

CHAPTER 6 (Revised March 2009)

Acne Vulgaris Charles Margolis

OBJECTIVES

- Recognize the common presentation of acne
- Understand the commonly used treatment modalities and the rationale for their use

DEFINITION

Acne vulgaris, commonly referred to as simply “acne,” is a disorder of the pilosebaceous units resulting in the formation of comedones, papules, pustules, and (occasionally) nodules. It occurs chiefly on the face and upper back and is due to overproduction of sebum within the pilosebaceous unit, increased “stickiness” of the squamous cells lining the duct, which blocks the pores, and the proliferation of a bacterium called *Propionibacterium acnes* (P. acnes).

INTRODUCTION

Acne is generally mild and significant scarring is uncommon except in severe cases. However, since lesions can affect appearance, and therefore, self-image, acne may have negative emotional consequences. Successful treatment of acne, particularly during adolescence, may be beneficial to the patient’s emotional health and may enhance the patient-doctor relationship; this is often helpful when tackling more complex adolescent health issues.

Complex hormone changes play a role in the development of acne lesions by regulating sebum production. In both genders, testosterone increases sebum production. Sebum also appears to be modulated by other hormones.

TERMINOLOGY (also see terminology in Chapter 22)

Acneiform lesion: a lesion that looks like, but is not, acne

Comedone, closed: a small follicular papule with inflammation (**red papule**) or without inflammation (**whitehead**)

Comedone, open: a dilated follicle with a central plug of sebaceous matter, often capped with dark epithelial debris (**blackhead**)

Nodule: in acne, a tender, raised, localized skin lesion usually more than 1.5 cm in diameter

Cystic lesion: the lesion seen when a nodule fails to discharge its contents into the skin

Deep pustule: the lesion seen after a nodule breaks down adjacent tissues leading to large pus filled lakes and sinuses

Nodulocystic acne: an advanced stage of acne that generally includes nodules, cystic lesions, and deep pustules and can lead to scarring

Papule: a raised lesion that is < 0.5 cm in diameter

Pilosebaceous: relating to the hair follicles and sebaceous glands

Superficial pustule: in acne, any papule on the skin surface that is filled with pus

Telangiectasia: terminal dilation of a small vessel, often appearing “spider-like”

ECONOMICS

It has been estimated that more than \$100 million dollars are spent each year on over-the-counter acne treatments, alone. The average cost of physician treated (often over months or years) acne ranges approximately \$30-\$100 for topical therapy and \$45-\$1,445 for systemic therapy. Laboratory monitoring can add another \$600 for those needing isotretinoin therapy. The use of older, generic medications may substantially reduce the cost of treatment compared with newer agents. In addition, there are the costs incurred at acne-related physician visits, estimated in 1990 to be more than 5 million per year.

BACKGROUND

Acne is the most common dermatologic problem seen by family physicians. The incidence of acne is similar in both genders, but it is often more severe in male patients. Easily visible acne is very common in adolescent males, appearing at some point in almost all of them. For females, menarche is associated with an increase in acne severity, particularly during menses. Pregnancy also can affect acne severity.

GENETICS

There is strong familial pattern to the severity of acne. Twin studies suggest that there is a hereditary component to its causation, but the precise mode of inheritance is unknown.

PREVENTION

Primary Prevention

Sunlight may affect acne, but this is controversial. Depending on the individual patient, sunlight may lead to the formation of more comedones or it may suppress the development of papules and pustules. Patients should be asked how sunlight affects their lesions and advised accordingly.

Oral contraceptives may change acne severity.

Secondary Prevention

Prevention of New and/or Advanced Lesions

Some risk factors may influence the degree of acne lesion recurrence and may be alterable.

Iatrogenic risk factors include medications such as oral contraceptives, lithium, isoniazid, phenytoin, halogenated medications, and systemic steroids (both medically appropriate and illicit use for body building).

Environmental risk factors include external oils such as those in makeup (water-based makeup is better than oil-based makeup for some patients) and cooking oils (e.g., cooks laboring over grills).

Trauma from picking at comedones, a common tendency, frequently leads to the formation of papules and pustules and should be discouraged. External compression (e.g., chin straps used by athletes, tight clothing) may also lead to inflammation of comedones.

