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GENERALIZED PUSTULAR PSORIASIS

A Report on Thirteen Patients

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Abstract. Generalized pustular psoriasis shows a fluctuating pattern, its course varying with time and from patient to patient. The prognosis and results of treatment are therefore extremely difficult to assess. The patients in this series have been followed up by us with regard to the natural course of the illness including complications and precipitating factors. Oral drug therapy has surprisingly often provoked acute pustular eruptions, and these patients have also strikingly often and rapidly developed contact allergy to topical applications. The undesirable effects of long-term systemic corticosteroid therapy have been confirmed in this series, chiefly by severe rebound phenomena, notwithstanding that such treatment has proved the only means of rapidly reversing life-threatening states. The effects of methotrexate and hydroxyurea were at times good but, not uncommonly, mediocre and occasionally even useless. Large doses of antibiotics have also failed to achieve the results described by others. On the contrary, secondary infection with beta-haemolytic streptococci has caused serious problems in several cases. Apart from careful protection from infection and precipitating factors, little can be done to influence the course of generalized pustular psoriasis, but trial with cytostatics is justified during severe bouts, pending the appearance of new lines of therapy.

Key words: Pustular psoriasis; Natural course; Clinical signs; Precipitating factors; Drug reactions; Treatment

Ever since 1910, when von Zumbusch (23) described a patient who over a period of 10 years had suffered nine episodes of generalized pustular psoriasis (GPP), this condition has puzzled dermatologists. Its aetiology and pathogenesis are still largely unknown. There has been disagreement about whether impetigo herpetiformis and acrodermatitis continua should also be regarded as forms of GPP, but most are now inclined to classify these two conditions separately (22).

Most papers on GPP contain reports on isolated cases only. The first major review was published in 1968 by Baker & Ryan (1), who described 24 of their own cases plus 80 others, details of which they had obtained through questionnaires sent to dermatologists in Great Britain. In 1971 the same workers published their views on the prognosis in this series, which had now been augmented.

Wide individual variations in the course and severity of GPP are sometimes seen. Acute exacerbations of the illness, which can be prolonged, usually call for hospital care. Our therapeutic resources are limited, and it is difficult to assess the effect of different drugs, owing to variations in the course of the disease state and to the spontaneous remissions that occur. Corticosteroids, various cytostatic drugs, and antibiotics have been suggested as possible therapeutic agents. Many hold the view that in addition to their usual side effects, corticosteroids are capable of provoking GPP in cases of psoriasis (4, 9, 13, 16, 17, 19). This has aroused interest in other possible precipitating factors.

The study now presented, in which the individual patients were followed up at our own unit over long periods, is concentrated on 1) the natural course and complications of the illness, 2) precipitating factors, and 3) an attempt to assess some forms of therapy by administering each drug repeatedly and at varying intervals to each individual.

CASE REPORTS

A series of 13 patients, 8 women and 5 men, suffering from generalized pustular psoriasis was investigated (Table 1). Nine have been followed up for 4–10 years, 4 for over 10 years. During severe, active phases the patients were admitted to this Department, and during intervening periods have been followed up regularly as out-patients.

Heredity. The series includes a pair of male uniovular twins. Both of these presented initially with psoriasis vulgaris, though 10 years apart, and each had his first attack

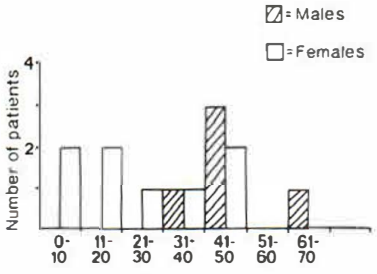

Fig. 1. Age of onset of first psoriasis eruption (by decades).

of pustular psoriasis about 6 months after the primary onset of the condition. The son of one of these twins developed psoriasis vulgaris at the age of 6 years.

Two sisters, both showing a combination of GPP, hypogammaglobulinaemia, and multiple drug hypersensitivity are also included. Their parents and two other sisters have no skin disease and no gammaglobulin abnormalities.

