

A Case report on impact of physiotherapy rehabilitation on partial claw hand secondary to borderline tuberculoid Hansen disease.

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Abstract: Background: Hansen's disease known as leprosy originated by *Mycobacterium leprae* is a chronic infectious disease. It hampers mostly skin and peripheral nerves. Claw hand is secondary impairment following Hansen's disease specially those not gone under physiotherapy treatment. Primary goal of physiotherapy rehabilitation is to reverse the functional impairment caused by Hansen's disease and customize lifestyle modification to restore functional day to day activities. In this case report presented that modified physiotherapy rehabilitation of partial Ulnar clawing following borderline tuberculoid Hansen's disease have very important role in regaining range of motion (ROM), sensation, muscle strength and improve hand grasp. **Case Presentation:** A 30 year old female reported to Dermatologist with the complaints of light coloured lesion over her right arm, loss of sensation of lesion and tingling numbness over right hand since 7 months and was diagnosed as a borderline tuberculoid Hansen's disease with partial Ulnar clawing of right hand. Then she was referred to physiotherapy for the rehabilitation after one month of multidrug therapy with the complaints of loss of sensation, weakness in attempting grasp with difficulty in doing functional activities. Patient was on lumbrical blocking splint to stretch the impaired fingers and regain range of motion. In physiotherapy rehabilitation, TENS, motor point electrical stimulation, Maitland's mobilization, mirror therapy with sensory re-education and strengthening exercises was given for 6 weeks, 5 days per week. **Conclusion:** In this case used modified physiotherapy rehabilitation for partial Ulnar clawing following borderline tuberculoid Hansen's disease aid in early regain of sensation, ROM and hand muscle strength and restore functional grasp.

Keywords: Hansen's disease, partial claw hand, physiotherapy rehabilitation

Introduction:

Hansen's disease known as leprosy originated by *Mycobacterium leprae* is a chronic infectious disease. It hampers mostly skin and peripheral nerves. (1) Non-traumatic peripheral neuropathy is a common clinical presentation of Hansen disease. Peripheral nerve damage secondary to Hansen's disease results into sensory loss, muscle contracture, deformities of fingers and muscle

weakness.(2) Partial claw hand is complication of impairment of Ulnar nerve in which muscles get weak which are innervated by Ulnar nerve which results into imbalance between interossei and lumbricals. This imbalance is marked by proximal interphalangeal (PIP), distal (DIP) interphalangeal joint flexion and metacarpophalangeal (MCP) hyperextension. Loss of interphalangeal joint extension and MCP flexion caused by weak intrinsic muscles and strong extrinsic muscles results into hyperextension deformity at MCP joint. Ulnar nerve does not supply to flexor digitorum profundus and flexor digitorum superficialis muscles which results into flexion at PIP and DIP joint leading loss of grasp function.(3) (4) Claw hand is secondary impairment following Hansen's disease specially those not gone under physiotherapy treatment. (5)Primary goal of physiotherapy rehabilitation is to reverse the functional impairment caused by Hansen's disease and customize lifestyle modification to restore functional independence of patient.(6)

In this case report presented that modified physiotherapy rehabilitation of partial Ulnar clawing following borderline tuberculoid Hansen's disease have very important role in regaining range of motion (ROM) ,sensation ,muscle strength and improve hand grasp.

Case description:

A 30 year old female noticed light coloured lesion over her right arm since 7 months. She had visited the dermatology department of AVBRH with the complaints of loss of sensation of lesion and tingling numbness over right hand after few days of appearance of lesion. She had also complained of difficulty in holding objects and doing fine movements. Patient reported that Hypopigmented patch was initially pea sized which was gradually increased coin sized lesion. Dermatologist referred the patient for NCV studies and diagnosed as borderline tuberculoid Hansen disease with partial Ulnar clawing of right hand. Then she was referred to physiotherapy for rehabilitation after 15 days of multidrug therapy with the complaints of loss of sensation on right arm, weakness in attempting grasp with difficulty in doing functional activities. There was no history of trauma, diabetes mellitus, hypertension or joint pain. Patient family and personal history was insignificant. Patient was conscious, cooperative and oriented. She had no sign of pallor, citrus, clubbing, lymphadenopathy or edema.

