Clinico Haematological Lymphoblastic Leukemia

Resistance Staphylococcus Psammomatous Arteriovenous

Discovering Thoughts, Inventing Future

VOLUME 14 ISSUE 3 VERSION 1.0
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Clinico Haematological Study of Acute Lymphoblastic leukemia

By Dr. Preethi C R
Jjm Medical College Davangere, India

Abstract - Context: Acute Lymphoblastic leukemia encom-passes a group of neoplasms composed of immature, precursor B (pre- B) or T (pre-T) lymphocytes referred to as lymphoblast.

Aims:
1. To know the relative incidence of Acute Lymphoblastic leukemia among the patients referred for complete haemogram at the department of pathology, JJMMC, Davangere.
2. To study the clinical manifestations and their correlation with various types of acute Lymphoblastic leukemia.
3. To study the haematological profiles in acute Lymphoblastic leukemia.

Settings and design: The study was a hospital based study conducted at haematology unit, Department of Pathology, JJM Medical college, Davangere.

Methods and material: The present study was done during the period of June 2006 to May 2008 at haematology unit department of Pathology, JJM Medical college, Davangere. Cases from chigateri general hospital, Bapuji hospital and other private hospitals situated in and around Davangere were included for the study.

Keywords: leukemias, all, hospital-based study.

GJMR-C Classification : NLMC Code: QZ 350, WH 250

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Clinico Haematological Study of Acute Lymphoblastic Leukemia

Dr. Preethi C R

Abstract - Context: Acute Lymphoblastic leukemia encompasses a group of neoplasms composed of immature, precursor B (pre-B) or T (pre-T) lymphocytes referred to as lymphoblast.

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Statistics: The results were expressed in percentage.

Results and conclusion: A total of 1039 patients who were referred to the department of haematology out of which 13 patients were diagnosed as Acute Lymphoblastic Leukemia. The present study is to highlight that light microscopic features of peripheral smear and bone marrow will still remain mainstay in the diagnosis of acute Lymphoblastic leukemias.

Keywords: leukemias, all, hospital-based study.

I. Introduction

Acute lymphoblastic leukemia encompasses a group of neoplasms composed of immature, precursor (B- pre-B) or T (pre-T) lymphocytes referred to as lymphoblast. Although ALL affects all age groups, ALL has its highest incidence in children between ages, 1-5 years with a peak at 3-4 years. In 1976, Bennet JM et al classified ALL into three sub types (L1, L2 and L3). According to a) the occurrence of individual cytological features b) The degree of heterogeneity in the distribution among the leukemic population of some or all of these features. The features considered are cell size, nuclear chromatin, nuclear shape, nucleoli, amount and basophilia of the cytoplasm.

In the year 1985, the first MIC (morphologic, immunologic, cytogenetic cooperative study group) proposed a classification of ALL. The children cancer study group (CCSG) has presented their own classification of ALL which borrows from FAB nomenclature. The latest WHO classification of the acute leukemias differs from the FAB classification in that greater than or equal to 20% blasts are used for the diagnosis of acute leukemias.

II. Objectives

1. To know the relative incidence of Acute lymphoblastic leukemia among the patients referred for complete haemogram at the department of pathology, JJMMC, Davangere.
2. To study the clinical manifestations and their correlation with various types of acute lymphoblastic leukemia.
3. To study the haematological profiles in acute lymphoblastic leukemia.

III. Materials and Methods

The present study on “Clinico-Haematological study of Acute Lymphoblastic Leukemias” was undertaken during the period of June 2006 to May 2008 at haematology unit, Department of Pathology, J J M Medical College, Davangere.

The cases from chigateri hospital, Bapuji hospital and other private hospitals situated in and around Davangere formed the material of the study. Case selection was based on clinical features and supported by laboratory evidences. Bone marrow aspiration was subsequently carried out after obtaining written consent from the patient or the guardian.

