

## **Treatment of leprous neuritis by neurolysis combined with perineural corticosteroid injection**

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*Summary* A study on leprous neuritis, involving the ulnar nerve, was carried out on 39 patients. The evaluation of nerve function was done before and after treatment by a score chart. Patients were divided into two groups. Group A (21 patients) was subjected to neurolysis only, and group B (18 patients) were given the combined treatment of neurolysis and perineural corticosteroid injection at the same time as neurolysis and subsequently at the end of the second and third weeks. In group B, 83.3% of patients showed 10% or more increase in the post-treatment score in comparison with 57.1% in group A. Improvement was more marked in paucibacillary cases and when the duration of nerve involvement was less than 3 months. Patients with short segments of nerve involvement with minimal thickening had better recovery. This procedure was observed to be simple, easy and well accepted by the patients, with a marked beneficial effect.

### **Introduction**

Neuritis in leprosy is a common complication. The pathological changes in the nerve are due to invasion of the nerve by *Mycobacterium leprae* leading to inflammatory changes with cellular infiltration. Inflammation leads to oedema inside the nerve, thus producing increased pressure, and the blood supply is compromised. The progress of inflammatory process and the resolution of oedema lead to increased fibrosis. In the initial stages these changes are reversible, provided relief is obtained, otherwise it will lead to permanent nerve damage. The bacillary load has of course to be diminished and the immunological tissue reaction is to be combated by suitable medication.<sup>1,2</sup> The other factor in neuritis is the compression of the nerve at the common anatomical sites, where the nerve distally passes through a rigid fibro-osseous tunnel, producing trauma by compression, friction and forced elongation leading to irreversible nerve damage.<sup>1,3</sup>

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The southern part of Orissa, India, where this study was carried out, is an endemic zone for leprosy. Leprosy patients in different stages of its complications are being reported although various reconstructive surgical procedures had been tried to correct the deformities in leprosy, its results were variable. In the present work prevention of complications in neuritis and resultant complications of the nerve affected were tried by surgical decompression (neurolysis) of the nerve combined with perineural corticosteroid injection.

Many conservative methods like perineural or intraneural injections of hydrocortisone, lignocaine and hyalase, application of heat in the form of hot compress, diathermy or waxbaths and ethylchloride spray had been tried in the past and its result were variable.<sup>4-7</sup> Surgical decompression (neurolysis) of the affected nerve had been advocated by many and the results were encouraging.<sup>8-12</sup> Neurolysis (external and internal) is believed to act by removing external factors and allowing release of oedema and compression. Corticosteroids are believed to act by absorption of oedematous fluid and by its anti-inflammatory properties.<sup>13</sup> Better results may be obtained by combining corticosteroids with neurolysis. Since nerve involvement is segmental, local corticosteroid injection (Triamcinolone acetonide) was preferred over oral corticosteroid therapy to avoid systemic complications of corticosteroids and to reduce fibrosis after neurolysis. By this method higher concentration is achieved at the site of injection, hence adequate effect is obtained. Simultaneous use of antileprosy drugs is essential to control the growth of the organism.

## Methods

### SELECTION OF PATIENTS

Patients on MDT as recommended by WHO (rifampicin, dapsone and clofazimine) and presenting with features of neuritis (pain, tenderness, sensory or motor deficit) were treated with prednisolone 30 mg per day in divided doses. It was gradually reduced and stopped over 3 weeks. Those patients who did not respond to prednisolone therapy, had inadequate response, or developed features of neuritis shortly after the cessation of prednisolone therapy were selected. Among them those with ulnar nerve involvement for less than 6 months and without atrophy of hand muscle were included in the study. All the patients were followed up for 1 year after treatment and were evaluated. Patients with multiple nerve involvement and children below 10 years of age were excluded from this study because evaluation is difficult.

### MATERIALS

Patients were divided into two groups and were matched for age, sex, type and duration of leprosy. In group A 21 patients underwent neurolysis only and in group B 18 patients underwent neurolysis with perineural corticosteroid injections. The results of both groups were assessed and compared with their pre-treatment status.

### PROTOCOL FOR EVALUATION OF NERVE DAMAGE

The protocol followed for this study was prepared as per the recommendation of the 'Workshop on neuritis' held at Scheiffelin Leprosy Research and Training Centre, Karigiri, India.<sup>14</sup>

**Table 1.** Protocol for evaluation of nerve damage

Sl no.	Test	Max score
1	Touch (nylon thread)	12
2	Static two-point discrimination	9
3	Moving two-point discrimination	9
4	Direction of movement	9
5	Tuning-fork test	3
6	Pin-prick test	9
7	Voluntary muscle power test	10
8	Nerve condition velocity	20
9	Nerve pain	3
10	Nerve tenderness	3
11	Stretch test	3
12	Compression test	3
Total score		93

**OPERATIVE TECHNIQUE**

Patients were operated on under local infiltration anaesthesia without the application of a tourniquet. The ulnar nerve was exposed up to 7 cm in the arm from the medial epicondyl and 3 cm in the forearm below the medial epiconyl. Epineurotomy was done by two longitudinal incisions on the epineurium. Damage to large blood vessels on the nerve were avoided. The wound was closed in a single layer. A compress was applied.

