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PRINCIPLES OF CLINICAL DIAGNOSIS

GENERAL

- Diagnosis of cutaneous disorders in infants and children requires careful inspection of skin, hair and nails
- Skin disorders of infants are different from skin disorders in adults
  1. For example, erythema toxicum neonatorum is only seen in newborns
  2. Skin of a young child tends to form blisters more easily (e.g. insect bites or mastocytomas)
- Determining morphology of skin lesions, their color and distribution will help generate a differential diagnosis

HISTORY

- Take a thorough history of events surrounding the skin disorder (Table 1.1)
  1. This includes the patient's age, race, sex, details of previous treatments and duration of the problem
  2. Focus attention on the particular morphology
  3. Physicians should be sensitive to the anxieties that parents might have and address these issues appropriately
     a. While taking a family history, note whether a family member has a similar but more severe disorder that may cause concern (e.g. psoriasis). Talking about these issues will let the parent know that you understand their concerns
  4. Developmental aspects, previous illnesses and previous surgery are important points in the history
  5. Newborn history should include the prenatal period, pregnancy and delivery

Table 1.1 Interviewing and treating pediatric dermatology patients

1. Children are different from adults. Learn the differences.
2. Approach patients cautiously. Sit across the room and talk to the parents before examining the child. This gives them time to 'size you up'.
3. Speak directly to the child as if he/she understands what you are saying. Make eye contact with the child.
4. Keep the parent in the room for procedures as much as possible unless it interferes with the procedure or the parent wishes to step out of the room.
5. Conservative management is best. Try to use the lowest effective dose of medication for the shortest time.
6. Avoid new therapies which do not have a proven track record in pediatrics until adequate clinical trials are performed.
7. Do not use treatments which may decrease growth or mental development.
8. Anticipatory guidance and emotional support are helpful especially in chronic disorders (e.g. alopecia areata, atopic dermatitis).

Adapted from Honig PJ. Potential clinical management risks in pediatric dermatology. Risk Management in Dermatology, Part II. AM Medica Communications LTS: New York, 1988: 6

   a. Maternal history may quickly lead to a diagnosis in some cases (e.g. maternal HIV or systemic lupus erythematosus)
6. Evaluation of young children requires a modified approach, depending upon the age of the child
   a. Establish a positive relationship with not only the parent but also the child
   b. Gain eye contact with the child at his own level. This is less threatening than standing over him in an intimidating manner
   c. Sit and talk to the parents without making any movements toward the young child. This allows time for him/her to observe your actions ('size you up') before speaking with them directly
   d. Refrain from using a loud voice or touching the child until he feels comfortable. These are techniques which pediatricians know very well
   e. Allow the child to play with small toys in the room. This is a way to distract him and allows one to observe his interactions, which could help with developmental history
   f. Obviously, young children cannot always answer specific questions. However, carefully observing the child may reveal answers to questions not even asked (e.g. observing scratch marks on a 6-month-old child obviates the necessity of asking whether the child is scratching)
7. School age children (5–10 years) can answer questions directly and are sometimes very informative
   a. Engaging them in conversation about school or an interest, such as a pet, may put the child at ease quickly
8. Adolescents can give a history and should be given instructions, giving the adolescent the ability to take care of his own skin, demonstrating his maturity and ability to care for his own health

PHYSICAL EXAMINATION

- Include the entire skin surface including hair, nails and oral mucosa
- Adequate lighting is important, preferably natural lighting through a window
   1. Additional lighting with high-intensity examination lights
   2. Side-lighting may demonstrate subtle elevations or depressions
- A magnifying glass may enlarge tiny variations of the skin
- Examination of the genitalia should not be overlooked; have an assistant or parent in the room, not only for the comfort of the patient but also for legal purposes
- Mucous membranes should also be examined, specifically looking for ulcers, white spots or pigmented lesions that may reflect a primary skin disorder
- Teeth should be examined for evidence of enamel dysplasia (pitting), infection or general hygiene