Inclusion criteria
- New cases of ALL

Exclusion criteria
- Treated cases of ALL

The following investigations were done:
1. Complete haemogram was performed and peripheral smear was stained by Leishman stain for all cases and examined in detail.

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2. Bone marrow aspiration and study was done in all cases and leishman stained smears were examined.

   In all cases, the following cytochemical stains were employed for diagnosis and subtyping of leukemias.
   - MPO – Myelo-peroxidase stain
   - SBB – Sudan Black B
   - PAS- Periodic Acid Schiff stain
   - NSE- Non specific esterase stain

   Acute lymphoblastic leukemias were classified based on FAB Criteria.

IV. Results

13 patients in this study were diagnosed as ALL. ALL patients were seen in the age range of 5 months to 16 years with a mean age of 8.3 years. The mean ages for males and females were 9.2 years and 6.0 years respectively. Out of the 13 patients, 9 were males and 4 were females, with a male to female ratio of 2.2:1.

   The main presenting symptoms were fever in 6 patients (46.1%), generalized weakness in 4 patients (30.8%) and backache in 3 patients (23%).

   Physical examination showed pallor of varying degrees in all patients. Lymphadenopathy was present in 8 out of 13 patients constituting (61.5%). All the patients had localized lymphadenopathy among which cervical lymphadenopathy was common.

   Mild to moderate Hepatomegaly was seen in 7 patients (53.8%).

   Mild to moderate Splenomegaly was seen in 10 patients (76.9%).

   Anemia of variable degree was seen in all patients of ALL. The Hb level ranged from 5.9-7.2 gm/dl. The mean Hb level being 6.7 gm/dl. TLC ranged from 16.9×10^9/l to 210×10^9/l, the mean TLC being 75.8×10^9/l. 5 patients (38.4%) had count between 11-49×10^9/l, 4 patients (30.7%) had counts between 50-100×10^9/l, 4 (30.7%) patients had counts >100×10^9/l.

   All the 13 patients had thrombocytopenia at the time of diagnosis, 5 patients had counts from 11-49×10^9/l, 4 patients had counts from 50-100×10^9/l, 4 patients had counts >100×10^9/l, with a mean platelet count of 82.3×10^9/l.

   10 out of 13 patients had an ESR of >50mm at the end of 1st hour and 3 patients between 20-50mm at the end of 1st hour.

   Bone marrow aspiration was performed in all 13 patients. Lymphoblast was the predominant cell with an average of 85% blasts on differential count. All the patients had decreased megakaryocytes. All were subtyped on morphological basis using FAB criteria into 3 subtypes-L1, L2, and L3. The identification of lymphoblasts was mainly on morphological grounds as stated in the FAB proposals. MPO/SBB and PAS stains were performed. Most of the ALL patients were MPO/SBB negative, but characteristic block positivity on PAS was seen in 38.5% of the patients.

   Table 1: Haematological Parameters in FAB Subtypes of ALL

<table>
<thead>
<tr>
<th>Haematological parameters</th>
<th>ALL (n=13)</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (gm/dl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>5.9-7.2</td>
<td>-</td>
<td>5.9-7.2</td>
<td>-</td>
</tr>
<tr>
<td>Mean</td>
<td>6.7</td>
<td>-</td>
<td>6.7</td>
<td>-</td>
</tr>
<tr>
<td>TLC (×10^9/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>16.8-210</td>
<td>-</td>
<td>16.8-210</td>
<td>-</td>
</tr>
<tr>
<td>Mean</td>
<td>75.8</td>
<td>-</td>
<td>75.8</td>
<td>-</td>
</tr>
<tr>
<td>Platelets (×10^9/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.46-145</td>
<td>-</td>
<td>0.46-145</td>
<td>-</td>
</tr>
<tr>
<td>Mean</td>
<td>82.3</td>
<td>-</td>
<td>82.3</td>
<td>-</td>
</tr>
<tr>
<td>Blast range (%)</td>
<td>60-90</td>
<td>-</td>
<td>60-90</td>
<td>-</td>
</tr>
<tr>
<td>Bone marrow decreased</td>
<td>13</td>
<td>-</td>
<td>13</td>
<td>-</td>
</tr>
<tr>
<td>megakaryocytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blast mean (%)</td>
<td>85%</td>
<td></td>
<td>85%</td>
<td>-</td>
</tr>
</tbody>
</table>

   a) Acute Lymphoblastic Leukemia (L1)
   No case of L1 was encountered in this study.

