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Rehabilitation Medicine Outcome of 51 Years Old Morbus Hansen Patient with Disability at Jayapura Hospital: A Case Report

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A B S T R A C T

Leprosy is a disease that causes high morbidity. Nerve damage due to Mycobacterium Leprae can cause impairment, disability to handicap for individuals. Jayapura is a city with quite high cases of leprosy in Papua. The method used is case report to presenting the case. A case of Leprosy with upper extremity with clawing hand disability due to ulnar nerve disorder will be described and displayed as a medical rehabilitation. The outcome of therapy showed improvements in function, flexibility, motor and sensory function of the upper extremities (metacarpal region). The conclusion of this case report is that disability in leprosy patients can provide improved flexibility and prevention of more severe disability with early detection, holistic management, medical rehabilitation and family support.

INTRODUCTION

Leprosy, or Hansen's disease, is a chronic bacterial infection caused by infection with *Mycobacterium leprae (M. leprae*). M. leprae, taxonomic order Actinomycetales, family Mycobacteriaceae, is an acid-resistant, gram-positive obligate intracellular bacillus that exhibits tropism for phagocytes in the skin and Schwann cells within peripheral nerves. Leprosy is found in tropical countries, especially underdeveloped and developing countries (Chen et al., 2022; Dastikop et al., 2021; Schilling et al., 2021).

Indonesia is still the number 3 largest contributor to leprosy cases in the world, after India and Brazil. In 2011, Indonesia reported 20,023 new cases of leprosy. Based on these figures, the number of cases with level 2 disability, namely visible disability, amounted to 2,025 people. According to *the World Health Organization* (WHO), in the world there are 312,036 reported cases of leprosy, and the number of new cases in mid-2008 was reported from 121 countries as many as 249,007 cases. Meanwhile, in Indonesia the number of patients in 2008 was 17,243 cases. Leprosy can cause deformity and disability, which arises due to several risk factors including the type of leprosy, the duration of active disease and the number of nerve rods affected. The disability that occurs in leprosy sufferers is due to a lack of knowledge/understanding and misguided belief in leprosy and the disability it causes (Chen et al., 2022; Prakoeswa et al., 2022).

The diagnosis of leprosy is based on the clinical, bacteriological and histopathological picture. Of the three, clinical diagnosis is the most important and the simplest. To diagnose leprosy in a person, at least one *cardinal sign* is needed. Without finding a *cardinal sign*, we can only diagnose the disease of the sufferer as a suspect (suspect) of leprosy. Patients need to be observed and re-examined after 3-6 months until the diagnosis of leprosy can be established or eliminated (Dharmawan, Abqari, et al., 2023; Shumet et al., 2015).

There are many ways that can be done to minimize the occurrence of defects and prevent the aggravation of existing defects. Among them is the diagnosis and management of diseases that are carried out early. Likewise, providing education to patients about various things that can cause disabilities so that they do not cause physical defects that look scary. Therefore, the author would like to present an example of a case of Leprosy with a disability where medical rehabilitation therapy is carried out at Jayapura Hospital.

LITERATURE RIVEW

Definition

Leprosy, or Hansen's disease, is a chronic bacterial infection caused by infection with Mycobacterium leprae (M. leprae). M. leprae, taxonomic order Actinomycetales, family Mycobacteriaceae, is an acid-resistant, gram-positive obligate intracellular bacillus that exhibits tropism for phagocytes in the skin and Schwann cells within peripheral nerves. Leprosy is found in tropical countries, especially underdeveloped and developing countries (Chen et al., 2022; Dastikop et al., 2021; Schilling et al., 2021).

Epidemiology and Burden of Deformity in Leprosy

Deformities remain a major challenge even in the post-elimination era in many countries. In a retrospective institutional study, deformities in leprosy (functional + morphological) included 11.41 % claw hand among functional deformities. In Bangladesh, among 670 leprosy patients, 8.50 % had claw hand (and 18.06 % grade 2 deformities) in the post-elimination stage. In a tertiary care hospital in Chennai (India), among 50 cases of hand deformities in old leprosy cases, 44 (88 %) had claw hands (complete in 30, ulnar claw in 14). Thus claw hand is a common upper-limb deformity in leprosy, highlighting the importance of early intervention and rehabilitation.