Clinical features and course. In 12 patients the pustular lesions were preceded by psoriasis vulgaris. In 8 the illness commenced after 30 years of age (Fig. 1). Five patients developed the first crop of pustules within a year of the debut of the psoriasis, and all of these were over 30 years when the first symptoms appeared. In the remaining cases the pre-pustular phase exceeded 4 years.

The patients are classified with regard to similarities in clinical features and course of the illness. In *Group One* comprising 5 patients, the course was characterized by intractable lesions on the hands and feet and intermittent bouts of GPP at intervals of up to several years. During the non-pustular periods the lesions on fingers and toes remained. In 2 of these patients the condition presented with pustules on the extremities; in 2 others the initial symptoms were those of classical psoriasis vulgaris, pustules on hands and feet developing later but before the onset of the GPP. In the fifth patient, acral pustules appeared 5 years after the debut of the GPP; the pustulosis has now improved, but the hand and foot lesions persist. Fig. 2 illustrates a characteristic clinical course from the first bout of GPP, the continuous pustular activity during the intervening periods (marked +) representing hand and foot lesions only.

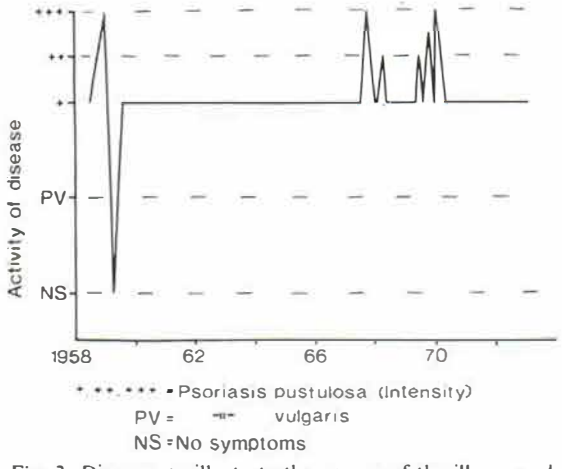

Fig. 2. Diagram to illustrate the course of the illness and severity of symptoms in a patient aged 60 years with pustular psoriasis and lesions on the hands and feet (Patient 3).

Group Two comprises the remaining 8 patients. The course of the illness in these cases was characterized by recurrent attacks of generalized pustulosis alternating with periods of psoriasis vulgaris of varying extent. In 5 of these patients the pustulosis was preceded by classical psoriasis vulgaris, and in 3 by inverse psoriasis localized to the axillae and groins. Six of the patients in this group showed symptom-free periods, but the intervals between the exacerbations varied greatly in duration. Fig. 3 illustrates the course of the illness in a patient who over a period of 19 years suffered from frequent, extremely severe attacks of pustulosis alternating with common psoriasis of usually very mild nature. Fig. 4 shows the course of the illness in a patient in whom the attacks of GPP occurring during the first few years resolved into psoriasis vulgaris, which has remained apparently healed for over 3 years. In the remaining 2 patients extensive active pustular changes have at the time of writing been present for one and 2 years, respectively.

In both groups acute exacerbations were associated with bouts of pustulosis of varying extent and appearing at relatively regular intervals of about one week. At other times the intervals between these bouts of pustulosis varied greatly. The exacerbations with the often cyclical episodes of pustulosis were sometimes limited to a month or two, but sometimes persisted for several months.

Laboratory findings. The exacerbations were accompanied by pyrexia, leukocytosis, and rising erythrocyte sedimentation rate; in late stages, anaemia and hypoalbuminaemia developed, sometimes very rapidly. Certain laboratory findings obtained during clinically moderately severe attacks of pustulosis in each patient are shown in Table II, illustrating the above phenomena. Fig. 5 shows the relationship between the intensity of the disease process, the serum albumin level, the haemoglobin value, and the erythrocyte sedimentation rate in one patient. The blood variables and serum albumin were hardly affected by the first period of illness. During the second exacerbation, serum albumin and haemoglobin values fell sharply, indicating that the patients' resources were overtaxed. A moderate increase in the serum transaminases unrelated to therapy was noted in one patient during a particularly severe exacerbation.

