Dermatology

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DERMATOLOGY

I. INTRODUCTION

A. Patients commonly present to the ED because of rashes and other skin complaints.

B. These skin lesions, exanthems, or eruptions may be caused by a variety of agents or illnesses, and may range from being transient curiosities to heralding life-threatening diseases.

C. Familiarity with not only typical skin changes but accompanying signs and symptoms will aid the ED physician in the diagnosis and management of these problems.

II. REVIEW OF LESIONS

A. Primary lesions – type/size

1. Raised
   a. Papules, nodules, tumors
   b. Vesicles, bullae, blebs
   c. Pustules
   d. Wheals (hives)
   e. Plaques

2. Flat
   a. Macules, patches
   b. Petechiae, purpura, ecchymosis

B. Secondary lesions

1. Sloughing - scaling, desquamation
2. Excoriations - abrasions, scratch marks
3. Crust-scabs
4. Ulcers
5. Lichenification, fissures
6. Atrophy
7. Scar (cicatrix)

C. Location

1. Localized
   a. Contact
   b. Exposed
   c. Intertriginous
   d. Hair-bearing

2. Generalized
III. APPROACH TO PATIENTS

A. History and physical

1. History: not to be neglected!
   a. Usual chief complaint, HPI, past history, ROS
   b. Remember occupation, hobbies, and sexual history

2. Physical
   a. Expose
   b. Visualize with adequate light
   c. Palpate with gloved hand

B. Ancillary tests

1. Bedside
   a. Side lighting
   b. Wood’s light
   c. Diascopy - compression with glass slide
   d. Manipulation of lesions

2. Others
   a. Slides - Gram stain, KOH, Tzanck smear
   b. Skin biopsy

C. Classification schemes

1. Algorithmic approach of Lynch
   a. Provides 95% diagnostic accuracy
   b. 65 common illnesses in 10 major groups

D. Other algorithms based on broad categories such as eczematosus, maculopapular, papular, etc. [see Pediatric Emergency Medicine by Ludwig and Fleischer and others]

IV. LIFE-THREATENING RASHES

A. Meningococcemia

1. Presentation
   a. May begin as URI/influenza-like illness coryza, pharyngitis, tonsillitis, or laryngitis. Fever, malaise, headache, vomiting, myalgia/arthritis
   b. Skin findings – hours to days. Diffuse mottling, morbilliform
      i. Petechiae (50-60% of patients)
      ii. Purpuric lesions
   c. Hypotension, oliguria, renal failure
      i. Usually fatal
   d. Poor prognostic factors
      i. Petechiae for less than 12 hours.
      ii. Systolic pressure <70mmHg
      iii. <20 WBC/mm³ in CSF
      iv. WBC <10,000/mm³
      v. ESR <10 mm/hr
   e. Diagnosed by gram stain, culture, or CIE

2. Treatment
   a. Cultures and antibiotics
      i. Penicillin G/Chloramphenicol
      ii. Broad-spectrum (such as ceftriaxone or cefotaxime)
   b. Close monitoring
   c. Supportive therapy
      i. ? heparin for DIC
      ii. ? steroids
      iii. Other anti-inflammatory therapies

3. Prophylaxis of contacts
   a. Who?
      i. Household members
      ii. Certain hospital personnel
      iii. Nursery school contacts
   b. How?

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<tr>
<td>rifampin</td>
<td>600mg q 12 x 4 doses</td>
<td>10mg/kg q 12 x 4 doses (1-12 yrs)</td>
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<td>5mg/kg q 12 x 4 doses (3 mo - 1yr)</td>
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<td>ceftriaxone</td>
<td>250mg IM</td>
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<td>ciprofloxacin</td>
<td>500 mg PO</td>
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B. Staphylococcal Scalded Skin Syndrome