Pathophysiology of Claw Hand Deformity

Claw hand deformity results from damage to the ulnar nerve, leading to paralysis of the intrinsic muscles of the hand (interossei and lumbricals). This causes an imbalance between flexors and extensors, resulting in hyperextension of the metacarpophalangeal (MCP) joints and flexion of the interphalangeal (IP) joints (Rana et al., 2020). M. leprae has a particular tropism for Schwann cells, causing demyelination and axonal degeneration (Scollard et al., 2021). The severity of deformity correlates with disease duration, number of nerves involved, and delay in initiating multidrug therapy (MDT) (Dharmawan et al., 2023).

Diagnosis

Clinical Diagnosis: The diagnosis of leprosy is primarily clinical. According to the World Health Organization (WHO), at least one of the following cardinal signs must be present: (1) hypopigmented or reddish skin lesion with loss of sensation, (2) thickened peripheral nerve with sensory or motor loss, or (3) presence of acid-fast bacilli in slit-skin smear (Shumet et al., 2015). NIn cases of claw hand deformity, careful neurological examination is essential to assess nerve thickening (especially ulnar and median), sensory impairment, and muscle wasting (Dharmawan et al., 2023).

Laboratory and Electrophysiological Tests : Skin smears, histopathology, and polymerase chain reaction (PCR) tests can confirm M. leprae infection in atypical cases (Walker et al., 2020). Nerve conduction studies help evaluate sensory-motor deficits in ulnar neuropathy and guide rehabilitation planning (Sharma et al., 2020).

Disability Classification: The WHO grading system classifies disability from grade 0 (no disability) to grade 2 (visible deformity). Claw hand represents a grade 2 disability (WHO, 2023). Functional assessment tools such as the Screening of Activity Limitation and Safety Awareness (SALSA) scale and Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire are also used (da Silva et al., 2019).

Management

Medical Management

Early treatment with WHO-recommended multidrug therapy (MDT)—dapsone, rifampicin, and clofazimine—is essential to stop bacillary proliferation and prevent further nerve damage (WHO, 2023). Corticosteroids are indicated for acute neuritis to reduce inflammation and prevent worsening of deformities (Lockwood & Saunderson, 2020).

Surgical Correction

Surgical intervention is considered when deformity becomes functionally significant but joints remain mobile. Tendon transfer procedures are the standard approach for ulnar or combined ulnar-median claw hand.

- The Flexor Digitorum Superficialis (FDS) four-tail transfer and Extensor Carpi Radialis Longus (ECRL) transfer are commonly used with comparable functional outcomes (Rajan et al., 2020).
- Modified Bunnell's technique has shown 93% good to excellent outcomes in grip strength and hand appearance (Rajan et al., 2020).
- Surgery should only be performed after completion of MDT and when the hand is free from active inflammation (Walker et al., 2020).

Rehabilitation Therapy

Physiotherapy and Exercise : Physiotherapy aims to maintain joint range of motion, prevent contracture, and strengthen unaffected muscles. Stretching, strengthening, and functional retraining are essential components (Setyawan et al., 2023). A study from Jepara Hospital in Indonesia reported improvement in joint mobility after seven physiotherapy sessions, though hand strength required longer rehabilitation (Setyawan et al., 2023).

Splinting and Orthoses: Splints help prevent deformity progression and improve hand positioning. A Sri Lankan prospective study using gutter and finger-loop splints showed marked improvement in alignment and function within four months (Gunasekara et al., 2021). New low-cost orthoprostheses developed in Brazil for leprosy-related claw hand improved daily activity performance and reduced stigma (Mendes et al., 2022).

Post-Surgical Rehabilitation: Postoperative care involves immobilization, gradual mobilization, and muscle retraining. Functional assessments using SALSA and DASH scales show significant improvement in most patients after tendon transfer and physiotherapy (da Silva et al., 2019).

Psychosocial and Community-Based Rehabilitation: Beyond physical therapy, patient education and community-based rehabilitation (CBR) are essential to overcome stigma and reintegrate patients socially and economically (Prakoeswa et al., 2022). Peer support groups and vocational training have proven effective in reducing social isolation.

METHODOLOGY

This case report study was conducted to describe the clinical presentation, diagnostic process, and management of a patient with Morbus Hansen who developed a claw hand deformity. The study utilized a descriptive observational

design focusing on a single patient treated at Jayapura Hospita. Ethical approval for this case report was obtained from the institutional review board, and informed consent was taken from the patient prior to publication of any clinical details or images.