TERMINOLOGY

- The description of lesions is important to help determine whether lesions are primary (initial) lesions or secondary lesions
- Primary lesions are *de novo* lesions which are most representative of the disorder (Table 1.2)
- Secondary lesions occur with time and demonstrate other changes (Table 1.3)
- Configuration describes the pattern of lesions on the skin (Table 1.4)
- Distribution describes where the lesions are found. Examples: localized, generalized, patchy, symmetric, asymmetric, segmental, dermatomal, or following Blaschko lines
- Number of lesions: single, grouped or multiple
- Color of lesions: red, pink, blue, brown, black, white, yellow or a variation of these colors (Table 1.5)
- Regional patterns if lesions are found primarily in a certain distribution (Table 1.6). Examples: photosensitive eruptions are seen on the face and arms with sun exposure; tinea versicolor tends to be on the upper chest and back

DISEASES

- In a pediatric dermatological practice, 35 diseases account for more than 90% of the diagnoses seen in patients (Table 1.7)

Table 1.2 Primary lesions

Primary (initial) lesions	*Description*
Macule	Flat; any change in color of the skin < 1 cm in size
Patch	Flat lesion > 1 cm in size
Papule	Solid elevated lesion < 1 cm diameter; greatest mass above skin surface
Nodule	Solid elevated lesion > 1 cm diameter; greatest mass below skin surface
Tumor	Solid elevated lesion > 2 cm diameter; greatest mass below skin surface
Plaque	Raised, flat, solid lesion > 1 cm; may show epidermal changes
Wheal	Raised, solid, edematous papule or plaque without epidermal change
Vesicle	Fluid-filled (clear) < 1 cm diameter, usually < 0.5 cm
Bulla	Fluid-filled (clear) > 1 cm diameter
Pustule	Vesicle or bulla with purulent fluid
Cyst	Cavity lined with epithelium containing fluid, pus, or keratin
Comedone	Plugged sebaceous follicle containing sebum, cellular debris and anaerobic bacteria
Petechiae	Extravasated blood into superficial dermis appearing as tiny red macules
Purpura	Extravasated blood into dermis and/or subcutaneous tissues associated with inflammation; may or may not be palpable

Table 1.3 Secondary lesions

Secondary lesions	*Description*
Crust	Collection of dried serum, blood, pus and damaged epithelial cells
Exudate	Moist serum, blood or pus from either an erosion, blister or pustule
Eschar	Dark or black plaque overlying an ulcer; seen in tissue necrosis
Scale	Dry, flaky surface with normal/abnormal keratin; present in proliferative or retention disorders
Lichenification	Accentuation of normal skin lines caused by thickening, primarily of the epidermis, due to scratching or rubbing
Excoriation	Localized damage to skin secondary to scratching
Erosion	Superficial depression from loss of surface epidermis
Ulcer	Full-thickness loss of epidermis, some dermis and subcutaneous fat, which results in a scar when healed
Fissure	Linear crack in the skin, down to the dermis
Atrophy	Thinning or loss of epidermis and/or dermis Epidermal atrophy may be very subtle, showing only fine wrinkling of the skin with increased underlying vascular prominence Dermal atrophy shows little if any epidermal change but shows depressions, reflecting loss of dermis or subcutaneous tissue
Scar	Healed dermal lesion caused by trauma, surgery, infection
Papillomatous	Surface with minute finger-like projections
Friable	Skin bleeds easily after minor trauma
Pedunculated	Papule or nodule on a stalk with a base usually smaller than the papule or nodule
Filiform	Finger-like, usually associated with warts on the face

Table 1.4 Configuration of skin lesions

Configuration	*Description*
Annular	Round lesion with an active margin and a clear center (e.g. granuloma annulare, tinea corporis)
Linear	Lesion occurring in a line (e.g. poison ivy dermatitis, excoriations)
Grouped	Lesions of any morphology located close together (e.g. molluscum)
Target	Dark, dusky center with erythematous border and lighter area in between (e.g. erythema multiforme)
Arciform	Semicircular
Gyrate/polycyclic	Lesions which were annular and/or arched and have moved and become joined
Serpiginous	Snake-like margins (e.g. urticaria, creeping eruption)
Herpetiform	Appearing like an eruption of herpes simplex virus with tightly grouped vesicles or pustules (e.g. dermatitis herpetiformis)
Zosteriform/ dermatomal	Following a dermatome (e.g. herpes zoster)
Segmental	Following a body segment (e.g. hemangioma)
Reticulated	Net-like pattern (e.g. livedo reticularis)
Umbilicated	Surface has round depression in center (e.g. molluscum contagiosum)