   b) Acute Lymphoblastic Leukemia (L2)
   All the 13 patients who were diagnosed as ALL were ALL-L2 in this study. The age range was 5 months to 16 years with a mean age of 8.3 years. The mean ages for males and females were 9.2 years and 6 years respectively. Out of the 13 patients, 9 were males and 4 were females, with a male to female ratio of 2.2:1.

   The main presenting symptoms were fever in 6 patients (46.1%), generalized weakness in 4 patients (30.8%) and backache in 3 patient (23%).

   Physical examination showed pallor of varying degrees in all patients. Lymphadenopathy was present in 8 of the 13 patients constituting (61.5%). All the 8
patients had localized lymphadenopathy among which cervical lymphadenopathy was common. Mild to moderate hepatomegaly was seen in 7 patients (53.8%). Mild to moderate Splenomegaly was seen in 10 patients (76.9%). Anemia of variable degree was seen an all patients of ALL. The Hb level ranged from 5.9-7.2gm/dl. The mean Hb level being 6.7gm/dl. TLC ranged from $16.9 \times 10^9/l$ to $210 \times 10^9/l$. The mean TLC being $75.8 \times 10^9/l$. 5 patients (38.4%) had count between $11 -49 \times 10^9/l$, 4 patients (30.7%) had counts between $50-100 \times 10^9/l$, 4 (30.7%) patients had counts $>100 \times 10^9/l$. 5 patients (38.4%) had count between $11 -49 \times 10^9/l$, 4 patients (30.7%) had counts between $50 -100 \times 10^9/l$, 4 patients had counts $>100 \times 10^9/l$. 10 out of 13 patients had an ESR of $>50$mm at the end of 1st hour and 3 patients between 20-50mm. Bone marrow aspiration was done in all 13 patients. Marrow was hypercellular. Aspiration showed reduced erythropoiesis and megalakaryopoiesis. Leucopoiesis showed a predominance of lymphoblasts which comprised of heterogenous population of both large and small lymphoblasts. The average blast count was 85%. Cytochemical staining for MPO/SBB was negative and PAS positivity was seen in 38.5% of the patients.

**c) Acute Lymphoblastic Leukemia (L3)**

No case of L3 was encountered in this study.

**V. DISCUSSION**

The mean age incidence in the present study was 8.3%. In studies conducted by Shome et al (1985) and Mathur (1993) et al, the mean age incidence was 15.6 and 29.7 respectively. This was more when compared to the present study.

The male female ratio in our study was 2.2:1. In studies done by Shome et al (1985) and Mathur (1993) et al, the male to female ratio was 3.4:1 and 2.4:1 respectively. This is more when compared to the present study.

The average figures for age incidences in the present study are less than the figures quoted in other Indian studies.

The main presenting symptoms were fever and generalized weakness in our study. The same was noted by Shome et al (1985) and Mathur (1993) et al. Bleeding manifestation as a presenting symptom was not noted in this study. Higher incidences of bleeding manifestations were noted by Shome et al (55%) and Mathur et al (47%). A high incidence of lymphadenopathy was seen consistently in this study and also in other studies. Hepatosplenomegaly was also a presenting symptom in this study. Similar observation was noted by Shome et al (1985) and Mathur (1993) et al, but with a more frequency among patients. Backache was seen in 23% of the patients in this study. Backache was not seen in study done by Shome et al (1985) and Mathur (1993) et al.

Pallor was present in our study and it correlates well with a study done by Mathur (1993) et al.