No bacteria were demonstrated in intact pustules in any case, and repeated blood cultures have proved negative in 8 patients.

Additional clinical signs and complications. Disabling polyarthritis developed in one patient.

During the 24 hours before an attack of GPP, 2 patients reported tenderness and enlargement of lymph nodes and considerable pain and tenderness of the skin at the sites where pustules subsequently developed.

Two patients repeatedly showed changes in the oral mucosa in the form of circinate, eroded plaques, but no pustules visible to the naked eye; and a third patient showed such plaques and also pustules on the tongue.

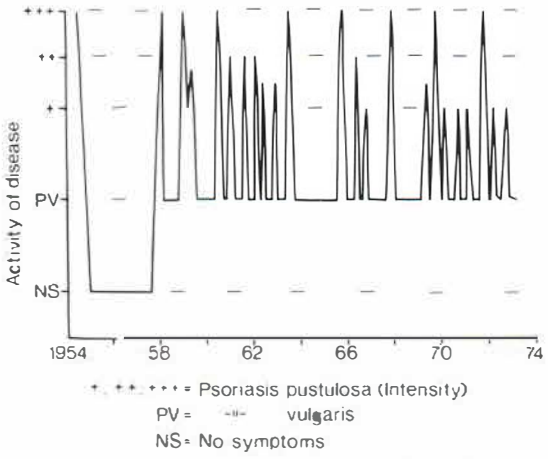

Fig. 3. Diagram to illustrate the course of the illness and severity of symptoms in a patient aged 42 years with pustular psoriasis without lesions on the hands and feet (Patient 9).

During severe attacks of pustulosis, 2 patients developed purulent conjunctivitis, accompanied in one case by iridocyclitis and bilateral corneal ulceration.

Two patients developed acute glomerulonephritis with severe general impairment. Beta-haemolytic streptococci had previously been isolated from skin lesions in both, although neither had complained of sore throat. The same organisms were also demonstrated on the skin of other patients in this series.

On two occasions one patient developed acute dyspnoea, incipient shock, and chest sounds suggestive of pneumonia, though the X-ray findings were normal.

No fewer than 10 of the 13 patients have shown one or several drug reactions, probably of allergic nature (Table III).

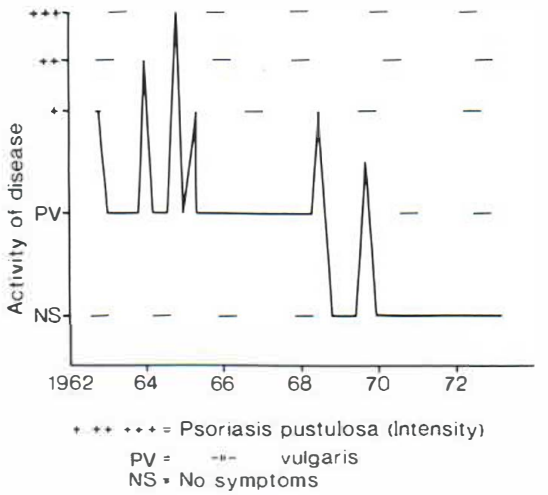

Fig. 4. Diagram to illustrate the course of the illness and severity of symptoms in a patient aged 30 years with pustular lesions but no leisons on the hands and feet (Patient 12).

PRECIPITATING FACTORS

A patient who, owing to residual lesions following a previous episode of pustulosis, was treated with extensive topical applications of a high-potency steroid preparation again developed GPP when the drug was withdrawn. Two patients who had received prolonged steroid therapy for asthma and psoriasis vulgaris, respectively, developed acute attacks of pustulosis when the dose was reduced.

Penicillin in one case and sulphonamides in 2 caused drug eruptions that subsequently developed into this patient's initial episode of pustular psoriasis.

On two occasions with a 6-year interval one patient was given premedication with morphine; both times an acute exacerbation of the skin lesions took place, and GPP developed.

Twice in one patient salicylic acid in combination with codeine elicited exanthema that on one occasion was accompanied by GPP.

Four patients who were given trial courses of sulphapyridine responded with exacerbations of the pustular lesions.