The subject of this case report was a diagnosed patient with Morbus Hansen presenting with characteristic deformities of the hand. Data were collected through direct clinical examination, patient interviews, and review of medical records. The collected data included sociodemographic characteristics, disease history, neurological findings, laboratory results, and imaging when available. Physical examination focused on identifying nerve involvement, muscle weakness, sensory loss, and characteristic deformities, particularly the claw hand posture.

Diagnosis of Morbus Hansen was confirmed based on clinical signs and bacteriological examination. Skin smear tests and, when indicated, skin biopsy were performed to identify Mycobacterium leprae. Neurological assessment included evaluation of ulnar and median nerve function, testing for muscle strength using the Medical Research Council (MRC) grading scale, and sensory testing using monofilaments. The claw hand deformity was classified according to the severity of motor impairment and functional limitation. Management consisted of multidrug therapy (MDT) as recommended by the World Health Organization, along with physiotherapy, splinting planning, and patient education for self-care and prevention of further disability.

Data Analysis and Presentation: data obtained from this single case were analyzed qualitatively and presented in descriptive form. Clinical photographs, examination findings, and diagnostic results were documented to support the discussion. The case was compared with existing literature to highlight similarities, differences, and clinical implications regarding the management of claw hand deformity in Morbus Hansen.

RESEARCH RESULT

Case Presentation

A 51-year-old man came to the Jayapura Hospital Poly with complaints of stiffness in the fingers of his right and left hands since 2 years ago. Complaints are accompanied by dry skin on the feet and hands and do not sweat in the area of the hands and feet. The patient admitted that at the beginning of the complaint, he felt a wound on his leg accompanied by a feeling of pain on both soles of his feet since August 2022. The patient complained of not being able to walk because his hands and feet were stiff. Patients also complained of both soles of the feet to the ankles unable to feel any sensations.
Decreased appetite. Normal bowel movements and defecation. VAS pain : 6

Previous Disease History:

The patient was hospitalized at Jayapura Hospital due to chronic leg injuries and after being treated by an internal medicine specialist and a dermatologist, it was known that the patient was diagnosed with Morbun Hansen (Lepra) based on the results of the BTA M. Leprae examination from

samples of scraping skin of the legs and earlobes. The patient then carried out Leprosy treatment at the North Jayapura Health Center for 14 months (From August 2022 – October 2023).

After completing the treatment, the patient complained of stiff fingers and severed toe due to the wound, but the patient did not feel any pain.

In January 2024, the patient was referred to Marten Indey Hospital to receive treatment from an orthopedic specialist, and the orthopedic doctor consulted the patient to the neurological polyclinic.

In February 2024, the patient complained of severe pain in the joints of the fingers of the body and could not eat. So, the patient was hospitalized at Marten Indey Hospital and a re-laboratory examination was carried out at the Labkesda for a BTA examination of skin scraping. The results of BTA skin scraping were negative for M. Leprae. On the blood laboratory examination for uric acid, leukocyte levels, etc. are said to be within normal limits. After an evaluation, the patient was referred to the medical rehabilitation polyclinic of Marten Indey Hospital for functional improvement. For approximately 10 months of treatment, the patient admitted that his fingers began to improve and began to be able to move slightly. Furthermore, the patient was sent to the Jayapura Hospital Medical Rehab Poly to be carried out comprehensive measures using a more complete modality.

History of Treatment and Physiotherapy
August 2022 – October 2023 : Leprosy program medicine
2024 : Gabapentin and anti-pain capsules
2024 : Physiotherapy; Infra Red (IR), Paravin bath, Finger joint flexibility exercises
Status generalis :
Head/Neck: eye conjunctiva anemis -/-, madarosis (-), impression of Fasies leonina (+), *cauliflower ear (-)r,* nose within normal borders, mouth dbn, neck
Thorax: symmetrical, regular, vesicular breath sounds, regular SI-SII heart
The abdomen is within normal limits.
Local status regio *manus digiti dextra et sinistra Deformity clawing hand* (+).
Dermatological status: Location Regio *manus sinistra et dextra* , Regio *cruris sinistra et dextra*

Fig.1 *clawing hand deformity*

Fig.2. Hyperpigmented lesions on tarsal dextra sinistra, amputatum digit V (post Therapy)

