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Original Article

The Combination Therapy of Oral Steroids and Nerve Decompression for Ulnar Neuritis in Leprosy - Usefulness in Prevention of Progression of Hand Deformities

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Hand, being an important functional part of the body, needs healthy complementing motor and sensory nerve supply. Both these functions get compromised following involvement of ulnar nerve in leprosy, which is the commonest nerve involved in Hansen's disease. It is commonly involved at the elbow level and results in clawing of the hand. There are two routine management protocols viz medical and surgical to manage ulnar nerve damage in leprosy. Steroid therapy along with anti-leprosy regimen is the common medical approach for treatment for ulnar neuritis. Patients not improving with medical management are taken up for surgical decompression. However, when to switch from medical to surgical intervention is topic of debate. In this study we have given steroid therapy in early (4-6 weeks) duration of ulnar neuritis along with anti-leprosy drugs and attempted to determine an appropriate period of medical treatment, beyond which there is no significant benefit in continuing sole medical management if no response is seen. Of the 247 eligible patients, 210 did not respond to 12 months of steroid therapy – the results 193 such patients, treated with steroids and nerve decompression and which were available for follow up were analysed. A total 158/193 (81.8%) cases showed the sensory recovery for touch within 4-6 weeks, deep sensation of pin prick returned in 117/193 (60.62%) cases in 6-8 weeks. Motor recovery was slow, it took 24 to 54 weeks. While 117/193 (60.62%) cases showed improved motor function, in 58/193(30%) cases there was no change and only 18/193(9.3%) cases deteriorated. It appears that period of 12 weeks is an ample time for medical treatment to start showing any form of improvement (motor or sensory) and if there is no improvement, patient should be considered for surgical decompression along with continuation of medical management (Steroid therapy). Our study shows that cases who failed to respond to exclusive medical steroid therapy by 12 weeks responded to combined medical plus surgical treatment as surgical decompression helps in the release of pressure on nerve tissue and improves the functional status.

Keywords : Leprosy, Disabilities, Hand, Progression, Combined, Oral Steroids, Nerve Decompression

Introduction

The peripheral nerves of hand are important because of their functional control on the muscles of the hand. In leprosy ulnar nerve

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is commonest to get involved because of its positioning in the elbow region. Damage to ulnar nerve (being mixed nerve) results in motor and sensory paralysis. This results in loss of sensation along the distribution of ulnar nerve in hand, clawing of hand and problem in pinch function. Paralysis of ulnar nerve is a severe debilitating issue for the patient as his hand function gets severely compromised.

The literature describes the treatment of the leprous neuritis as predominantly medical management. Barroso-Freitas et al (2021) have tried up to 80mg/day steroids orally with tapering down to 10mg/day for 6-9 months while Van Veen et al (2007) have reported the effect of bolus dose orally /I.V. with a maintenance dose for 6/9 months. Garbino et al (2008) have used 1 mg/kg/day at the beginning and, tapering to 0.5 mg/kg/day or less in one month.

Multiple studies with different protocols have shown variable results, particularly pain sensation taking time to subside along with prognosis of the sensory motor status. In the Cochrane Review (Van Veen et al 2007) and the study of Barroso-Freitas et al (2021) did not find definite results in favour of the corticosteroid therapy along with conflicted consensus regarding time limit for duration of disease, duration of intake of corticosteroid and the pain, sensory and motor status recovery. Cochrane review also stated that for new onset nerve function impairment patients when given steroid therapy showed comparatively better results and that the group of patients who underwent nerve decompression along with steroid showed better improvement in symptoms.

Keeping above all the findings of various workers we planned a study on usefulness of addition of nerve decompression procedure along with steroid therapy in early ulnar nerve function impairment.

