Current Practice

Diagnosis and Treatment of Scabies

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The diagnosis of scabies depends on finding a burrow or one stage of the parasite. The search is prompted by clinical suspicion and informed by knowledge of the natural history and habits of the human *Acarus scabiei*. The best source of this information is the monograph by K. Mellanby.¹

Scabies should be considered in every patient who complains of persistent itch. In typical cases the diagnosis is easy, but when the visible changes are unusual or slight scabies may not be suspected. It is important to think of the itching patient in relation to his environment, and if another member of the household is itching too there is a *prima facie* case for suspecting an infestation.

Natural History of the Acarus

The clinical manifestations of scabies are the eventual result of an impregnated female acarus establishing her home in the skin. The host usually picks her up by close physical contact with a case of scabies, but infected bedding and clothing can sometimes transmit the disease. She chooses the site for her home and then she elbows, bites, and digs her way into the skin, tunnelling within the stratum corneum, but not penetrating any deeper. Unless the patient has had scabies previously he does not itch at this stage, and the burrow is inconspicuous. The acarus tunnels on slowly (0.5 to 5 mm. per day) leaving a trail of eggs and faeces behind her in the burrow. The eggs hatch into larvae, which develop first into nymphs and then into adults, the process taking about two weeks altogether.¹ The immature forms leave the burrow and take shelter in the hair follicles. The mature males are said to make short burrows, but they are rarely seen and probably spend a restless life in search of love. The proof of their successful activity is the new generation of impregnated females which start burrows of their own. About one month after the establishment of the first burrow the patient begins to itch, probably because he has become sensitized to acarine products. The patient now realizes that something is wrong with his skin, he begins to scratch, and, according to Mellanby, the scratching limits the population of acari by depriving them of a roof over their heads, and perhaps by crushing them as well. In experimentally induced infections Mellanby found that the population reached a maximum within three months, and varied from 20 to 400 egg-laying females. Examination of nearly 900 men with scabies showed a mean population of 11.3 adult females, and that more than half the patients harboured five adult female acari or fewer. It is generally believed that infestations do not clear spontaneously, but Mellanby hints that they may do so rarely.

Clinical Features

The patient comes to the doctor complaining of severe generalized irritation, made worse on getting warm, particularly on going to bed. Examination reveals an eruption which has two aspects: the burrows, which have to be searched for, and changes resulting from sensitization and secondary infection,

which are obvious. There is a widespread rash of follicular papules, usually well marked on the abdomen, buttocks, the inner sides of the thighs, and the axillary folds. Scratch marks, crusted papules, and pustulation demonstrate the effects of scratching. The burrows are found on the sides and webs of the fingers, on the ulnar border of the hands, on the volar aspect of the wrists, on the points of the elbows, on the axillary folds, on the areolae of the nipples in women and on the external genitalia in men, on the buttocks, and on the margins or soles of the feet. Mellanby found the hands and wrists the favourite site (63% of the acari recovered came thence), the extensor aspect of the elbows being next (10.9%). The undisturbed burrow is a thin, wavy, dark hairline about 1 cm. long. It begins at a funnel-shaped opening bordered by ragged edges of the stratum corneum, and ends in a white, shiny dot, quite perceptible to keen naked eye observation, which is the acarus. A vesicle often develops just behind the acarus in the floor of the burrow. The sites of old burrows are marked by ragged edges of the stratum corneum that have formed their walls, and a crust representing the dried vesicle. An infective eczema is apt to develop on the fingers and wrists and at many other sites, including the nipples and the glans penis. Although it can mask the burrows its presence suggests the possibility of scabies to the trained eye. Patients who are unable to scratch do not develop septic lesions or eczema.

Diagnosis

The clinical picture, comprising an itchy patient, papules, vesicles, and pustules on the fingers and wrists, and follicular papules on the trunk, should be regarded as due to scabies unless proved otherwise. The diagnosis is probable if other members of the household are affected, and is put beyond doubt if a burrow can be found or acarine material can be identified. The best method is to scrape an entire burrow along its length with the edge of a scalpel blade held at right angles to the skin. The material is transferred to a microscope slide, mounted in a drop of liquor potassae, warmed gently, and examined under the low power of the microscope. The acarus has a body shaped like a tortoise, with two pairs of legs in front and two pairs behind. The fore-legs end in "suckers" and the hind-legs in long bristles. She is about 400 microns long, and coated with short bristles. If you find her you will confirm the diagnosis, and if you let the patient look down the microscope you will ensure his co-operation. If you fail to find the acarus you may find eggs or immature forms. It may be necessary to examine more than one burrow.