Sternal tenderness was present in studies conducted by Shome et al (1985) and Mathur (1993) et al, but was not observed in the present study. CNS manifestations was present in study conducted by Shome et al (1985), but it was not observed in the present study.

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>73</td>
<td>94</td>
<td>46.1</td>
</tr>
<tr>
<td>Generalized weakness</td>
<td>80</td>
<td>100</td>
<td>30.8</td>
</tr>
<tr>
<td>Bleeding</td>
<td>55</td>
<td>47</td>
<td>-</td>
</tr>
<tr>
<td>Pain abdomen</td>
<td>20</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>Pallor</td>
<td>87</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>80</td>
<td>88</td>
<td>61.5</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>77</td>
<td>75</td>
<td>76.9</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>88</td>
<td>75</td>
<td>53.8</td>
</tr>
<tr>
<td>Sternal tenderness</td>
<td>39</td>
<td>53</td>
<td>-</td>
</tr>
<tr>
<td>Signs of haemorrhage</td>
<td>16</td>
<td>47</td>
<td>-</td>
</tr>
<tr>
<td>CNS manifestations</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Back ache</td>
<td>-</td>
<td>-</td>
<td>23</td>
</tr>
</tbody>
</table>

Anemia was seen in all the cases of ALL in the present study. Similar finding was observed in study conducted by Mathur et al. Mean Hb percent was 6.7gm/dl in the present study, and it was more compared to Mathur et al.

The mean TLC in the present study was $75.8 \times 10^9/l$. In the study done by Mathur et al, it was
This count was less when compared to the present study. Thrombocytopenia was present in all the patients in the present study. The mean platelet count was 82.3×10^9/l in the present study. This was high when compared to the study conducted by Mathur et al, where it was 55.2×10^9/l.

Bone marrow examination was performed in all 13 cases.

The mean blast percentage was 85%. This was more when compared to Mathur et al where it was 57%.

Table 3: Comparison of haematological parameters of ALL

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hbgm/dl</td>
<td>2-9.5</td>
<td>5.9-7.2</td>
</tr>
<tr>
<td>Range</td>
<td>5.2</td>
<td>6.7</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TLC (×10^9/l)</td>
<td>8-90</td>
<td>16.8-210</td>
</tr>
<tr>
<td>Range</td>
<td>35.8</td>
<td>75.8</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelets (×10^9/l)</td>
<td>20-150</td>
<td>0.46-145</td>
</tr>
<tr>
<td>Range</td>
<td>55.2</td>
<td>82.3</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blasts (%)</td>
<td>20-90</td>
<td>60-90</td>
</tr>
<tr>
<td>Range</td>
<td>57</td>
<td>85</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the present study, all the patients, that were diagnosed as ALL were ALL-L2 (100%). In the study done by Mahendrakumar (1998) L2 was a predominant subtype. Shome et al (1985) reported an almost equal incidence of L1 and L2 (45.8% and 42.4%).

The mean age for L2 was 8.3 years in the present study. Shome et al (1985) reported a mean age of 17.7, whereas Mahendrakumar (1998) reported a mean age 13.6 for L2. In this study, the sex ratio showed a male predominance in L2 subtype (2.2:1). The Shome et al (1985) showed a sex ratio of 2.6:1 in L2 type, whereas the study of Mahendrakumar (1998) showed a sex ratio of 1.8:1 in L2 type.

The general pattern of clinical features varies with the findings of Shome et al (1985). Fever and generalized weakness were a common initial clinical presentation in the present study whereas in study done by Shome et al (1985) a higher percentage of fever and generalized weakness were noted. Lymphadenopathy was common in ALL-L2 in the present study (61.5%) and is less when compared to Shome et al (73%). Splenomegaly correlates well with study by Shome et al (1985). Hepatomegaly was seen in less frequency when compared to Shome et al (1985). Backache was seen in 23% of the patients in this study and was not seen in study conducted by Shome et al (1985).