Seven patients noted at least once a worsening of the skin lesions in association with infection, usually of the respiratory tract. In 2, infection of the skin by beta-haemolytic streptococci was accompanied by acute exacerbation of the skin condition.

In one patient the skin lesions made their debut 4 months post partum, and in another with psoriasis vulgaris of many years' standing the first pustules appeared on the extremities in the eighth month of pregnancy.

Two of the 13 patients regularly show deterioration during summer, but no deleterious effect of light has been established in either.

In 2 patients, periods of intemperence have been accompanied by episodes of pustulosis.

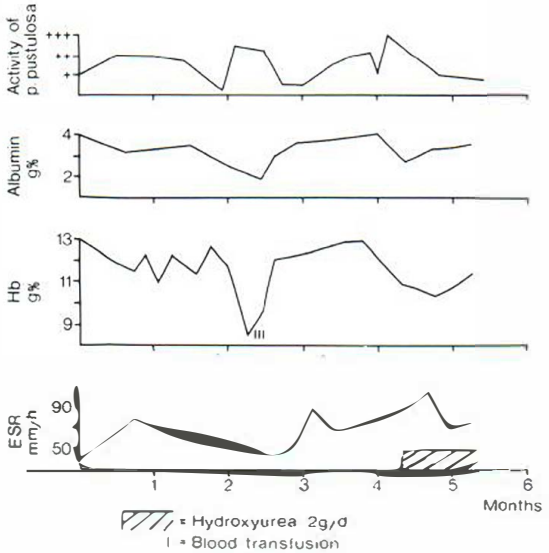

Fig. 5. Relationship between the severity of the illness and the serum albumin, haemoglobin, and erythrocyte sedimentation rate in a patient with pustular psoriasis (Patient 7).

Table I. *Thirteen patients with generalized pustular psoriasis. Some clinical data*
PV=Psoriasis vulgaris, (G)PP=(Generalized) pustular psoriasis, S=Severe, M=Mild

Pat. no.	Sex	Age	Duration (years) of		Exacerbations				
			PV	GPP	No.	Intervals between exacerbations	Severity	Max. duration	Intervals between pustular bouts during exacerbation periods
1	♀	41	16	7	4	2 mo. – 2 y.	S+M	6 mo.	2–8 w.
2	♀	22	20	7	8	3 mo. –2 y.	S	4 mo.	1–8 w.
3	♀	58	15	15	3	>5 y.	S+M	6 mo.	1–2 w.
4	♂	67	21	7	2	4 y.	S	2.5 y.	5 days – 3 mo.
5	♂	60	19	5	5	1 mo. – 1 y.	S+M	1.5 y.	1–8 w.
6	♂	41	8	7	2	>5 y.	S+M	3 mo.	2 w.
7	♂	71	1.5	1	1	–	S	6 mo.	1–5 w.
8	♀	77	71	11	5	3 mo. – 7 y.	S+M	6 mo.	2–4 w.
9	♀	41	22	19	>10	1 mo. – 3 y.	S+M	5 mo.	1–4 w.
10	♀	56	23	2	1	–	M	3 w.	Only one bout
11	♂	45	2.5	2	1	–	S+M	2 y.	1–6 w.
12	♀	30	12	11	6	5 mo. – 5 y.	S+M	3 mo.	1–2 w.
13	♀	67	17	16	5	6 mo. – 5 y.	S+M	5 mo.	1–3 w.

TREATMENT

Systemic corticosteroids were given to 9 patients over seventeen periods altogether. The initial dose was 30–80 mg prednisolone or equivalent drug per day. In 6 patients a good initial effect was obtained during several periods of treatment, but on only three occasions did it persist for more than 3 months. New crops of pustules appeared when the dose was reduced during several periods in 8 patients, and in 2 cases these were severe. In 3 patients corticosteroids had no effect upon the skin lesions on any occasion.

Side effects. Diabetes mellitus was provoked in 3 patients after 3–6 months of treatment. Two patients developed osteoporosis, and one of these also, probably secondarily, renal calculus. A reversible confusional state occurred in one case.

