Table 4: Correlation of myeloid antigens with lactate dehydrogenase value

| LDH  | Antigen | Negative | Positive |
|------|---------|----------|----------|
| Mean |         | 406.04   | 235.4    |
| SE   |         | 66.16    | 10.96    |
| Median |      | 289.5    | 233      |
| Percentile 25 | | 253   | 215      |
| Percentile 75 |       | 357      | 254      |

P = 0.026

LDH = Lactate dehydrogenase, SE = Standard error

that findings of Bhushan B et al. which introduced that MY+ cases achieved CR more than MY− cases[2] and also discordant with Kurec et al. which reported that MY+ ALL achieved CR less than MY− cases.[4]

Uckun et al.’s results are generally consistent with these studies, in showing that myeloid antigen expression does not correlate with poor outcome for children with ALL and emphasize that their study provides new insight on the clinical significance of myeloid antigen expression in childhood ALL and shows that regardless of risk classification, ALL patients who are MY+ have treatment outcomes similar to those who are MY− ALL.[29]

Furthermore, the correlation between myeloid antigens expression and their effects on hematological parameters was evaluated in this study and found that there were no significant statistical differences in initial WBC and PLs count; these findings were compatible with that established by Bhushan B et al. and Kurec et al.[3,4] and discordant with that reported by Lopes et al., Uckun et al., which considered that MY+ ALL cases usually have initial WBC count less than MY− ALL and more initial PLs count.[18,29]

While in the current study, significant statistical differences were found in Hb value at diagnosis (Hb value usually more in MY+ cases than MY− cases) and LDH value at diagnosis (LDH value usually less at diagnosis in MY+ cases than MY− cases), this result was approachable with that established by Pui et al.[27] and conflicting with Tanyeli et al., Uckun et al., Wiersma et al. which instituted that there were no differences between MY+ and MY− ALL cases in these values[12,29,29] and also unfriendly with Amirghofran et al., which founded that CD33 usually associated with low Hb value.[11]

According to initial P.B. blasts and B.M. blasts percent, there were no significant statistical differences in P.B. blasts percent between MY+ and MY− cases, but there were significant statistical differences in initial B.M. blasts percent between MY+ and MY− ALL cases (B.M. blasts percent less in MY+ ALL than in MY− ALL at diagnosis); this finding was compatible with that reported by Lopes et al.[18]

The differences about the prognosis of myeloid antigens expression in ALL between studies may be due to the differences in treatment protocol, definition criteria of myeloid antigens expression in ALL, and populations.[1]

Conclusions

1. CD13 is the most frequent aberrant myeloid antigens which was expressed in childhood ALL, less frequently CD33, while CD14 showed no expression
2. MY+ ALL may have better prognosis as they have lower value for B.M. blast percent and LDH
3. There was no difference in response to induction therapy between MY+ and MY− ALL.

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Conflicts of interest
There are no conflicts of interest.

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Immunohistochemical expression of SOX11 as a diagnostic tool for mantle cell lymphoma

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Abstract:

BACKGROUND: SOX11 is a transcription factor that has role in central nervous system development, it has found that this marker expressed in nuclei of mantle cell lymphoma and may play vital role in diagnosis and pathogenesis of mantle cell lymphoma.

AIMS: To evaluate the diagnostic role of SOX11 immunohistochemical expression in mantle cell lymphoma.

MATERIALS AND METHODS: A cross sectional study was designed, a total of 62 left over tissue samples (paraffin block of bone marrow biopsy) were included in the study. All the samples were taken from the Medical city/ teaching laboratories, and presented during the period 2014-2016. Cases diagnosed according to the WHO classification of mature B-cell Neoplasms with 26 cases having CLL/SLL, 17 were mantle cell lymphoma and 19 cases with follicular lymphoma. All the practical steps were carried out in teaching laboratories department of pathology and forensic medicine/ Al-Nahrain University - Collage Of Medicine. From each block, two sections were taken, and one were immunohistochemically stained for SOX11. And other section stained for haemtotoxylin and eosin stain.

RESULTS: In MCL, nuclear staining of SOX11 was seen in 16 (94.12%) of 17 patients, SOX11 nuclear staining was also seen in 1 case (3.85%) of 26 CLL/SLL cases, and 0 (0.0%) of 19 patients with FL. Furthermore, compared with CLL/SLL and FL, the positive rate of SOX11 nuclear staining was significantly higher in the MCL samples (P < 0.001). In addition SOX11 nuclear positivity had high sensitivity (94.12%) and specificity (97.78 %) in diagnosis of MCL compared to Cyclin D1.

CONCLUSIONS: SOX11 is a powerful diagnostic tool for MCL, and may help in distinguishing it from other B-cell lymphoproliferative disorders.