Patients and Methods

This study was undertaken at Dept. of Orthopedics, F.H. Medical College (FHMC), Agra. Cases for this study were recruited from patients attending O.P.D at Dept of Orthopaedics along with Dept of Medicine and Dermatology at F.H. Medical College, Agra and the O.P.D. of National JALMA Institute for Leprosy and Other Mycobacterial Diseases (ICMR), Agra. Patients presenting at the O.P.D. of National JALMA Institute for Leprosy and Other Mycobacterial Diseases (ICMR), Agra were examined and if there was any nerve involvement detected, were advised to see OPD of Dept. of Orthopaedics FHMC. Patients suitable for surgery underwent nerve decompression and were regularly followed up as per study protocol at both the places [(F.H. Medical College, Agra and the O.P.D. of National JALMA Institute for Leprosy and Other Mycobacterial Diseases (ICMR)].

The patients complaining of numbness, paresthesia in little finger and ring finger with or without compromise of hand function and fulfilling the inclusion criteria were included in the study. All these patients were examined for their smear status for lepra bacilli.

Inclusion criteria was clinically diagnosed cases of Hansen's disease; Neural symptoms duration of 4 - 6 weeks (as per history given by patients; Neural symptoms duration of 4 - 6 weeks (as per history given by patients; No history of previous steroid intake; Exclusive ulnar nerve involvement; All those cases who do not show any clinical improvement in their sensory and motor symptoms and pain after taking of steroid for 12 weeks' time.

Exclusion criteria was known cases of Diabetes Mellitus and those having any other known

contraindications for steroids therapy (Fungal Infection, Glaucoma, any Joint Infection).

A total of 247 leprosy patients having involvement of ulnar nerve for duration of 4-6 weeks were observed (from April 2015 to December 2019). All these patients were given steroids along with anti leprosy treatment and were followed up at every 2-week interval (Smith et al 2004)). At the end of 12 weeks out of 247 patients, 37 patients were those who had resolution of all the neural clinical symptoms while the rest 210 patient did not show any change. Present study is based on observations made on these 210 cases; however, 17 patients were lost to follow up hence in final study 193 patients were included.

As per the protocol of the study we cconcentrated only on those cases which did not show any improvement in the 12 weeks period. In literature, there are studies (Wagenar et al 2017) which have highlighted the significance of time duration of steroid treatment for good clinical outcome, but literature is lacking on the protocol for defining the change of modality needed if there is no improvement with steroid treatment. Corticosteroids are the cornerstone of management in acute nerve damage in leprosy, are recommended by the WHO and are widely available. But corticosteroids have certain shortcomings. Long-term therapy may cause serious adverse effects, such as peptic ulcers, cataract, or psychosis. These limitations of corticosteroids has led to the necessity to find alternative therapeutic approaches (Van Veen et al 2007). Surgery alone as therapy for treating neuritis is not recommended, but there is discussion about whether the combination of surgery and medical treatment (e.g. steroids) will give better results than medical treatment alone (Kazen 1996, Malaviya 2004).

In this study we have tried to determine the usefulness of combination therapy of oral steroids and nerve decompression for ulnar neuritis in leprosy in prevention of progression of hand deformitiesfor cases who fail to respond to 12 weeks of medical steroid therapy.

The decision to intervene was taken at 12 weeks depending on the clinical status after 12 weeks of steroid therapy. All the patients were continued on maintenance dose of steroid for 6 months.

Demographic Analysis

Of these 193 cases 84 cases were females while remaining 109 cases were males. The age ranged between 5 years to 60 years.

All these patients were diagnosed cases of leprosy and having complains of paresthesia, tingling sensations, loss of touch sensation in little and ring finger of hand. The ulnar nerve was palpable and tender at elbow in cubital tunnel (Fig. 1) along the posterior border of medial epicondyle. Clawing of little finger (Fig. 2) and positive Wartenberg's sign (Fig. 3) was present in some of these cases.