Methotrexate. Four patients received methotrexate during a total of eight periods. The drug was administered either intramuscularly (one dose of 10–25 mg per week) or by mouth (7.5–15 mg within one 24-hour period per week). To minimize hospitalization, intramuscular administration has frequently been replaced by oral therapy after primary remission. Remissions of more than 3 months' duration was obtained on five occasions in 3 of the 4 patients in eight periods of treatment. In the fourth patient, methotrexate was given for only one period, one injection per week for 3 weeks, without benefit.

Side effects of methotrexate therapy have included slightly haemorrhagic erosions in the pustular areas in one

Table II. *Laboratory values registered during a severe exacerbation*

Patient no.	Temp. (°C)	ESR (mm/h)	Hb (g/100 ml)	WBC/mm³	Albumin (g/100 ml)
1	39.2	136	9.2	14 600	1.7
2	39.4	49	8.6	21 600	3.1
3	40.2	64	10.9	11 600	–
4	39.8	100	8.9	19 800	3.1
5	39.8	50	10.7	13 300	2.9
6	39.6	116	12.5	14 200	4.4
7	40.2	68	8.5	13 500	2.3
8	39.2	72	8.7	10 000	2.6
9	39.3	79	11.2	9 700	3.2
10	38.0	55	13.1	6.500	4.0
11	39.3	53	16.3	16 100	2.2
12	39.0	28	9.9	15.500	2.5
13	38.8	91	10.5	14 600	–

Hand–foot symptoms	Further clinical signs and comments
–	Often circinate pattern
Bouts	Severe arthritis. Corneal ulceration Hypogammaglobulinaemia
Contin.	Symptoms succ. milder
Contin.	Bronchial PP? Conjunctivitis
Contin.	Glomerulonephritis. Tongue lesions
–	Sudden death 1969 (not due to skin disease)
Bouts	Painful lymph nodes
Contin.	Glomerulonephritis
–	Painful lymph nodes
–	
Bouts	Tongue lesions. Uniovular twin to patient no. 6.
–	Free from skin symptoms for more than 3 y. Hypogammaglobulinaemia
Contin.	

case, the changes regularly appearing 3–4 days after administration of the drug. In one case a possible rebound effect with violent GPP occurred 10 days after cessation of therapy. Slight increase in transaminase values and a slight, transient fall in leukocyte and thrombocyte counts were noted in several cases 4–7 days after administration of the drug.

Hydroxyurea. Six patients received this drug by mouth over altogether twelve periods. In four of the periods a daily dose of 0.5–1 g was given, and no response to therapy was obtained in any case. In eight periods the daily dose was 1.5–2 g. Primary remission occurred in six instances, in four persisting for more than 3 months. At the time of writing another remission has lasted for 50 days. Two patients have failed to respond even to the higher dose. The beneficial effect of hydroxyurea has usually appeared after about 8 days' therapy.

Side effects. Macrocytic anaemia developed in 3 patients. In the 2 who were investigated by sternal puncture the bone marrow showed a megaloblastic reaction. The serum B_{12} was normal in all 3, but one showed slight folic-acid deficiency. This last-named patient's treatment and blood charts are shown in Fig. 6, from which it can be seen that after administration of folic acid the haemoglobin returned to normal but the macrocytic features persisted. When hydroxyurea was discontinued for 12 days the blood values tended to return to normal, but on reinstitution of treatment, both macrocytosis and anaemia recurred. The patient illustrated in Fig. 7 developed grave anaemia with macrocytic features; the bone marrow failed to recover until 3 weeks after stopping the hydroxyurea. In these 2 patients the macrocytic anaemia developed after 1–2 months' treatment with 1.5–2 g per day; in the third the blood changes appeared after roughly 6 months' therapy, smaller doses being used, owing to a tendency to leukopenia.

Pancytopenia occurred in one patient. A contributory factor was probably a slight impairment of renal function resulting in reduced excretion of the drug. The condition proved quickly reversible, and at the same time the skin healed completely. Moderate leuko- and thrombocytopenia were common, and were easily managed by adjusting the dose or by discontinuing the drug.

