

NERVE ABSCESS IN LEPROMATOUS LEPROSY

REPORT OF A CASE, WITH A REVIEW OF REPORTS OF NERVE ABSCESS IN JAPAN

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The so-called nerve abscess, one of the interesting features of leprosy, is recognized to be neither common nor rare in the neural and tuberculoid forms of the disease. On the other hand the condition is exceptional and rare in lepromatous leprosy, but it does occur although there are very few reports of it.

Some workers, e. g., Hughes (5), have held that nerve abscess occurs only in tuberculoid leprosy, because of the relatively low reactivity of the tissue in the other forms. In discussing Hughes' paper, however, Muir stated that in India he had seen such lesions in lepromatous cases that probably had begun as of the neural type, and Austin said that he had twice encountered them in operations on lepromatous cases in Fiji.

Wade (27), undertaking to obtain further information from these observers, told of two unpublished cases of reactional nature in his own experience. In one instance bilateral ulnar abscesses were found at autopsy, and they were pictured in a monograph by Wade and Rodriguez (29), the only such picture heretofore published. The other example was a biopsy specimen obtained at an operation performed for relief of acute ulnar pain. In both instances the lesions were histologically and bacteriologically lepromatous, not tuberculoid.

In reply to the inquiry Austin (1) showed that his observations were entirely clinical, without bacteriological or other examinations. Muir (13) referred specifically to a "C2-N2" case mentioned in a publication by Muir and Chatterji (14), which had multiple nerve abscesses containing pus with abundant acid-fast bacilli.

The only case report previous to the present one that is documented by a photomicrograph, to my knowledge, was a brief one by Schujman (21). The patient, negative to lepromin, had no skin lesions but there were two nodules of the ulnar nerves. Sections showed typical lepromatous histology; bacilli were said to be abundant.

Wade (28) then called attention to the matter editorially, urging that any such cases should be reported. That suggestion led to the present article.

I have long been interested in nerve abscess in leprosy, and during the period of some twenty-five years at the skin clinic of the Tohoku University I have seen four examples, three in tuberculoid cases and the

one in the lepromatous case reported here, previously mentioned briefly, without pictures, in an article in the Japanese language (20). Two other such cases have been reported in Japan, very briefly in abstracts, and they are also reviewed. Note is also made of certain instances in which tuberculoid changes, without abscess formation, have been found in nerves of lepromatous cases. Finally, the recorded instances of nerve abscess in tuberculoid and neural leprosy reported in this country are summarized in a tabulation.

I. NERVE ABSCESS IN A LEPROMATOUS CASE

In this case there were two abscesses in nerve branches associated with the right ulnar nerve, both of which were removed and subjected to thorough examination.

Patient K. N., a masseur's son, 20 years old, born healthy and strong. His parents and two brothers were all in good health. No leprosy patients among relatives or in the neighborhood. He had noticed that his nose had become obstructed two or three months before he visited the clinic in June 1943. According to his account, it was just one month before that an itchy, erythematous eruption had appeared on the face, with no disturbance such as headache, fever or nerve pain. He had received no medical treatment before his visit.

The patient was a well-built youth, without any noteworthy findings with respect to the internal organs. Tuberculin reaction 22 x 25 mm. Mitsuda reaction negative. Wassermann and Kahn blood serum reactions negative.

Regarding the skin eruptions, the face (Fig. 1) was of a reddish-brown color, with diffuse infiltration partly smooth and partly irregular in appearance. Here and there were numerous papules and nodules, from rice-grain- to pea-sized. In places they were conglomerated to make plaques, especially below the right end of the lower lip and on the chin. The earlobes were reddish and slightly swollen. There was slight loss of hair in the lateral third of the eyebrows. Sensory disturbance here was not definite, except for a complaint of itching of the face. On the ulnar side of the right forearm there was sensory disturbance of slight degree without visible skin changes. On the fronts of both legs there was light pinkish, diffuse infiltration with a rough and cracked surface, showing very slight sensory disturbance.

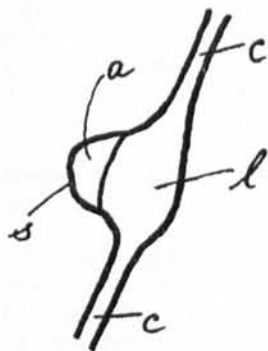
Abundant leprosy bacilli with globi were found in smears from the nodules and the infiltrations of the face, and also from the nasal mucosa, but scanty from the infiltrations of the legs. Histological examination of a skin nodule excised from the chin showed typical lepromatous changes.

