Problems in Family Practice

Alopecia: A Systematic Approach to Diagnosis and Therapy

Larry E. Millikan, MD
Columbia, Missouri

Alopecia is a difficult problem for the physician. It is a common reason for specialist referral because of frustration with the complexities of etiology, the impatience of the patient, and often some uneasiness of diagnosis in the mind of the physician. The concern for possible serious underlying causes, and the relative expense required to rule these out also play an important role in the early referral of these cases. The vast majority of these cases do not reflect serious disease and so do not require expensive work-ups. Through a systematized approach, they can be easily taken care of by the patient's primary physician. This paper presents a practical approach for the busy physician to deal with this problem quickly and easily in a systematic manner that minimizes the possibility of overlooking serious problems and defines the level of investigation necessary in most cases.

Alopecia means loss of hair and does not connote any specific etiology. This paper is aimed at developing an approach to the rapid sorting of cases of alopecia to allow an early estimate of the significance of the alopecia, and of the cost involved in completing the work-up. The most important step in diagnosis, careful history taking, will be stressed. Only in rare cases of alopecia are expensive and sophisticated tests as well as specialist consultation needed, and often there is no definitive therapy available. The vast majority of instances of alopecia, however, can be dealt with definitively without referral.

History

Careful history taking is extremely important in the evaluation of alopecia, for few agents can cause alopecia in a short period of time. The hair loss caused by drugs may take place as many as eight weeks after use of the agent.

Alopecia is a source of profound emotional concern to men and women alike. Careful history taking must distinguish those patients in whom an emotional problem preceded the alopecia from those in whom the emotional difficulties merely reflect the patient's reaction to sudden hair loss, its cosmetic effect, and the patient's loss of self-image. After initial attention to the emotional tone of the patient to allow for careful analysis of the subsequent historical items, one should carefully document significant recent items in the patient's history that may be a key to the pathogenesis.

Normal Hair Growth

To approach the history properly, a very brief review of hair physiology and metabolism is in order. The growth cycles of the scalp hairs are dyssynchronous. The average scalp hair grows approximately 0.35 mm a day (about one inch per month). This is the average rate of growth in the young adult, and it decreases with age. From the average growth rate, one can appreciate the length of time of hair growth in a young girl whose hair is waist-long. An individual hair in the growth phase may continue for a long time, usually four to six years or longer. This is followed by cessation of growth (rest phase) with the single hair shedding in from six weeks to six months after the rest phase has started.

The amount of hair on the scalp at a given moment in time is the direct result of the interrelationship between the growth, resting, and loss phases of all the hair. A graphic example of this may be seen in pregnancy. Elevated hormone levels in pregnancy prolong the life of existing scalp hairs but new hairs continue to appear at the same rate, resulting in a net increase in hair. This stimulus ceases after delivery. The hairs that have had a prolonged life span are nearly all lost at the same time, sometimes resulting in a rather dramatic loss of hair in the postpartum period. In the same manner, oral progestational hormone therapy can result in changes of the hair cycle, resulting in synchronization of the cycles, with loss of many hairs at the same time. More commonly, various drugs can cause significant changes in the hair cycle (Table 1). Some drugs, such as the anticoagulants, cause an acceleration of the changeover from growing to resting hairs resulting in a decrease in the formation of new hairs and an accelerated loss rate. Chemotherapeutic and cytotoxic agents can have an effect on the hair papilla. In very high doses, many of these drugs directly kill growing hairs with a resultant rapid hair fall. This is especially true with thallium and cyclophosphamide. Radiotherapy of the

From the Division of Dermatology, Department of Medicine, University of Missouri Medical Center, Columbia, Missouri. Requests for reprints should be addressed to Dr. Larry E. Millikan, Division of Dermatology, University of Missouri Medical Center, Columbia, Mo 65201.