1. Etiology: toxigenic strains of Staphylococcus aureus
   a. Produce epidermolytic toxin
      i. Acts at granular layer of epidermis (intraepidermal)
2. Various names - spectrum of severity
   a. Ritter disease / pemphigus neonatorum – neonates
   b. Toxic epidermal necrolysis (TEN) / Lyell disease - older children
   c. Bullous pemphigus
3. Site of infection: conjunctivitis, abrasions, nasopharynx, umbilicus, circumcision, urinary tract, endocarditis, blood
4. Sudden fever and irritability with cutaneous tenderness
5. Flaccid blisters, erosions, easy disruption of skin (Nikolsky’s sign)
6. Secondary flaky desquamation
7. Loss of normal integument
   a. Fluid and electrolyte loss
   b. Heat loss
   c. Portal of secondary infection
8. Treatment
   a. Systemic antibiotics: parenterally
   b. Supportive care
   c. Do not use steroids
   d. Topical preparations of no benefit

C. Erythema multiforme

1. There is no consensus in the literature as to what this entity is.
   Describes a spectrum of illnesses including (from mild to severe):
   a. Erythema Multiforme Minor
   b. Erythema Multiforme Major
      i. Stevens-Johnson Syndrome (mucous membranes)
      ii. Toxic Epidermal Necrolysis (widespread blistering)
2. Mortality of about 10%
   a. From sepsis and fluid/electrolyte deficits
3. Causes/precipitants
   a. Exact cause unknown; suspected to be immunologic reaction to foreign antigen
   b. Common causes
      i. Herpes simplex infection
      ii. Mycoplasma infection
      iii. Drug reaction
         • Anticonvulsants (phenytoin, carbamazepine)
         • Sulfonamides
         • NSAIDs
         • Other antibiotics (cephalosporins, penicillin)
4. Clinical manifestations
   a. Prodromal symptoms
      i. Malaise, fever, myalgias, arthralgias, headache, diffuse pruritus or burning
   b. Hallmark: target or “iris” lesions and symmetric erythematous macules or plaques on extensor surfaces
   c. Variable; evolve during course
      i. Lesions become papules, vesicles, or bullae
   d. Mucous membranes/genitalia
      i. Painful superficial ulcerations

5. Treatment
   a. No definite consensus on optimal management
   b. Supportive/symptomatic
      i. Mainstay of therapy
   c. Discontinue all new drugs (unless life threat itself)
   d. Admit if: greater that 10% TBSA involved with blisters or severe mucous membrane or ocular involvement
   e. Wound care
      i. Dressings, isolation (just like burns)
   f. IV fluids
      i. Volume, electrolytes, nutritional support
   g. Steroids
      i.Controversial
      ii. If used, short course (5-10 days)

V. EXANTHEMS

A. Measles (rubeola)
   1. Incubation: 10-12 days with few signs and symptoms
   2. Prodrome: 2-4 days; enanthem (Koplik spots), fever, Cough Coryza and Conjunctivitis (3 Cs)
   3. Final: exanthem; maculopapular rash (neck, face, body, arms, legs) with high fever
   4. Complications: otitis media, pneumonia, diarrhea, encephalitis
   5. Modified measles - partially immune host
   6. Atypical measles - after killed virus vaccine

B. Rubella (German, 3-day measles)
   1. Few prodromal symptoms
   2. Rash is variable - pink macules and papules
   3. Posterior cervical / postauricular adenopathy
   4. Difficult to diagnose clinically unless epidemic
   5. Complications uncommon
6. No specific therapy  
7. Risk to pregnant women - evaluation and counseling  

C. Scarlet fever  
1. Due to exotoxin - producing Group A β-hemolytic streptococci  
2. Fever, pharyngitis, abdominal pain/vomiting, headache  
3. Enanthem; bright red oral mucosa, palatal petechiae, white tongue  
4. Strawberry tongue – white, then red  
5. Exanthem; starts as blanchable fine punctate truncal eruption, “sandpaper”  
   a. Pastia lines, facial flushing/circumoral pallor  
6. Desquamation after 4-5 days  
7. Treat with penicillin  