Nerve lesions.—The great auricular and peroneal nerves were slightly thickened. Both ulnars showed marked enlargement and tenderness above the elbow, especially the right trunk which was palpable as a pencil-thick cord. Furthermore, in the ulnar area of the right upper arm, two nerve branches (perhaps ulnar antebrachial cutaneous nerves) were palpable as cords two or three times as thick as a G guitar-string, running along near the ulnar itself. Each of these cords had a cherry-sized swelling, slightly tender on pressure. There were two enlarged cubital lymph nodes each about the size of a soy bean, not painful on pressure.

Excised swellings.—The swellings were excised. During the operation they were ruptured, and a considerable quantity (3-4 cc.) of whitish-

yellow pus came out. Smears of that material showed abundant leprosy bacilli with globi, numerous lepra cells and foamy cells, and much amorphous sediment. Contrary to expectation, leucocytes were very scanty. Cultures of the pus in glycerol broth and on blood agar and Petraghani's egg medium gave no growths.

The excised swellings were both grayish-white, ovoid, rough-surfaced masses, nearly the same in shape and size, each situated in a nerve cord. As shown schematically in Text-fig. 1, the nerve sheath formed the wall of the abscess sac in both instances. After fixation, the specimen represented (Fig. 2) measured 3.3 cm. long, and 2.2 cm. wide at its broadest part.¹ The cut surface of the swelling was grayish-white in color with a brownish tint. The mass was filled with pus, not only in the sac but also in spaces or crevices in the granuloma which constituted the bottom and walls of the sac (Fig. 3).



TEXT-FIG. 1. Schematic drawing of one of the excised abscesses: *c, c*, nerve cord; *l*, the leproma in the nerve; *a*, abscess; *s*, abscess wall (nerve sheath).

Histological findings.—The nerve sheath is highly infiltrated and thickened, showing fine networks of increased fine fibers with round cells and lepra cells among them. The nerve cord as a whole is changed into a lepromatous granuloma (Fig. 4), consisting of lepra cells in various stages of evolution including numerous large foamy cells (Fig. 5). Round cells are rather few, forming very small foci here and there. There are hardly any polymorphonuclear leucocytes, either in the sheath or in the nerve cord. The nerve fibers are destroyed over a wide range, a few of them or traces remaining among the increased fibroblasts and connective tissue fibers. No traces of tuberculoid structure or caseous necrosis, which are the most striking characteristics of the nerve abscess in the tuberculoid or neural cases, can be found. Bacilli are abundant (Fig. 6).

OTHER REPORTS OF LEPROMATOUS NERVE ABSCESES

There can be found in the Japanese literature only two other reports of such lesions, by Fujita in 1952 (3) and Hirako in 1955 (4). Both

¹ These measurements were taken from the photograph of the specimen, made after fixation in formalin, which included a scale which had to be trimmed off because of limitations of space in the plate.—EDITOR.

reports consist only of brief abstracts of papers read before the Japanese Leprosy Association, and they have not been published otherwise. The essential features of the cases as recorded, together with those of my own, are summarized in Table 1.

The abscess of Fujita's case appeared in the great auricular nerve of a lepromatous case in the course of an erythema nodosum leprosum reaction. The histopathology of the nerve lesion was quite similar to that

TABLE 1.—Nerve abscess in lepromatous cases reported in Japan.

No.	Author and year	Nerve involved	Number and size	Histological findings	Remarks
1	Sato 1948	R. ulnar antibrachial cutaneous	2, cherry	Lepromatous	Bacilli innumerable
2	Fujita 1952	Auricular (Side?)	1, finger tip	Same as ENL	During erythema nodosum
3	Hirako 1955	Antebrachial cutaneous; superficial branches of ulnar and peroneal.	Multiple, rice to corn grain	Caseous necrosis; wall of histiocytes and foamy cells	Bacilli innumerable

of the skin eruption. There was infiltration of numerous foamy cells and neutrophil leucocytes mingled with eosinophils in the nerve bundles and the epineurium and perineurium. Fibrin fibers containing mucoitin sulfate were demonstrated in the leucocyte foci.