Keywords: Immunohistochemistry, leiomyomatosis peritonealis disseminata, mantle cell lymphoma, SOX11

Introduction

Mantle cell lymphoma (MCL) is a subtype of non-Hodgkin’s lymphoma (NHL), with aggressive clinical course, not so common reaching (5%–10%) of B-lymphoproliferative disorders (B-LPD), characterized by cyclin D1 expression and differentiated from possible morphologic imitators, comprising chronic lymphocytic leukemia/ small lymphocytic lymphoma (CLL/SLL) and follicular lymphoma (FL) by CD5, CD23, and CD10 expression,¹² as CD5 shared by both MCL and (CLL/SLL), but CD23 usually lacking in the former, while CD10 lands usually in FL. Nevertheless, CD23 negative CLL may also present.⁵³

Lately, SOX11, plays a major role in neurogenesis and remodeling, also has been found to be detected in the nuclei of MCL cells.⁴ Recent studies showed that both SOX11 mRNA and protein highly expressed in MCL irrespective to cyclin D1.⁵⁻⁷

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Furthermore, SOX11 showed to be expressed in more than 90% of MCL and in 100% of MCL with negative cyclin D1.\(^8\)

In this work, we studied SOX11 expression in a group of B-LPD through immunohistochemistry (IHC) to investigate whether nuclear staining of SOX11 can serve as a useful diagnostic marker for MCL.

**Aims of the study**

The aim of this study was to evaluate the diagnostic role of SOX11 immunohistochemical expression in MCL.

**Materials and Methods**

A cross-sectional study was designed; a total of 62 leftover tissue samples (paraffin block of bone marrow biopsy) were included in the study. All the samples were in use from the Medical city/teaching laboratories and presented during the period 2014–2016. Cases diagnosed according to the WHO classification of lymphoid neoplasms,\(^9\) with 26 cases having CLL/SLL, 17 were MCL, and 19 cases with FL. The diagnosis was made depending on flow cytometry reports and for MCL cases, diagnosis was confirmed by the demonstration of cyclin D1 expression by IHC. All the practical steps were carried out in teaching laboratories department of pathology and forensic medicine/Al-Nahrain University, College of Medicine. From each block, two sections of 5\(\mu\)m thickness were taken; one section was immunohistochemically stained for SOX11 and the other for hematoxylin and eosin stain.

Immunohistochemical procedure for SOX11: the procedure was carried out according to manufacturer’s instructions. Taking sections and mounted on Fisher brand positively charged slides. Then, slides deparaffinized and placed in DAKO antigen retrieval (pH 6). Later on, labeled streptavidin-biotin staining kit (Dako) used for staining, used for staining, after blocking endogenous peroxidase, and incubation of primary antibody (abcam mouse monoclonal anti-SOX11 antibody [CLO142] ab154138) at 20\(^\circ\)C overnight.

**Statistics**

A nonparametric two-way contingency table Chi-square test or Fisher’s exact test was employed, using Prism 7 for Mac OS X software, version 7.0a (Graph Pad Software, San Diego, California, USA). The validity of SOX11 in discrimination of MCL than other LPD was calculated using sensitivity, specificity, and positive and negative predictive values.

**Results**

Nuclear expression of SOX11 in MCL, CLL/SLL, and FL is demonstrated in [Table 1 and Figure 1]. In MCL, nuclear staining of SOX11 was seen in 16 (94.12%) of 17 patients, and the staining was uniform and strong in mainstream of the neoplastic cells. In the remaining, one case of MCL had lacked staining of SOX11 in both nuclei and cytoplasm.

SOX11 nuclear staining was also seen in 1 (3.85%) of 26 CLL/SLL cases, with moderate nuclear expression and was negative in all (19) patients with FL [Figure 2].

Furthermore, compared with CLL/SLL and FL, the positive rate of SOX11 nuclear staining was significantly higher in the MCL samples \((P < 0.001)\) [Table 1]. In addition, SOX11 nuclear positivity had high sensitivity (94.12%) and specificity (97.78%) in diagnosis of MCL compared to cyclin D1 [Table 2].

**Discussion**

LPDs include a wide variety of diseases, with variable prognosis and clinical behavior; for that, accurate measures for diagnosis are needed. MCL usually diagnosed depending on cyclin D1 expression; however, some negative cases do exist, this leads SOX11 to be potential nominee to differentiate MCL from other B-LPD.\(^{10,11}\)

Dictor \textit{et al.} among other researchers studied the use of SOX11 in LPD, where their findings were not so specific for MCL diagnosis, while Zhang \textit{et al.} work proved that nuclear staining of SOX11 was expressed in 54 (93.1%) of 58 MCLs, with other subtypes of LPD showed lower rate of positivity. This phenomenon might be explained due to different primary antibody kits used and numerous working practices used in IHC, the difference between these IHC results among different studies indicates that polyclonal antibody targeting SOX11 is not able to identify MCL from B-NHLs.\(^{5,11}\)