Inspection
Hyperpigmented macular to plaque in size, *multiple* discrete lesions of the circumscript.
The supporting examination Obtained
1. Peripheral Nerve Examination
    1. N. Ulnaris
        1. Nerve enlargement (+)
        2. Anesthesia on the tips of the anterior part of the pinky and ring finger
           (+)
        3. *Clawing* the pinky and ring finger (+)
    2. N. Medianus
        1. Enlarged nerve (-)
        2. Anesthesia of the anterior part of the index and middle fingers
           (-)
        3. Thumb adduction (-)
        4. *Clawing* the thumb, index finger and middle finger (-)
        5. Thumb contracture (-)
    3. N. Radialis
        1. Anestesi dorsum manus (-)
        2. Hanging hand (-)
        3. Finger or wrist extension (-)
    4. N. Poplitea Lateralis
        1. *Foot drop* (-)
    5. N. Tibialis Posterior
        1. Anesthesia on the soles of the feet (+)
        2. Anesthesia of the cruris region 1/3 distal anterior (+)
        c) *Clow toes* (-)
    6. N. Facialis

(a)Legophthalmus (-)

2. Sensibility Examination
    1. Pain
       Using the sharp, blunt part of the bouncing needle. The sole of the foot cannot feel sharp and dull
       (+).
    2. Touch
       Using cotton. The lesion part in the tarsal pedis dextra and sinistra cannot feel the touch of cotton (+).

Early Holistic Diagnostics

1. Personal Aspects
    1. Reason for arrival: routine control
    2. Concern: the defect is increasing and cannot be cured again
    3. Hope: the defect does not increase and can be cured again
    4. Perception: the defect will continue to grow and the existing defect cannot be cured

2. Clinical Aspects
    Morbus hansen tip multibasiler

3. Internal Risk Aspects
    1. Psychosocial Aspects of the Family
       The patient's wife does not treat the patient warmly, the patient avoids close interaction with the patient.
    2. Functional Degree: Degree 2 (Able to carry out daily light work inside and outside the home and start reducing work activities)

Management During Being a Fostered Family

Nonmedikamentosa :

a. Daily skin care
    1. Wash your hands and feet every night after work with a little soap (don't detergent)
    2. Soaking your feet for about 20 minutes with cold water
    3. If the skin is soft, rub the feet with foam rubber to remove the dry skin.
    4. The skin is smeared with oil.
    5. Regularly the skin is examined (is there redness, *hot spots*,Pain, sores and others)

b. Hand and foot protection
  1. Hands:
    1. Using gloves when working
    2. No smoking
    3. Do not touch hot glasses/items directly
    4. Coating the handles of household appliances with soft materials
  2. Feet
  • Using footwear
    1. Limit walking, as close and slow as possible
    2. Elevating the legs when lying down

c. Physiotherapy exercises

The objectives of the exercise are:
Prevent contractures, improve motion function, increase muscle strength, increase endurance
(*endurance*)

1. Joint range of motion exercises: passively straighten the fingers using a healthy hand or with the help of another person, maintained for 10 seconds, performed 5 – 10 times per day to prevent stiffness. The frequency can be increased to prevent contractures. Joint range of motion exercises are also done on the fingers in all directions of motion.
2. Active exercises straightening fingers with your own muscle power
3. For the legs, stretch the muscles of the back leg by standing facing the wall, swinging your body close to the wall, while keeping your feet on your feet.
4. The exercise program can be improved in general tomaintains muscle elasticity, mobility, muscle strength, and endurance.

Medicamentosa **:**

1. Rifampicin 600 mg monthly, taken in front of an officer
2. Diamino Diphenyl Suffone (DDS) 100 mg daily, taken at home
3. Clofazimin: 300 mg monthly, in front of officers, continued 50 mg daily, taken at home.
4. Vitamin B compleks 3 x 1 tablet (50mg)

Family Data: no other family members have the same complaint
Final Holistic Diagnostics

1. Personal Aspects
    1. Reason for arrival: routine control
    2. Concerns: worries have diminished
    3. Expectations: not yet reached the maximum
    4. Perception: defects can be prevented and overcome by doing skin care, hand and foot protection and physiotherapy exercises
2. Clinical Aspects : Morbus hansen type multibasiler type post treatment (14 months)
3. Internal Risk Aspects
    1. Source of transmission: due to limited activities, the patient has little contact with the source of transmission, namely the patient's friends
    2. Immunity: increases immunity or immunity of the body by resting, living a healthy life, and eating nutritious food.
4. Psychosocial Aspects of the Family : The family is not really helpfull to the patient in his healing process.
5. Functional Degree: Degree 2 (Able to carry out daily light work inside and outside the home and start to reduce work activities).