The process of abscess formation in Hirako's case is especially interesting. The patient had lepromatous leprosy which at the time was in the "secondary neural" state. Abruptly, in a night, there appeared on all four extremities many small subcutaneous nodules—abscesses—that varied in size from a grain of rice to a kernel of corn. These corresponded to the superficial branches of nerves, such as the antibrachial, ulnar and sural. No sign of erythema nodosum leprosum was seen. Caseous necrosis with a wall of foamy cells and histiocytes in the nerve was the main histological finding in the nodules. No leucocytes were found. Leprosy bacilli were abundant, especially in the necrotic material. Cultures of that material for the tubercle bacillus were negative. Hirako concluded that necrosis of lepromatous granulomata was the cause of the abscess formation.

The nerve abscesses in the three cases discussed were all quite different from the "cold abscess" in their histopathology. The existence of such lesions was first brought to attention by Wade (27), who suggested that they were probably due to lepra-reaction phenomena, in the

way that lepromatous skin lesions may break down in reactional conditions. It is a fact that the lesion in Fujita's case occurred during an erythema nodosum leprosum reaction. Those of Hirako's case developed abruptly, overnight, but otherwise there was no evidence of a reactional condition. In my own case there was nothing peculiar about the patient's condition, or—so far as known—the production of the abscesses, and it is difficult to associate them with lepra reaction. It may perhaps be that the patient was in a period of acute exacerbation—lepromatization in the incipient stage.

LEPROMATOUS CASES WITH TUBERCULOID NERVE LESIONS

There have been no reports, in Japan or anywhere else so far as is known, of the "cold" type of nerve abscess in lepromatous cases. There have, however, been three reports of tuberculoid nerve lesions, without abscess formation, in cases of that type. These reports were Kobayashi (7), Saijo (17), and Miyata (11), all based on autopsy findings.

Kobayashi, in a report of autopsy studies on 60 cases (38 lepromatous, 19 neural, 3 tuberculoid), told of the finding of tuberculoid lesions in the ulnar nerve of one case, a 58-year-old man with lepromatous leprosy whose ulnar showed histologically a granuloma with Langhan's giant cells and leprosy bacilli.

Saijo's case was that of a 21-year-old man with lepromatous leprosy supposedly complicated with pulmonary tuberculosis. In the left peroneal and right supraorbital nerves there were found small foci of caseation close to lepromatous infiltrations. He regarded these caseous lesions as tuberculous in nature, stating that he could demonstrate tubercle bacilli in them, besides leprosy bacilli in the lepromatous infiltrations. Mitsuda (10) expressed doubt that these lesions were tuberculous in origin. I personally believe the caseous changes were not tuberculous but leprosy in nature, for reasons to be discussed later.

Miyata's observation is recent. The case was of a 20-year-old girl with lepromatous leprosy who had died of sepsis complicating the course of an erythema nodosum leprosum reaction. At autopsy there was found in one of the ulnar nerves a small tuberculoid lesion with necrosis and giant cells.

It is not at all strange that tuberculoid nerve lesions may be found, even if rarely, in lepromatous cases. Lepromatous cases often arise, by deterioration of resistance, from forms of the disease in which tuberculoid lesions of the nerves occur, and these may, if examined, be found to be remnants of the previous condition. The possible role of borderline cases in this connection, suggested by Wade (28), requires future studies to make it clear.

It now remains to summarize the cases of nerve abscess of the "cold" type in neural or tuberculoid leprosy reported in Japan.

IV. NERVE ABSCESS IN NEURAL AND TUBERCULOID CASES

It is indisputable that the cold abscess type of nerve lesion is associated with neural or tuberculoid cases, and is derived from liquefaction of the caseous nerve lesions which may occur in cases of those forms of the disease. There is no room for doubt that lepra reaction is one of the main causes of the development of abscess formation. One-half of the 100 cases that Lowe (8) observed were induced by the use of potassium iodide. On the other hand, Muir and Chatterji (14) attributed the cause to various factors, such as accumulation of bacilli at certain points and enhancement of individual resistance and recovery reaction.

