

Acne



UCSF Dermatology

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Module Instructions



- The following module contains a number of green, underlined terms which are hyperlinked to the [dermatology glossary](#), an illustrated interactive guide to clinical dermatology and dermatopathology.
- We encourage the learner to read all the hyperlinked information.

Goals and Objectives



- The purpose of this module is to help medical students develop a clinical approach to the evaluation and initial management of patients presenting with acne and rosacea.
- After completing this module, the medical student will be able to:
 - Identify and describe the morphology of acne and rosacea
 - Discuss the pathogenesis of acne
 - Name risk factors for acne and rosacea
 - List the basic principles of treatment for acne and rosacea
 - Develop an initial treatment plan, including patient education
 - Discuss when to refer to a dermatologist

Acne Vulgaris: The Basics



- Acne vulgaris, often referred to as “acne”, is a disorder of pilosebaceous follicles
 - Typically presents at ages 8-12 (often the first sign of puberty), peaks at ages 15-18, and resolves by age 25
 - Affects 90% of adolescents and affects races equally
 - Family history is often positive
 - 12% of women and 3% of men will have acne until their 40s
 - In women it is not uncommon to have a first outbreak at 20-35 years of age

Acne Vulgaris: The Basics



- Characterized by open and closed comedones, papules, pustules, cysts, nodules and often scars
 - Open comedones are flat or slightly elevated papules with a central opening filled with blackened keratin (blackhead)
 - Closed comedones are ~ 1 mm yellowish papules (whiteheads)
 - Papules and pustules seen in acne are 1-5 mm in size, with erythema and edema (caused by inflammation)
- Acne affects mainly the face, neck, upper trunk and upper arms
- Acne should be treated aggressively to avoid permanent scarring and cysts

Case One



Jim Reynolds

Case One: History



- HPI: Jim Reynolds is an 17 year-old healthy teenager who presents to his primary care physician with “pimples” on his face for the last 2 years. He reports a daily skin regimen of aggressive facial cleansing with a bar of soap during his morning shower.
- PMH: no chronic illnesses or prior hospitalizations
- Allergies: no known allergies
- Medications: none
- Family History: father and mother had acne as teenagers
- Social History: lives at home with parents and attends high school
- ROS: negative

Case One: Skin Exam



Classification of Acne Vulgaris



- Classification of acne is based on the morphology
 - Grade 1: open comedones
 - Grade 2: open and closed comedones and some papulopustules
 - Grade 3: pustular acne
 - Grade 4: nodulocystic acne
- It is equally important to describe the severity (each grade can be mild to severe depending on the amount of acne) and note the presence of scarring for each patient

Case One, Question 1



- How would you describe Jim's exam?
 - a. mild comedonal without presence of scarring
 - b. mild-moderate mixed comedonal and inflammatory with presence of scarring
 - c. mild-moderate mixed comedonal and inflammatory without presence of scarring
 - d. nodulocystic, mild

Case One: Question 1



Answer: b

- How would you describe Jim's exam?
 - a. mild comedonal without presence of scarring
 - b. mild-moderate mixed comedonal and inflammatory with presence of scarring**
 - c. mild-moderate mixed comedonal and inflammatory without presence of scarring
 - d. nodulocystic, mild

Skin Exam Findings



Exam of left cheek: numerous pustules, papules, open and closed comedones with some scarring.

Open comedo

Closed comedo

Pustule

Inflamed papule

Scarring

How Would You Describe the Following Patients' Acne?



Remember for each patient to include the morphology, severity and presence of scarring.