Table 1. An Approach to Diagnosis in Alopecia

History

Common Causes by Age

Childhood/Prepubescent – tinea, alopecia areata, trichotillomania
Adolescent – alopecia areata, trichotillomania
Post Adolescent – male or female pattern baldness
Middle Age – drugs, illness
Old Age – physiologic, drugs

Time Sequence

Illness

Acute febrile illness with high fever

Drug

Thallium, anticoagulants – heparin, coumarins, dextran (see Table 2)

Trauma

Hereditary

Examination

Scalp

Scarring alopecia – acne necrotica miliaris, dissecting cellulitis, lupus erythematosus (discoid, systemic), lichen planus, post traumatic, post burn, post x-ray, hot comb alopecia, and post kerion

Nonscarring alopecia – tinea, alopecia areata, trichotillomania, alopecia neoplastica (tumor metastasis)

Hair shaft

Pohl-Pincus mark (post metabolic or drug insult) – associated with
Beau's line in the nail
Acquired trichorrhexis nodosa
Monilethrix
Tinea
Alopecia areata – exclamation-point hair

scalp in high doses can give this very same picture. Lower doses of cytotoxic drugs or x-irradiation may only temporarily interfere with the metabolism of the hair papilla. This will cause a temporary diminution in growth and constriction of the diameter of the hair shaft as the hair grows out. This same phenomenon occurs in the nails resulting in transverse grooves called Beau's lines. Careful examination of both hair and nails should detect this apparent drug effect. Examination of the nails is important in patients with alopecia for the nail plate, although damaged, is rarely shed in drug induced hair changes, but the hair shaft may be weakened in areas of constriction (called the Pohl-Pincus line) and the hair may break off at scalp level. Correlation between the length of the remaining hair stub and the groove on the nail confirms drug effect on the hair papilla. Severe systemic illness can cause the same type of hair and nail changes. This was common in the days of typhoid fever and other illnesses associated with very high fever and resulted in formation of Beau's lines and the Pohl-Pincus mark or, in severe cases, dramatic hair fall about 6 to 12 weeks after the illness. The high metabolic demands of the illness have an important effect on the cellular turnover in the follicle.

Many cases of alopecia result from a subtle alteration of the normal physiology of hair. With a careful examination and knowledge about the rate of hair growth and nail growth, one can accurately pinpoint in time the pertinent metabolic and chemical insults, and this will give clues to the etiology of the alopecia.

Because of the importance of timing in the effect of various agents on hair growth, a carefully documented history sequentially arranged on paper is often useful to the clinician in sorting out the many possible causes for the alopecia. This is especially true when patients are on multiple drugs. With delineation of all these factors by taking a careful history, one may often reach some tentative conclusions as to the etiology of the alopecia, even prior to examination of the scalp.

Examination

Examination is the next step in the evaluation of the patient. Since one can differentiate the scarring from the nonscarring types of alopecia, the examination should initially concentrate on the scalp. Important points to be considered on examination are the distribution of the alopecia, localization to unusual sites, and the presence or absence of scarring. Certain types of alopecia can result from pressure or trauma, and these are quite apparent from the distribution of the alopecia. Hereditary types of alopecia also have characteristic localizations, such as in the bitemporal areas. During the examination of the scalp, changes such as erythema, edema, and the presence of multiple pustules, would suggest a deep folliculitis (acne necrotica miliaris) or some other associated scalp disease amenable to treatment. Severe scarring of the scalp may be associated with significant post inflammatory hypopigmentation in dark-skinned persons. This suggests systemic disease (Table 3) or severe local scalp disease such as dissecting cellulitis or kerion.

Physical trauma is a frequent and important cause of hair loss and a pattern in the hair decrease may be useful in the diagnosis of a traumatic alopecia, such as that related to hot comb treatment, rollers, pincurls, excessive use of waving lotions, bleaches, thermal or electric burns, local trauma, factitial trauma, or x-ray.