The typical picture is subject to a number of variations. Infants develop burrows on the head as well as on the hands and feet, which will have implications for treatment. Cleanly people usually develop few lesions, which is one reason why the disease is apt to be missed in nurses. A heavy, helpless patient with an undetected infestation, who requires a lot of lifting, can start an epidemic among the nursing staff before anyone realizes what has happened. It is amazing how scabies can remain undetected under such aliases as "reaction to irradiation," "drug eruption," and "neurodermatitis." The blisters

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that develop in the floor of the burrows can mimic cheiro-pompholyx, and the infective eczema that has been mentioned already can dominate the picture. The eczema may sometimes be limited to the nipple area or glans penis and form the presentation of the disease. Sometimes the infective element predominates and produces folliculitis, boils, cellulitis, or lymphangitis. The amount of itch varies from torment to little or none. Absence of irritation is believed to account for the thousands of acari that abound in Norwegian scabies. The manifestations of this rare form resemble an exfoliative dermatitis. The diagnosis usually has to await an epidemic of scabies being traced to the patient, but on one occasion it was made by post when a skin biopsy from a puzzling case was received by a distant laboratory, and sections showed the stratum corneum almost as full of mites as the rind of a Stilton cheese.

Differential Diagnosis

The disease most commonly confused with scabies is *eczema*, particularly atopic eczema (Besnier's prurigo). The itch can be as intense, it has the same quality of being aggravated by heat (a feature that occurs in most forms of pruritus), and appropriate lesions may be seen on expected areas such as fingers, wrists, nipples, and trunk. Burrows will not be seen, but a linear arrangement of eczema vesicles can give an impression of a burrow. Other members of the family may suffer from atopic eczema. Occasionally one needs to observe the patient for a time and to try the effect of treatment before being certain that scabies is not present. The infective eczema that is a part of scabies is betrayed by the distribution of the lesions.

Papular urticaria causes intense irritation in young children. The child finds relief in scratching the papules that occur on the trunk and limbs, causing them to ooze or bleed. The exudate dries into crusts and secondary infection often ensues. No burrows occur and urticarial lesions predominate, but scabies can be imitated closely in other respects, including the occurrence of more than one case in the family. Many cases of papular urticaria can be traced to the bites of insects, among which fleas, bedbugs, and the parasites of birds, cats, and dogs are important. The patient gets better in hospital because the parasites are left at home, whereas a scabetic child brings its own parasites with it and the change of environment does not influence the eruption.

Human disease resulting from contact with *animal scabies* is a special example of papular urticaria. Most animals harbour their own brand of acarid, which is indistinguishable morphologically from the human acarid, but is incapable of burrowing and breeding in any species but the one for which it has become adapted. The dog is no exception, and his acari cause an itchy papulo-vesicular eruption in master and his household. Dog scabies is called sarcoptic mange. This interesting and often overlooked cause of skin trouble has been reviewed recently by Smith and Claypoole.³ The mangy dog, like the patient with Norwegian scabies, harbours thousands of acari, which explains the liberality with which he scatters them in his environment. *Cheese mites* can be acquired in much the same way by those who hump cheeses on their shoulders or handle them, and they cause local irritation at the sites of contact. Many other commodities such as *grain*, *straw*, and *copra* can harbour parasites that irritate the people handling them, and the part played by vegetation in providing a home for the *harvest bug* is well known. No burrows are found in any of these diseases.