Acne Vulgaris



Acne Vulgaris



Moderate comedonal acne
without evidence of scarring

Note mild post-inflammatory
hyperpigmentation

Acne Vulgaris



Acne Vulgaris



Severe nodulocystic acne
with presence of scarring



Back to Case One



Jim Reynolds

Case One, Question 2



- What elements of the history are important to ask Jim?
 - a. medications for other conditions
 - b. dietary history
 - c. weight-lifting and other dietary supplements
 - d. all of the above

Case One, Question 2



Answer: d

- What elements of the history are important to ask Jim?
 - a. medications for other conditions
 - b. dietary history
 - c. weight-lifting and other dietary supplements
 - d. all of the above**

Important History Items



- Medications: A number of medications can cause or worsen acne including:
 - Lithium
 - Phenytoin
 - Isoniazid
 - Systemic corticosteroids
 - Androgens
 - Anti-depressants
 - Certain chemotherapy medications

Important History Items



- Diet: Diets with high glycemic load may worsen acne. Lowering the glycemic load of the diet may improve acne. Chocolate and oils in the diet are not causal except through this mechanism.
- Weight gain and supplements: Anabolic steroids can cause and worsen acne. Weight-gaining and vitamin supplements may contain large amounts of iodine, which can worsen acne.

Case One, Question 3



- Which is (are) related to the pathogenesis of acne vulgaris?
 - a. bacteria in the hair follicle
 - b. androgens in the circulation
 - c. follicular plugging
 - d. sebum secretion
 - e. all of the above

Case One, Question 3



Answer: e

- Which is (are) related to the pathogenesis of acne vulgaris?
 - a. bacteria in the hair follicle
 - b. androgens in the circulation
 - c. follicular plugging
 - d. sebum secretion
 - e. all of the above**

Acne Vulgaris: Pathogenesis



- Acne Vulgaris is related to 4 factors:
 - Presence of hormones (androgens)
 - Sebaceous gland activity (increased in presence of androgens)
 - *P. acnes* (bacteria) in the hair follicle (lives on the oil and breaks it down to free fatty acids which cause inflammation)
 - Plugging of the hair follicle as a result of abnormal keratinization of the upper portion (gives rise to comedones)

Case One, Question 4



- Which of the following agents are effective in treating acne vulgaris?
 - a. oral antibiotics
 - b. topical benzoyl peroxide
 - c. topical retinoid creams
 - d. all of the above

Case One, Question 4



Answer: d

- Which of the following agents are effective in treating acne vulgaris?
 - a. oral antibiotics
 - b. topical benzoyl peroxide
 - c. topical retinoid creams
 - d. all of the above**

Treatment: Basic Principles



- Systemic and topical **retinoids**, systemic and topical **antimicrobials**, and systemic **hormonal** therapies are the main classes of treatment
 - The treatments for acne are directed at one or more of the 4 causative factors
 - Multiple agents are often used with activity against different pathogenic causes (e.g. topical antibiotic plus retinoid)
 - Use topical antibiotics with benzoyl peroxide to prevent the development of antibiotic resistance
- Acne scarring is difficult to treat, therefore aggressive prevention is important

Common First-Line Treatments



- Mild comedonal: topical retinoid
- Mild papular/pustular: topical retinoid, topical antibiotics, topical benzoyl peroxide
- Moderate papular/pustular: oral antibiotics with topical retinoid and benzoyl peroxide

Common First-Line Treatments



- Moderate nodular: oral antibiotic with topical retinoid and topical benzoyl peroxide
- Severe nodular: oral isotretinoin
- Scarring and keloids: oral isotretinoin

Back to Case One



Follow-up: Jim Has Called The After-hours Answering Service Very Concerned About A New Symptom Of “Dizziness”, Which Began After He Started His New Medication.

Case One, Question 5



- Which of the following treatment regimens was prescribed for Jim's acne?
 - a. Minocycline 100mg po BID
 - b. Tetracycline 500mg po once daily
 - c. Isotretinoin 1mg/kg/day divided BID
 - d. None of the above

Case One, Question 5



Answer: a

- Which of the following treatment regimens was prescribed for Jim's acne?
 - a. Minocycline 100mg po BID**
 - b. Tetracycline 500mg po once daily
 - c. Isotretinoin 1mg/kg/day divided BID
 - d. None of the above