D. Erythema infectiosum (fifth disease)  
1. Caused by human parvovirus B19 [bad for sicklers & 1st trimester]  
2. Incubation: 4 to 14 days (20 tops)  
3. Little to no prodrome  
4. 3 stage rash  
   a. “Slapped cheek” - fiery red, macular erythema or raise edematous plaques  
   b. 1-4 days later: erythematous maculopapular rash on trunk and extremities  
   c. Fading to lacy, reticular pattern – “grandma’s doily”  
5. Rare complications in children  
6. No specific antiviral treatment  

E. Roseola infantum (exanthem subitum)  
1. Viral: HHV-6  
2. Occurs between 6 months and 3 years - most before 1 year  
3. Fever with irritability for 3 to 5 days; no focus  
4. Fever abates, then rash appears - rose-pink macules  
5. No specific treatment  

VI. URTICARIA AND ANGIOEDEMA  

A. General  
1. Manifestations of various immunologic and inflammatory mechanisms or idiopathic  
2. Respiratory, GI, and cardiovascular systems may be involved  
3. Can occur in any age, race, sex, occupation, geographic location, or season
B. Presentation

1. Urticaria: circumscribed, raised, erythematous, usually pruritic, evanescent areas of edema that involve the superficial portion of the dermis
2. Angioedema: edematous process extends into the deep dermis and/or subcutaneous and submucosal layers
3. Usually abrupt onset, last 24-48 hours, and may recur
4. Accompanying symptoms:
   a. Headache, dizziness, hoarseness, wheezing, shortness of breath, nausea, vomiting, abdominal pain, diarrhea, arthralgias

C. Treatment

1. Identification and removal of participant
2. H₁ antihistamines (sedating / non-sedating)
3. H₂ antihistamines
4. Corticosteroids
5. Epinephrine if airway/respiratory compromise

VII. ERYTHRODERMAS

A. Toxic shock syndrome

1. Etiology: This syndrome of hypotension, fever, rash, and multi-organ system involvement is thought to be caused by toxins produced by *Staphylococcus aureus*. About 90% of cases occur in menstruating women using tampons. Cases not associated with menstruation have been related to cutaneous staph infections and with nasal packing.
2. Case definition: Major criteria
   a. Fever - temp > 102°F
   b. Rash - erythroderma (localized or diffuse) followed by desquamation
   c. Mucous membrane - hyperemia of oral, vagina or conjunctiva
   d. Hypotension - history of dizziness, orthostatic changes, or hypotension
   e. Multisystem manifestations
   f. Diagnosis requires all four major and three or more systems
3. Clinical course:
   a. This syndrome is acute in onset, and may present on a variety of ways depending upon the organ systems involved.
   b. Characteristically there is a fever greater than 102°F, hypotension (systolic BP <90 mmHg), and an erythroderma.
   c. Patients may have myalgias, abdominal pain, weakness, headache, confusion, vomiting or diarrhea.
d. Similarly, there may be multiple laboratory abnormalities.

4. Treatment:
   a. Restoration of intravascular volume is essential.
   b. A focus of infection must be sought and addressed - tampons removed, etc.
   c. Although anti-staph agents are recommended, no effect on outcome is proven.
   d. Most patients improve within 48 hours of initiation of therapy.

B. Kawasaki syndrome

1. Etiology
   a. Generalized vasculitis, unknown – suspected to be viral, children <5

2. Presentation: The diagnosis is made by the presence of fever and at least 4 of 5 principal clinical features:
   a. Extremity changes
   b. Polymorphous exanthema
   c. Bilateral conjunctival injection
   d. Lip and oral changes
   e. Cervical lymphadenopathy

3. Complications
   a. Include coronary artery aneurysms and myocardial inflammation/ischemia

4. Treatment
   a. Gamma globulin therapy within 10 days and high dose of aspirin

VIII. VESICULOBULLOUS DISORDERS

A. Varicella and herpes zoster- Herpes varicella-zoster virus → chicken pox/shingles

1. Chicken pox
   a. 150-200,000 annual U.S. cases
   b. Incubation: 10-21 days
   c. Low-grade fever and malaise
   d. Red macules → papules → crops of vesicles becoming pustular and then crusted scabs [all present at the same time]
   e. Pruritus, pain
   f. Complications – pneumonia
   g. Symptomatic treatment: calamine, antihistamines
   h. Specific antiviral therapy: acyclovir (immunocompromised)
      i. 20 mg/kg (800 mg max) PO qid for 5 days ($$)