Pediculosis corporis produces intense itch and pigmentation of the trunk and proximal parts of the limbs. The lice and their eggs should be sought in the underclothes. *Pubic lice* can be overlooked or mistaken for small blood crusts. The lice and the eggs are attached to body hair. *Parasitophobia* is a delusion of infestation. The patient describes feeling insects crawling beneath the skin. Examination reveals traumatic

lesions, some having small darkish crusts, the result of excavating with the finger nails or other digging implement. Often a small crumpled piece of paper is produced for the doctor's inspection containing "the parasites"; it holds a collection of heterogeneous debris such as scales, crusts, bits of hair, crumbs, nail clippings, sugar grains. The proffering of such pathetic "evidence" of infestation is not a sufficient reason for excluding an infestation. Compulsive picking, pinching, or scratching of the skin occurs without delusions of infestation and gives rise to difficulty in the physician's mind because there is no proper name for it. Neither *neurodermatitis* nor *dermatitis artefacta* is really apt. It is easy to invoke emotional factors as a cause of itch, but before doing so it is wise to make sure that the patient is under an appreciable emotional strain, and also that physical causes such as *lymphadenoma*, *drug reactions*, *occult neoplasms*, and *renal disease* can be excluded.

Most cases of *dermatitis herpetiformis* that come to our clinic have been treated for scabies. *Dermatitis herpetiformis* produces groups of lesions on favourite sites such as scalp, shoulders, buttocks, hips, and elbows, but it usually spares the hands. The histological picture of an early papulo-vesicle is characteristic, and a response to sulphapyridine or dapsone can be anticipated.

Biliary cirrhosis, pruritic eruptions of *pregnancy*, a toxic reaction to the *contraceptive pill*, and *onchocerciasis* are rarer causes of persistent severe itch and papules that can be confused with scabies.

Treatment

The three essential things to do are to treat all the members of the household simultaneously, to use an application that will kill the parasites, and to apply it to the whole skin area, not merely the spots. Failure can be traced to neglect of these injunctions.

Simultaneous treatment is important, because unless the infestation can be stamped out in the household at one blow the untreated members will reinfect the treated ones sooner or later. "The household" includes everyone living in the house and extends to outsiders who are involved in regular close physical contact with members of the household, such as the relative or the neighbour who pops in every day.

Sulphur ointment B.P. and benzyl benzoate application B.N.F. will kill the parasites. They are used half strength for older children and quarter strength for babies. Sulphur has a reputation for being more certain and less likely to cause irritation. Benzyl benzoate is pleasanter to use and is kinder to the clothing. Mellanby¹ believed them equally effective. The medicament is applied to the whole skin surface excluding the scalp and face (except in babies, whose heads must be treated) particular care being taken to see that no fold or crease is missed, and that the soles of the feet are included. Applications are made on three successive nights. A bath before the first application and another on the night after the last application is desirable. Wherever possible clean underclothes and clean sheets should be used after the last bath. The treatment seldom irritates the skin provided that it is limited to three applications. Patients should be warned that it is natural for the itch to persist for some weeks after treatment. Local treatment at this stage should be confined to simple applications such as calamine lotion. Many "failures of treatment" that we see are no longer infested, but have a sulphur or benzyl benzoate dermatitis often brought on by the patients continuing these medicaments contrary to instructions, in the belief that because they are still itching they are still infested. Unless a live acarid is found it is impossible to decide whether the patient is still infested in the weeks succeeding treatment. Failure of thoroughly applied treatment is equivalent to reinfection, and in this event one must search for the member of the household who has been overlooked. The anti-scabetic treatment takes precedence over local treatment of any sepsis. Oral antibiotics

should be used concurrently to treat severe pyogenic infection or lymphangitis. When the mites have been dealt with any residual infection can be treated, for example with an antibiotic-corticosteroid local application. Attempts to deal with the sepsis before tackling the infestation will not succeed. Scabies can be transmitted by sexual contact, and it is advisable to bear in mind the possibility of associated venereal disease.

The efficient treatment of scabies in a community is a matter of knowledge and organization. It should be possible to eradicate such an easily treatable infestation, and its continued existence in Britain should be a cause for concern. The provision of treatment centres would help the general practitioner, who is the person in the best position to deal with the problem. The advantages of treatment centres would be that a routine of thorough treatment could be provided which would virtually guarantee that the person treated would be cured of his infestation; furthermore, such a centre would be a means of treating the rest of the household, an operation which is difficult at present. As long as the success or failure of treat-

ment continues to lie so largely in the hands of the patient, so long will scabies continue.