Treatment Side Effects



- Topical agents will often dry the skin
 - Initially using retinoids and benzoyl peroxide every other day and/or with a moisturizer may lessen their irritancy
- Common side effects of oral antibiotics
 - All tetracyclines can cause GI upset (epigastric burning, abdominal discomfort, nausea, vomiting and diarrhea can occur)
 - **Tetracycline** is contraindicated in pregnancy and in children less than 10 years old
 - **Minocycline** can cause vestibular toxicity, manifested as dizziness, ataxia, nausea and vomiting
 - **Doxycycline** may produce mild-to-severe photosensitivity reactions of the skin

Isotretinoin Side Effects



- Common side effects of isotretinoin include: xerosis (dry skin), cheilitis (chapped lips), transaminitis, and hypertriglyceridemia
- Isotretinoin is teratogenic and therefore absolutely contraindicated in pregnancy
 - Female patients must be enrolled in a pregnancy prevention program in order to use this medication
 - Two forms of contraception must be used during isotretinoin therapy and for one month after treatment has ended
- There is no increased evidence of suicidality with use of isotretinoin, but mood changes are possible
- Severe headache can be a manifestation of the uncommon side effect pseudotumor cerebri

Patient Education



- Patient education and setting expectations are important components of effective acne treatment
 - Lack of adherence is the most common cause of treatment failure
 - With the patient, the physician should develop the therapeutic regimen with the highest likelihood of adherence
 - Acne treatment is only treating new lesions, not the ones already there

Patient Education



- Patients should use only the prescribed medications and avoid potentially drying over-the-counter products, such as astringent, harsh cleansers or antibacterial soaps
 - Recommend daily moisturizer when patients are using solutions and gels because they have more drying effects than creams and ointments
- Overaggressive washing and the use of particulate abrasive scrubs often exacerbates acne and should be avoided
- Cosmetics are labeled as “non-comedogenic” if they do not cause or exacerbate acne

Case Two



Ms. Emily Garcia

Case Two: History



- HPI: Ms. Garcia is a 22 year old woman who was referred to the dermatology clinic for new onset acne.
- PMH: no history or major illness or hospitalizations, no pregnancies
- Allergies: allergic to penicillin, unsure of the reaction (was very young)
- Medications: occasional multivitamin
- Family history: non-contributory
- Social history: lives in the city and attends college
- Health-related behaviors: gained 40 pounds over the past 4 years despite healthy diet and exercise habits
- ROS: new upper lip and chin hair growth, irregular menstrual cycles since menarche, last period was 4 months ago

Case Two: Skin Exam



Moderate comedonal and inflammatory acne of cheeks and jaw line. Also with scattered terminal hairs on the upper lip and lower chin.



Hair loss noted on frontal and parietal scalp.

Case Two, Question 1



- Ms. Garcia was given spironolactone and her acne improved. Why did this medication work?
 - a. the diuretic effect of spironolactone eliminated sodium resulting in less sebum
 - b. spironolactone has anti-androgenic effects
 - c. spironolactone has anti-comedonal activity
 - d. spironolactone when used appropriately has anti-bacterial activity

Case Two, Question 1



Answer: b

- Ms Garcia was given spironolactone and her acne resolved. Why did this medication work?
 - a. the diuretic effect of spironolactone eliminated sodium resulting in less sebum (not true)
 - b. spironolactone has anti-androgenic effects**
 - c. spironolactone has anti-comedonal activity (not true)
 - d. spironolactone when used appropriately has anti-bacterial activity (not true)

Case Two, Question 2



- Based on the history and exam, what is the most likely diagnosis?
 - a. Gram negative folliculitis
 - b. PCOS
 - c. Cushing Syndrome
 - d. *S. aureus* folliculitis

Case Two, Question 2



Answer: b

- Based on the history and exam, what is the most likely diagnosis?
 - a. Gram negative folliculitis*
 - b. PCOS**
 - c. Cushing Syndrome
 - d. *S. aureus* folliculitis