The mean Hb levels in ALL-L2 subtype correlates with Shome et al study (1985). TLC also correlates with Shome et al series.

Thrombocytopenia was seen in all patients in this study. The mean platelet count was little less when compared to study done by Shome et al (1985).

Table 4: Comparison of haematological parameters of in FAB subtypes of ALL

<table>
<thead>
<tr>
<th>Haematological parameters</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hbgm/dl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TLC (×10^9/l)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelets (×10^9/l)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bone marrow decreased megakaryocytes (in %)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the present study PAS positivity was seen in only 38.5% of patients while study by Shome et al (1985) series reported PAS positivity in 20% of ALL patients. Mahendrakumar (1998) reported PAS positivity in 43.8% of ALL patients. Fayaz khan10 reported PAS positivity in 53.5% of ALL patients.

VI. Conclusion

ALL was diagnosed in 13 patients (20.63%). All the patients that were diagnosed with ALL were ALL-L2. Lymphadenopathy was the most consistent feature with fever, generalised weakness, backache and...
hepatomegaly. Anemia and thrombocytopenia were present in all the patients. TLC count ranged from 16.9 to 210×10^9/l with a mean of 75.8×10^9/l. The mean blast percentage was 85%.

The present study is to highlight that light microscopic features of peripheral smear and bone marrow still remain mainstay in the diagnosis of acute leukemias, whereas immunotyping and cytogenetics are complimentary procedures at specialized centres.

However, with newer modalities of therapy and rewarding curative results in haematological malignancies, the use of cytochemistry, immunotyping and cytogenetics have become gold standards for arriving at a specific diagnosis.

**References Références Referencias**

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Psammomatous Arteriovenous Malformation-Brain: A Rare Histological Presentation Leading to Diagnostic Dilemma

By Sanjay Piplani, Rahul Mannan, Manas Madan, Harjot Kaur, Saumil Garg & Monika Lalit
Baba Farid University, India

Abstract- Occurrence of psammoma bodies (PB) in CNS is strongly associated with meningiomas. Its occurrence with arterio-venous malformation (AVM) is rare. We report a case of an unconscious 70 year old male who presented in the emergency department with mass lesion and on histopathology revealed a lesion composed of variable sized dilated and congested vascular channels which were mainly thin walled but with few thick walled vascular channels as well. Also noted were numerous lamellated calcified bodies (PB) which were present both intra-vascularly in small vascular channels as well as extra-vascular glial tissue. The minimal glial tissue included in the biopsy showed astrocytic proliferation showing mild anisonucleosis and hyperchromasia. Hence on light microscopy a differential diagnosis of Psammomatous cavernous haemangioma with a possibility of concurrent meningioma was suggested, as the synchronous presence of both the lesions is well documented in literature. A possibility of angiomatous variant of meningioma was also suggested.

Keywords: av malformation, cns, psammoma bodies.

GJMR-C Classification : NLMC Code: WL 300

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Abstract- Occurrence of psammoma bodies (PB) in CNS is strongly associated with meningiomas. Its occurrence with arterio-venous malformation (AVM) is rare. We report a case of an unconscious 70 year old male who presented in the emergency department with mass lesion and on histopathology revealed a lesion composed of variable sized dilated and congested vascular channels which were mainly thin walled but with few thick walled vascular channels as well. Also noted were numerous lamellated calcified bodies (PB) which were present both intra-vascularly in small vascular channels as well as extra-vascular glial tissue. The minimal glial tissue included in the biopsy showed astrocytic proliferation showing mild anisonucleosis and hyperchromasia. Hence on light microscopy a differential diagnosis of Psammomatous cavernous haemangioma with a possibility of concurrent meningioma was suggested, as the synchronous presence of both the lesions is well documented in literature. A possibility of angiomatous variant of meningioma was also suggested. For confirmation of diagnosis, immunohistochemical studies were recommended which confirmed the lesion to be arising from vascular endothelial cells; so thereby conclusively ruling out meningotheliomatous neoplasm. Hence a final diagnosis of psammomatous arteriovenous malformation was rendered.

