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Case Report

Mid-Borderline Leprosy with Mild Type 1 Reaction in Children: A Case Report

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ABSTRACT

Background: Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*. Cases of leprosy in children are rarely found because of the long incubation period of *Mycobacterium leprae*. **Purpose:** To report a case of mid-borderline leprosy with a mild type 1 reaction in a seven-years-old girl patient. **Case:** A 7-years-old girl patient presented with multiple red and white patches on her face, body, arms, legs, and buttocks since 6 months before. There was no itching, numbness, pain, or fever. There was no thickening of peripheral nerves and no nerve function impairment. Her grandmother was suspected to have leprosy, but she had never been treated and had already passed away. From the acid fast bacilli (AFB) examination, the bacterial index (BI) was 1+ and the morphological index (MI) was 2%. A serologic test examination was also performed and the result were Immunoglobulin (Ig) G 3716 u/ml and IgG 284 u/ml. The patient got multidrugs therapy for 12 months and after 9 months of treatment, the pre-existing patches became erythematous, thickened, and felt pain when touched, but there was no fever. In the presence of pain, oral ibuprofen was then administered and the patches began to improve. **Discussion:** Due to the possibility of leprosy reaction, it is important to immediately give prompt treatment to children with type 1 leprosy reaction that is associated with neuritis and leads to deformities. **Conclusion:** Early diagnosis and therapy for a type 1 leprosy reaction are very important to prevent deformities.

Key words: infectious disease, leprosy, mild type 1 reaction.

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BACKGROUND

Leprosy is a chronic granulomatous disease affecting mainly skin and nerves, caused by the obligate intracellular pathogen *Mycobacterium leprae*.[1] Leprosy has been a major public-health problem in many developing countries for centuries. Children are believed to be the most vulnerable group to infection with *Mycobacterium leprae* given their nascent immunity and possible intrafamilial contact.[2] But cases of leprosy in children are rarely found because of the long incubation period of *Mycobacterium leprae*.

The transmission of leprosy still occurs continuously in some endemic areas, particularly in India, Brazil, and Indonesia, which reported over 10.000 new cases and accounted for 81% of the global burden of leprosy in 2015. The World Health Organization (WHO) data in 2017 suggests that Indonesia is one of the top 3 countries with the highest leprosy cases. There were 15.910 new cases in Indonesia. During 2015-2017, there were 3.373 new leprosy cases in East Java, 1.183 new cases in West Java, 1.644 in Central Java, and 1.091 in South Sulawesi.[3,4]

Leprosy in children younger than 15 years old is an important epidemiological indicator. It is correlated with recent diseases and active focus of transmission in the community, reflecting the inefficiency of local control programs. In 2015, the proportion of children among new cases globally was 8.9%, or 18.796 cases. It has been reported that up to 11% of patients had grade 2 disability at the time of diagnosis, rising to 27.3% during follow-up. These disability rates in children are worrying and unacceptable as they reflect

long delays in the diagnosis of leprosy, highlighting a failure of the health services system and gaps in the approach to control the disease. Children with lower socio-economical backgrounds seem to be more vulnerable to this infection.[4,5] Generally, children under 15 years of age do not present a leprosy reactions. Some studies have shown a low frequency of a leprosy reactions varying between 1.36% and 8.33%. In all of these studies, the type 1 reaction was the most commonly found, which is expected, given that the most frequent clinical form was borderline.[6,7]

A rare and interesting case of mid-borderline leprosy with mild type 1 reaction in children was reported. The diagnosis was established by history-taking, physical examination, laboratory examination, and also serologic test examination. This case is being reported to create awareness and immediately give prompt treatment to avoid disabilities and deformities.

CASE REPORT

A 7-years-old, Javanese girl, came with her parents to the Dermatology and Venereology Outpatient Clinic in Dr. Soetomo General Academic Hospital with the chief complaint of multiple red and white annular patches on her face, body, arms, legs, and buttocks. The patches appeared 6 months before admission. The first patches appeared on her right cheek and buttocks. The patches did not accompany with itchy and pain sensation. The family initially thought the patches were caused by a fungal infection, so they purchased an antifungal cream, but the patches persisted with no progression. Two months before admission, the parents noticed that the patches were spreading to her body and also extremities, therefore they decided to get the child checked.