2. Shingles
   a. Reactivation of latent virus from dorsal root ganglia – mechanism unknown
b. Unilateral, dermatomal, vesicular rash
c. Pain - acute neuritis and postherpetic neuralgia
d. Immunocompromised - more severe disease and complications
e. Treatment: analgesia (including steroids) antiviral therapy - acyclovir 800 mg PO 5x/day or famciclovir 500 mg tid or valacyclovir 1 gm tid for 7 to 10 days

3. Pregnancy and HVZ
   a. Congenital varicella syndrome
      i. Muscle/bone defects, limb defects, microcephaly, blindness, seizures, mental retardation
      ii. Greatest risk during first trimester (5-10%)
   b. Neonatal infection
      i. From material chicken pox within four days of delivery
      ii. Up to 30% mortality in child
c. Exposure recommendations
   i. If susceptible pregnant woman is exposed to chicken pox, VZIG (immune globulin) should be administered within 96 hours

B. Herpes simplex
   1. Gingivostomatitis/orolabialis (also genitalis – see STDs)
   2. HSV-1 or HSV-2 (10-15% crossover)
   3. Recurrent, grouped vesicles
   4. Painful, burning, or tingling - may hinder oral intake
   5. Treat symptomatically or with acyclovir if immunocompromised
   6. Topical penciclovir may be beneficial

IX. SKIN INFECTIONS AND INFESTATIONS

A. Impetigo
   1. Etiology
      a. Impetigo is the most common bacterial infection of the skin. It involves the superficial skin layers, and is usually caused by group A β-hemolytic streptococci or Staphylococcus aureus.
      b. It commonly appears in children and young adults at sites of minor skin trauma, and occurs more frequently in warmer climates/seasons.
   2. Clinical appearance
      a. There are two forms of impetigo based primarily upon its appearance. The nonbullous form (impetigo contagiosa) typically forms “honey” crusted lesions, whereas the bullous form (impetigo bullosa) begins as a small vesicle and rapidly develops into bullae. Bullous impetigo is invariably caused by Staph aureus.
3. Treatment
   a. Look for complications such as post-streptococcal glomerulonephritis. There is debate in the literature about optimal treatment, but most would agree that topical therapy with mupirocin (Bactroban) or systemic therapy with an anti-staph agent is acceptable. Trimethoprim/sulfamethoxasole or clindamycin are appropriate choices. Local wound care is advisable.

B. Tinea (fungal)
   1. May involve any body surface
   2. Indolent - both to get and rid
   3. Serpiginous borders, scaling, central clearing
   4. Treatment: topical, systemic

C. Ectoparasites
   1. Scabies (Sarcoptes scabei- mites)
      a. Presentation: Patients presenting with an intensely pruritic rash of characteristic distribution must be suspected of having scabies. The usual site for the mites to burrow are the interdigital spaces, backs of hands, elbows, axillae, groin, breast, umbilicus, penis, shoulder blades, small of the back, and the buttocks. The fecal droppings of the mites are believed to cause the pruritus, which is sometimes excruciating. Erythematous, elevated tracks with minute vesicles at one end are characteristic; however, excoriations with bleeding and secondary infection are more common.
      b. Diagnosis: Diagnosis is based clinically on characteristic lesions and distribution. The mite may be recovered from a burrow, as may be fecal pellets. A history of contact may be elicited.
      c. Treatment: The recommended drug of choice is 5% permethrin (Elimite) applied topically. Alternates include a single application of lindane/gamma benzene hexachloride (Kwell\textsuperscript{R}), 100% crotamiton (Eurax), and topical sulfur-containing preparations. Treatment is the same in adults and children. If secondary infection is present, appropriate antibiotics should be instituted.
   2. Lice
      a. There are three varieties (species) of parasitic lice in humans:
         i. Head louse (Pediculus humanis capitis)
         ii. Body louse (Pediculus humanis humanis)
         iii. Crab louse (Phthirus pubis)
      b. Presentation: Head lice and pubic crabs are usually only annoying and irritating infestations with few complications. Body lice on the other hand have been found to be the vectors
of epidemic typhus, trench fever, and relapsing fever. Irritating saliva is injected during feeding causing severe itching. Again, secondary infection may be present.