Antibiotics. One patient was treated for 6 weeks with a combination of Kloxacillin 2 g and Cephaloridin 4 g daily, as described by McFadyen & Lyell (12). During the fifth week of treatment this man developed a severe exacerbation. Scanty growth of *Staphylococcus aureus* was obtained from the blood on one occasion, but the same organism was at that time also isolated from the aspiration point. In all, eleven blood cultures before and during therapy were negative (on each occasion the patient's temperature exceeded 38.3°C).

In addition, both short and long periods of treatment with penicillin and broad-spectrum antibiotics have been tried without effect, except upon secondary infection.

Three patients were treated with caps. containing tetracyklin 167 mg+oleandomycin 83 mg (Sigmamycin®, Pfizer), 1–2 caps./day over a period of roughly 2 years. A striking reduction in the incidence and duration of pustular episodes took place in all 3, but severe recurrences followed after about 18 months in 2, despite therapy. In the third patient the improvement persisted, and she remains

Table III. *Reactions to drugs among the patients with psoriasis pustulosa generalisata*

Patient no.	1	2	3	5	6	7	8	9	12	13
Penicillin		+			+					
Sulphonamide		+	+		+		+		+	
Salicylates					+				+	
Morphine							+			
Codeine								+		+
Procaine										+
Betamethasone-17-valerate			+							
Lanolin			+							
Mercury	+	+		+						
Iodochlorhydroxyquin			+			+				
Dibenzthione (Fungiplex)						+				
Tar	+			+			+			

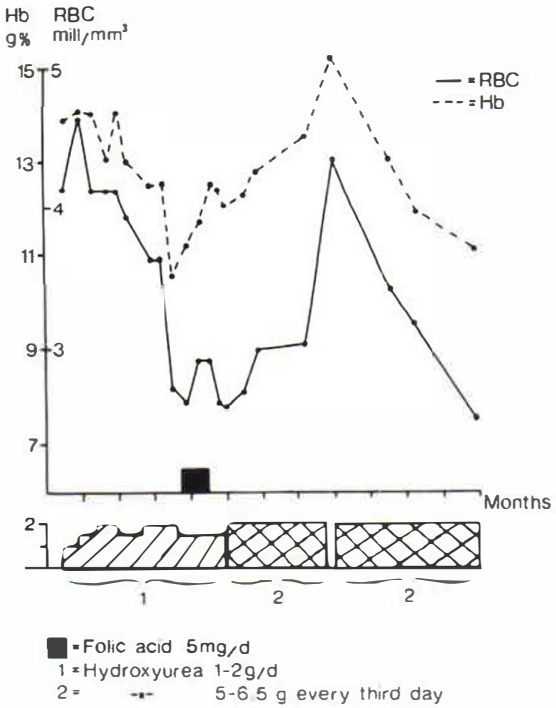

Fig. 6. Patient with psoriasis pustulosa. Development of macrocytic anaemia during hydroxyurea therapy (Patient 11).

completely free from symptoms 4 years after discontinuation of the drug. The rationale for this form of therapy is the theory that a pathological intestinal flora might contribute to the attacks of pustular psoriasis. Anaerobic culture of faeces was done in 7 of the patients; no conclusions can at present be drawn from the findings, but the results are to be reported when further material has been collected.

Sulphapyridine was tried in 4 patients, all of whom became worse.

Blood. The 13 patients received altogether 45 bottles (450 ml) of blood in seventeen transfusions. Their general condition improved, but on only two occasions did the skin lesions show improvement. Blood transfusion therefore apparently has no specifically beneficial effect on the skin in pustular psoriasis, but seems to be indicated only in presence of resistent anaemia or hypoproteinaemia.

DISCUSSION

Reports on the familial occurrence of pustular psoriasis have appeared in the literature (5, 7, 10, 14, 19, 20). No previous reports on uniovular twins suffering from pustular psoriasis, and none on pustular psoriasis associated with hypogammaglobulinaemia would seem to have been published.