*Consider gram negative folliculitis in the acne patient with a long history of topical and oral antibiotic exposure

Polycystic Ovarian Syndrome



- Ms Garcia most likely has polycystic ovarian syndrome (PCOS)
 - Affected individuals must have two out of the following three criteria: (1) oligo- and/or anovulation, (2) hyperandrogenism (clinical and/or biochemical), and (3) polycystic ovaries on sonographic examination*
 - In addition to hormonal acne, increased circulating androgens also results in hirsutism
 - Women with PCOS also have a greater degree with insulin resistance which can cause acanthosis nigricans

*Based on definition from the Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group, 2004

Androgens in Acne



- In many post adolescent women, antiandrogen therapy can improve acne
 - These women have hormonal acne; their serum hormone levels are usually normal
 - Hormonal acne lesions are often perioral and along the jaw line
 - Many women report a pre-menstrual flare
- Not all women with hormonal acne are tested for hyperandrogenism
 - However, it should be considered in the female patient whose acne is severe, sudden in onset, or associated with hirsutism or irregular menses

Treatment of Hormonal Acne



- Commonly used agents to treat hormonal acne include:
 - Spironolactone 50mg -100mg daily
 - Oral contraceptives
 - The following oral contraceptives have been approved by the FDA for treatment of acne: Yaz, Ortho Tri-cyclen, Estrostep
 - There is good evidence and consensus opinion that other estrogen-containing OCPs are also effective

Case Three



MS. SHERRI JOHNSON

Case Three: History



- HPI: Ms Johnson is a 33 year-old woman who presented to clinic with “red cheeks” for the last year
- PMH: migraine headaches since childhood, ~1 per 2 months
- Allergies: none
- Medications: none
- Family history: not contributory
- Social history: marginally housed
- Health related behaviors: drinks 3 pints of vodka per day, no tobacco or drug use
- ROS: negative

Case Three: Skin Exam



Facial erythema with papules and pustules on the nose and cheeks as well as some scattered papules and pustules on the forehead and chin.

No comedones are noted.

Case Three, Question 1



- What is the most likely diagnosis?
 - a. systemic lupus erythematosus
 - b. bacterial folliculitis with cellulitis
 - c. rosacea
 - d. pellagra from niacin deficiency
 - e. seborrheic dermatitis

Case Three, Question 1



Answer: c

- What is the most likely diagnosis?
 - a. Systemic lupus erythematosus (does not present with pustules)
 - b. Bacterial folliculitis with cellulitis (pt does not have acute or systemic symptoms)
 - c. Rosacea**
 - d. Pellagra from niacin deficiency (would expect scale but not pustules)
 - e. Seborrheic dermatitis (erythematous patches and plaques with greasy, yellowish scale accentuated on the central face)

Acne Rosacea: The Basics



- Acne rosacea, also called rosacea, is a chronic inflammatory condition located at the “flush” areas of the face (nose, cheeks > brow, chin)
- Papules and pustules superimposed on a background of telangiectasias and general erythema
- More common in women
- Age of onset 30-50s (later than acne vulgaris)
- Affected persons flush easily
- Patients often report very sensitive skin

Case Three, Question 2



- Which of the following might trigger Ms Johnson's rosacea?
 - a. alcohol
 - b. heat/hot beverages
 - c. sunlight
 - d. hot, spicy foods
 - e. all of the above

Case Three, Question 2



Answer: e

- Which of the following might trigger Ms Johnson's rosacea?
 - a. alcohol
 - b. heat/hot beverages
 - c. sunlight
 - d. hot, spicy foods
 - e. all of the above**

Acne Rosacea Triggers



- Alcohol
- Sunlight
- Hot beverages (heat)
- Hot, spicy food
- If it makes you flush it can flare rosacea
 - Includes emotional stress
- Unlike acne vulgaris, rosacea is not related to androgens

Clinical Features of Rosacea



- Rosacea is typically located on the mid face including the nose and cheeks with occasional involvement of the brow, chin, eyelids, and eyes
- Patients have erythema and telangiectasias
- Patients can have papules and pustules
- The absence of comedones helps to distinguish acne vulgaris from rosacea
- Rhinophyma (W.C. Fields nose)
 - Dermal and sebaceous gland hyperplasia of the nose
- Ocular rosacea: keratitis, blepharitis, conjunctivitis



The Following Photos Illustrate Different Types of Rosacea

Erythematotelangiectatic Rosacea



Erythema and telangiectasias scattered on the nose and cheeks.