Further Diagnostic Procedures

When the scalp is normal, attention must be focused upon possible defects within the hair itself. A quick screening examination should be done with the Wood's lamp. This will immediately detect any alopecia related to a fungus which fluoresces. In the young patient *Microsporum audouinii* is a common offender. Fungal infection weakens the hair shaft structurally, with resultant breaking off of the hair and clinically apparent alopecia. Upon examination

of the scalp with the Wood's lamp, the broken off hair shafts in the patches of alopecia may fluoresce a bright green. Green fluorescence is found in most non-inflammatory *Microsporum* infections. In the adult, tinea capitis is often associated with a more inflammatory reaction which in many cases does not fluoresce. Fungal infections should be suspected in nonscarring alopecias in younger patients. It is rare to see permanent alopecia from the non-inflammatory forms of tinea capitis. In contrast, the more inflammatory forms of tinea capitis (also called kerion), seen in some children and in many adults, cause localized alopecia that may go on to scarring with permanent hair loss. Early treatment of the inflammatory element of tinea is most important in preserving normal hair.

Upon completion of the Wood's lamp examination, several hair shafts should be carefully inspected. Obvious structural defects may become apparent upon examination under magnification with a loupe or dissecting microscope. Most congenital structural defects in the hair shaft are associated with long-term and symmetrical hair loss. It is unusual for these to cause localized hair loss or hair loss of short duration that would bring the patient in to see the physician. However, some congenital disorders may be aggravated by the use of certain chemicals and could result in a sudden worsening of a chronic alopecia. Examination of the scalp hair may also discover acquired structural damage such as trichorrhexis nodosa, a fracture of the shaft caused by permanents, hair dyes, bleaches, or rubbing of the scalp. Other unusual hair shaft defects have been described,[1] but it is beyond the scope of this article to discuss these rare abnormalities.

In most cases, scarring alopecia may require biopsy to obtain further data leading to confirmation of the diagnosis. Tissue examination may permit further identification of various types of scarring alopecia (Table 3). Biopsy is also sometimes helpful in the differentiation of nonscarring alopecias. For example, the characteristic histological picture seen in alopecia areata consists of a lymphocytic inflammatory infiltrate surrounding the dermal papilla and is diagnostic. Changes associated with trichotillomania are also said to be characteristic.[2] The trauma associated with compulsive hair pulling may result in a characteristic microscopic hemorrhage and other subtle changes. Therefore, in some cases, biopsy and pathologic confirmation may be very useful in the establishment of a diagnosis.

Upon completing the history, examination, and other diagnostic methods which have been described, the diagnosis for the vast majority of types of alopecia can be made. By exclusion, there remain the most common causes of nonscarring alopecia, hereditary baldness, alopecia areata, and trichotillomania. Trichotillomania may present as either nonscarring or scarring alopecia but often is difficult to differentiate from alopecia areata. A biopsy may be helpful in alopecia areata, and careful examination may reveal the so-called "exclamation-point" hairs present at the edge of an enlarging patch.[3] This hair is most characteristic, possessing a pigmented shaft, with a brush border on the distal end, and distinctive narrowing as one approaches the hair bulb which forms the dot at the bottom of the exclamation point. Here again, an examination of the nail is in order. Most characteristically, one may see diffuse pitting of the nails. This appears in a regular, grid-like pattern on the nails in many cases. Nail pitting in alopecia areata is suggestive of a systemic basis for this idiopathic disorder. However, one does not see this organized, grid-like pitting in all cases. Pitting may be minimal, random, or even absent in some cases of alopecia areata. It is important in alopecia to examine the entire affected area and to pluck hairs from several areas near the lesions to examine for exclamation-point hairs. If hairs can be plucked very easily from the periphery of an enlarging patch, this suggests that the process is still in active progression. One can follow the disease by this means to determine the rate of progression or regression of the disease. Exclamation-point hairs are not found in trichotillomania and removal of perilesional hair is not as easy as in alopecia areata. Biopsy may be necessary to differentiate the two conditions.