**PERINEURAL CORTICOSTEROID INJECTION**

Triamcinolone acetonide 20 mg with 1500 iu of hyaluronidase was injected around the thickened nerve after neurolysis and was repeated at the end of the second and third weeks.

**FOLLOW UP**

Patients were followed up at the end of 3 weeks, 3 months and 1 year following neurolysis for any complications of either operations or corticosteroid injections. Recovery from nerve damage was also evaluated.

**OBSERVATIONS**

Age, sex, type of leprosy, presenting features, duration of nerve involvement, pre-operative and post-operative scores were recorded in both the groups.

**Results**

Patients were evaluated at the end of 1 year of follow-up. Improvement after treatment in score by 10% or more was marked in 15 out of 18 patients (83.3%) in group B compared

**Table 2.** Patients treated with neurolysis only (group A)

Sl. no.	Age (years)	Sex	Type of leprosy	Duration of nerve involvement (months)	Clinical presentation			Score		Recovery score	Recovery (%)
					Thickened nerve	Tenderness	Pain	Pre-treatment	Post-treatment		
1	14	F	TT	less than 3	+	+	+	65	83	18	19.3
2	14	M	TT	less than 3	+	+	+	67	82	15	16.1
3	15	F	TT	less than 3	+	+	+	35	77	42	45.1
4	19	M	TT	less than 3	+	+	+	51	70	19	20.4
5	13	M	BT	less than 3	+	+	+	46	77	31	33.3
6	15	M	BT	less than 3	+	+	+	63	79	16	17.2
7	16	F	BT	less than 3	+	+	+	57	63	6	6.4
8	24	F	TT	3-6	+	+	+	17	29	12	12.9
9	18	M	TT	3-6	+	+	+	75	86	11	11.8
10	28	M	TT	3-6	+	+	+	30	65	35	37.6
11	19	M	BT	3-6	+	+	+	16	33	17	18.2
12	33	M	BT	3-6	+	+	+	71	86	15	16.1
13	21	M	BT	3-6	+	+	+	49	75	26	27.9
14	38	F	BT	3-6	+	+	-	26	32	6	6.4
15	22	M	BB	3-6	+	+	+	41	25	-16*	-17.2
16	50	M	BB	3-6	+	+	+	15	17	2	2.1
17	37	M	BL	3-6	+	+	-	14	15	1	1
18	19	M	BL	3-6	+	+	+	43	51	8	8.6
19	19	F	BL	3-6	+	-	-	63	71	8	8.6
20	35	M	BL	3-6	+	+	+	44	51	7	7.5
21	33	F	LL	3-6	+	-	-	44	50	6	6.4

\* Deteriorated.

+, present; -, absent.

**Table 3.** Patients treated with neurolysis and perineural corticosteroid injection (group B)

Sl. no.	Age (years)	Sex	Type of leprosy	Duration of nerve involvement (months)	Clinical presentation			Score		Recovery score	Recovery (%)
					Thickened nerve	Tenderness	Pain	Pre-treatment	Post-treatment		
1	15	F	TT	less than 3	+	+	+	48	78	30	32.2
2	19	M	TT	less than 3	+	+	+	53	81	28	30.1
3	17	M	TT	less than 3	+	+	+	77	87	10	10.7
4	13	M	BT	less than 3	+	+	+	58	77	29	31.1
5	19	F	BT	less than 3	+	+	+	39	76	37	39.7
6	32	F	TT	3-6	+	+	+	60	81	21	22.5
7	14	F	TT	3-6	+	+	+	59	81	22	23.6
8	40	F	TT	3-6	+	+	+	64	79	15	16.1
9	22	F	TT	3-6	+	+	+	16	59	43	46.2
10	24	M	TT	3-6	+	+	+	48	81	33	35.4
11	22	M	BT	3-6	+	+	+	27	59	32	34.4
12	18	M	BT	3-6	+	-	-	50	76	26	27.9
13	19	M	BT	3-6	+	+	+	14	49	35	37.6
14	43	M	BB	3-6	+	+	-	34	16	-18*	-19.3
15	18	M	BL	3-6	+	-	-	46	57	11	11.8
16	21	M	BL	3-6	+	+	+	66	71	5	5.3
17	32	M	BL	3-6	+	-	-	43	50	7	7.5
18	20	M	LL	3-6	+	+	-	11	39	28	38.1

\* Deteriorated.

+, present; -, absent.

with 12 out of 21 patients (57.1%) in group A. Improvement in score within 10% was observed in 8 out of 21 patients in group A compared with 2 out of 18 patients in group B. One patient in each group had decreased in score by more than 10% and had nerve involvement for 3–6 months with borderline leprosy (BB). When the nerve involvement was less than 3 months, better results were obtained in both groups, i.e. 6 out of 7 patients in group A and all 5 patients in group B had shown an improvement of score by 10% or more. In patients with nerve involvement for 3–6 months, 6 out of 14 patients (42.8%) in group A and 10 out of 13 patients (76.9%) in group B had shown improvement in score by 10% or more. In group A 7 out of 14 patients (50%) and in group B 2 out of 13 patients (15.3%) have shown improvement in score within 10% when the nerve involvement was for 3–6 months.

