Auer rods in polymorphs in a case of acute myeloid leukemia

Sir,

Auer rods are crystalline inclusions, pathognomonic of myeloid differentiation of the leukemic blasts. Their presence in maturing myeloid cells and monocytes is rare. They have primarily been described in patients with acute promyelocytic leukemia (APL) and other French-American-British (FAB) subtypes of acute myeloid leukemia (AML), namely AML-M1, M2 and M4. We would like to document a case of AML-M2 with eosinophilia, where numerous polymorphs showed presence of Auer rods.

A 10-year-old male, born of nonconsanguineous marriage, presented to us with high-grade fever, loss of appetite and generalized weakness of 10 day’s duration. Physical examination revealed moderate pallor and presence of submandibular lymph node measuring approximately 2 cm in maximum dimension. Complete hemogram showed hemoglobin of 73 g/L, total leucocyte count of $10.3 \times 10^9$/L, platelet count of $29 \times 10^9$/L and smear examination revealed 16% blasts, some of which contained Auer rods. Bone marrow aspiration smears were cellular and showed approximately 53% blasts, along with maturing myeloid series of cells and 8% eosinophils. Auer rods were noted in some of the neutrophils and myelocytes [Figure 1]. In addition, significant dysplasia was noted in the mature myeloid cells in the form of Pseudo–Pelger–Huet anomaly and hypogranulation [Figure 1]. On flow cytometry, theses blasts were positive for CD34, CD117, HLA-DR, CD13, cMPO and also showed aberrant expression of CD19. Interestingly these cells were negative for CD33. Hence, a final diagnosis of AML with maturation (FAB AML-M2 with eosinophilia) was proposed. Conventional cytogenetics showed a normal male karyotype, however molecular analysis using reverse transcription-polymerase chain reaction revealed AML1-ETO, ([f8;21]) fusion product.

Auer bodies are rod-shaped crystalline inclusions formed of azurophilic granules, named after John Auer, though they were first recognized by Thomas McCrae.[1] Based on the electron microscopic finding way back in 1977, it was concluded that the formation of Auer rods is due to defects in the formation, aggregation, and concentration of the peroxidase granules in the leukemic blasts.[2] Auer rods in neutrophils are a rare finding and their presence in

Figure 1: May–Grunwald–Giemsa stained bone marrow aspiration smear showing Auer rod in neutrophil; inset showing a hypogranular and hypolobated neutrophil and myelocyte containing Auer rod
neutrophils is suggestive of nucleo-cytoplasmic asynchrony; where the nuclear maturation has occurred, however, the cytoplasmic granule content is similar to that of immature myeloid cells. A brief review of the literature has shown 11 case reports where authors have documented the presence of Auer rods in neutrophils, myelocytes, and rarely in monocytes [Table 1]. Majority of these cases belonged to the FAB AML-M2 and M3 category though occasional cases of AML-M1 and myelodysplastic syndrome have also been reported. In cases of APL, it was observed by the authors that Auer rods positive neutrophils were increased in patients after remission induction in pre all-trans-retinoic acid era.

In the present case, Auer rods are found in neutrophils, and some of the neutrophils also showed Pseudo–Pelger–Huet anomaly and hypogranulation; features of dysplasia. Morphologically the index case belonged to FAB AML-M2 category, though occasional cases of AML-M1 and myelodysplastic syndrome have also been reported. In cases of APL, it was observed by the authors that Auer rods positive neutrophils were increased in patients after remission induction in pre all-trans-retinoic acid era.

Overall, in conclusion, the presence of Auer rods is supposed to be associated with a good prognosis. Their presence in neutrophils and cells other than blasts clearly point that these cells are part of a malignant clone; however; their role in long-term clinical implications and diagnostic significance is still unclear. Moreover, their presence is not associated with any specific cytogenetic abnormality.

Manish Kumar Singh, Ruchi Gupta, K. Surabhi, Khaliqur Rahman

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<th>Other morphological features</th>
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<tr>
<td>Manish et al.</td>
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<td>Neutrophils</td>
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ND: Not done, AML: Acute myeloid leukemia, MDS: Myelodysplastic syndrome, APML: Acute promyelocytic leukemia

REFERENCES


Sir,

Oral cancer causes several deaths throughout the world each year. The high mortality rate attributed to oral cancer is mostly due to late detection or diagnosis of potentially malignant and malignant lesions of the oral cavity. Currently, several screening modes are available to the clinical fraternity to detect these lesions. Among them, the recently emerging technologies include Microlux and in vivo confocal microscopy.

Microlux DL is based on the principle of tissue reflectance. In this technique, the patient rinses 1% acetic acid solution for 60 s in the oral cavity. The acetic acid rinse eliminates surface debris and dehydrates the epithelial cells which cause their nuclei to appear prominent. The room light should be lowered at the start of the procedure. The oral cavity is then examined with the help of blue-white light (440 nm) generated by a battery operated light emitting diode fiber optic source. The normal oral epithelium will visually appear as light bluish, whereas the abnormal epithelium as a distinct aceto-white. A recent study concluded that Microlux aids in the diagnosis of oral premalignant and malignant lesions. Microlux does not distinguish between benign and malignant lesions. However, it increases the probability of detecting the lesion and revealing new lesions when compared with conventional oral examination. Microlux is a promising adjunct screening device in this direction.

Confocal microscopy is a reflectance imaging technique in cell biology. It is a cost effective technique and can be used in developing countries. It has the advantage of optical sectioning and high-resolution imaging by blocking the light originating from tissue layers above and below the focal plane. In vivo confocal images from the oral cavity using a miniaturized fiber optic confocal reflectance microscope shows the characteristic features such as nuclear irregularity, enlargement, crowding, changes in nuclear to cytoplasmic ratio, changes in capillary network and spacing, which is used to differentiate oral squamous cell carcinoma from normal oral mucosa. It helps to acquire high-resolution images in real time to evaluate morphological changes in tissues in the cellular level. It uses a diode laser as a source of monochromatic and coherent light. The basic principle lies in the difference in reflectivity of the tissues. Contrast is based on differences in refractive index, which can be enhanced using simple contrast agents such as acetic acid or using fluorescent dyes such as fluorescein and 5-aminolevulinic acid. Furthermore, exogenous contrast agents such as topical acriflavine and intravenous fluorescein can be used. The advantage of this technique is that it requires no surgical procedure and histopathologic sectioning and staining. A recent study validated the use of this technique to evaluate tissue architecture and cell morphology of the oral cavity. Though the techniques especially in vivo confocal microscopy are in the developmental stage, they are promising and advantageous in the early detection of oral cancer. More research and progress in biomedical instrumentation technology may maximize the efficiency of these emerging technologies, leading to decreased mortality rate due to oral cancer.

Vagish Kumar L. S.

Department of Oral Medicine and Radiology, Yenepoya Dental College and Hospital, Yenepoya Research Centre, Yenepoya University, Mangalore, Karnataka, India

Correspondence to:

Dr. Vagish Kumar L. S.,

Department of Oral Medicine and Radiology, Yenepoya Dental College and Hospital, Yenepoya Research Centre, Yenepoya University, Mangalore - 575 018, Karnataka, India.

E-mail: vagishkumar_12@rediffmail.com

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