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Histopathological Features of Leprosy: Descriptive Study

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Abstract

Introduction: The histopathology of lepromatous skin varies according to the cell-mediated immunity of the host against *Mycobacterium leprae*. In tuberculoid and borderline tuberculoid leprosy, epithelioid noncaseating granulomas predominate, and acid-fast bacilli (AFB) are absent or only rarely present. In borderline lepromatous and lepromatous leprosy, the infiltrate is composed of macrophages with a vacuolar cytoplasm, lymphocytes, and plasma cells. *Methodology:* A Descriptive study was carried out at a Tertiary care Hospital to know the in depth features of Leprosy. Totally 58 cases were recruited based on non probability purposive sampling technique. *Results:* Borderline tuberculoid (BT) comprised 33 cases (56.8%), Tuberculoid leprosy (TT) 20 cases (34%), Borderline leprosy 1 case (1.7%) and Borderline lepromatous (BL) 4 cases (7.3%). One case of BT was in reaction and three were of relapses. *Conclusion:* There is no independent gold standard for diagnosis of leprosy.

Keywords: Leprosy; Histopathology; Laprae.

Introduction

The world granuloma was originally used to describe the mass of granulation tissue ie., capillaries, fibroblasts and macrophages which forms at a site of tissue repair. This regrettable definition has probably been handed down from Virchow (1964) [1] who defined a granuloma as essentially a tumor or neoplasm composed of granulation tissue. Fobus (1955) [2] has emphasised that the process of granulomatous inflammation is intimately connected with activity on the part of the macrophages. More recently the word granuloma is considered as a broad term covering subacute to chronic inflammatory processes that are more or less circumscribed. Histologically one sees a varying assortment of epithelioid cells, histiocytes, giant cells of different types, lymphocytes, plasma cells, eosinophils and mast cells at times with zones of necrosis of pesudonecrosis (Montgomery, 1967) [3]. A contemporary definition of a granuloma is a lesion consisting predominantly of macrophages. It need not necessarily show necrosis, fibrosis or giant cells. More recently a granuloma is defined as a collection of histiocytes that may have abundant cytoplasm and confluent borders (epithelioid histiocytes), often with Langhan's type giant cells. Granulomas may be associated with necrosis, may palisade around areas of necrobiosis, may be mixed with other inflammatory cells, may include foreign body-type giant cells, and may contain ingested foreign material or pathogens (Lever, 1997) [4].

The histopathology of lepromatous skin varies according to the cell-mediated immunity of the host against *Mycobacterium leprae*. In tuberculoid and borderline tuberculoid leprosy, epithelioid noncaseating granulomas predominate, and acid-fast bacilli (AFB) are absent or only rarely present. In borderline lepromatous and lepromatous leprosy, the infiltrate is composed of macrophages with a vacuolar cytoplasm, lymphocytes, and plasma cells. AFB is numerous. Edema inside and outside the epithelioid granulomas, together with the appearance of large giant cells, are the main features of type 1 reactions. A conspicuous neutrophilic infiltrate in the subcutis

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with or without vasculitis is found in erythema nodosum leprosum. The main histopathologic features of leprosy and its particular forms are discussed in this review.

The main feature of the vast majority of leprosy biopsy specimens is a granulomatous infiltrate that has different features according to the form of leprosy, the time and site of the biopsy, the presence of a leprosy reaction, and therapy. The clinical spectrum of leprosy correlates in most of cases (but not in all) directly with histopathologic results, reflecting the different grade of cell-mediated immune response (CMI) of the host against *Mycobacterium leprae* [5-8].

Methodology

A Descriptive study was carried out at a Tertiary care Hospital to know the in depth features of Leprosy. Totally 58 cases were recruited based on non probability purposive sampling technique.

These patients are clinically suspected of having granulomatous and non-granulomatous lesions. The duration of their illness varied from months to years and the patients belonged to a wide age range. The clinical assessment of the patients were done by the Dermatologists. The skin biopsies were taken from the most prominent lesion or from the anaesthetic area depending on clinical diagnosis. These sections were subjected to microscopic examination and the study of the epidermis, dermis, dermal appendages, arteries and nerve bundles were carried out.

Results

This study was undertaken to evaluate skin biopsies showing granulomatous reactions in detail. Of the 94 cases evaluated, 58 were of leprosy. In the rest of the cases, the aetiologies were of fungi, tuberculosis and non-infections granulomas. Cases of leprosy were classified according to Ridley and Joplings classification and the borderline tuberculoid leprosy comprised the largest group coming upto 56.8%. There were 11 cases of cutaneous tuberculosis, among this lupus vulgaris comprised 7 and tuberculosis verucosa cutis 4 cases. All the cases of leprosy and tuberculosis were subjected to AFB staining. For leprosy cases modified Fite-Faraco stain was used.

Borderline tuberculoid (BT) comprised 33 cases (56.8%), Tuberculoid leprosy (TT) 20 cases (34%), Borderline leprosy 1 case (1.7%) and Borderline lepromatous (BL) 4 cases (7.3%). One case of BT was in reaction and three were of relapses.