c. Diagnosis: Diagnosis is made by finding lice and nits (eggs) in the hair. They are readily visible to the naked eye.

d. Treatment: The Medical Letter recommends permethrin 1% (Nix) or 0.5% Malathion (Ovide) topically. Alternatives include pyrethrins with piperonyl butoxide (Rid and others), lindane (Kwell\textsuperscript{R}), and 0.03% copper oleate (Cuprex\textsuperscript{R}). Eyelash infestations can be treated with ophthalmic ointment of yellow oxide of mercury. Treatment should be repeated in one week.

D. Lyme disease

1. General
   a. Tick-borne infection caused by \textit{Borrelia burgdorferi}, a spirochete, and transmitted by the \textit{Ixodes} ticks
   b. Case definition: presence of erythema migrans rash \(\geq 5\) cm diameter or lab confirmation of infection with \textit{B. burgdorferi} and at least one objective sign of musculoskeletal, neurologic, or cardiovascular disease
   c. Multisystem illness with myriad manifestations
   d. Serologic testing is of limited value (timing and specificity)

2. Clinical presentation
   a. Dermatologic
      i. Erythema migrans
         • Present in 50-83% of cases
         • Begins 2-30 days after tick bite
         • Starts as red macule an erythematous annular lesion with central clearing
         • Average size: 15cm
         • If untreated, lasts about a month; resolves within days of treatment
         • Secondary/multiple/metastatic erythema migrans lesions can appear within days to weeks after the primary
      ii. \textit{Borrelia} lymphocytoma
         • 1% of cases in Europe
         • Firm red nodule or plaque
         • Earlobe in children; nipple/areola in adults
      iii. Acrodermatitis chronica atrophicans
         • Biphase pattern
         • Early (inflammatory): erythematous/violaceous discoloration in doughy and swollen skin
         • Weeks to years (atrophic): glistening skin [cigarette-paper] with prominence of blood vessels
iv. Others: benign lymphocytic infiltration, anetoderma, morphea, allergic reactions

b. Neurologic
   i. Begins months after initial presentation
   ii. Up to 15% of cases
   iii. Common manifestations: meningitis, encephalitis, cranial neuropathies (Bells), radiculopathies, myelitis
   iv. Later: paresthesias, organic brain syndrome, spastic paraparesis, dementia

c. Cardiac
   i. 8-10% of cases
   ii. Varying degrees of AV block
   iii. Myocarditis, pericarditis

d. Musculoskeletal
   i. Arthralgias and myalgias
   ii. Arthritis of large joints

3. Treatment
   a. Shortens duration and prevents later illness
   b. Duration of treatment dependent on severity of symptoms
   c. Oral regimens
      i. Doxycycline 100 mg BID or amoxicillin 500 mg TID
      ii. For 10-20 days up to 1 month (for arthritis or Bell’s)
   d. Parenteral
      i. Ceftriaxone 2g/day or Penicillin G 20-24 million units/day IV for 14-21 days

E. Rocky Mountain Spotted Fever

1. Etiology/pathogenesis
   a. Etiologic agent: *Rickettsia rickettsii* Coccobacillus, obligate intracellular bacteria
   b. Vector-borne disease transmitted by certain ticks:
      i. Wood tick (Dermacentor andersoni) Dog tick (Dermacentor variabilis)
   c. Widespread; most cases from south Atlantic coastal and south central states
   d. Organism spreads from portal of entry (bite) to all body organs resulting in increased vascular permeability and vasculitis

