up schedule

• ROS: Weight loss, decreased appetite, decreased UOP
PHYSICAL EXAM

Initial VS: T 104.7  HR 126  BP 88/53  RR 35  POX 100% RA
Wt 11.3 kg (<3rd percentile)
General: Ill appearing, very thin. Awake, alert.
CV: Regular rhythm. 2/6 systolic ejection murmur LLSB. CRT <3 secs
Pulm: Tachypneic. No retractions. Lungs CTAB.
Abd: Soft, NT/ND. No HSM.
Neuro: Moves extremities spontaneously.
Skin: No rash. No edema.
LN: No appreciable lymphadenopathy
Most common category of causes of fever of unknown origin in children is:

- Factitious fever
- Connective tissue diseases
- Infectious diseases
- Drug fever
- Neoplasms
RESULTS

- WBC 6  
  Seg 25%, Band 21%, Lymph 50%, Mono 4%, Eos 0%
- Hgb 9.2
- MCV 73, ANC 2800
- Plt 109

- Na 135
- K 4.2
- Cl 97
- CO2 25
- BUN 13
- Cr 0.25
- Glucose 101
- Ca 8.6

- Mg 2
- Phos 4.3
- AST 91
- ALT 55
- Alk phos 143
- GGT 86
- Alb 3.1
- Bili 0.1

- ESR 81
- CRP 7.3

- CXR: Enlarged cardiac silhouette
What would be on your differential diagnosis for this patient with prolonged fever?
DIFFERENTIAL DIAGNOSIS

- Rheumatic fever
- Malaria
- Oncologic
- Viral illness (adenovirus, EBV, enterovirus)
- HIV
- Pneumonia
- Endocarditis
- Kawasaki
- Myocarditis
- Hepatitis
- HLH
FURTHER WORKUP

UA: Negative for protein, ketones, blood, nitrite, leuk

HIV: negative
Malaria smear (x2): negative
Peripheral smear: No abnormal cells

Ferritin 802, LDH 1354, uric acid 1.2
INFECTIONOUS DISEASES

- EBV and CMV: past EBV infection
- Parvo neg
- Bartonella neg
- Rickettsial panel neg
- Typhus fever ab neg

- Flu, RSV, adeno, entero, HMPV, paraflu neg
- Hepatitis panel: wnl
- Quantiferon neg
- Brucella neg
- Stool: O&P and culture negative
FINAL RESULT

Initial blood culture:

*Salmonella Typhi*

3 days of positive blood cultures
IMMUNOLOGY AND HEMATOLOGY

- CH50 (complement activity): high
- Immunoglobulins: normal to high
- Iron panel: consistent with iron deficiency
- Hgb pharesis: wnl
HOSPITAL COURSE

• Started on ceftriaxone with positive blood culture, received 14 days IV
• Developed abdominal pain and distension on HD #8, Xray showed constipation
• Fever persisted until HD #13
• CRP and ESR downturned
• Discharged home with boost supplement for weight and iron supplement for anemia
TYPHOID FEVER

• Etiology: Caused by *Salmonella typhi* serotype
• Incidence:
  • 21 million cases annually
  • 222,000 typhoid-related deaths annually
  • Mostly Asia and Africa
• Transmission: Contaminated food or water
• Incubation period:
  • Average 7-14 days
  • Range 3-60 days
TYPHOID FEVER

• Early Symptoms: 1\textsuperscript{st} week
  • Fever, headache, malaise, anorexia, lethargy
  • Relative bradycardia

• Later Symptoms: 2\textsuperscript{nd} week
  • Hepatomegaly, splenomegaly
  • Skin: dactylitis, rose spots
  • Abdominal pain: can cause ileus, intestinal perforation, cholecystitis

• More severe:
  • Persistent bacteremia
  • Meningitis, encephalopathy
DACTYLITIS

© Martin Myers, MD
ROSE SPOTS
TYPHOID FEVER

• Lab abnormalities:
  • Anemia
  • Leukopenia or leukocytosis (if later in illness, associated with intestinal perforation)
  • Abnormal liver function

• Diagnosis:
  • Blood culture (positive in 40-80% of patients)
  • Serologies: not useful in endemic areas (may represent previous infection)
TYPHOID FEVER

• Treatment
  • With antibiotics, mortality rates decreased from 15% to <1%
  • Options: fluoroquinolones, 3rd generation cephalosporins, or azithromycin
  • Resource limited areas: chloramphenicol, ampicillin, Bactrim
• Uncomplicated disease: oral antibiotics
• Severe/complicated disease:
  • Empiric with ceftriaxone 10-14 days
  • Consider steroids
• Prevention: Typhoid vaccine
What infectious tropical diseases would you consider in a pediatric traveler from Burundi?
RETURNED TRAVELER: BURUNDI

- Vaccine preventable:
  - Hepatitis A and B
  - Malaria
  - Rabies
  - Typhoid
  - Yellow Fever

- No vaccines:
  - Zika virus
  - African Tick bite fever
  - Chikungunya
  - Sleeping sickness (African trypanosomiasis)
CASE 4:  
“OUT, OUT DARNED SPOT”
PRESENTATION

A previously healthy 8 year old girl with a lesion to the side of the face for 9 months. Lesion was unresponsive to hydrocortisone and clotrimazole after being seen by the pcp for multiple visits. Parents note that the lesion began as a small pink papule and grew in size. Increased itching to the area over the last 3 days.

