Clinical study

MYELINATED - NERVE BEHAVIOR IN PSORIASIS

M. Lomuto, P. Simone, M. Iannantuono, P. Di Viesti, M. Zarrelli, G. Ditano and G. Lagioia

ABSTRACT

The relationship between the nervous system and psoriasis is still unclear. Certain neuropeptides seem to play significant roles, but less is known about the behavior of myelinated nerve fibers. In a group of 26 psoriasis patients motor function was evaluated using bipolar surface electrodes over the median, ulnar and peroneal nerves. Sensorial function was tested along the median, ulnar and sural nerves. Abnormalities were observed in only two patients; one presented a slight reduction in motor conduction velocity of the peroneal nerve; in the second, motor conduction velocity along the peroneal nerve was markedly reduced. There were also moderate reductions in the sensorial conduction velocities of the median and ulnar nerves, and no response could be evoked with sural nerve stimulation. Both sensory and motor parameters were normal in all other patients. There were no correlations between our findings and the patient's PASI index, the presence of arthro-myalgia, the duration of the disease or alcohol/tobacco use. These findings demonstrate the integrity of the peripheral nervous system (at least as far as large fibers are concerned) in psoriasis patients. These large fibers do not appear to play a significant role in this disease.

KEY WORDS

psoriasis, myelinated fibers, nerve conduction

INTRODUCTION

The relationship between psoriasis and the peripheral nervous system is still unclear and is the object of discussion.

In several publications (1,2,3), Farber et al. have reaffirmed their belief that substance P contributes significantly to the development of psoriasis lesions by inducing neurogenic inflammation. Their conclusions are based, in part, on their observations of several patients who experienced spontaneous remission of their psoriasis-lesions in regions subjected to surgical anesthesia (4,5). The lesions reappeared when sensation was restored. A number of other studies have also emphasized the importance of substance P and other neuropeptides contained in small unmyelinated sensorial fibers in the pathogenesis of psoriasis (2,6,7).

In cases of traumatic anesthesia, however, myelinated nerve fibers, as well as small unmyelinated C nerve

fibers, are interrupted. Much less is known, however, about the behavior of large nerves in psoriasis. Sindrup et al. (8) described three psoriasis patients with polyneuritis who presented neurological changes, including reductions in motor and sensorial conduction velocity, decreased potential amplitudes and increased distal motor latency. These observations suggest that myelinated nerve fibers are also involved in psoriasis, at least in those cases associated with polyneuritis.

The aim of the present study was to evaluate large sensorial and motor nerve behavior in patients with psoriasis.

MATERIALS AND METHODS

Our study group was composed of 26 psoriasis patients (19 males, 7 females) ranging in age from 21 to 84 years (mean age: 52.9 years). The PASI index (which is, admittedly, a rather crude measure of psoriatic disease) ranged from 3.6 to 72 (mean: 18.3). The duration of the disease ranged from one month to 25 years (mean: 9.6 years). Eleven patients suffered some degree of arthropathy, accompanied by myalgia in three cases, by paresthesia in three others and by pruritus in five. Two patients reported family histories of psoriasis.

None of the patients had any metabolic diseases, such as diabetes mellitus or thyroid dysfunction, or electrolyte imbalances. Daily alcohol consumption (primarily in the form of wine) among the 17 patients who drank, ranged from 10 to 150 g. The remaining nine denied all forms of alcohol consumption. Fifteen patients smoked anywhere from two to forty cigarettes a day (mean: 13.5/day).

The results of the nerve function studies performed on these 26 patients (described below) were compared to normal values obtained in our laboratory in local patients without any form of neurological disease observed in the last 5 years.

NERVE FUNCTION STUDIES

Patients were placed in the supine position in a room, where the temperature was 22-24°C and allowed to relax prior to initiation of each study. Bipolar surface electrodes were used for all studies of motor and sensorial function. Needle electrodes, which provide more accurate readings, were not used because of the pain involved in their insertion. In order to minimize the influence of the skin lesions on impulse transmission, all electrodes were attached to healthy skin areas that had been cleaned with ether. This consideration forced us to abandon our initial plan to check transmission along the anterior tibial nerve since the skin overlying this was often the site of lesions.