The genetically determined alopecias are common, but rarely reach the physician as a major complaint. Male pattern alopecia presents as fronto lateral thinning which becomes evident in the late teens and progresses to varying degrees of baldness, often involving the crown. In the woman, in contrast, hereditary thinning seems to occur primarily on the vertex of the scalp and usually does not go on to areas of total baldness. In these cases, all diagnostic efforts mentioned above will be negative or normal. But hereditary alopecias are easily recognized by the patterns they form on the scalp. A careful history will often substantiate baldness as a hereditary factor. The prime concern of the physician in these cases is to rule out other possible associated conditions that may accelerate the genetic tendency toward baldness. The hereditary alopecias seem to be of less concern to patients, however, than sudden localized forms. Most patients want to be reassured that they have common male baldness and sadly accept the fact. Some, unfortunately, seek out every quick promise of cure.

Table 2. Drugs and Hair Loss

Destruction of Growing Hairs

X-ray (high dose)
Cyclophosphamide
Thallium
High doses cytotoxic drugs

Damage to growing hairs

X-ray (low dose)
Colchicine
Cytotoxic drugs
Methotrexate

Shortening Hair Cycle

Androgens*
Birth control pill?
(progestin dominant)
Heparinoids
Coumarins
Vitamin A (this is
likely mechanism)
Methysergide
Dextran

Lengthening Hair Cycle

Estrogens*

Occasional Causes
(mechanisms unclear)

Quinicrine
Quinine
Thiouracil compounds
Allopurinol
Tridione

*affect only hairs that are susceptible

Table 3. Scarring Alopecia

Infection

- Kerion
- Acne necrotica miliaris
- Dissecting cellulitis
- Other chronic infections
- Herpes zoster
- Tertiary syphilis

Physical

- Trauma
- Burn
- Hot comb
- X-ray
- Factitial

Systemic Disease

- Lupus erythematosus
- Lichen planus

Therapy

In alopecia, the primary effort should be aimed at diagnosis. Once the diagnosis is established, appropriate therapy is often self-evident. In generalized alopecia related to toxic or metabolic changes, reassurance is all that is necessary once the etiologic agents have been removed. The scarring alopecias often are due to active underlying diseases or inflammatory processes (Table 3) in which appropriate therapy is quite important. Prevention of further scarring will prevent progression of the alopecia. In most instances, correction of the underlying disease is the appropriate means of preventing further scarring. Lichen planus and lupus erythematosus are examples of diseases in which appropriate intralesional steroid therapy is necessary to control the progressive scarring. This will decrease the inflammatory response resulting in follicle destruction. Steroids may also be useful in the acute phase of physical insult from trauma, burns, etc. In some cases of small areas of localized scarring, we feel that hair transplantation may be beneficial. In a young child who has a patch of scarring alopecia from some physical injury, early hair transplantation will restore hair to the area and markedly minimize the psychological stigma.

The most rewarding types of alopecia to treat are those caused by fungal infections. Today there are effective agents for the treatment of these infections. The active site of fungal growth is just within the follicle orifice, out of reach of most topical agents. Therefore, treatment requires the use of griseofulvin, which has all but eliminated the need for x-ray epilation as an approach to the treatment of tinea capitis. Early adequate treatment with griseofulvin in recommended dosages will rapidly eradicate the fungal infection. In cases of large epidemics a one-dose regimen using 1.5 gm of griseofulvin in the single dose has been found effective. In general, however, we treat such patients for three weeks with daily griseofulvin therapy. Dosages vary with the age and weight of the patient. Griseofulvin is best absorbed with lipids and therefore should be given with a fatty meal.

In inflammatory tinea capitis, the use of griseofulvin given with systemic steroids is suggested to reduce the inflammatory reaction. The dosage of steroids varies with the severity of inflammation, but we generally recommend steroid therapy in a dosage of 1/2 mg per kg every other day. This is sufficient to decrease inflammation and minimize scarring, and gives the best prognosis for the growth of hair within the involved area. Alternate-day steroids also minimize side effects related to corticoid therapy.