Table 1.5 Other descriptive terms

Characteristic	*Examples*
Color	Pink – caused by increase in blood flow or interstitial fluid Red – caused by increased blood or dilated blood vessels Purple – caused by increased blood or dilated blood vessels Violaceous – lavender, bluish pink Depigmented – complete loss of pigment Hypopigmented – partial loss of pigment Brown – increase in melanin in epidermis Gray/blue – increase in melanin in dermis or subcutaneous tissue Black – intensely concentrated melanin Yellow – associated with lipids or sebaceous glands
Border	Circumscribed – limited in space by something drawn around or confining an area Diffuse – spreading, scattered
Palpation	Smooth – surface not different from surrounding skin Uneven – felt in scaly or verrucous lesions Rough – feels like sandpaper

- Reaction patterns help group disorders together (Table 1.8)
  1. Examples are eczematous eruptions: atopic dermatitis, allergic contact dermatitis
  2. Examples are papulosquamous disorders: psoriasis, seborrheic dermatitis

DIAGNOSTIC TESTS

Potassium hydroxide examination

Potassium hydroxide (KOH) examination is used for suspected fungal infections of skin, hair and nails

Table 1.8 Common dermatologic diagnoses by reaction pattern

Eczematous
Atopic dermatitis (eczema)
Infantile eczema
Nummular eczema
Allergic contact dermatitis
Dermatophytosis
Diaper dermatitis
Scabies

Papulosquamous
Psoriasis
Seborrheic dermatitis
Pityriasis rosea
Syphilis
Lichen planus

Vesiculobullous
Impetigo
Herpes simplex virus
Varicella-zoster virus
Epidermolysis bullosa
Miliaria
Scabies

Infiltrative pattern
Nodular
- Erythema nodosum
- Pyogenic granuloma
- Juvenile xanthogranuloma
- Cyst

Papular
- Granuloma annulare
- Mastocytosis
- Xanthomas
- Molluscum contagiosum

Atrophy and/or sclerosis
Scleroderma
Morphea
Lichen sclerosus
Lipoatrophy
Aplasia cutis congenita

Vascular reactions/erythema
Urticaria
Vasculitis
Viral exanthem
Erythema multiforme
Erythema annulare centrifugum

Acneiform
Acne vulgaris
Steroid-induced acne
Perioral dermatitis
Rosacea

Verrucous
Warts
Nevus sebaceus
Epidermal nevus

Erosive
Acrodermatitis enteropathica
Epidermolysis bullosa

- Demonstration of hyphae or spores confirms the diagnosis of tinea
- Oral lesions suspected of *Candida* can be scraped in a similar fashion to demonstrate the typical pseudohyphae or budding yeast forms

Scabies preparation

Scrape a burrow or unexcoriated papule, and apply KOH or mineral oil to the slide before microscopic examination

- Best areas to find mites: wrists, in between fingers, or along sides of feet of infants
- Examine at 4× power to demonstrate mites, eggs or scybala (feces)

Pediculosis

This can be confirmed by finding a live louse on the skin or scalp, or by demonstrating nits on the hair shafts

- Affected hairs can be cut with scissors, placed on a glass slide and covered with immersion oil or KOH to demonstrate nits

Fungal cultures

Fungal cultures confirm a diagnosis of tinea capitis, tinea corporis or onychomycosis

- Using appropriate fungal culture media (Sabouraud's agar, Mycosel agar) allows for identification of fungal species
- Dermatophyte Test Media (DTM) can be used in the office for easy identification of dermatophytes, but does not speciate fungi

Tzanck smear

This is used for diagnosis of herpes simplex or varicella-zoster virus

- Remove vesicle roof with a scalpel blade and place on a glass slide
- The base of the lesion is gently scraped and transferred to a slide, then stained with a Giemsa or Wright stain
- Multinucleated giant epithelial cells under 40× microscopy are diagnostic for herpes virus or varicella-zoster infections

Table 1.6 Regional patterns and diagnosis

Scalp
Seborrheic dermatitis
Tinea capitis
Alopecia areata
Psoriasis
Nevus sebaceus
Aplasia cutis congenita