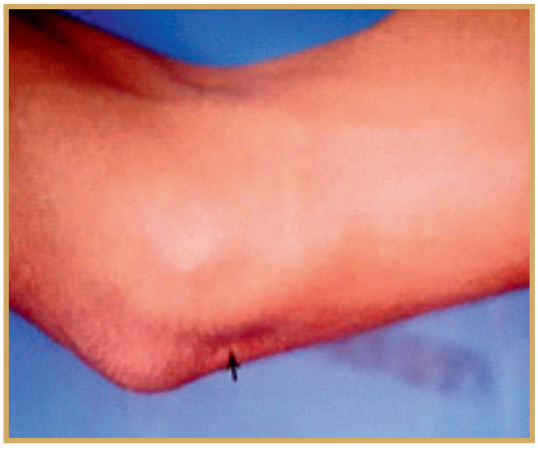

Fig. 1 : Swelling over the medial epicondyle

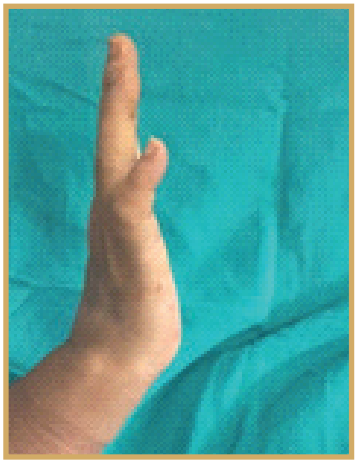

Fig. 2 : Clawing of little finger

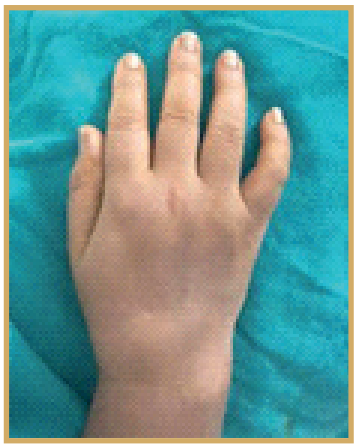

Fig. 3 : Wartenberg's Sign - Loss of adduction of little finger

Medical treatment

All the cases were started with 40 mg. prednisolone /day and Aspirin 150 mg, BD along with anti-leprosy drugs. Dose of prednisolone was tapered down 5 mg every 8th day and in 8 weeks it reached 5 mg /day This was continued as maintenance dose for 6 months. Patients were observed at 2 weeks interval for improvement of sensory & motor status of ulnar supplied muscles and the intensity of pain at elbow region in Cubital Tunnel. Sensory status was assessed using superficial touch and pin prick. Pain assessment was done using Visual Analogue Scale. Motor assessment was done using medical research council grading (Paternostro-Sluga et al 2008).

210/247 patients did not show any improvement in their symptoms at 12 weeks and these patients were undertaken for nerve decompression, however, 17 patients were lost to follow up hence in final analysis 193 patients were included.

Decompression of the Ulnar Nerve

All the patients were given 0.5 mg. Alprax (Alprazolam) tablet at bedtime to manage anxiety issues and for proper sleep on the pre-operative night. All procedures were undertaken under axillary block regional anesthesia with 2% xylocard (Lidocaine).

Patient was put in supine position with forearm on the sideboard in full supination. Part was prepared from axilla to hand. Medial epicondyle was palpated, and cubital tunnel was opened by skin incision (Fig. 4). An incision was given in the perineurium and epineurium to decrease the inflammatory compression on the axons (Fig. 5). Drain was kept draining oedematous fluid. Skin was sutured by 3 - 0 silk and crepe bandage applied. The hand was kept in an arm pouch post operatively.