DISCUSSION

Leprosy is one of the oldest diseases. The word leper comes from the Indian language Leprosy, known since 1400 BC. The word Lepra is mentioned in the Gospels, a translation of the Hebrew zaraath, which actually includes several other skin diseases. It turns out that various descriptions of this disease are very

vague, especially when compared to the leprosy we know today. Leprosy is a chronic infectious disease, the cause of which is *Mycobacterium leprae* which is intracellular obligate. The peripheral nerve is the first affinity, then the skin and the mucosa of the upper respiratory tract, then can be divided into other organs except the central nervous system(Butlin et al., 2019).

Leprosy is also named as Leprosy, Morbus Hansen, Hanseniasis, Elephantiasis Graecorum, Satyriasis, Lepra Arabum, Leontiasis, Kushta, Melaats, Mal de San Lazaro. *Mycobacterium Leprae* or Hansen's germ is a germ that causes leprosy discovered by a scholar from Norway GH. Armauer Hansen in 1873**.** These germs are acid-resistant, rod-shaped with a size of 1-8 µ, 0.2-0.5 µ wide, usually in clusters and some are scattered one by one, live in cells, especially tissues that are cold and cannot be cultured in artificial media(Menaldi et al., 2022).

Leprosy can be transmitted from people with multibasilar type leprosy (MB) to other people by direct transmission. The exact mode of transmission is not yet known, but most experts argue that leprosy can be transmitted through the respiratory tract and skin. More than 125 years after the discovery of *M. leprae*, basil has not been cultivated in vitro. The diagnosis of leprosy is based on the results of a physical examination and skin biopsy and/or smear. *Slit smears* - skin can be done by making superficial incisions in the skin at standard sites (bilateral ears, elbows, and knees), as well as from some typical skin lesions. After the incision is made, the inner surface of the wound is then scraped with a knife that is cut at the right angle to the incision. After the tissue fluid and dermal tissue are obtained and transferred to a clean microscopic slide in a circular manner. After these slides were stained with Ziehl nelson and given emersible oil, the amount of acid-resistant bacilli seen under a microscope was determined and declared as a "bacteriological index" (Yoo et al., 2023).

The diagnosis of leprosy is based on the clinical, bacteriological and histopathological picture. Of the three, clinical diagnosis is the most important and simplest. Before the clinical diagnosis is established, an anamnesis, a clinical examination must be carried out (skin examination, examination of peripheral nerves and their functions). To establish a clinical diagnosis of leprosy, there must be at least one cardinal *sign.* The main signs (Dharmawan, Korfage, et al., 2023):

1. Skin lesions that are anesthetic. Macular or plaque or less often on papules or nodules with a clear loss of palpation, pain and temperature. Other specific skin disorders are changes in skin color and texture as well as hair growth disorders.
2. Thickening of peripheral nerves. Thickening of the peripheral nerve is very rare except in leprosy. In leprosy-endemic areas, the discovery of peripheral nerve thickening can be used to establish a diagnosis. To evaluate this requires continuous exercise, how to feel the nerve and at the time of examination it is necessary to compare it with the nerve.
3. The discovery of *M. Leprae*. *Mycobacterium Leprae* is included in the *Mycobacteriaceace family*, order Actinomycetales, class *Schyzomycetes*. It is pleomorf-shaped, straight, the stem is slender and the rest are parallel

with both ends rounded, measuring 1-8 mm long and 0.3-0.5 mm wide. This bacillus resembles a stem-shaped germ that is Gram-positive, immobile and does not spores. Mycobacterium *Leprae* is mainly found on the skin, nasal mucosa and superficial peripheral nerves and can be indicated by skin incision smears or scraping of the nasal mucosa. It has been clinically proven that this basil usually grows in areas with a temperature of less than 37^{o}C.

Case Discussion

A 51-year-old man came to the Jayapura Hospital Poly with complaints of stiffness in the fingers of his right and left hands since 2 years ago. Complaints are accompanied by dry skin on the feet and hands and do not sweat in the area of the hands and feet. The patient admitted that at the beginning of the complaint, he felt a wound on his leg accompanied by a feeling of pain on both soles of his feet since August 2022. The patient complained of not being able to walk because his hands and feet were stiff. Patients also complained of both soles of the feet to the ankles unable to feel any sensations.

