



## LEISHMAN-DONOVAN (LD) BODIES IN BONE MARROW ASPIRATION: A CASE REPORT

**Dr. Swati Singh**

(M.D) Pathology Consultant Pathologist, Agra Uttar Pradesh 282001

**Dr. Vinay Kumar \***

(M.D) Pathology Consultant Pathologist, Agra Uttar Pradesh 282001

\*Corresponding Author

### ABSTRACT

We report a case of a 10-year-old male, resident of Agra who was evaluated for high grade, intermittent fevers over the last 6 months. On examination, he had pallor and massive splenomegaly. Complete blood count results showed hemoglobin: 8.6 g/dL, white blood cell count:  $3.3 \times 10^9/L$ , and platelet count:  $80 \times 10^9/L$ . The peripheral blood smear revealed anisocytosis, polychromasia and pancytopenia. Subsequently, bone marrow procedure was performed as a part of workup for evaluation of fever and splenomegaly. Bone marrow aspirate showed *Leishmania donovani* bodies (LD bodies) in macrophages characterized by a kinetoplast and characteristic double dot appearance. Normal hematopoiesis was noted. A diagnosis visceral leishmaniasis was made.

**KEYWORDS** : Aspirate, bone marrow, leishmaniasis

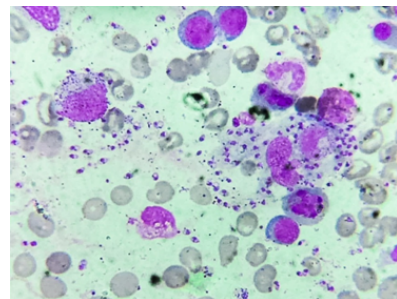
### INTRODUCTION

Visceral leishmaniasis (VL), also known as kala azar, is an endemic disease in tropical and subtropical regions of India. It may mimic and lead to a variety of hematological disorders like pancytopenia, myelofibrosis, myelodysplasia and hemophagocytosis. Although the diagnostic utility of bone marrow aspirate smears is well proven. The cytological and histological features associated with VL have been described individually in literature. However, there is no such report from the Indian subcontinent that describes all these morphological features together.

### DISCUSSION

Leishmaniasis is caused by the protozoan parasite *Leishmania* *Donovani* and transmitted by the bite of infected sandfly *Phlebotomus* *argentipes*, dog is the most common reservoir. Also known as kala azar (Indian name meaning black fever), VL is endemic in tropical and subtropical regions. It is a chronic illness characterized by irregular fever, hepatosplenomegaly and pancytopenia, progressive weakness and emaciation which can result in death if left untreated. Globally, the incidence and prevalence of kala azar cases per year are 0.5 and 2.5 million, respectively. Leishmaniasis is considered to be endemic in focal areas in about 90 countries in tropics, subtropics, and Southern Europe while in India, 130 million population is at risk of the disease.<sup>[1,6]</sup> Visceral leishmaniasis is considered to be disease of low altitude as climatic and geographical factors play an important role in the distribution of vector, parasite, and reservoir.<sup>[2,7]</sup> Recently, some studies have also reported new focus of leishmaniasis at higher altitudes of Himalayan and sub-Himalayan regions of India.<sup>[8-10]</sup> Socioeconomic factors including illiteracy and poverty may be related to the spread of leishmaniasis as 66.6% of cases were present in lower economic group in our study. Fever and hepatosplenomegaly were the common clinical presentation in the present study which is consistent with other studies.<sup>[11]</sup> However the disease was clinically unsuspected in 81.4% of the cases primarily because its presence in nonendemic areas and secondarily as clinical features overlapped with other prevalent infections of this area such as malaria, enteric fever, and HIV or with liver diseases. This itself lays the importance of vigilant bone marrow aspirate examination for the search of LD bodies and observation of associated bone marrow cytology features even if the clinical suspicion is low. The probable reason may be delayed diagnosis due to late presentation of cases from remote areas in the study or association with other infections such as tuberculosis and typhoid. On bone marrow aspirate cytology, increased histiocytes and hemophagocytosis were an important common phenomenon observed in the present study which is in contrast to previous study from Iran by Daneshbod et al. which has reported it to be uncommon cytological findings.<sup>[4]</sup> However another study has also reported hemophagocytosis as common finding which may be attributed to longer duration of

