ABC of Dermatology

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INTRODUCTION

Lupus erythematosus.

The object of this series is to provide the non-specialist with a practical guide to the diagnosis and treatment of skin conditions. Instead of the usual systematic description of each individual disease, the history, clinical appearance, and pathology of a few common, key conditions are discussed. These are then used as a basis for comparison with other skin diseases.

This approach is suitable for most types of skin lesion that present as rashes, blisters, or ulcers, for example. Some subjects such as allergic reactions, autoimmunity, acne, and infections, however, are covered in a more conventional didactic manner.

One advantage of dealing with dermatological conditions is that nature presents us with the lesion to examine and interpret without the need for complex investigations, although a biopsy is sometimes needed to make or confirm the diagnosis. An understanding of the histological changes underlying the clinical presentation makes the interpretation of skin lesions easier and more interesting. Consequently, clinical descriptions are accompanied by an account of the underlying pathological processes.

Many skin diseases reflect pathological processes in other organs and indeed may be the first sign of disease. For example, a girl presented recently with a rash on her face suggestive of lupus erythematosus and a history of lassitude, weight loss, and weakness. The diagnosis of lupus erythematosus with renal disease was confirmed on subsequent investigation. Such dermatological connections with systemic disease are mentioned in the relevant places.

Descriptive terms

Macule

All specialties have their own common terms, and familiarity with a few of those used in dermatology is a great help. The most important are defined below.

Derived from the Latin for a stain, the term macule is used to describe changes in colour or consistency without any elevation above the surface of the surrounding skin. There may be a loss or increase of melanin, giving a black or blue colour depending on the depth of the pigment. Vascular dilatation and inflammation produce erythema.

Macule

- (a) Melanin pigment in epidermis.
- (b) Melanin pigment below epidermis.
- (c) Erythema due to dilated dermal blood vessels.
- (d) Inflammation in dermis.

Papules and nodules

A papule is a circumscribed, raised lesion, conventionally less than 1 cm in diameter. It may be due to either epidermal or dermal changes.

A nodule is similar to a papule but over 1 cm in diameter.

Plaque

Plaque is one of those terms which convey a clear meaning to dermatologists but is often not understood by others. To take it literally, one can think of a commemorative plaque stuck on the wall of a building with a large area relative to its height and a well defined edge. Plaques are most commonly seen in psoriasis.

Vesicles and bullae

Vesicles and bullae are raised lesions that contain fluid. A bulla is a vesicle larger than 0.5 cm. They may be superficial within the epidermis or situated in the dermis below it.

Lichenification

Lichenification is another term frequently used in dermatology as a relic of the days of purely descriptive medicine. Some resemblance to lichen seen on rocks and trees does occur, with hard thickening of the skin and accentuated skin markings. It is most often seen as a result of prolonged rubbing of the skin in localised areas of eczema.

Nummular lesions

The word nummular literally means a "coin like" lesion. There is no hard and fast distinction from *discoïd* lesions, which are flat disc like lesions of variable size.

Pustules

The term pustule is applied to lesions containing purulent material—whether due to infection or not.

Rashes

Psoriasis of both legs.

A simplistic but helpful approach to rashes is to classify them as coming from “inside” or “outside.” Examples of inside, or endogenous, rashes are atopic eczema and drug rashes, whereas fungal infections or contact dermatitis are from outside. Each type has its own distinctive characteristics.

Symmetrical rash.

Asymmetrical rash—contact dermatitis.

Symmetry

Most endogenous rashes affect both sides of the body: think of the atopic child or man with psoriasis on his knees. Of course, not all exogenous rashes are asymmetrical. A seamstress uses scissors in her right hand, where she develops allergy to metal, but a hairdresser or nurse will develop an allergic rash on both hands.

Allergic reactions producing photosensitivity.

Distribution

It is useful to be aware of the usual sites of common skin conditions. Eruptions that appear only on areas exposed to sun may, of course, be entirely or partially due to sunlight. Some conditions are due to a sensitivity to sunlight alone, such as polymorphous light eruption, or a photosensitivity to topically applied substances or drugs taken internally.

Lesion in deeper tissues with normal epidermis.

Small vesicles of eczema.

Morphology

The appearance of skin lesions gives several clues to the pathological processes.