Eat and drink normally but in small amounts. Normal bowel movements and bowel movements.

WHO developed 2 types/classifications to facilitate treatment in the field, namely *Paucybacillary* (PB) and *Multibacillary* (MB) types which are differentiated as in the table below (Ministry of Health of the Republic of Indonesia, 2005):

Table 1. Differences in the Type of Morbus Hansen

Key Signs	PB	MB
Leprosy spots.	Sum 1 – 5	Total > 5
Thickening of the peripheral nerves that is accompanied by impaired function.	Only one nerve	More than one nerve
Smear preparations.	BTA Negative	BTA Positive

The patient was diagnosed *with multibacillary* type morbus hansen , because in patients numb spots or leprosy lesions numbered more than 5.

The multi-drug therapy (MDT) *treatment regimen* is used in Indonesia, this regimen is based on WHO recommendations, namely: (Pramudya Wardhani et al., 2022; Setia Rahayu & Mery Giovani, 2022).

a. Patients *with basil pausi* (PB)

1). Patients with PB lesion 1 were given a single dose of ROM (rifampicin, ofloxacin and minocycline).

1. Adults 50-70 kg: rifampicin 600 mg, ofloxacin 400 mg and minocycline 100 mg

2. Children 5-14 years old: rifampicin 300 mg, ofloxacin 200 mg and minocycline 50 mg The treatment is given only once and the patient is classified in the RFT *(release from tretment) group.* In the leprosy program in Indonesia, this ROM regimen is not used, patients with PB with 1 lesion are treated as in PB with 2-5 lesions (Gofur et al., 2023; Karna et al., 2023; Yoo et al., 2023)

2). Patients with PB lesions 2-5
Adults: rifampicin 600 mg, dapsone 100
mg (taken the first day in front of the officer) and dapsone 100 mg (taken home days 2-28). Treatment duration : 6-9 months (6 blisters)

3) Multi *bacillus* patients (MB) (Gunawan et al., 2018)
1. Adults: rifampicin 600 mg, clofazemin 300 mg, dapsone 100 mg (taken the first day in front of the officer) and clofazemin 50 mg, dapsone 100 mg (taken at home days 2-28). Duration of treatment : 12-18 months (12 blisters)
2. Children under 10 years old, MDT doses are given based on body weight, namely: rifampicin 10-15 mg/kg BB, dapson 1-2 mg/kg BB and clofazemin 1 mg/kg BB.

These patients have completed a treatment regimen called RFT (*release from treatment*). After RFT, the patient remains PB leprosy for 2 years and MB leprosy type for 5 years. Leprosy patients who have passed the observation period after RFT are called RFC (*release from control*) or free from observation.

Prevention *of disability* (POD) is an effort to provide preventive measures for patients to avoid the risk of disability during the course of leprosy, especially due to leprosy reactions. The purpose of disability prevention is to prevent defects from arising or increasing after the patient is registered in treatment and supervision. The occurrence of defects in leprosy patients is caused by damage to peripheral nerve function both by germs and due to nerve inflammation (neuritis) during a leprosy reaction.[7]

1. Impaired sensory function
Damage to sensory function will cause loss or numbness which results in injuries to the hands and feet. Meanwhile, if it hits the cornea of the eye, it causes a lack or loss of the blinking reflex.
2. Damage to motor function
The strength of the muscles of the hands and feet becomes weak or paralyzed and then shrinks (atropy), the fingers and toes are bent (*claw hands* and *claw toes*) and joint stiffness (contractures) occurs. When damage occurs to the eyelid muscles, then the eyelids cannot be closed (*lagopthalmus*).
3. Damage to autonomic function
Damage to autonomic function will result in disturbances in sweat glands, oil glands and blood circulation so that the skin becomes dry, thickened, hard and cracked. Patients at risk of disability are patients who get MDT late, experience leprosy reactions, especially reversal reactions, many patches on the skin and patients with nerve pain or nerve enlargement.