symptoms.<sup>[3]</sup> Other associated features such as plasmacytosis, erythroid hyperplasia, plasma cells with abnormal inclusions (Russell bodies, Mott cells, and Crystals), and dysmyelopoiesis may also be helpful indicators of leishmaniasis. Aggregates of LD bodies in form of irregular flower shape, ring shape, and strap shape may also be uncommonly observed in leishmaniasis, which at times may mimic fungal spores or platelet aggregates and therefore necessitates a pathologist to have knowledge of such irregular aggregates. Although the exact cause for this cannot be ascertained, the authors suggest that it may be related to APD which is higher in endemic regions leading to more cytoplasmic disintegration. The release of extracellular cysteine proteinase by amastigotes may be responsible for this cytoplasmic lysis.<sup>[4]</sup> Interestingly, the LD body was also demonstrated in megakaryocyte and red blood cell in our study which has not been reported before. The bone marrow biopsy examination commonly indicates increased vascularity which may be due to reparative process and uncommonly shows necrosis or granuloma which may be associated due to thrombosis of capillary lumen by parasites.<sup>[12]</sup> Although giant cells, necrosis and granulomas are considered to be uncommon and atypical findings in VL in present study, their presence should also prompt close search of LD bodies on bone marrow aspirate cytology. This is especially important in areas where TB is endemic and may be associated with leishmaniasis.



**FIG.1** Bone marrow aspirate film showing a macrophage containing LD bodies. There are also some apparently extracellular organisms.

### CONCLUSION

Thus to conclude the knowledge of common, uncommon, and atypical features on bone marrow aspirate cytology is helpful in clinching an early and correct diagnosis of leishmaniasis especially in nonendemic areas where clinical suspicion is low. In contrast to previous study from endemic region, hemophagocytosis and pancytopenia were commonly observed while granular and free cytoplasmic bodies were uncommon morphological findings in the present study. The features will guide the pathologist for vigilant search of LD bodies in the marrow aspirate for definite diagnosis. In addition, it will also be useful in preventing the use of advanced and

costly diagnostic modalities in the diagnosis of visceral leishmaniasis along with unnecessary workups.

#### CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

#### References

1. B. L. Herwaldt, "Leishmaniasis," in Harrison's Principles of Internal Medicine, A. S. Fauci, E. Braunwald, D. L. Kasper et al., Eds., pp. 1296–1300, McGraw-Hill, New York, NY, USA, 17th edition, 2008.
2. G. S. Bhunia, S. Kesari, A. Jeyaram, V. Kumar, and P. Das, "Influence of topography on the endemicity of Kala-azar: a study based on remote sensing and geographical information system," *Geospatial Health*, vol. 4, no. 2, pp. 155–165, 2010.
3. P. Bhatia, D. Haldar, N. Verma, R. K. Marwaha, and S. Varma, "A case series highlighting the relative frequencies of the common uncommon and atypical/unusual hematological findings on bone marrow examination in cases of visceral leishmaniasis," *Mediterranean Journal of Hematology and Infectious Diseases*, vol. 3, article e2011035, 2011.
4. Y. Daneshbod, S. J. Dehghani, and K. Daneshbod, "Bone marrow aspiration findings in kala-azar," *Acta Cytologica*, vol. 54, no. 1, pp. 12–24, 2010.
5. K. K. Dhingra, P. Gupta, V. Saroha, N. Setia, N. Khurana, and T. Singh, "Morphological findings in bone marrow biopsy and aspirate smears of visceral kala azar: a review," *Indian Journal of Pathology and Microbiology*, vol. 53, no. 1, pp. 96–100, 2010.
6. K. Park, "Leishmaniasis," in Park's Textbook of Preventive and Social Medicine, K. Park, Ed., pp. 279–282, M/s Banarsidas Bhanot, Jabalpur, India, 21st edition, 2011.
7. A. Elnaiem, J. Schorscher, A. Bendall et al., "Risk mapping of visceral leishmaniasis: the role of local variation in rainfall and altitude on the presence and incidence of kala-azar in eastern Sudan," *American Journal of Tropical Medicine and Hygiene*, vol. 68, no. 1, pp. 10–17, 2003.
8. A. Joshi, A. Gulati, V. Pathak, and R. Bansal, "Post-Kala-Azar-dermal-leishmaniasis: an unusual presentation from Uttarachal (a non-endemic hilly region of India)," *Indian Journal of Dermatology, Venereology and Leprology*, vol. 68, no. 3, pp. 171–173, 2002.
9. R. Sharma, V. Mahajan, N. Sharma, and A. Sharma, "A new focus of cutaneous leishmaniasis in Himachal Pradesh (India)," *Indian Journal of Dermatology, Venereology and Leprology*, vol. 69, no. 2, pp. 170–172, 2003.
10. S. K. Mahajan, P. Machhan, A. Kanga et al., "Kala-azar at high altitude," *Journal of Communicable Diseases*, vol. 36, no. 2, pp. 117–120, 2004.
12. L. M. Prieto Tato, E. La Orden Izquierdo, S. Guillén Martín et al., "Visceral childhood leishmaniasis: diagnosis and treatment," *Anales de Pediatría*, vol. 72, no. 5, pp. 347–351, 2010.