DIAGNOSIS

Presentation

Some patients may seek medical attention for acne or present with a “complexion problem.” Other patients may not mention acne as a problem but may be pleased to hear about treatment options when the family physician offers help.

HISTORY

History of present illness

- How long has acne been a problem? The onset of symptoms is usually in adolescence in male patients. In female patients, acne often begins in adolescence, but many experience its onset after the age of twenty.
- Does anything seem to make the acne worse or better (e.g., sunlight, stress)?
- Have you been exposed to iatrogenic or environmental risk factors, (see SECONDARY PREVENTION section)?
- What **previous therapy** have you tried? Many patients have already used over-the-counter preparations, often including benzoyl peroxide. If previous treatments have been beneficial, they may be continued. If they were not beneficial, consider ascertaining the patient’s level of adherence to necessary regimens before excluding their use.
- What do you think **causes** your acne? Good place to dispel myths.
- How much of a problem has acne been for you? An assessment of the **emotional impact** on the patient is often warranted, particularly during adolescence when emotional liability is already an issue. Many patients are despondent about the possibility of getting help for acne, in some cases because of the failure of previous treatments. Always project a positive attitude about treatment, as this will encourage adherence to the medical regimen and is generally warranted by outcomes.
- Where are your acne lesions typically located?

Past medical history

The onset of puberty is relevant although it is unlikely to change to approach to therapy.

If your patient is on a medicine likely to induce or exacerbate acne (see IATROGENIC FACTORS under PREVENTION), questions here might include whether alternative treatments have been tried, and if so, what their effect was.

If your female patient is on oral contraceptives (OCs) or might benefit from being on OCs, triphasic norgestimate-containing OC formulations may be the medication of choice. Thus, consider the follows:

- Is she on OCs?
- Is she sexually active? If “yes,” does she want to be pregnant? If “no,” how likely is it she will let you or another responsible adult know *before* she becomes active?
- Does she have any problems related to her menses that might be helped with OCs?

Family history

- Is there a history of nodulocystic acne in close relatives?

Social history

Many anecdotes refer to the effect of stress on the appearance of acne lesions; however, there is no evidence from controlled studies demonstrating a relationship between stress and acne.

Ask about occupation (see Environmental Risk Factors under the Prevention section).

Review of Systems

This section of the history is not usually helpful for treatment decisions.

Physical Examination

Acne lesions are usually located on the face, upper back, and chest, in descending order of frequency. These are the locations with the greatest concentration of pilosebaceous units. The lesions include comedones (whiteheads and blackheads), papules, pustules, and nodules. Scars may also be present from previous lesions.

Laboratory Tests

Routine laboratory studies are not indicated unless severity or other physical findings suggest hormone abnormalities.

DIFFERENTIAL DIAGNOSIS

Rosacea (also called **acne rosacea** or **acne erythematos**) is a vascular-related acneiform lesion.

It occurs in adults, increasing in frequency with age and involves lesions and/or a skin flush on the central face including the nose, conjunctivae, and infraorbital areas. Telangiectasias may be seen. Comedones are rare. There are many hypothesized, thus far unproved, causes including excessive alcohol consumption.

Perioral dermatitis is often associated with current or recent past (“rebound”) overuse of topical corticosteroids on the face. It usually appears as papules and/or pustules on erythematous bases, most commonly around the mouth and in the nasolabial folds.

Folliculitis appears as pustules surrounding a hair. Each of the pustules is surrounded by a reddish halo.

THERAPY

Acne is usually simple to treat and commonly and generally easily managed by family physicians. Treatment should be offered to all patients with the condition. Therapy “failures” are often secondary to poor adherence to the required regimen, so carefully explore that issue before moving to the next step.

Nonpharmacologic Therapy

Education about the factors that do, and do not, contribute to acne development is highly important. Printed educational materials are widely available and should be used to supplement verbal advice.

Diet appears to have little, if any, effect on the frequency or type of acne lesions present.

There are many myths about the factors that are considered likely to cause acne, including chocolate, dirt, and masturbation. Dispelling these myths is useful so ask your patient what she or he thinks has made it worse.