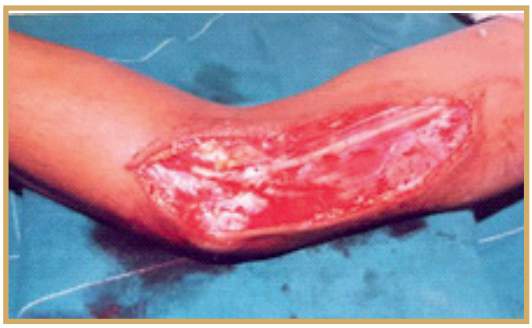

Fig. 4 : Incision over the medial epicondyle

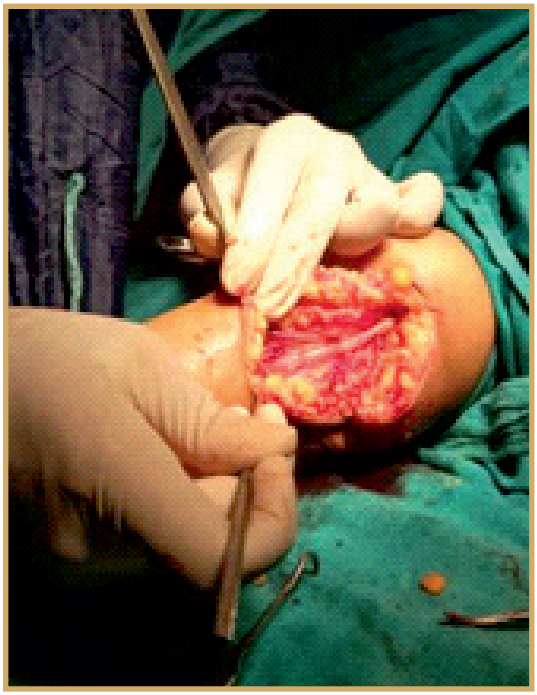

Fig. 5 : Incision given in the perineurium and epineurium

Post operatively amoxycillin with clavulanic acid 625 mg combination was given for 5 days. The dressing was changed after 72 hours, and the drain removed.

Follow up

After completion of decompression, patients were followed at an interval of one month for three months and then every 6 months up to 2 years. 17 patients were lost to follow up, so at the final follow up after 2 years there were 193 patients, which were included in the study.

Results

Pre-operatively the motor power of ulnar supplied muscle was 1 + (MRC) grading in 39 cases, while 2-3 + in 108 cases, and 4-5 in 46 cases totaling 193 cases.

a. The recovery from pain was seen in 1st 24 hours in all cases.

b. While total 158/193 (81.8%) cases showed the sensory recovery for pin & cotton touch within 4-6 weeks while the deep sensation of pin prick returns in 117/193 (60.62%) cases in 6-8 weeks (Table 1).

c. Pain disappeared in all the cases in 1st 24 hours. This was the main achievement of the Nerve Decompression.

d. The recovery of motor improvement was very different from sensory recovery and took 24 weeks to 54 weeks to recover completely (Table 2).

Table 1 : Sensory improvement and pain recovery post operatively in 193 cases

Types of Disease	Total no. of cases	Sensory recovery for pin and cotton touch (4-6 weeks)	Sensory recovery for deep pin prick (6-8 weeks)	Cases who had pain as complaint	Pain Relief
PB	114	89	68	79	79
MB	56	48	41	43	43
N	23	21	19	23	23
Total	**193**	**158**	**117**	**145**	**145**

Table 2 : Motor power status (In MRC grade)-comparison of pre and post operative status

Total no. of Cases	Motor Power (MRC grade) Pre-operative	Motor Power (MRC grade) post-operative	No. of Case	Remark
039	+1	3	32 7	Improved No change
108	2-3	4-5	55 43 10	Improved No change Deteriorated
046	4	5	30 8 8	Improved No change Deteriorated
Total – 193	-	-	-	-

i. 32 cases (82.51%) of the 39 cases which showed MCR + 1 grade pre-operatively improved to grade 3 post operatively. While 7(17.94%) cases were deteriorated to 0.

ii. 55 (50.72%) cases out of 108 cases in which muscle power in range of 2-3+ improved 4-5 grade while 43 (35.81%) cases were no improvement in their preoperative muscle power, and 10 (9.25%) of the 108 cases deteriorated to 0 grade.

iii. There were 46 cases who had grade 4 muscle power, of which 30(65.21%) improved to grade 5 post operatively. 8(17.31%) cases were no change in their motor power while remaining 8(17.31%) deteriorated to grade 0 (Table 2).

Discussion

The routine treatment of neuritis in leprosy is higher doses of steroids with anti-leprosy drugs. Husain et al (2007) showed that the damage of nerve tissue precedes clinical signs and symptoms. Once the damage of nerve tissue is established, the development of deformity is inevitable (WHO 1970).