Face
Contact dermatitis
Perioral dermatitis
Pityriasis alba
Acne
Milia
Photosensitivity disorders

Trunk
Tinea corporis
Tinea versicolor
Pityriasis rosea
Psoriasis

Extremities
Psoriasis (also scalp and nails)
Scabies (also groin and waistline)
Granuloma annulare
Erythema nodosum
Erythema multiforme
Dyshidrotic eczema
Gianotti–Crosti syndrome
Cutis marmorata

Nails
Psoriasis
Alopecia areata
Twenty nail dystrophy
Lichen planus
Ingrown toenail

Oral
Lichen planus
Mucocele
Geographic tongue
Stevens–Johnson syndrome

Genital/groin
Lichen sclerosus
Condyloma acuminata
Acrodermatitis enteropathica
Intertrigo

Table 1.7 Most common dermatoses in children

Acne
Alopecia areata
Atopic dermatitis (eczema)
Café au lait macules
Capillary malformation (port wine stain)
Condyloma acuminata
Contact dermatitis
Drug eruption
Epidermal cyst
Folliculitis
Granuloma annulare
Hemangioma
Herpes simplex
Ichthyosis
Impetigo
Keloid
Keratosis pilaris
Mastocytosis
Milia
Molluscum
Nevi
Pityriasis alba
Postinflammatory hyperpigmentation
Postinflammatory hypopigmentation
Psoriasis
Pyogenic granuloma
Scabies
Seborrhea
Telangiectasias
Tinea capitis
Tinea corporis
Tinea versicolor
Urticaria
Viral exanthem
Vitiligo
Warts

- Scrapings (using a scalpel blade) from a scaly lesion are placed on a clean glass slide
- Nail scrapings can be obtained by scraping with a scalpel blade or small dermal curette underneath the nail for keratinous subungual debris
- Place scrapings on a glass slide
- Apply a few drops of 10–20% KOH
- Apply a cover slip
- Heat the slide to facilitate dissolution of the cell walls or allow the slide to sit for 15–20 min without heating
- If 20% KOH in dimethylsulfoxide (DMSO) is used, heating is unnecessary
- KOH can also be formulated in ink-based preparations which darken the hyphae for easier identification (examples: Chlorazole fungal stain from Delasco Dermatologic Lab and Supplies, Inc (www.delasco.com), or Swartz–Lampkin solution)
- Examine microscopically at 10× or 20× power with the condenser in the lowest position

Wood's lamp examination

A Wood's lamp emits long-wave ultraviolet light

- Screening for fungal scalp infections caused by *Microsporum* species shows green fluorescence of affected hair shafts
  1. It is important to verify that the actual hair shaft is causing fluorescence, which can easily be seen with a magnifying lens
  2. Lint, scales and other debris on the scalp also fluoresce and should not be confused with tinea
- Hypopigmentation or depigmentation can be accentuated (e.g. tuberous sclerosis patches) and delineated, particularly in light-skinned patients
- *Corynebacterium minutissimum*, which causes erythrasma, fluoresces a coral red color
- Urine of patients with certain types of porphyria fluoresces pink

Bacterial cultures

- Purulent material from representative lesions are swabbed with a soft sterile swab, inserted into the appropriate tube and sent to the laboratory

Viral culture

This requires a special transport medium, which is available at most large hospitals

- Blister fluid and the base of the lesion should be swabbed or aspirated and then inoculated into the appropriate media

Skin biopsy

Skin biopsy is carried out for routine histopathologic or immunofluorescence examination

- Topical anesthetic can be applied to the skin prior to biopsy to reduce the pain of the needle stick for local anesthesia
- Punch biopsies or elliptical biopsies should demonstrate all three levels of the cutis (epidermis, dermis and subcutaneous fat)
- Shave biopsies (saucerization) may be indicated for more superficial lesions
- Biopsy is best done by a physician who is trained in the knowledge of which areas are best biopsied and what histology is expected
- Immunofluorescence may be indicated for certain connective tissue disorders or bullous diseases and requires special transport media

Diascopy

Diascopy is performed by placing a glass slide over the skin lesions with light pressure

- Vascular lesions typically show characteristic blanching with refilling once the slide has been removed
- Granulomatous disorders such as sarcoidosis may demonstrate an apple jelly color

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