Pharmacotherapeutics (Table 6–1)

Topical medications are often effective and should be tried before systemic medications, which may have greater side effects and risks. It is important to apply anti-acne medication in a thin film and spread it over the entire area where acne lesions *may* occur, not just where the lesions are currently present. In order to minimize side effects, the initial applications may need to be less frequent.

TABLE 6–1. Acne Pharmacotherapy

Medication	Comments	Side Effects
<i>Benzoyl peroxide*</i>	<i>Available without a prescription, first-line treatment</i>	<i>Redness, irritation</i>
<i>Salicylic acid</i>	<i>Available OTC</i>	<i>Redness, irritation</i>
<i>Topical antibiotics</i>	<i>As effective as oral antibiotics, hard to apply to the back</i>	<i>Redness, irritation</i>
<i>Topical retinoids</i>	<i>Especially effective for comedones</i>	<i>Redness, irritation</i>
<i>Oral antibiotics</i>	<i>Convenient, use when topical treatments fail</i>	<i>Mild nausea, may affect OC efficacy (many, rare, others)</i>
<i>Oral contraceptives OCs</i>	<i>May have other positive therapeutic effects, often as effective as other medications (noted above)</i>	<i>Mild nausea, headaches (many, rare, others)</i>
<i>Oral isotretinoin</i>	<i>Highly effective, benefit often prolonged. If pregnancy possible, use only with highly effective birth control</i>	<i>Many frequent Highly teratogenic Blood draws needed</i>

Topical benzoyl peroxide

Some patients use over-the-counter benzoyl peroxide before consulting with a physician, having heard from peers, family, the media, or pharmacists about its efficacy. Benzoyl peroxide gel, commonly used in a 5% or 10% over-the-counter concentration, is often quite effective in decreasing colony counts of *P. acnes*. Thus, if your patient has not tried this fairly safe alternative, consider it as your first choice.

Benzoyl peroxide works best for open comedones (**blackheads**). Some individuals are intolerant of benzoyl peroxide, developing contact or irritant dermatitis. Sometimes this is caused by using too much too soon.

When used alone, benzoyl peroxide is commonly applied once daily to cleansed areas. If no negative irritation is present after several days to 1 week, applications can be increased to twice daily. Three applications daily is a safe regimen, but few patients tolerate three applications or can adhere to the schedule. It is important to counsel patients that benzoyl peroxide can bleach clothing, so many patients prefer to use it at night.

Follow-up times are variable but commonly the next visit is set for five or six weeks after the highest tolerable dose began.

Salicylic Acid is an OTC agent that can be used to treat mild to moderate comedonal or papulopustular acne. It works by increasing epithelial cell turnover and preventing the formation of comedones. It is available most commonly as a face or body wash.

Note

When a follow-up visit is suggested, keep in mind that skin turnover takes approximately 1 month.

Topical antibiotics

Some topical antibiotics (e.g., clindamycin, erythromycin, metronidazole) also decrease colony counts of *P. acnes*. If benzoyl peroxide does not achieve appropriate results, many clinicians discontinue benzoyl peroxide and prescribe a topical antibiotic. It is generally recommended that topical antibiotics be used twice daily. The use of these agents may be associated with dryness, erythema, or peeling of skin. A newer antimicrobial is azelaic acid 20% cream and it has been shown to achieve efficacy equal to older products, including oral antibiotics.

Antibiotics Plus Benzoyl Peroxide

Some clinicians add the topical antibiotics to the benzoyl peroxide either once or twice daily. Although it is generally less expensive to use the individual medications, one can prescribe one gel that includes both a macrolide antibiotic and benzoyl peroxide.

Topical Retinoids

Three topical retinoids, which are Vitamin A analogs, have been used against closed, comedonal acne (whiteheads). The one most commonly used is tretinoin. Tretinoin reduces squamous cell stickiness and proliferation. It may be used in combination with antibacterial agents. Skin irritation may limit its use particularly in fair-skinned individuals. For this reason, dosing starts slowly with every other day use progressing to daily use and higher concentrations as tolerated. Tretinoin creams are less irritating than gels. Apply at night, and watch for hypersensitivity to sun in warm months. Because retinoids have a different mechanism of action from antibiotics, it is often especially effective to combine the use of retinoids with antibiotics. Two other retinoids currently available are adapalene 0.1%, available as a cream, gel, and solution, and less irritating than tretinoin, and tazarotene 0.1%, cream or gel, which may be more effective than tretinoin.