It is apparent from reports by Muir (12), Lowe (8, 9), Wade (25, 26), and Chatterji (2) that this condition is not—or was not in the past—rare in India, but it would seem to be more infrequent in other parts of the world. As for Japan, I have been able to collect only 13 cases, the earliest ones dating back to 1904 and 1909, the latest recorded in 1950, since when—perhaps because they are even more rare, under sulfone treatment—none has been reported. These cases are summarized in Table 2.²

The first case tabulated, reported by Yoshii in 1904 (30), was diagnosed as tuberculous neuritis of the median nerve. However, the clinical findings—such as sensory disturbances and muscle atrophy with contractures of the left hand and forearm—indicate leprosy rather than tuberculosis. Very few people in those days had any knowledge of tuberculoid lesions in leprosy. Hence it is regarded as probable that the case was actually leprosy.

There is also the question of probability of tuberculosis of the peripheral nerves. Spielmeyer (23) described histological changes of degenerative neuritis in the peroneal nerve of severe tuberculosis cases. The late Prof. O. Kimura, a pathologist at our university who specialized in nerve pathology, once told me that caseous tuberculous neuritis was extremely rare, and that it occurred almost exclusively in the left phrenic nerve near the crossing of the thoracic duct when caseous tuberculous change existed in the lymph node close to the nerve in the same site.

Few as have been the cases of cold abscess of the nerve reported in Japan, there have been many reports of caseous but not liquefied neuritis in neural or tuberculoid leprosy, by Shiota (22), Tachikawa (24), Ota and Sato (16), Saito (19) and Sato (20) among others. It therefore appears that caseous neuritis, which is the basis of abscess formation, is common in Japan, whereas the superimposed changes that produce the typical nerve abscess are rather rare.

As for the cause of abscess formation, interesting explanations have been given by authors cited (8, 9, 14, 25, 26), but it is generally recognized

² Besides these cases, according to Saikawa (18), Mitsuda has observed two typical examples in patients with neural leprosy, one of the ulnar and the other of the antebrachial cutaneous nerve. As they were not published, however, they could not be included in the tabulation.

that lepra reaction of one kind or another is often involved. There are many cases, however, in which no relationship with any such condition can be established, although it is to be recognized that abscesses of the tuberculoid type, at least, are likely to persist for a long time after a reaction. It would have subsided, had there been one.

TABLE 2.—*Nerve abscess in neural or tuberculoid cases reported in Japan.*

No.	Author and reference	Sex, age, type ^a	Location, nerves affected	Number and size	Bacilli, smears & sections	Remarks
1	Yoshii 1904 (29)	F 15 N?	L. median	1, egg	(Biopsy)	Diagnosed tuberculous neuritis
2	Shiota 1909 (22)	M 19 N	L. ulnar, 1. radial, r. peroneal	3, thumb tip	Smear— section— (biopsy)	Chinese
3	Do	M 19 (?)	L. ulnar, 1. med. ante- brachial	2, thumb tip	Smear— section+ (biopsy)	
4	Do	M 14 N	L. supra- orbital	1	Smear— section— (biopsy)	
5	Do	M 46 N	L. peroneal, 1. cutan., sural	2, pencil thick	Smear— section— (biopsy)	
6	Ogasawara, Ninomiya 1934 (15)	M 17 T	L. ulnar, (median?)	Fistula	Smear— (not biopsied)	
7	Do	M 17 N	R. ulnar, r. median, r. radial	3, finger tip	Punctured pus (not biopsy)	
8	Do	M 25 N	R. lateral, antebrach., cutan.?	(?)	(Not biopsied)	
9	Ota and Sato 1935 (16)	M 26 T	L. auricular	1, finger tip	Smear— section+ (biopsy)	In lepra reaction
10	Do	F 18 T	L. auricular	1, finger tip	Smear— section+ (biopsy)	In lepra reaction
11	Inaba 1944 (24)	M (?)	Auricular (side?)	2, finger tip	Smear— (not biopsied)	
12	Sato 1948 (20)	M 29 T	L. auricular	1, finger tip	Smear— section+ (biopsy)	After lepra reaction
13	Saikawa 1950 (18)	F 66 T	L. ulnar and cutan. nerve branches	8, biggest 3 cm diameter	Smear 3+ section 3+ (biopsy)	

^a F = female, M = male, N = neural, T = tuberculoid.

Males overwhelmingly exceed females in the reported cases of cold abscess. All of Lowe's 100 patients were males, as were 10 of the 13 summarized in Table 2; but females are not exempt.

As for the nerves involved, the ulnar above the elbow is said to be the most common site, but other deep trunk nerves may be affected, and various superficial (cutaneous) nerves including especially the great auricular. Of the 30 abscesses in the 16 cases dealt with in this report, 6 appeared in the ulnar, 5 in the great auricular, 4 in the antebrachial cutaneous, 3 in each the median, radial and peroneal, and smaller numbers in various other superficial nerves, including the supraorbital in one instance.