The history of a family member suffering from similar symptoms was unclear. Her parents said that her grandmother, who lived together before, had a similar patches on her body but they didn't know if it's itchy, numb, or not, and it had never been treated. Her grandmother had already passed away a year ago. The history of other close contact with leprosy was denied.

From physical examination, the patient was found to be compos mentis. The body weight was 18 kilograms and the body height was 106 centimeters. The blood pressure, heart rate, and temperature were within the normal limit. From cutaneous examination on the face, there was erythematous plaque with punch out lesion on her right cheek, on the chest region there was a small white macule, on the back region there were white macules with irregular border, on the upper extremities region there were wide red macules with punch out lesion on the left arm, on the lower extremities region there were multiple erythematous and hyperpigmented macules on the thigh and calf with various sizes. On the gluteal region there were multiple red plaques with punch-out lesions. There was no thickening of peripheral nerves and no nerve function impairment, no muscle weakness, but there was hypoesthesia patch and plaques.

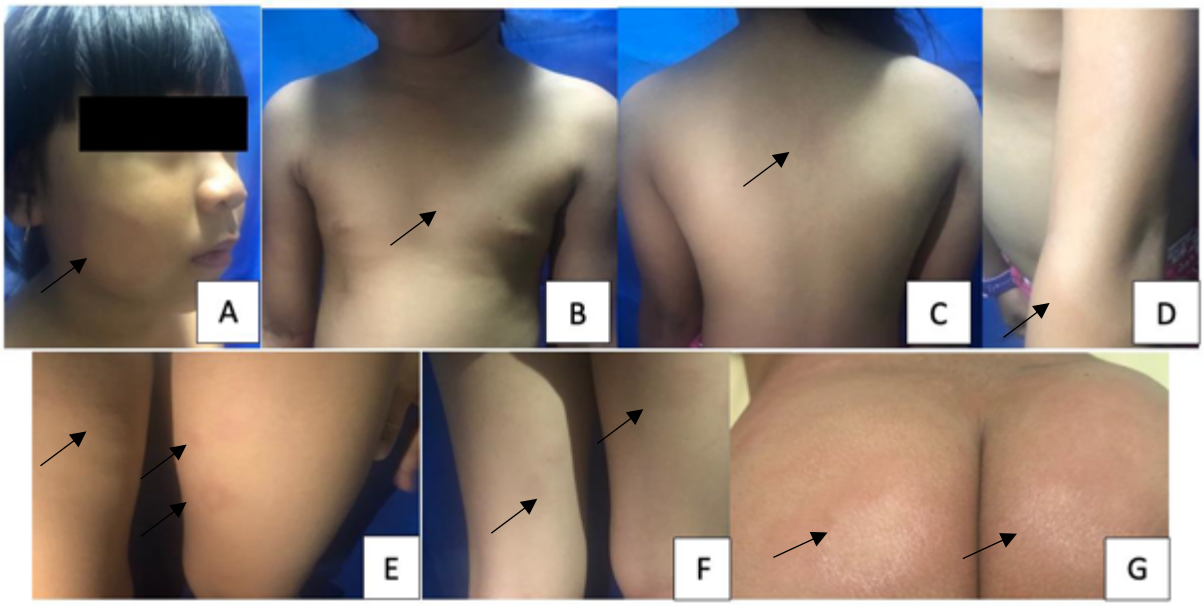

Figure 1. Before treatment. (A) Erythematous annular plaque on the right cheek, (B) White macule on the center of the chest, (C) White macule on center of the back, (D) Erythematous annular macules with punch out lesion on the left elbow, (E, F) Multiple red macules on the right and left thigh, (G) Multiple red macules with punch out lesion on the buttocks.

From the slit skin smear revealed the presence of globi form of acid-fast bacilli (AFB) with bacteriological index (BI) was 1+ and morphological index (MI) was 2%. Serologic test examination shows that anti *phenolic glycolipid* (PGL) 1 Immunoglobulin (Ig) M was 3716 u/ml and IgG was 284 u/ml. There was an increase in IgM result. This patient was diagnosed as a mid-borderline leprosy.