There are no literature or controlled trials data for a comparison of steroid therapy with nerve decompression (Van Veen et al 2012). Smith et al (2004) have observed that low dose prophylactic prednisolone (20 mg/day) during the first four months of multidrug treatment for leprosy reduces the incidence of new reactions and nerve function impairment in the short term, but the effect is not sustained at one year. Wagenaar et al (2017) suggested 20-week course of prednisolone as effective as a 32-week course in improving and restoring recent clinical nerve function impairment in small group of leprosy patients.

In our current study we planned to intervene with surgical decompression in patients who did not show any improvement or with patients who had clinical deterioration at 12 weeks follow up. In literature, there are studies (Wagenaar et al 2017) which have highlighted the significance of time duration of steroid treatment for good clinical outcome. In these studies (Van Veen et al 2012, Smith et al 2004, Wagenaar et al 2017) it has been observed that most of the patient with nerve function impairment start showing results (either improvement or deterioration) between 12 to 20 weeks of steroid therapy. Keeping in view of nerve pathology and treatment modalities we have taken 12 weeks as minimum time for

steroid therapy before intervening with nerve decompression in early neuritic cases.

After 12 weeks the decision of decompression was based on the intensity of pain and recovery of sensory and motor status of muscles. The patients with steroid therapy who did not show any improvement till 12 weeks were taken as study cases.

We evaluated 193 cases who have undergone ulnar nerve decompression. The minimum follow up was of 18 months and the maximum regular follow up was done up to 2 yrs. The mean sensory recovery was seen much better in pure neuritic-N (21/23, 86%) leprosy cases. Multibacillary-MB (79%) cases also showed good sensory recovery while the paucibacillary-PB (68%) type case showed the low sensory recovery in comparison to 'N' & 'MB'. These results are similar to reported in WHO document (1998) and Husain & Malaviya (2007).

The motor recovery is also impressive. 117/193(60%) cases improved from their pre-operative status while 58/193(26.92%) remains status-co. Only 18/193(9.23%) cases deteriorated to motor status 0. It has seen that in present series (60%) cases showed improvement in the motor function of hand and the functional status reached to near normal while (26.92%) cases able to the maintain their motor status as before pre-operative. In these cases, they have a functional useful hand which could have deteriorated if they had not undergone nerve decompression. Only (7.71%) cases had deterioration in motor status and established claw hand.

Pandya (1978) and Wan et al (2016) have reported poor result of nerve decompression in cases not responding to steroid therapy. It is found that in these studies decompression was done quite late when the deformity started setting in and patients had taken steroids for long time even though pain/and sensory & motor status were not responding to treatment.

Parikh et al (1968) showed that in neuritic pain nerve decompression is very useful, our series also confirms the same. Srinivasan (1993) also advocated that approach to prevent the hand deformities decompression may be a good tool.

There is conflicting data regarding time duration of steroid treatment for peripheral neuropathy in Hansen's disease along with results of non-sustainable effect at one year (Smith et al 2004). Surgery alone as therapy for treating neuritis is not advisable, hence efforts are being made to determine whether the combination of surgery and medical treatment (e.g. steroids) will give better results than medical treatment alone. Boucher et al (1999) showed that the medico-surgical treatment had a significant better result on pain and on major but incomplete nervous involvement but no significant statistical differences according to the nerve involved, the duration of the deficit, the form of leprosy and the type of anti-bacillary treatment.

In this study we have tried to determine the usefulness of combination therapy of oral steroids and nerve decompression for patients with exclusive ulnar nerve neuritis in Leprosy for prevention of progression of hand deformities with short duration of symptoms (4 - 6 weeks). It is important to note the importance of shorter duration for symptoms as the longer the pathology stays, there are high chances of developing deformities (muscle wasting, clawing). Hence aim is to prevent the development of deformities.

Conclusion

Our study concludes that for all types of leprosy cases with evidence of neuritis with early sensory and motor symptoms 12 weeks is sufficient time to give medical treatment trial. If they don't show any improvement in these 12 weeks, they must be undertaken for internal Nerve decompression

along with continuation of steroid therapy to prevent any occurrence and progression of deformity.

The steroid therapy plus decompression is better modality to prevent nerve function impairment than only exclusive steroid or nerve decompression therapy.

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