There are no papules, pustules, or comedones present.

Papulopustular Rosacea



Erythema with papules and pustules on the nose and chin.

Patient also has erythematous patches on the cheeks bilaterally.

Glandular Rosacea



Facial erythema, scattered papules, pustules and cysts on the nose, forehead, and cheeks.

This patient also has rhinophyma.

Acne Rosacea Treatment



- Most treatments are directed at specific findings manifested by rosacea patients
- All patients should use sunscreen daily
- Types of treatment include:
 - Topical products: metronidazole, sodium sulfacetamide, azelaic acid and sulfur cleansers and creams
 - Oral antibiotics for pustular and papular lesions
 - Isotretinoin is considered in severe cases (these patients should be referred to a dermatologist)
- Therapy is often long-term

Back to Case Three



Ms. Sherri Johnson

Case Three, Question 3



- Which of the following medication regimens would you use to treat Ms Johnson's rosacea?
 - a. Isotretinoin
 - b. Oral tetracycline
 - c. Topical clindamycin
 - d. Recommend reduce alcohol use
 - e. b + d

Case Three, Question 3



Answer: e

- Which of the following medication regimens would you use to treat Ms Johnson's rosacea?
 - a. Isotretinoin (rosacea not severe enough)
 - b. Oral tetracycline**
 - c. Topical clindamycin (can be used, but typically start with topical metronidazole)
 - d. Recommend reduce alcohol use**
 - e. b + d**

Case Three, Question 4



- True or False, topical and oral antibiotics are the best treatment for the erythema of rosacea.

Acne Rosacea Treatment



Answer: false

- The medical management of rosacea may not diminish the erythema
- Vascular lasers and intense pulsed light (IPL) therapy may be used as alternatives or as adjunctive therapies (for erythema and telangectasias)
- Photoprotection is also helpful in treating the erythema of rosacea
- Destructive lasers and other surgical treatments are used for treatment of rhinophyma

More on Treatment



- Topical steroids are not used in rosacea treatment
 - They exacerbate or induce an acneiform eruption resembling rosacea called “steroid rosacea”
 - Treatment of “steroid rosacea” involves stopping the topical steroids and giving oral tetracyclines
- Use caution when treating any central facial eruption with topical steroids. It may be rosacea which will flare when the topical steroids are stopped.

Take Home Points: Acne Vulgaris



- Acne vulgaris is characterized by open and closed comedones, papules, pustules, nodules, and cysts
- Include the morphology, severity and presence of scarring when describing acne
- Pathogenesis of acne vulgaris is related to the presence of androgens, excess sebum production, the activity of *P. acnes*, and follicular hyperkeratinization
- Systemic and topical retinoids, systemic and topical antimicrobials, and systemic hormonal therapies are the main classes of treatment for acne vulgaris
- Untreated acne can result in permanent scarring
- All acne treatments are associated with side effects
- Isotretinoin is an effective medication for the treatment of acne, but should be reserved for difficult to treat cases and monitored closely for side effects

Take Home Points: Acne Rosacea



- Rosacea is an inflammatory condition located on the face with erythema and telangiectasias and often papules and pustules
- Unlike acne vulgaris, rosacea does not present with comedones and is unrelated to hormones
- Topical products, oral antibiotics and isotretinoin can be used to treat the papules and pustules of rosacea, but will not reverse the underlying erythema
- All patients with rosacea should use sunscreen
- Do not use topical steroids to treat rosacea

End of the Module



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