In patients, impairment has been obtained , which is damage to sensory function in patients obtained by numbness in the hands and feet so that patients cannot distinguish between hot objects (hot water, cigarette butts) and cold objects (ice water). Impairment of motor function is also obtained due to the presence of *clawing hands* on *the manus digiti sinistra.* Impairment of autonomic functions is also obtained from examining the skin that becomes dry and cracked. For further disability prevention, I intervened on the patient on March 7, 2014 to perform daily skin maintenance, hand and foot protection and perform physiotherapy exercises as mentioned in the management of non-medical treatment.

The level of leprosy disability according to the WHO, namely (Menaldi et al., 2022; Pangestu et al., 2023)

a. Disability of the hands and feet
Level 0: no sensitivity impairment, no visible damage or deformity.
Level 1 : there is a sensitivity disorder, with no visible damage or deformity.
Level 2: there is damage or deformity.

b. Grade 0 eye defects: no eye disorders due to leprosy, no visual impairment.
Grade 1: there is a disorder in the eye due to leprosy; There is no severe impairment of vision. Visus 6/60 or better (can count fingers at a distance of 6 meters).

Level 2: severe visual impairment (visus less than 6/60; unable to count fingers at a distance of 6 meters).

In patients, a level of disability in the hands and feet is obtained level 2, because deformity has been obtained.

Rehabilitation management that has been given to patients includes:

1. Consultation: patients receive consultation by medical rehabilitation specialists at Dok 2 Hospital regarding the functional and psychosocial conditions faced
2. Education: education about preventing more severe disabilities by using footwear, maintaining hygiene, and slowly building communication with people around them.
3. Physiotherapy: Physiotherapy measures provided include paraffin baths, Infra red, and flexibility exercises for muscles and joints of the fingers and feet. Then, it is planned to be given Lasser therapy
4. Evaluation: the specialist doctor evaluates the sessiability and motor function as well as the disability of the clawing hand on the fingers of the patient's hand.

In this patient, sensory impairment (numbness in hands and feet, inability to perceive hot vs cold), motor impairment (claw hand on manus digiti sinistra), and autonomic impairment (dry, cracked skin) are present. According to WHO / Asia-Pacific disability grading, this amounts to Grade 2 disability in hands/feet (visible deformity present).

To align with WHO / Asia-Pacific guidance on leprosy rehabilitation with deformity, the following management was implemented and/or planned:

1. **Early Detection & Monitoring of Nerve Function**

- Sensory and motor assessments are part of regular follow-ups. Any sign of neuritis or progression triggers prompt medical management.

2. **Preventive Rehabilitation & Self-Care**
   - Daily skin care and protection of hands and feet are emphasized.
   - The patient is educated in inspecting hands/feet daily, protecting extremities from injuries and extremes of temperature (hot, cold).
   - Use of suitable protective footwear and gloves where needed.
3. **Assistive Devices / Orthoses**
   - Night splint for claw hand is provided (or scheduled) to maintain finger extension and prevent further contracture.
   - Orthoses / protective footwear / insoles for feet to prevent injury.
   - Assistive tools for daily tasks if needed.
4. **Physiotherapy & Therapeutic Modality Regimen**
   - Physiotherapy as per plan: paraffin baths, infrared therapy, flexibility & range-of-motion exercises for joints and muscles of affected hand and feet.
   - Strengthening exercises targeting hand intrinsics and finger extensors.
   - Plan for reconstructive surgery evaluation if deformity is non-reversible and impacts function severely.
5. **Assistive Technology (ATDs)**
   - Review and provide devices as per WHO technical guidance (e.g. splints, orthoses, protection devices).
   - Ensure patient is trained in safe usage of ATDs.
6. **Psychosocial, Community & Vocational Rehabilitation**
   - Consultation includes psychosocial aspects: addressing stigma, improving social participation.
   - Encourage involvement in peer support.
   - Explore possible vocational adaptations if needed.
7. **Evaluation & Outcome Tracking**
   - Define concrete outcome metrics: sensory improvement (hot/cold discrimination), degree of deformity, prevention of ulcers / injuries, functional improvement, quality of life.
   - Follow-ups at defined intervals (e.g. quarterly).
   - Reassessment of disability grading over time.

Finally, it can be concluded that with an anamnesis, a complete and detailed physical examination and supporting examinations, we can establish a diagnosis of Leprosy with disability and provide holistic and appropriate management.

ADVANCED RESEARCH

Further research related to the effectiveness of providing physical therapy with various modalities on the therapeutic outcomes of leprosy patients with disabilities is expected to be improved to improve the quality of life of leprosy patients, especially in Papua.

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