Trichotillomania and alopecia areata have a strong psychogenic component. It is in this area that the family physician, who has a keen awareness of family interrelationships, may play a key role in therapy. It is seldom adequate to treat such patients with medication alone. The whole family must be taken into consideration, with suitable guidance from the physician. Trichotillomania may clear without any residua, if care is taken to avoid the scarring that is possible from secondary infection and manipulation of the areas of trichotillomania.

While alopecia areata is considered to have a strong psychogenic overlay, there are many cases in which one can find no significant psychopathology. It is important to check carefully with the family regarding emotional problems that could be associated with alopecia areata. Correction of these is the first step in therapy. If no obvious psychopathology or precipitating factor can be found, then it is appropriate to treat these patients with drugs. The benzodiazepine group of ataractics has been used quite frequently in the treatment of alopecia areata. These may be given in standard dosages. Appropriate therapy with topical or intralesional corticosteroids to the involved area is indicated in all cases, at least as an initial trial. Steroids may decrease the lymphocytic component of the inflammation and permit the regrowth of the hair. The response, however, is often only temporary and both the physician and the patient should be aware of this. Intralesional steroid injection done with a #25 to 30 gauge needle or the Dermojet applicator is useful in small areas of localized alopecia. In patients who have generalized alopecia of the universalis or totalis type, it would be impractical to inject enough steroid to obtain significant changes. In these cases, early education of the patient toward the use of a wig is important. Those patients who have significant loss of eyebrows and eyelashes might be candidates for oral alternate-day steroids. While the regrowth of scalp hair is slow and often ineffective, there can be gratifying results with regrowth of the eyebrows and eyelashes. We believe that therapy should be aimed at the regrowth of these cosmetically vital areas, and education of the patient in the proper wearing of a wig to cover the scalp defects is often appreciated by patients. *Steroid therapy should only be considered when it is aimed at directing the regrowth of certain localized areas like the eyebrows and eyelashes.*

Male pattern and female pattern baldness respond to no therapy at the present time. Hormones and steroids have been tried and, at best, give a feeble, temporary fuzz-like response. Their use is mentioned only to condemn the practice. Therapy in male and female pattern baldness is aimed at secondary factors that may be associated with acceleration of the process. Appropriate treatment of significant seborrhea is important in minimizing or slowing the rate of hair

loss. Careful avoidance of many of the potent chemicals used in beauty parlors may be important for the woman whose hair loss seems to be accelerating. The last decade has seen a dramatic advance in the use of hair transplants in the treatment of male pattern baldness. This indeed seems to be a reasonable approach in those patients who feel significant impact from baldness. Hair transplantation is a tedious and very expensive process. Therefore, we feel that it is indicated in those forms of localized childhood alopecia or in those patients with male pattern (genetic) alopecia in which there are severe psychologic sequelae stemming from the baldness. The transplanted hair seems to respond as its donor site. Hairs taken from the nuchal area tend to retain their hair growth and function for the rest of the patient's life. This method has been a breakthrough for patients with localized scarring alopecia and for those with male or female pattern baldness who have the means and the desire to undergo this tedious, expensive, and difficult process.

Lastly, another of the most treatable of these forms of alopecia are the acne variants. Dissecting cellulitis of the scalp responds in many cases to therapy with systemic tetracyclines. Most of the local scrubs of the scalp with various antibacterial agents also may be of use. Acne necrotica miliaris, which is a localized acneiform eruption in the hair follicles also responds to low dose tetracycline which minimizes the intensive pruritus, decreasing trauma and scarring, and stops the progression of the alopecia.

The practicing physician now has available appropriate therapy for many of the causes of progressive alopecia. In those cases where there is no easy cure, it is important that the physician makes an early diagnosis. In those cases that respond to therapy, early treatment will minimize the potential for scarring and resultant cicatricial alopecia. Equally important is the physician's role in helping the patient learn the cause of his hair loss. Only he can save the patient from the ranks of the many who spend vast amounts of time and money seeking cures for their incurable problem. If the physician can teach the patient to accept the reality of his hair loss, he has done a real service.

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