For motor studies, electrodes were applied over the median, ulnar and peroneal nerves. Sensorial function was evaluated in the median, ulnar and sural nerves. Sensory stimulation was delivered with a rectangular waveform lasting 0.1 millisec at a frequency of 1 Hz, similar to that received from the brain itself.

The median nerve was stimulated at the wrist and at the elbow (just below the head of the radius) for motor studies. Responses were recorded by electrodes placed over the abductor pollicis brevis. Sensorial stimulation of this nerve was delivered through an electrode attached to the 2nd finger. Recording electrodes were attached to the median side of the wrist. Amplitude of 16 responses to supramaximal stimulation were assessed.

For motor studies, the ulnar nerve was stimulated at the wrist and sulcus ulnaris; impulses were recorded in the 5th abductor digiti of the hand. Sensorial stimulation of the ulnar nerve was delivered through electrodes attached to the 5th finger. Recording electrodes were attached to the inner surface of the wrist. The amplitudes of 16 responses to supramaximal stimulation were evaluated.

Study of the peroneal nerve was limited to the motor compartment. Stimulation was delivered at the ankle and caput fibulae and responses recorded in the extensor digitorum brevis.

Stimulation of the sural nerve (which is purely sensorial) was delivered through an electrode attached to the posterior calf. Responses were recorded at the lateral malleolus.

The following parameters were examined: distal motor latency, conduction velocity (both motor and sensorial) and potential amplitude (motor and sensorial).

Distal motor latency refers to the time that elapses between delivery of the stimulus and muscle response and is a reflection of pathology involving structures through which the impulse passes (e.g. carpal tunnel syndrome).

Motor conduction velocity is defined as the distance between two points of stimulation divided by the difference between their relative latency periods. This parameter reflects myelinization of the nerve since motor impulses travel along the myelin sheath.

Sensory nerve conduction velocity is calculated as the distance between two points of stimulation divided by the difference between their relative latency

points.

The amplitude of the potential offers a rough index of the amount of damage suffered by the nerve fibers making up bundle. Differences of less than 50% between two points are actually insignificant since this parameter is quite sensitive to external factors, such as edema or excessive adipose tissue surrounding the nerve.

RESULTS AND DISCUSSION

Table I shows nerve-function parameters of the 26 psoriasis patients evaluated. Only two of the patients presented conduction parameters that were abnormal (Table II).

The first patient (no. 25) was a 57-year-old male who had psoriatic arthritis (primarily of the hands and feet) for 25 years. The PASI index in this case was 72. The only abnormality found here was a very slight reduction in the motor conduction velocity of the peroneal nerve (38 m/sec.; minimal normal value: 40 m/sec.). None of the sensory parameters or motor parameters for other nerves fell outside normal limits. However, the fact that this patient smoked 40 high-nicotine cigarettes and drank one liter of wine (i.e. 120 gr. alcohol) each day makes it difficult to attribute this change to his psoriasis alone. It should be pointed out, however, that he did not show any signs of tobacco poisoning, alcoholism or metabolic disease.

The second patient (no. 26) was a 68-year-old male who had suffered from psoriasis vulgaris for five years. There were no signs of arthropathy or myalgia; the PASI index was 23. He smoked 20 cigarettes and drank 1/2 liter of wine (i.e. 60 gr. alcohol) per day. Motor conduction velocity along the peroneal nerve was, in this case, markedly reduced to 27.5 m/sec. There was also moderate reduction in sensorial conduction velocity along the median and ulnar nerves, and even intense stimulation of the sural nerve failed to evoke any response whatsoever. The latter suggests severe sural nerve damage with survival of only a few fibers. Again, the correlation between the nerve damage and the disease is open to discussion given the patient's smoking and drinking habits.