As a rule leprosy bacilli are difficult to demonstrate in the cold type of abscess, and when found they are very scanty. It is, therefore, interesting that in Saikawa's case they were abundant and found in masses, and they extracellular.

SUMMARY

1. An instance of nerve abscess in a case of lepromatous leprosy is presented. In each of two ulnar antebrachial cutaneous nerves of an 18-year-old boy there occurred an abscess with purulent matter which consisted chiefly of lepra cells, particularly foamy cells, but few leucocytes. Leprosy bacilli were abundant, but there were no bacteria that could be grown in cultures. Histologically there was no resemblance to the so-called "cold abscess." The lesion was not tuberculoid and showed no caseous necrosis; it was definitely lepromatous in nature, with abundant bacilli.

2. Two other cases of lepromatous nerve abscesses recorded in Japan are reviewed briefly. The essential features of all three cases are tabulated.

3. No lepromatous case with an abscess of the cold type has been reported in Japan. There are, however, records of three lepromatous cases in which tuberculoid or caseous lesions were found in nerves at autopsy, in one instance together with lepromatous infiltrations.

4. Reports of 13 cases with cold abscesses have been found in the Japanese literature, and they are summarized in a tabulation. Typical lesions of this kind are rather rare in this country, although caseous lesions of the nerves are often found in cases of tuberculoid or neural leprosy.

RESUMEN

1. Preséntase un caso de absceso neural en un enfermo de lepra lepromatosa. En cada uno de los nervios cutáneos antebraquiales del cubital de un joven de 18 años, se formó un absceso lleno de materias purulentas que constaban principalmente de células leprosas, y en particular células de Mikulicz, pero pocos leucocitos. Los bacilos leprosos abundaban, pero no había bacterias cultivables. Histológicamente, no había semejanza al llamado "absceso frío." La lesión no era tuberculoidea y no revelaba esfacelo caseoso; era netamente de naturaleza lepromatosa, con bacilos en abundancia.

2. Se repasan sucintamente otros 2 casos de absceso neural lepromatoso publicados en el Japón, y se tabulan las características esenciales de los 3 casos.

3. En el Japón no se ha descrito ningún caso lepromatoso con un absceso de la forma fría. Sin embargo, hay protocolos de 3 casos lepromatosos en los que se descubrieron en la autopsia lesiones tuberculoideas o caseosas en los nervios, en un caso junto con infiltraciones lepromatosas.

4. En la literatura japonesa, se han encontrado reseñas de 13 casos con abscesos fríos, que se sumarizan en una tabla. Típicas lesiones de este género son algo raras en el país del A., aunque a menudo se descubren lesiones caseosas de los nervios en casos de lepra tuberculoidea o neural.

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DESCRIPTION OF PLATE

PLATE 12

FIG. 1. Slight but diffuse lepromatous infiltration of the face, with here and there small flat lepromata. (The plaque of the lip and chin is not well shown.) Partial loss of hair in the lateral thirds of the eyebrows.

FIG. 2. Photograph of one of the specimens, the abscess sac mostly torn off; *l* is the leproma, *a* the remaining part of the sac, and *c,c* the nerve cord. (Measured by a scale included in the original picture, the specimen when photographed after formation fixation measured 3.3 cm. long and 2.2 cm. wide at the broadest part. —EDITOR.)

FIG. 3. Longitudinal section of one of the abscesses including the nerve cord at one end: *x*, abscess sac (wall almost torn off); *l*, the lepromatous granuloma, of which the bottom end walls of the sac were made; *s*, spaces or crevices that were filled with pus when the specimen was removed; *c*, nerve cord. About 2X.

FIG. 4. Photomicrograph of a part of "*c*" in Fig. 2. Marked destruction and degeneration of the nerve bundle, which is almost completely replaced by increased fibroblasts and connective tissue fibers. Nerve sheath thickened. There are lepra and foamy cells, with bacilli and globi. About 156X.

FIG. 5. High magnification of a small area in "*l*" in Fig. 2. Lepra cells and large foamy cells. About 650X.

FIG. 6. Abundant lepra bacilli in an area corresponding to "*l*" in Fig. 2. Frozen section. About 650X.