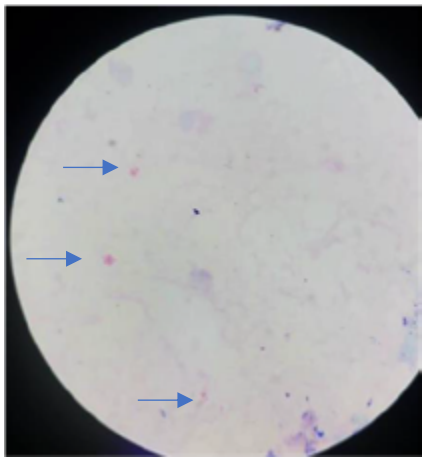

Figure 2. Slit skin smear examination showed 3 globi form of acid-fast bacilli.

The parents had already undergo the slit skin smear examination and the results were negative. The patient started the treatment with multidrugs therapy for leprosy (MDTL) for children with multibacillary (MB) type, which consists of monthly doses of rifampicin 450 mg and clofazimine 200 mg, plus daily doses of dapsone 50 mg, and clofazimine 50 mg every other day, given for 12 months as per the WHO recommendation. The patient was also given multivitamin such as tiamin twice a day and B complex vitamin once a day.

On the 9th month of treatment, the patient came with chief complaints of thickening of the previous patches and painful when they were touched. The first thickening patches appeared two weeks before control. It became erythematous and there were some scales on the patches and plaques. The patient felt pain, especially when they were touched, but there was no fever. There was no nerve function impairment. Some of the plaques were new lesions. From the history taking, the patient had influenza for 2 weeks and the patches and plaques became thickened. There was no toothache or strenuous activity.

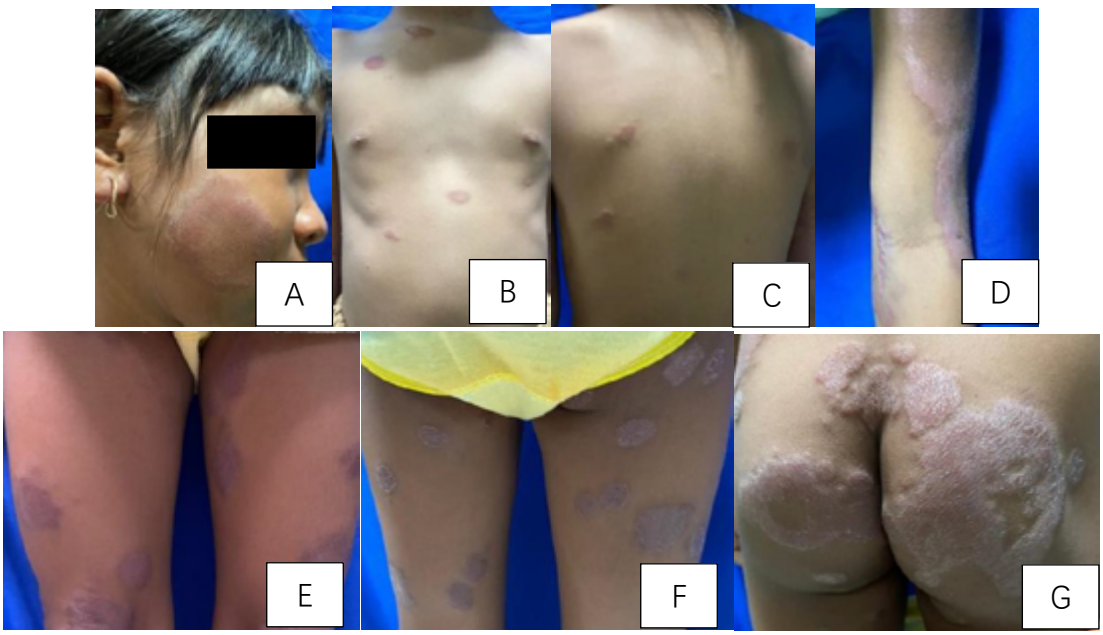

Figure 3. On the 9th month of treatment the pre-existing patches and plaques became erythematous also thickened and there were scales on it. There were new lesions.