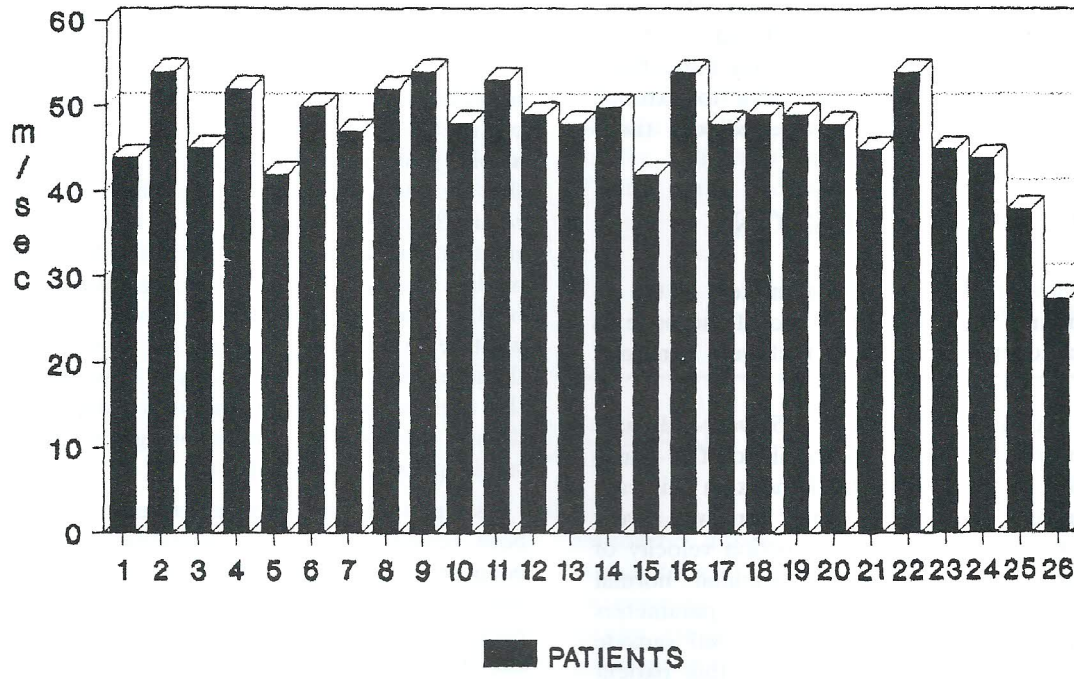
As far as the other psoriasis patients were concerned, both sensory and motor functions seemed to have been preserved. There were no correlations between nerve-function parameters and the PASI index, the presence or absence of arthro-myalgia, duration of the disease or even alcohol or tobacco use. This suggests the integrity of the sensory and motor compartments of the nerves we tested.

The fact that the potential amplitudes, both sensory and motor, were consistently normal in all of the

Table I. Nerve-function parameters of the 26 investigated psoriasis patients

	NERVE FIBERS			
	MEDIAN	ULNAR	PERONEAL	SURAL
Distal motor latency time (normal value less than 4.5 millisec)	2.6 - 4.3	2.3 - 3.2	3.1 - 4.8	
Motor conduction velocity (normal value more than 45 m/sec)	46 - 62	45 - 68	27.5 - 54	
Amplitude of motor action potential (normal value more than 2 milliVolt)	3 - 30	7 - 20	2 - 15	
Sensory conduction velocity (normal value more than 45 m/sec)	44 - 65	38 - 68		41 - 57
Amplitude of sensory action potential (normal value more than 2 microVolt)	3 - 16	3 - 15		6 - 30

Table II. Motor nerve conduction velocity of peroneal nerve (normal values more than 40 m/sec)



patients we tested is very interesting; in that it seems to reflect the integrity of the nerve fibers themselves. However, this parameter is only a crude index of fiber integrity. Numerous extrinsic factors, such as the depth of the nerve or the amount of surrounding fat, are in fact, capable of altering it.