Clinical findings:

She was haemodynamically stable. On finding she had well defined, single hypo pigmented patch of size 5×3 cm present over right arm. She had a partial clawing of little and ring finger of right hand with hyperextension at MCP joint and flexion at PIP and DIP joint of little and ring finger. Muscle wasting of thenar and hypothenar was seen over right hand. On palpation there was thickening of ulnar nerve. ROM of flexion, extension, abduction and adduction at PIP and DIP of ring and little fingers were reduced due to joint contracture .Muscle power testing of hand muscles was performed on the basis medical research counselling (MRC) grading has been mentioned in table no.1. On sensory examination there was loss of pain and touch sensation over hypopigmented patch. There was loss of perception to touch and temperature on medial two fingers (little and ring finger) of right hand.Frommet's test (book test) and card test was positive in right hand. Functional outcome was 2/10 taken on patient –specific functional scale.

Physical therapy intervention

Patient had treated for six weeks, 5 days per week. Patient and her family education were done before commencement of intervention. Patient was on lumbrical blocking splint to stretch the impaired fingers and regain range of motion of flexion at MCP joint and flexion and extension at interphalangeal joint of ring and little fingers. In first 2 week ,Electrical muscle stimulation was applied to stimulate individual motor point of Abductor digiti minimi, Interossoi, lumbricals and flexor digitorum profundus by using pen electrodes , electrical pulse at frequency less than 1/s (0.05-0.1 ms) .Low-frequencies (2Hz) transcutaneous electrical nerve stimulation (TENS) applied for 10 minutes .(7) Passive ROM exercises was given initially to fingers in adduction and abduction in pronation which helps in further regains of strength of interosseous muscles and maintained mobility of joint, ligament and muscle for 10 repetitions, 2 sets. Mirror therapy along with sensory re-education was given for 30 minutes a day with tactile stimuli of different textures and shapes. Then progressed to active assisted exercises by placing MCP joint at 90° and fingers flexed and extended with the help of unaffected hand. Mainland’s mobilization was given for 1-2 oscillation/sec for 1 minute to improve ROM. Myofascial release technique was applied with foam roller lasting for 30 second (5×3 sets) and 1 minute rest and massage given on shortened muscle to reduce tightness. From 4 week active exercises was started for finger, MCP joint. Free home exercises of pronation and supination ROM was taught to patient with screwdriver and handle which help to stimulate the nerve. Once Voluntary muscle activity returns in 4 weeks progressed to strengthening exercises with manual and mechanical resistance, 10 repetitions with 2 sets of Interosseous muscles and lumbricals. In case report above modified physiotherapy rehabilitation helped to early improvement of sensation, ROM, muscle strength and resume functional independence in day to day activities.

Table No.1 MRC grading scale

Hand muscles	Right hand	left hand
Abductor digiti minimi	1	5
Interossoi	1	5
Lumbricals 4th and 5th fingers	1	5
flexor digitorum profundus of 4th and 5th finger	2	5
Flexor Capri ulnaris	2	5

DISCUSSION:

Hansen’s disease known as leprosy originated by Mycobacterium leprae is a chronic infectious disease. It hampers mostly skin and peripheral nerves. (1) Partial claw hand is complication of impairment of Ulnar nerve in which muscles get weak which are innervated by Ulnar nerve which results into imbalance between interossei and lumbricals. (3)(4) In this case report modified physiotherapy rehabilitation has been used in borderline tuberculoid Hansen disease with partial Ulnar clawing in regaining range of motion, sensory re-education and muscle strength and improve hand grasp and functional activities. Lumbrical blocking Splint helps in

reverse of functional impairment and restores the ROM without compromising day to day activities. Low-frequency (2Hz) transcutaneous electrical nerve stimulation restores healing of leprous ulcer by release of endogenous corticosteroids discussed by Kaada, Birger.(7) K Leanne, et al. observed that early sensory reeducation along with mirror therapy and late sensory reeducation were equally effective.(8) In this case mirror therapy along with sensory education started immediately which helped the patient to restore the sensation. Santhosh Rath studied that immediate joint mobilization is safe and reduced deformity and increased ROM of fingers than immobilization.(9) (10) Myofascial release technique was applied with foam roller lasting to reduce tightness of shortened muscle. Strengthening of hand muscle done with manual and mechanical load to restore functional grasp. In this case modified physiotherapy rehabilitation aid in early regain of sensation, ROM and hand muscle strength and restore functional grasp.

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