The patient was given extra ibuprofen 200 mg twice a day for a month; the MDTL and multivitamin continued. After a month, the thickening of the lesion was thinning out and becoming hyperpigmented. There were no reports of pain in the lesion.

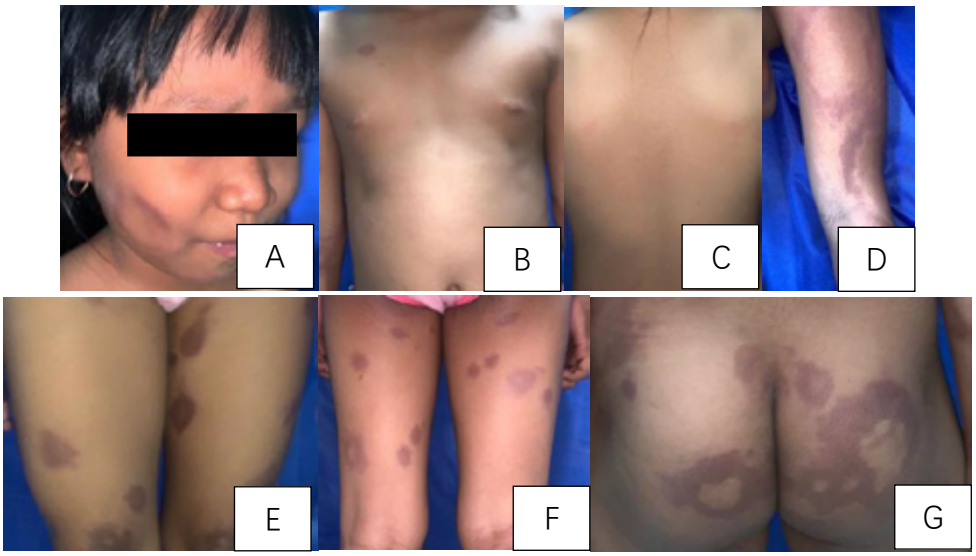

Figure 4. In the 10th month of treatment, the patches and plaques began to thin out and became hyperpigmented.

DISCUSSION

Hansen's disease, or leprosy, is a chronic granulomatous bacterial infection that primarily affects skin and peripheral nerves. Diagnosis is currently based on 3 cardinal signs specified by WHO: hypopigmented or erythematous macules with sensory loss, thickened peripheral nerves, and a positive acid-alcohol-fast smear or skin biopsy. Modern multidrugs therapy and new antibiotics of proven efficacy have made it possible to meet the WHO's targeted reduction in the incidence of *M. leprae* infection to a single case per 10.000 inhabitants in countries where the disease is endemic.[1,3,8]

Leprosy is spread around the world with different endemicities. Among the 122 endemic countries in 1985, 98 countries had achieved leprosy elimination, for example, a prevalence rate < 1/ 10.000 population. Indonesia occupied third place after India and Brazil in donating leprosy in the world. Despite the drastic decline in the number of registered cases, the actual number of new cases detected has not been reduced at all.[9]

In Indonesia, children under the age of 14 who suffer from leprosy are ± 13%. In other reports, it is mention that leprosy cases in children in Indonesia are 12.01% and 82.43% of them are multibacillary (MB) type cases.[9,10] Children form a high-risk group in the families of leprosy patients. Familial contacts are known to have a significant role in the development of childhood leprosy. The risk of developing leprosy in a person is four times greater when there is neighbourhood contact. However, the risk increases to nine times when the contact is intra-familial.[2,9] The mode of transmission of leprosy is still not conclusively proven, although infection by nasal droplets in believed to be the main route. The first lesions were also observed on the bare buttocks of toddlers, acquired possibly from sitting on contaminated soil, suggesting that the skin is at least one of the important routes of transmission of the disease.[2,11]

The clinical, pathological, bacilloscopic, and immunological criteria of the Ridley and Jopling classification provide the basis for the most complete classification of the various forms of the disease, including indeterminate, tuberculoid leprosy (TT), borderline tuberculoid (BT), mid-borderline (BB), borderline lepromatous (BL), and lepromatous leprosy (LL). Mid-borderline leprosy is the most unstable type because patients in this group can be quickly downgraded to the LL type if they are not treated. Borderline lepromatous type leprosy showed erythematous lesions in the form of polymorphic plaques with undefined borders. Lesions are usually symmetrical and tend to be polymorphic.[1,11,12]