Summary

The diagnosis of scabies is a matter of suspicion backed up by knowledge. Suspect every patient with a persistent itch, particularly if other members of the family are affected. Accurate diagnosis requires the discovery of a burrow or acarine products. Benzyl benzoate application or sulphur ointment should be applied to the whole skin surface below the chin on three occasions only. Every member of the household is treated simultaneously. Without treatment centres this preventable disease is likely to remain endemic.

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TODAY'S DRUGS

With the help of expert contributors we publish below notes on a selection of drugs in current use.

Radioactive Phosphorus

Radioactive phosphorus ^{32}P is prepared by neutron bombardment of sulphur. It is supplied as the isotope ^{32}P as sodium radio-phosphate containing a small amount of carrier phosphate. It can be obtained from the Radiochemical Centre, Amersham, Buckinghamshire, England, and is supplied as sodium phosphate ^{32}P injection B.P.

Radiopharmacology

^{32}P is a β particle emitter. This radiation has a mean energy of 1.7 MeV, and the particles have an average range in soft tissues of 7 mm. The half-life of the isotope is 14.3 days. When it is injected intravenously it is at first evenly distributed throughout the body but gradually becomes concentrated in the bone marrow, liver, and spleen in a tenfold concentration compared with other tissues. Some phosphorus is taken up by bone and may be released only slowly, and can in this way have a prolonged effect on the bone marrow. The time that ^{32}P remains in the body is relatively short, the biological half life is eight days with excretion occurring largely through the kidneys. The urine of patients recently given ^{32}P is radioactive. It may be a radiation hazard for nursing staff dealing with enuretic patients, for example.

Clinical Uses

Lawrence¹ introduced ^{32}P in 1937 for the treatment of leukaemia and polycythaemia rubra vera. Although ^{32}P is no longer used in acute leukaemia it is effective in polycythaemia rubra vera, and can be used in chronic leukaemias and other malignancies.

Polycythaemia rubra vera.— ^{32}P is taken up by rapidly dividing cells and when given in doses of 3 to 5 millicuries intravenously causes a gradual fall in haemoglobin, haematocrit, red cell volume, and white cell and platelet counts. The amount of ^{32}P given in the first dose depends on the size of the patient and the elevation of the red cell mass. The effect of ^{32}P is delayed for several months. Remission may require further injection of ^{32}P at intervals of a few months and courses of 15 millicuries may be necessary. It is essential that the patient should have regular examinations of the blood and no further ^{32}P should be given in the presence of a low white cell or platelet count.

Patients with polycythaemia rubra vera who require surgery are particularly at risk from haemorrhage or thrombosis.² If an elective operation is to be done then the patient can be made fit for operation in two or three months' time after a dose of ^{32}P followed by a course of venesection until the haemoglobin is below 16 g./100 ml. and the haematocrit below 52%. If operation cannot be delayed venesection alone should be used, as ^{32}P will not be effective.

Essential Thrombocythaemia.—Haemorrhagic thrombocythaemia is a myeloproliferative disease closely allied to polycythaemia rubra vera. It may be effectively controlled by ^{32}P , which will reduce the platelet count to normal.

Chronic Myeloid Leukaemia.— ^{32}P may induce a remission in this condition, and it can be maintained with further regular small doses. This treatment has been reported³ as giving results comparable to those with busulphan, but in Britain busulphan is preferred because it gives smoother control.

Metastatic Carcinoma.—Metastases of carcinoma of the breast and prostate can be affected by ^{32}P . This treatment will relieve pain, especially when it is used in conjunction with a short course of testosterone.^{4 5 6} It does not appear to increase length of survival. Experience in Britain is limited, but the value of this technique in the relief of pain in carcinoma of the prostate has been reported in a small series.⁷

Toxicity

^{32}P will affect all the cells of the bone marrow, and if given in sufficient amount will cause aplasia with its complications of haemorrhage and infection. Patients with polycythaemia rubra vera treated with ^{32}P have developed aplastic anaemia, myelosclerosis, and acute leukaemia. How far the development of the latter two conditions is directly attributable to ^{32}P therapy rather than the natural consequence of prolonged survival is not clear and will have to await the results of co-operative trials.⁸

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