A diagnosis of spectrum of leprosy was made when the granulomas were compact and composed of epithelioid cells, surrounded by a dense cuff of lymphocytes with or without Langhans giant cells or in the presence of erosion of epidermis .

The diagnosis of BT spectrum of leprosy was made when the granuloma was less compact and epithelioid cells were admixed with lymphocytes. The cuffing of granuloma by lymphocytes was less pronounced .

One case of BT was in type-1 reaction, which was diagnosed by oedema in granuloma, dilated lymphatic channels and infiltration of the granuloma by acute inflammatory cells . Three cases of BT were of relapses, where the patients had full course multi-drug chemotherapy earlier. In two of them recurrence occurred 2 years after completion of therapy and in one it occurred after 1 V. years. BB spectrum of leprosy was diagnosed when the granulomas were composed of sheets of epithelioid cells with scanty lymphocytes.This type of picture was obtained in 1 patient. BL spectrum of leprosy was diagnosed when the 4uloma was composed of macrophages admixed with a considerable number of lymphocytes.

Discussion

Out of 58 cases of leprosy, 12 cases showed acid fast bacilli (20.6%). Thisis comparable to a study by Prasad et al (1997) who studied 49 cases of leprosy theskin was multibacillary in 1 1 cases (22.6%).

When Job CK et al [9] studied 26 patients Acid fast bacilli was seen in thesections of only two cases. In the same study, M. leprae were detected using" PCR technique in 1 1 patients. It is included that since the ûnding of M- leprae is crucialin the conûrmatory diagnosis of early leprosy and acid fast bacilli was demonstrable only in a limited number of cases, it is suggested that other methodsfor detection of M. leprae such as PCR should be employed whenever feasible.

In the present study, Job and Chacko" modiûcation of File Faraco stainingwas used for the demonstration of bacilli. One of the main drawbacks of theconventional File Faraco Stain for M. leprae that the decolourisation step is veryfast, as acid alcohol is used for the purpose. Since M. leprae is less acid andalcohol fast, if declorisation step is prolonged for a few seconds more, the bacilliwill not be demonstrable. On the other hand if decolourisation is not enough, thebackground will be densely stainedand it may be difficult to identify the acid

fastbacilli. This dificulty is overcome in this modification. In this method instead of 1% acid alcohol, only 5% sulphuric acid is used, so the decolourization time can beprolonged upto 10 minutes. In the AFB stained sechlinnthe 1-2 micrometer Mdfast granules in eccrine sweat gland cell could be used as a satisfactory intimal positive control.

The AFB staining was also useful in demonstrating mast cells in skin andnerve sections. Ridleygé has observed an increase in mast cells which in somecases is confined to sites like nerve. Lin et al have also observed an increase inmast cells in indeterminate leprosy- In the present study also the increase in mastcells was noted in skin sections. Under low power objective there is a chance tomistake mast cell granules for M. leprae- In order to avoid this all the AFB stainedsections should be examined under oil immersion objective.

Most consistent ûnding in all cases of leprosy was the selective localization and infiltration of neurovascular bundles by the granulomas. Also there was often epidermal atrophy, lack of caseation necrosis and lack of fibrosis. Epidermalatrophy was more pronounced in case of 'IT granulomas.

Nirmala V [10] et al had made a comparison between tuberculoid leprosy andcutaneous tuberculosis and noted that in tuberculosis there is often a proliferationreaction of the epidermis with areas of ulceration, signiûcant ûbrosis and absence of nerve destruction.

A review of literature (Ridley and Jopling)" indicates that the lymphocyteswere very numerous in TI' polar and are peripheral to the epithelioid cellaggregates, forming a dense cuff around it. In BT the number of lymphocytes isvariable and is often present within the granuloma rather than peripheral to it. In BB spectrum the lymphocytes were few. All these findings were confirmed in this study and the BB granulomas alsoshowed a plasmacytic infiltration in addition to the lymphocytes. Giant cells within the granulomas were variable and were most numerousin the TT granulomas, only a few BT cases showed them and was absent in BBand BL ones. In the Ridley and Joplings original article it is suggested thatconsiderable number of large Langhan's giant cells throughout the granuloma inthe superficial dermis signify TT polar. Giant cells are fewer in TT subpolar. InBT granuloma, giant cells may be fairly numerous, but though of the Langhan's type, they are not very large.

Also it was noted that, in 'IT spectrum the granulomas were compact andmost frequent in the superûcial dermis often with associated epidermal atrophy. In contrast, BT granulomas were less compact, showed distribution following neurovascular bundles. These observations parallels with that made byauthors like Lever and Rid ley.

As there can be some degree of overlap between different types of leprosy,both clinically and histopathologically. Correlation of clinical and histopathological features along with bacteriological index appears to be more useful for accuratetyping of leprosy than considering any oneof the single parameters alone. Taking any of the clinical signs, clinical types, histopathological parameters orhistopathological types as a gold standard is not ideal.

Conclusion

Correlation of clinical and histopathological features along with bacteriological index appears to be more useful for accurate typing of leprosy than considering any one of the single parameters alone.

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