The most challenging part for physicians is to elicit sensory loss to fine touch in children, which is impossible and inaccurate. Although pain sensation can be elicited, the child will not cooperate and pain is always the last sensation to go among all sensations. One of the easy techniques that can be done is checking for temperature sensations. One can take test tubes containing warm and cold water. The patient is asked to close their eyes and the examiner can ask by

touching the test tubes on skin to appreciate whether they are cold or warm.[3,12]

Slit-skin smears, from the suspected lesions of leprosy, should be stained for AFB with Ziehl-Neelsen staining to estimate the number of *M. leprae* when present. Smears are positive in LL, BL, and sometimes BB cases.[3,13] Skin biopsies should be done by taking the sample up to the dermis or even subcutis. In mid-borderline leprosy, there are aggregates of epithelioid cells, scarce dispersed lymphocytes, no Langerhans multinucleated giant cells, and increasing numbers of AFB.[1,14,15]

In childhood leprosy, reactional episodes and disabilities are less frequently seen. However, when present, they tend to occur in older children due to their relatively well developed immunological status. Recently, a higher incidence or reactional episodes, both type 1 and 2 reactions, occurring with or without neuritis in children has been observed, mostly in hospital-based studies. Type 1 reaction represent an enhanced cell-mediated immune response to *M. leprae* and usually occur after treatment is initiated. Skin lesions become erythematous and/ or oedematous and may ulcerate. The type 1 reaction most commonly occurs in the BT, BB, and BL forms. This is characterized by erythema and swelling in the pre-existing lesions and the manifestation of new lesions (papules or plaques).[2,16] Enlarged nerves may show nodularity at times. Neuritis is present if an individual has any of the following: spontaneous nerve pain, paraesthesia, tenderness, or new sensory or motor impairment. In general, children with MB disease are at higher risk for reversal reactions.[16,17]

The sensibility of the PGL1 test as a predictor of clinical leprosy development was below 50% for all studies, and its specificity was above 80%. There is an association between anti-PGL1 positivity and the development of leprosy, but we cannot state that an anti-PGL1 result reflects recent infection by *M. leprae*. The relationship is more complex and involves host immunity.[17,18]

The disease in children is eminently responsive to treatment. Multidrugs therapy (MDT) is the mainstay of the leprosy elimination strategy as it cures patients, reduces the reservoir of infection, and interrupts its transmission. The dosage regimen, of both paucibacillary and multibacillary MDT for children, according to the different age groups.[2,19,20]

In general, leprosy reactions are rare in children under 15 years of age. In all of the studies, the type 1 reaction was most commonly found in children. Type 1 reaction is associated with neuritis. Even though reaction may appear after drug treatment is instituted, it is not advisable to discontinue or reduce anti-leprosy medication because of these. In mild reactions, those without neurologic complications or severe systemic symptoms or findings, treatment may be supported. Bed rest and administration of aspirin or non-steroidal anti-inflammatory drugs may be used. But severe neuritis can lead to sudden nerve palsy, leading to deformities such as foot drop, wrist drop, and clawing. Hence, neuritis should be treated with adequate dose of corticosteroid to bring down inflammation and damage in the nerves.[2,21]

Leprosy in children is a strong indicator of recent transmission of the disease. Early diagnosis and treatment is the fundamental strategy to prevent leprosy transmission. Early diagnosis in children can be hard, even for those with experience in dealing with this disease, because of the wide range of clinical aspects of the skin lesions and mainly due to the difficulty of performing the clinical peripheral nerve evaluation. The reaction manifestation must be awared because it also can happened in children. Ongoing research tries to develop better diagnostic tests and to advance chemoprophylaxis and immunoprophylaxis approaches. Leprosy expertise must be maintained and the health professional's skills for leprosy diagnosis must be improved.