In all cases but one in the present series, psoriasis vulgaris preceded the pustular changes, and in most the initial lesions presented after the age of 30 years. This latter finding tallies with that of an earlier report (1), in which however the development from psoriasis vulgaris to the pustular form was said to take place as a rule within 2 years of the debut; in 8 of our patients this interval exceeded 4 years. Since various provocative factors, such as infection and certain drugs, would seem capable of influencing the conversion of psoriasis vulgaris into the pustular form, one of these may have affected the time interval.

There is reason for differentiating patients with pustular psoriasis and concomitant pustulosis on the hands and feet, primarily owing to the prognosis (17). Pustulosis of the hands and feet has proved extremely chronic and as a rule resistant to therapy and patients with this form of the illness have usually remained almost completely unable to work even when the generalized pustular lesions have remained under control, owing to the persistent acral pustulosis. None of the 5 patients that we assigned to the "acral" group has recovered completely.

In contrast, patients with alternating attacks of GPP and psoriasis vulgaris but without pustules on the hands and feet have remained largely free from

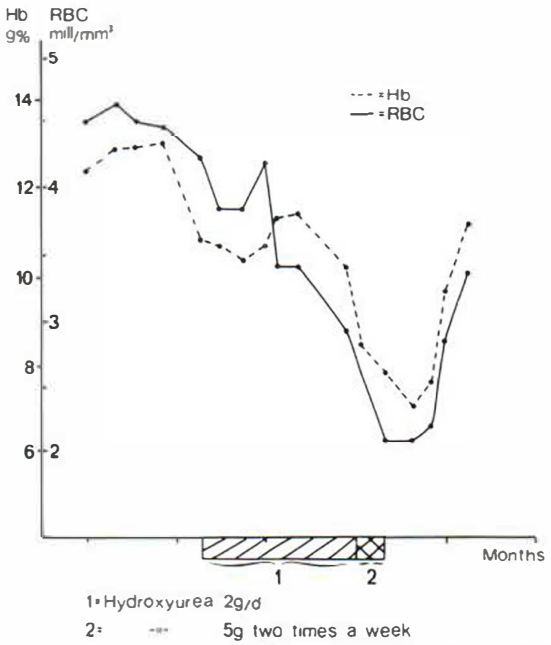

Fig. 7. Patient with psoriasis pustulosa. Development of grave anaemia with macrocytic features during hydroxyurea therapy.

Table IV. *Exogenous factors that may have precipitated attacks of psoriasis pustulosa generalisata in 13 patients*

Cessation of therapy with corticosteroid ointments (1 patient)
Oral corticosteroid therapy for indications other than psoriasis pustulosa (2 patients)
Other drugs
Penicillin (1 patient)
Sulphonamide (2 patients)
Morphine (1 patient)
Salicylates+Codeine (1 patient)
Sulphapyridine (4 patients)
Infection (7 patients)
Pregnancy (1 patient, post partum)
Sun irradiation (2 patients)
Alcohol consumption (2 patients)

symptoms for long periods, and the prognosis has been much more favourable. One of these patients seems to have recovered completely.

The patients have shown considerable differences with regard to the intensity of the affliction and to the recurrence rate. Furthermore, the course of the generalized pustulosis appears to vary greatly in the individual patient from one attack to another. The often cyclical nature of the development of the pustules during an active phase of the illness and the peculiar proclivity of the pustules to start over a limited area, such as a shoulder or thigh, and to spread to most of the body within one or a few days, are puzzling, but seem to be intrinsic features of the condition. An interesting observation made by 2 patients, and confirmed by us, is swelling of lymph nodes draining areas that later, within 24 hours, developed severe pustular changes. This is not the series of events that takes place in septic states due to bacteria. Blood cultures and cultures of the contents of intact bullae have been negative. We have never seen evidence of contagion between patients with GPP and patients with psoriasis vulgaris or other skin conditions.

The sometimes rapid falls in haemoglobin and serum albumin concentrations that have been fairly common have been explained by leakage of red cells and serum protein through abnormal capillary endothelium, whereas no increased losses via gut or kidneys have been demonstrable (4).

Clinical signs in the oral cavity (1, 3, 8, 10), conjunctiva, and cornea (8, 10, 18) are important with regard to differential diagnosis.