## **Discussion**

Leprosy is primarily a disease of the peripheral nerves. Nerve involvement is complex. Inflammation with cellular infiltration and oedema lead to swelling of the nerve and compression of the nerve fibres. Neurolysis relieves the nerve from compression and gives the best result before irreversible nerve damage has occurred.<sup>15</sup> All the patients were clinically quiescent during the treatment and were on multidrug therapy. Seven patients had neuritis at the time of detection of disease. The remainder of the patients had the disease for 6 months to 2 years before they developed neuritis. The patients followed-up for 1 year were being reported because patients not showing an improvement within 1 year after surgery were not likely to respond.<sup>16</sup>

In group A improvement in score by 10% or more was observed in 57.1% of patients. Similar results have been observed by Vaidyanathan & Vaidyanathan<sup>8</sup> and Palande,<sup>12</sup> but the results were more gratifying in patients undergoing surgical decompression with perineural corticosteroid injection (group B), and improvement in score by 10% or more was marked in 83.3%. Better results in this group could be due to the additional benefit of corticosteroid, which acts by its anti-inflammatory properties, reducing oedema and fibrosis. This result could not be compared due to the lack of published data of similar type.

Relief from pain and tenderness were marked in all the patients of both groups but occurred earlier in group B. Recovery was better when the duration of nerve involvement was short, nerve function deficit was less, and in paucibacillary cases. Patients with a short segment of nerve involvement and minimal thickening had a better recovery. Patients with positive stretch test and compression test had severe nerve function deficit and showed poor recovery after treatment.

Only 2 patients who deteriorated had a lot of fibrous adhesions around the nerve and thickening of the nerves was more marked. Sharp dissection was required to free them from surrounding tissues excluding the nerve bed. Perineural corticosteroid injections were not repeated in these 2 patients showing no improvement to maintain a uniformity of therapy.

Though we strictly followed the protocol, more stress was given on touch sensation and nerve conduction velocity. These are reproducible.<sup>17</sup> Motor nerve conduction velocity is more accurate and gives a better picture of how the nerves are affected.

Under the coverage of specific treatment of the disease, progressive nerve damage

could be prevented by neurolysis. The beneficial effect of surgery is further accentuated by local corticosteroid injections at suitable intervals. We would recommend combined treatment of neurolysis with perineural corticosteroid injection, when the nerve involvement is of a short duration. More emphasis should be given to the early detection of neuritis and referral of these patients to suitable hospitals for treatment. Patients properly selected would benefit by this simple, inexpensive and easy procedure. However, our series is small and awaits more extensive study.

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## **Traitement de la névrite lépreuse par la neurolyse en combinaison avec des piqûres périneurales de corticoïdes**

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*Sommaire* - Une étude a été menée, concernant le nerf cubital, sur la névrite lépreuse chez 39 patients. La fonction nerveuse a été évaluée avant et après le traitement par un tableau de marque. Les patients ont été séparés en deux groupes. Les 21 patients du groupe A ont été soumis à une neurolyse seulement, et les 18 patients du groupe B ont reçu un traitement combiné comprenant une neurolyse et des piqûres périneurales de corticoïdes au même temps que la neurolyse et aussi à la fin de la seconde et la troisième semaine. 83,3% des patients du groupe B ont montré une augmentation de 10% ou plus dans leur score après traitement contre 57,1% dans le groupe A. L'amélioration a été plus marquée chez des cas paucibacillaires, et dans les cas où il y avait moins de trois mois que le nerf avait été attaqué. La récupération a été meilleure chez des patients avec segments courts de nerf atteints avec une augmentation minimale de grosseur. Cette procédure s'est montrée simple, facile, et bien acceptée par les patients, ayant un effet très favorable.

## **El tratamiento de la neuritis leprosa mediante un programa combinado de neurólisis e inyecciones perineurales de corticosteroides**

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*Resumen* - Se llevó a cabo un estudio, basado en el nervio cubital, sobre la neuritis leprosa en 39 pacientes. Se evaluó la función nerviosa antes y después del tratamiento mediante una tabla de puntuaciones. Los pacientes se dividieron en dos grupos. El grupo A, compuesto de 21 pacientes, fue sometido únicamente a una neurólisis y los 18 pacientes del grupo B recibieron un tratamiento combinado de neurólisis e inyección perineural de corticosteroides, repitiéndose solo la inyección al fin de la segunda y la tercera semana. El 83,3% de los pacientes del grupo B mostraron un aumento de un 10% o más en su puntuación después del tratamiento, comparado con un 57,1% en el grupo A. Fue más destacada la mejoría en casos paucibacilares, y cuando el período que llevaba afectado el nervio no excedía los tres meses. Aquellos pacientes con segmentos cortos de nervio afectados y con aumento mínimo de grosor se recuperaron mejor. Este procedimiento mostró ser simple, fácil y fue bien acogido por los pacientes, consiguiendo un efecto benéfico notable.