REFERENCES

1. Salgado CG, de Brito AC, Slagado UI, Spencer JS. Leprosy. In: Kang S, Amagai M, Bruckner AL, Enk AH, Margolis DJ, McMichael AJ, Orringer JA, editors. Fitzpatrick's Dermatology. 9th ed. New York: McGraw-Hill; 2019. p. 2892-919.
2. Singal A, Chhabra N. Childhood leprosy. In: Kumar B, Kar HK, editors. IAL Textbook of Leprosy. 2nd ed. New Delhi: Jaypee Brothers Medical Publishers; 2017. p. 360-8.
3. Narang T, Kumar B. Leprosy in children. Indian J Pediatr 2019; 20(1): 12-24.
4. Alinda MD, Geani S, Agusni RI, Kusumaputra BH, Reza NR, Prakoeswa CRS, *et al*. Diagnosis and management of leprosy. Berkala Ilmu Kesehatan Kulit dan Kelamin 2020; 32(2): 149-57.
5. Baretto JG, Frade MAC, Filho FB, da Silva MB, Spencer JS, Salgado CG. Leprosy in children. Curr Infect Dis Rep 2017; 19(23): 1-8.
6. Diallo MA, Diatta BO, Moussa I, Fall LT, Dieng M. Leprosy among children in Senega. International Knowledge Press 2017; 10(3): 89-92.

7. Oliveira MBB, Diniz LM. Leprosy among children under 15 years of age. An Bras Dermatol 2016; 91(2): 196-203.
8. Eichelmann K, Gonzales G, Salas-Alanis JC, Ocampo-Candiani J. Leprosy. An update: definition, pathogenesis, classification, diagnosis, and treatment. Actas Dermosifiliogr 2013; 104: 554-63.
9. Prakoeswa FRS, Sutrisna EM. Leprosy: an overview of epidemiology and risk factor in Indonesia. J Biol Innov 2017; 6(6): 991-5.
10. Wibawa T, Satoto TBT. Magnitude of neglected tropical diseases in Indonesia at postmillenium development goals era. J Trop Med 2016: 1-9.
11. Rodrigues Junior IA, Gresta LT, Noviello MLM, Cartelle T, Lyon S, Arantes RME. Leprosy classification methods: a comparative study in referral center in Brazil. Int J Infect Dis 2016; 45: 118-22.
12. Ilyas F. Discrepancy between clinical manifestations and histopathological features in borderline borderline leprosy. Int J Med Rev Case Rep 2019; 1-4.
13. Santos DF, Mendoca MR, Antunes DE, Sabino EFP, Pereira RC, Goulart LR, Goulart IMB. Revisiting primary neural leprosy: clinical, serological, molecular, and neurophysiological aspects. PLoSNegl Trop Dis 2017; 11(11): 1-14.
14. Ghafoor R, Zia M, Anwar MI, Ahmed M, Kumar KL, Iqbal M. Demographic, clinical and histopathological spectrum of leprosy: a study of 30 Pakistani patients. J Pakistan Assoc Dermatologists 2017; 27(4): 324-9.
15. Massone C, Belechew WA, Schettini A. Histopathology of the lepromatous skin biopsy. Clin Dermatol 2015; 33(1): 38-45.
16. Walker SL, Lockwood DNJ. Leprosy type 1 (reversal) reactions and their management. Lepr Rev 2008; 79: 372-86.
17. Penna MLF, Penna GO, Iglesias PC, Natal S, Rodrigues LC. Anti-PGL-1 positivity as a risk marker for the development of leprosy among contacts of leprosy cases: systematic review and meta-analysis. PLoSNegl Trop Dis 2016; 10(5): 1-11.
18. James WD, Berger TG, Elston DM, Neuhaus IM. Hansen's disease. Andrew's diseases of the skin. Philadelphia: Elsevier; 2016.
19. Fischer, M. Leprosy – an overview of clinical features, diagnosis, and treatment. J Dtsch Dermatol Ges 2017; 15(8): 801-27.
20. Maymone MBC, Venkatesh S, Laughter M, Abdat R, Hugh J, Dacso MM, *et al.* Leprosy: treatment and management of complications. J Am Acad Dermatol 2020; 83: 17-30.
21. Pradhan S, Nayak BP, Dash G. Childhood leprosy: a review. Indian J Paediatr Dermatol 2019; 20: 112-6.