No other new or constitutional symptoms.
Darned Spot Question #1 -- What is not a likely differential diagnosis for this lesion:

- Tinea Corporis
- Granuloma Annulare
- Pityriasis Rosea herald patch
- Discoid Lupus

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Darned Spot Question #2 -- What skin test that can be performed if necessary might help clarify the diagnosis:

- Tzanck smear
- Fungal culture
- Punch biopsy

Skin Prick Testing

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ER EVALUATION

• Family had dermatology appointment scheduled at LBJ, but family wanted to be seen at TCH.
• Differential included discoid lupus versus partially treated tinea corporis
• Fungal culture obtained and sent. Discussed with family that it was a very slow growing test.
• Prescribed topical ketoconazole
• Discharged home with dermatology appointment in 3 days
IT'S LUPUS
DERMATOLOGY EVALUATION

• Visit #1 Suspect discoid lupus
• Punch biopsy needed for confirmation
• Patient was very tearful during discussion of biopsy so recommend biopsy in OR
• 11 days later parents declined biopsy due to significant skin improvement
• Trial of topical clobetasol prescribed
• Visit #2 referred to rheumatology and ophthalmology
• Told derm that she was being followed by Harris Co. hepatology
• Labs sent and prescribed Plaquesnil/hydrochloroquine orally
Darned Spot Question #3 -- Which criterion is NOT part of the class for systemic lupus erythematosus:

- Leukopenia
- Oral or nasopharyngeal ulceration
- Seizures
- Acholic (white stools)
- Blood cell casts in urine
BACK TO THE ER

• 2 months of initial ER visit – returned for vomiting/fever/LUQ pain
• Received (2) 20 ml/kg NS boluses for tachycardia/SIRS and ceftriaxone
• Abnormal labs including elevated liver enzymes, ANC=960, lipase=586
• +SSA and ANA 1:320
• Admitted to rheumatology for 6 days for pancreatitis
• 6 days stay with clinical improvement
• Discharged home on Plaquenil and steroids
RHEUMATOLOGY CLINIC

• Completed ophthalmology appointment with normal exam/no uveitis
• Wean steroids, continue Plaquenil and PPI
• Begin Imuran/Azathioprine
• Continue dermatology follow up
Darned Spot Question #4 -- Why was the patient prescribed a PPI (pump inhibitor):

- Increase absorption of B12
- Increased risk of steroid gastritis
- Decrease risk of clostridium difficile

Treat hypermagnesemia

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LAST FOLLOW UP

Seen in dermatology clinic and doing well.

Questions?
CASE 5: APNEA, JAUNDICE, AND VOMITING…OH MY!!
HPI

- 13 day old F full term infant presenting with vomiting
- Emesis and diarrhea with every feed x1 week
- Afebrile
- Yellow skin
- Episodes of eyes deviated upward
  - Resolved with stimulation
  - Limp during episodes
  - Perioral cyanosis
PMH

• 40W6D by C-section due failure to progress
• Episode NBNB emesis on DOL 1:
  • NICU admission
  • AXR dilated air loops
  • Contrast enema normal
  • Meconium plug

• ROS: Negative for fever, cough, congestion
INITIAL EC COURSE

• Medical evaluation called for:
  • Episodes of respiratory pauses (<20sec)
  • Perioral cyanosis
  • Hypoglycemia: glucose 40
PHYSICAL EXAM

Initial VS: T 98.4  HR 142  BP 85/52  RR 36  POX 70-100% Wt 3.8kg

General: Sleepy but arousable with stimulation.


CV: RRR. No murmurs. 2+ brachial/femoral pulses.

Pulm: Intermittent pauses of 10sec each. One with 5 secs of perioral cyanosis with sats 70%. Lungs CTAB.

Abd: Mild distension, nontender. Decreased bowel sounds. No HSM.

Neuro: Decreased tone all extremities. Moves extremities spontaneously.

Skin: Mild jaundice
place the patient on 2L oxygen with improved saturations, although she is still sleepy. What is the next best intervention?