The surface may consist of normal epidermis overlying a lesion in the deeper tissues. This is characteristic of many types of erythema in which there is dilatation of the dermal vessels with associated inflammation or vasculitis. Alternatively the epidermis may be abnormal. For example, increasing thickness of the keratin layer may form scales, as in psoriasis, or a more uniform thickening in areas lichenified by rubbing. An eczematous process is characterised by both scaling and small vesicles forming in the epidermis.

The margin of some lesions is very well defined, as in psoriasis or lichen planus, but in eczema it merges into normal skin.

Blisters or vesicles occur as a result of (a) oedema between the epidermal cells or (b) destruction of epidermal cells or (c) the result of separation of the epidermis from the deeper tissues. Of course, more than one mechanism may be in the same lesion. Oedema within the epidermis occurs in endogenous eczema, although it may not be apparent clinically, particularly if it is overshadowed by inflammation and scaling. It is also a feature of contact dermatitis. Widespread blisters occur in:

- (a) viral diseases such as chickenpox; hand, foot, and mouth disease; and herpes simplex;
- (b) bacterial infections such as impetigo; and
- (c) primary blistering disorders such as dermatitis herpetiformis, pemphigus, and pemphigoid and metabolic disorders such as porphyria.

Deeper bullae may occur in congenital conditions (such as epidermolysis bullosa), lichen planus, and pemphigoid without much inflammation. On the other hand, deeper bullae forming as a result of vasculitis, sunburn, or an allergic reaction are associated with pronounced inflammation. In psoriasis there may be deeper pustules, containing polymorphs but sterile, which show little inflammation. Drug rashes can appear as a bullous eruption.

Pemphigus—superficial blister.

Herpes simplex.

Impetigo.

Dermatitis herpetiformis.

Assessment of the patient

A relevant history should be taken with particular reference to:

Where?—Site of initial lesion(s) and subsequent changes in distribution.

When?—Have there been any previous episodes? If so, note the duration of these and the present condition.

Progress?—Is it getting better or worse? Does it itch?

Treatment?—Treatment to date—both by prescription and by home remedies.

What else?—Are there any associated conditions? Ask about any medication and drugs, whether prescribed or bought "over the counter."

We now come to the matter of using these basic concepts in the diagnosis of lesions in practice. The next four articles deal with two common skin diseases—psoriasis, which affects 1-2% of the population, and eczema, an even more common complaint. Both are rashes with epidermal changes. The difficulty arises with the unusual lesion: Is it a rarity or a variation of a common disease? What should make us consider further investigation? Is it safe to wait and see if it resolves or persists? The usual clinical presentations of psoriasis and eczema are set out and used as a basis for comparison with variations of the usual pattern and other skin conditions.

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Basic Molecular and Cell Biology

Molecular immunology of antibodies and T cell receptors

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Antigen receptors

The key feature of the immune system is the ability to react and neutralise foreign substances, known as antigens, when they invade the body. These antigens—for example, viral coat proteins—are removed by the immune system primarily by two types of white cells (lymphocytes) circulating in the blood: these are the B lymphocytes and T lymphocytes (called B cells and T cells respectively). Because of the large number of potential foreign antigens the immune system has developed a highly variable set of antigen receptors, which are found on the surface of B and T cells. Each cell expresses only one receptor, and the complete repertoire is provided by the large number of different B and T cells available at any one time. The B and T cell receptors are related in their structure, but important differences distinguish B cell receptors

(the antibodies) and T cell receptors. Perhaps the main feature is the ability of antibodies to be secreted into the plasma by the subfraction of B cells concerned with combating a particular infection. Secretion of T cell receptors does not appear to occur.

T cell receptors are associated with other proteins on the cell surface which seem to have a vital role in the function of the cell. One such molecule is a membrane protein called CD4 (formerly T4), which is a characteristic of a subset of T cells which help B cells to produce antibody. This so called helper T cell population is the primary target for the virus which causes the acquired immune deficiency syndrome (AIDS), and the CD4 molecule appears to serve as a recognition site for the virus itself—that is, it is the receptor on T cells for the AIDS virus. Thus during the development of AIDS there is a progressive loss of helper T cells and associated loss of ability to produce secreted antibodies, the key feature of antibody mediated responses.

Antibodies and T cell receptors are found on the outside of the cell surface of B and T cells respectively. The proteins are attached to the cell surface by a so called constant region; the part of the protein which fixes on to the antigen is the variable region, which is free on the outside of the cell. The latter name is explicit since the differences between individual receptors on the vast population of lymphocytes are found in this part of the molecule. The functions of the receptor, such as generating signals to tell the cell to start

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