2. Clinical manifestations
   a. General
      i. Incubation of about 7 days (2-14 range)
      ii. Initial symptoms nonspecific: fever, malaise, severe frontal headache myalgias, nausea/vomiting/anorexia, abdominal pain, photophobia
   b. Cutaneous
      i. Maculopapular rash (3-5 days)
      ii. Becomes more defined and petechial
iii. Begins on extremities (wrists and ankles), spreads centrally to trunk
iv. Involves palms and soles; +/- face
c. Gastrointestinal
   i. Nausea, vomiting, abdominal pain, diarrhea
   ii. Mistaken for acute abdomen
   iii. Hepatomegaly, splenomegaly, clinical jaundice, pancreatitis (mild)
d. Pulmonary
   i. Cough, dyspnea, non-cardiogenic pulmonary edema, infiltrates on CXR, hypoxemia
e. Neurologic
   i. Rickettsial encephalitis (grave prognosis)
   ii. Confusion, delirium, ataxia, coma, seizures
   iii. Papilledema, hearing loss, SIADH
f. Renal
   i. Elevated BUN (prerenal azotemia)
   ii. Acute tubular necrosis from hypovolemic shock
g. Cardiac
   i. Mild effect on myocardium
   ii. Abnormal EKG (consistent with myocarditis; arrhythmia)
3. Treatment
   a. Early appropriate treatment decreases mortality from 25% to 5% or less
   b. Adults: doxycycline 100 mg BID for 5-7 days
   c. Children: doxycycline 2.2 mg/kg BID [stains teeth] or (if under 8 years of age) chloramphenicol 100 mg/kg/day IV in 4 divided doses [hematologic side effect]

F. Erythema marginatum

  1. Due to Streptococcal disease – major (Jones) criteria for acute rheumatic fever
  2. Rash:
     a. Pink, pale centers with rounded or serpiginous borders
     b. Vary in size
     c. Mainly on trunk and proximal extremities (not on face)
     d. Evanescent, transient and migratory
  3. Treatment
     a. With penicillin if ongoing infection suspected (rare)
     b. Aspirin for anti-inflammatory effects

X. CUTANEOUS MANIFESTATIONS OF BIOTERRORISM

A. Anthrax

B. Smallpox
DERMATOLOGY

PEARLS

1. Positive Nikolski sign is seen in toxic epidermal necrolysis.

2. Steven's Johnson syndrome is erythema multiforme with severe mucosal involvement.

3. May see high output cardiac failure with erythroderma.

4. Initial therapy of toxic shock syndrome is fluids.

5. Pemphigus vulgaris is an autoimmune disorder treated with steroids and immunosuppressive agents. Dermatomyositis is often associated with an underlying malignancy.

6. Osler nodes seen in endocarditis are painful dermal nodules.

7. Janeway lesions are painless palmar nodules.

8. SLE may cause a classic facial "butterfly rash" or as a generalized rash in sun exposed areas.

9. Target or iris lesions are seen in erythema multiforme.

10. Dermographism may be seen in patients with urticaria.

11. Toxic shock syndrome is due to an exotoxin produced by S. aureus.

12. Kaposi's sarcoma in AIDS patients may affect the skin, mucous membranes and internal organs.

13. Tender, erythematous nodules on the shins are seen in erythema nodosum.

14. Pyoderma gangrenosum is associated with systemic disorders such as tuberculosis, cancer, arthritis and connective tissue disorders. It is not an infection. It may respond to treatment with dapsone.

15. Ichthyosis appears as fish-like scales on the skin.

16. Mucormycosis is a rapidly progressive fungal infection of the sinuses seen in diabetics and immunocompromised patients.

17. Extensive debridement is necessary in mucormycosis.
18. Basal cell carcinoma typically appears as a central ulcer with a raised pearly-white border. Squamous cell carcinoma is usually seen in sun exposed areas.

19. Acanthosis nigricans is a velvety hyperpigmented patch of skin and may be a marker of underlying malignancy or diabetes.

20. Neurofibromatosis features multiple subcutaneous tumors and cord or brain tumors such as acoustic neuromas, meningiomas and Schwannomas.

21. Necrobiosis lipoidica diabeticorum is a yellow, waxy plaque seen over the shins in some diabetics.
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