- Give a normal saline bolus of...
- Give IV zofran at 0.15mg/kg
- Begin bag mask ventilation
- Give D 10 bolus of 2mL/kg
EC COURSE

- Received D10 bolus of 2 ml/kg
- More awake
- Then episode of emesis followed by apnea and cyanosis
- Patient intubated for airway protection and apnea
What is on your differential for this infant with vomiting, apnea, hypoglycemia, and jaundice?
DIFFERENTIAL DIAGNOSIS

- Sepsis
- Metabolic disorder
- Pyloric stenosis
- Intestinal obstruction
- Liver disease
- Viral gastroenteritis
- UTI
- NAT
- Congenital heart disease
<table>
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<th>Value</th>
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<td>WBC</td>
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<tr>
<td>Ammonia</td>
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</table>
RESULTS

UA: Negative for protein, ketones, blood, nitrite, leuk
SG 1.020, pH 6.0

CSF: WBC 9, RBC 2450, glucose 79, protein 194

Rapid RSV: negative
Winter respiratory viral panel: negative
HSV CSF and blood PCR: Negative
Enterovirus CSF and blood PCR: Negative
RESULTS

• Pyloric US: Negative for pyloric stenosis

• CXR/AXR: No opacities. Nonobstructive bowel gas pattern.
RESULTS

TSH 481
T4 13.0
Free T4 0.3
T3 uptake 25
Thyroid US: Small lobes of thyroid gland with mildly heterogeneous echotexture and focal cysts within either lobe.

ACTH stimulation test: normal
What diagnosis fits these lab findings?

- Adrenal insufficiency
- Congenital adrenal hyperplasia
- Primary hypothyroidism
- Central hypothyroidism

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PRIMARY HYPOTHYROIDISM

• Started on synthroid
• Extubated on HD 3 with no further apneic episodes
• Most recent visit TSH 4.3
CONGENITAL HYPOTHYROIDISM

• Etiology:
  • Sporadic: majority; thyroid dysgenesis
  • Hereditary: inborn errors of thyroid hormone synthesis

• Incidence: 1:2,000 to 1:4,000 newborns

• One of most common treatable cause of mental retardation
CONGENITAL HYPOTHYROIDISM

• Clinical presentation
  • GI: Constipation, abdominal distension, feeding difficulty, intestinal hypomotility
  • Skin: Prolonged jaundice, dry skin
  • HEENT: Hoarse cry, macroglossia, large anterior fontanel
  • CV: bradycardia
  • General: hypothermia
  • Neuro: Increased sleepiness/lethargy, hypotonia
• Delayed presentation: protective maternal thyroxine
APNEA AND HYPOTHYROIDISM

• Sleep study: 43% infants with central apnea
• Resolve after treatment with synthroid
• Respiratory distress/failure with congenital hypothyroidism
CONGENITAL HYPOTHYROIDISM

• Diagnosis:
  • Newborn screening: T4 and/or TSH
  • Primary: low T4, high TSH
  • Central: low T4, low/normal TSH
  • Thyroid US

• Treatment:
  • Early treatment, higher IQ levels
  • Oral levothyroxine
CASE 6:
“EYE” SEE YOU
5 year old previously healthy female with left eye redness intermittently for one week complaining of:

- Itching
- Mild crusting
- Photophobia
- Tearing
- Photophobia
ER EVALUATION

- No uptake on fluorescein exam
- Decreased visual acuity
- Small white spot at 4 o’clock
- Erythema left conjunctiva and sclera
- Hyperemia and edema conjunctiva palpebrae
SEE YOU QUESTION #1 -- What is the most concerning diagnosis of the differential:

- Allergic conjunctivitis
- Viral conjunctivitis
- Corneal abrasion
- Corneal ulceration

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• Per mom, patient has had eye redness on and off for the past year about 3 episodes.
• history of styes
• had a sty about 6 mos ago that recently popped about a month ago
• moderate blepharitis both eyes
• corneal scars both eyes
PHLYCTENULAR KERATITIS

• occurs primarily in children from 6 months to 16 years old
• higher prevalence in females and higher incidence during spring
• corneal lesions typically may have more severe pain and photophobia
• can lead to ulceration, scarring and mild to moderate vision loss
• Although rare, corneal perforation is possible as well
EYE SEE YOU QUESTION #2 -- What is the etiology of this diagnosis?

1. Hypersensitivity reaction
2. Congenital cataracts
3. Chagas disease
4. Behcet’s disease

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HYPERSENSITIVITY REACTION TO BACTERIAL ANTIGENS

- primarily staphylococcal
- TB
- Chlamydia and other bacterial agents
- Risk factors for S. aureus exposure include chronic blepharitis and suppurative keratitis.
Question #3 -- Optimal treatment for phlyctenular keratitis

- Cyclovir 3% eye drops
- Patching and lubrication
- Immunotherapy
- Steroid eye drops

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PRESCRIBED TREATMENT

• Maxitrol eye drops 4x/day left eye only
• Recommend daily lid scrubs with warm compresses at least 3-4x/day
• Recommend start of Erythromycin eye ointment at bedtime
• Blepharitis: Start frequent warm compresses for treatment, baby shampoo scrubs for prevention
“RICE SOCK COMPRESSES”
FOLLOW UP

• Called by eye clinic for follow up
• Didn’t show