As for the two patients with alterations, it is important to remember that, in both cases, there were factors other than psoriasis that may have caused or contributed to the nerve damage. In addition, there was no correlation between the damage observed and the extent or duration of the patient's disease. The more severe alterations were, in fact, seen in a patient whose PASI index was only 23 and who showed no signs of either arthropathy or myalgia. The other patient, who had only a slight reduction of the motor conduction velocity of the peroneal nerve, had a much higher index and had suffered from his disease far longer than the first one. Other patients in this series with high PASI indices and signs of articular damage were entirely normal in all of the studies we performed.

If we consider the possible role for substance P in psoriasis, the finding of severe sensorial nerve damage in the second patient is important. This deficit should have been associated with a localized resolution of the lesions, but no such effect was observed. This finding seems to conflict with observations of other authors on regression of psoriasis lesions in areas affected by interruption of nerve trunks, or the low incidence of psoriasis among leprosy patients. The discrepancy might be related to the condition of the small nerve fibers, which were undoubtedly damaged in both of the situations cited above. We do not know whether similar damage had occurred in the patients we studied because the approach we used was not suitable for evaluation of small nerve fibers. This interpretation is consistent with the hypothesis of Farber et al. regarding the causative role of substance P in psoriasis since this substance seems to be found primarily in small fibers.

Our findings demonstrate the integrity of the peripheral nervous system (at least as far as large fibers are concerned) in psoriasis patients, even those with symptoms of polyneuritis (paresthesia, pruritus, pain). These myelinated fibers, thus, appear to play an insignificant role in psoriasis. However, our findings conflict with those of other investigators (8) and our study was carried out on very limited number of patients. Further studies of a larger series of patients are thus necessary to clarify the problem.

REFERENCES

1. Farber EM, Nickoloff BJ, Recht B, Fraki JE. Stress, symmetry and psoriasis: a possible role of neuropeptides. J Am Acad Dermatol 1986; 14: 305-11.

2. Naukkarinen A, Nickoloff BJ, Farber EM. Quantification of cutaneous sensory nerves and their Substance P content in Psoriasis. J Invest Dermatol 1989; 92: 126-29.

3. Farber EM, Rein G, Lanigan SW. Stress and psoriasis Psychoneuroimmunologic mechanisms. Int J Dermatol 1991; 30: 8-12.

4. Farber EM, Lanigan SW, Boer J. The role of cutaneous sensory nerves in the maintenance of psoriasis. Int J Dermatol 1990; 29: 418-20.

5. Raychaudhuri SP, Farber EM. Are sensory nerves essential for the development of psoriatic lesions? J Am Acad Dermatol 1993: 28: 488-9.

6. Eedy DJ, Johnston CF, Shaw C, Buchanan KD. Neuropeptides in Psoriasis: an immunocytochemical and radioimmunoassay study. J Invest Dermatol 1991; 96: 434-38.

7. Anan P, Springall DR, Blank PA, et al. Neuropeptides in skin disease: increased VIP in eczema and psoriasis but not axillary hyperhydrosis. Br J Dermatol 1991; 124: 547-9.

8. Sindrup SH, Ibsen MHW Sindrup JH, Sindrup EH. Psoriasis and polyneuropathy. Acta Derm Venereol 1990; 70: 443-5.

AUTHORS' ADDRESSES

Michele Lomuto MD, professor and chairman, Dpt Dermatology
Hospital "Casa Sollievo della Sofferenza", 71013 San Giovanni Rotondo, Italy
Pasqualino Simone MD, professor and chairman, Dpt Neurology, same Hospital
Pietro Di Viesti MD, consultant neurologist, Dpt Neurology, same Hospital
Michele Zarrelli MD, consultant neurologist, Dpt Neurology, same Hospital
Giuseppina Ditano MD, consultant dermatologist, Dpt Dermatology, same Hospital
Marco Iannantuono MD, resident, Dpt Dermatology, same Hospital
Giuseppa Lagioia MD, resident, Dpt Neurology, same Hospital