Note

Tretinoin treatment often needs 3-4 weeks to see positive effects. It prevents the formation of new lesions rather than clearing up old lesions.

Oral antibiotics

Oral antibiotics are more convenient to use than topical medications, especially when acne is located on the back. They achieve their benefit through antimicrobial and antiinflammatory actions. Tetracycline is the most commonly used oral antibiotic. The most common dose is 500 mg twice daily, although daily doses can range from as low as 250 mg to as high as 2 g. Erythromycin, trimethoprim-sulfamethoxazole, doxycycline, and minocycline may be used as well. Some evidence favors minocycline as being more potent than other oral antibiotics. There are reports of increasing resistance of *P acnes* to antibiotics. Using other agents in combination with antibiotics may reduce antibiotic resistance.

Note

Tetracyclines are contraindicated in pregnancy. Any female of childbearing age should be carefully screened and educated about their use. Many clinicians will only prescribe tetracyclines for males, or females on adequate birth control.

Oral contraceptives

A triphasic norgestimate-containing OC formulation appears from several studies to be as effective for moderate acne as benzoyl peroxide, the topical or oral antibiotics, or tretinoin. On the other hand, although the combination oral contraceptives, (i.e., contain both an estrogen and one of several different progestins) that have been evaluated in placebo-controlled trials have been found to be effective in reducing inflammatory and non-inflammatory facial acne lesions, how they compare to standard acne treatments is unknown.

This is particularly important to keep in mind for patients already on oral contraceptives. However, some clinicians recommend them for patients who are not already taking OCs if other areas of their health may benefit from OCs (see PAST MEDICAL HISTORY section). Anti-androgenic agents such as spironolactone have also been found to be useful in acne, although they are not commonly used.

Isotretinoin

Isotretinoin, an oral medication related to tretinoin, is useful in severe or treatment-resistant cases of acne (e.g., nodulocystic lesions that may lead to scarring if not adequately treated). Side effects occur with high frequency and in wide variety. They include xerosis, epistaxis, arthralgias, elevated triglyceride and lipid levels (requiring frequent blood test monitoring), teratogenic effects, and pseudotumor cerebri. Consequently, it is advisable to exhaust the other options available for treatment before starting treatment with isotretinoin. A summary of acne medication can be found in Table 6-1.

Note

The potential fetal abnormalities associated with isotretinoin use are so severe that most physicians do not prescribe isotretinoin to females unless they are taking very reliable birth control.

URGENCIES & EMERGENCIES

Highly inflamed lesions can be associated with emotional turmoil in some adolescents. In cases where quick response to treatment is desired, as in the case of a teenager wishing to attend an important high school dance, it may be appropriate for experienced practitioners to employ intralesional injections of corticosteroids.

SPECIAL POPULATIONS**Children****Newborn Acne**

“Neonatal” or “infantile” acne is often due to the relatively high androgen levels arising from the adrenal glands in either sex, or the testes in boys. This is a self-limiting condition that usually resolves spontaneously within a couple of months. Thus, reassurance is usually the treatment of choice.

Pregnancy

Acne tends to improve during the second and third trimesters, and to flare after delivery or weaning.

- **Isotretinoin** is highly teratogenic. Even topical tretinoin use should be discouraged during pregnancy because of concerns about possible teratogenicity.
- **Tetracycline** may stain the teeth of the fetus, particularly during the first trimester. Some large studies have suggested strongly that tetracycline is less of a fetal threat than once thought, but it should be avoided until further researched.
- **Sulfas** may cause kernicterus during late pregnancy.

Seniors

The persistence of inflammatory acne beyond 50 years of age is unusual, although occasionally older patients will have comedones, often located on the temples. These respond well to tretinoin treatment.

REFERRALS

Referrals to dermatologists for acne management are rarely necessary, although some family physicians less familiar with the treatment of difficult cases commonly refer acne patients to dermatologists. Patients also may request referral to a dermatologist, feeling that acne is a problem requiring a specialist. In most cases, an explanation of the simplicity of treatment is often helpful in continuing care by the family physician.

REFERENCES

Russell JJ: Topical therapy for acne. *Am Fam Physician* 61:357–365, 2000.
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