Unaccountable shock in one of our patients is evidently not unprecedented (8). Abnormal chest sounds were not accompanied by abnormal X-ray findings. A possible explanation might be a briefly transient psoriatic involvement of the bronchial mucous membranes.

Most secondary infections of the skin were caused by beta-haemolytic streptococci. Two patients developed severe glomerulonephritis, requiring treatment with systemic corticosteroids. Prophylactic treatment with penicillin may therefore have to be considered during acute exacerbations of the pustular psoriasis. As the incidence of drug reactions has been high, however, we prefer to isolate such patients during active periods of the illness and to treat only confirmed bacterial infections.

Because of the surprisingly high incidence of drug reactions, the short time required to produce them, and the fact that many patients developed reactions to several drugs, it would seem that these patients have an increased propensity for drug reactions, but this has not yet been confirmed in other reports. Drug reactions often aggravate GPP. Other aggravating factors include infection (1, 9, 10, 17) and pregnancy (2, 18, 22).

Acral lesions have shown poor response to treatment with corticosteroids, methotrexate, and hydroxyurea. All three types of drug have sometimes resulted in healing of generalized pustular lesions, but none has proved universally successful. Concerning long-term effects, corticosteroids have given the least satisfactory results, and having regard to the rebound phenomenon, side effects, and probable prolongation of the exacerbations in certain cases, we now avoid these preparations. In fulminating pustular psoriasis with general impairment, however, corticosteroids have proved swiftest in bringing about remission, and are capable of checking a precipitate and potentially lethal condition.

The long-term effects of methotrexate were better, as has also been reported by other investigators. All things considered, injection therapy has proved the more efficient, but a dose of 20–25 mg per week has usually been required, which is more than we have found necessary in common psoriasis. By monitoring the serum transaminase level and blood data about 5 days after administration of the drug and interrupting treatment if pathological values persist, it has been possible to avoid serious complications completely.

Hydroxyurea is the newest preparation in our therapeutic arsenal. Our own findings have proved

less favourable than those in earlier reports, however, (21): in the first place we have not observed the quick effects described, and our patients have required larger doses, viz, 1,5–2 g daily by mouth. We consider there is no point in continuing to give hydroxyurea if no effect has been obtained within 14 days. This is in contrast to the effect of the preparation in psoriasis vulgaris, where the response appears to reach a maximum very much later (6, 11, 15). As with methotrexate, the therapeutic effect of hydroxyurea has failed in some cases. Hydroxyurea may result in macrocytic anaemia or leukopenia (6), which are nevertheless said to be reversible despite continued treatment. In our experience, however, the blood changes are not always reversible in pustular psoriasis if treatment is continued: in addition to the macrocytic anaemia and tendency to leukopenia, the fall in thrombocyte count has been marked, particularly on repeated therapy. We consider this will essentially limit the use of hydroxyurea in the treatment of GPP. It is possible that other dosage regimens may help to reduce the effects on the blood. Investigations are in progress.

At present we start the treatment of GPP conservatively, using mild topical applications without steroids, a full diet, and careful bacteriological and hygienic regimens. If the course is prolonged and the symptoms are troublesome, hydroxyurea is given in a dose of 1.5–2 g daily by mouth. Alternatively, methotrexate is given, but hydroxyurea seems to produce much quicker results, and this drug has proved easy to administer in ambulant patients. Systemic corticosteroids are employed only when life appears to be threatened. We also avoid topical application of high-potency steroid preparations except on chronic lesions of the hands and feet when other therapy has proved ineffective. Antibiotics are given only when there is secondary infection, after culture and establishment of the resistance pattern of the organism.

The results of treatment of pustular psoriasis are evaluated with the greatest difficulty owing to the wide variations in the course of the disease. Furthermore, owing to the marked propensity of the patients to develop drug reactions, therapeutic trials may involve a risk of aggravating instead of improving the condition. When GPP is developing or during exacerbations, it is then important to consider possible aggravating factors. Furthermore, when cytostatic drugs are given, it is very important to make regular checks on blood data, liver transaminases, and kidney function.

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