II. Case Report

A 70 year old male presented in the emergency department of a tertiary care teaching hospital post trauma head after a road side accident. On admission, patient was unconscious. His Glasgow coma scale was 9. Patient was taken up for routine haematological, biochemical and serological investigations which were within normal limits. On ophthalmological examination, evidence of increased intracranial tension was suggested and patient was taken to the radiodiagnosis department for CT Head. Radiological opinion revealed a hyperdense lesion of size 7.2x3.4x5.7cm associated with hemorrhage seen in the region of right temporal lobe, right basal ganglia and corona radiate. Effacement of sylvian tissue with compression of right lateral ventricle and midline shift of 6 mm towards left side was noted.[Figure-1] To relieve the intracranial tension and to reach a conclusive diagnosis regarding the nature and etiology of mass lesion, craniotomy was done. The blood clots along with tissue fragments were evacuated and the specimen thus collected was sent to the pathology department for histopathological examination (HPE). The tissue was processed; 3-4 micron thick sections were cut and stained with haematoxylin and eosin stain. The sections processed showed variable sized dilated and congested vascular channels which were mainly thin walled but with few thick walled vascular channels as well. Also noted were numerous lamellated calcified bodies (psammoma bodies) which were present both intra-vascularly in small vascular channels as well as extra-vascular glial tissue. [Figure-2 and 3]

Keywords: av malformation, cns, psamma bodies.

I. Introduction

Psammoma body (from Greek word psammos meaning “sand”) is a lamellated round collection of calcium. It is an example of dystrophic calcification seen mainly in various neoplastic and non neoplastic lesions. [1] Its occurrence in CNS is strongly associated with meningotheliomatous malignancies (meningiomas).

We present an interesting case of CNS lesion in a 70 year old male presenting with increased psammomatous calcification in angiomatous malformation (AVM) leading to a diagnostic dilemma.
Figure 1: Mass lesion seen in temporal lobe on CT scan plate

Figure 2: Multiple lamelated calcified psammoma bodies lying amidst hemorrhagic glial tissue. The glial tissue itself is exhibiting mild anisonucleosis. [H & E 200 X]
Figure 3: Areas of haemorrhage and presence of both thin walled dilated vascular channels as well as few thick walled muscular channels. [H & E 200 X]

The minimal glial tissue included in the biopsy showed astrocytic proliferation showing mild anisonucleosis and hyperchromasia. Slightly angulated nuclei were also noted. However, no obvious paranuclear vacuoles or grooving was noted. Hence on light microscopy a differential diagnosis of Psammomatous cavernous haemangioma with a possibility of concurrent meningioma was suggested, as the synchronous presence of both the lesions is well documented in literature. A possibility of angiomatous variant of meningioma was also suggested.

For confirmation of diagnosis, immunohistochemical studies (IHC studies) were recommended which demonstrated immunoreactivity with CD31 and CD34 and immuno-negativity for EMA and CK-18. IHC therefore confirmed the lesion to be arising from vascular endothelial cells; so thereby conclusively ruling out meningotheliomatous neoplasm. The exuberant changes noted in the glial tissue were attributed to the phenomenon of reactive gliosis arising in setting of haemorrhagic diathesis of a vascular neoplasm post trauma. Hence a final diagnosis of psammomatous arteriovenous malformation was rendered.

III. DISCUSSION

Psammoma bodies (PB) are lamillated basophilic structures which stain for mucin, calcium and iron. Osteopontin produced by the macrophages is closely linked to their pathogenesis in the setting of dystrophic calcification. [6]

Although conventionally presence of PB is harbinger of malignancy; for example, its presence in locations such as thyroid or cervical lymph node, almost always points towards a diagnosis of papillary carcinoma thyroid. Its presence is documented in various tumours such as papillary renal cell carcinoma, papillary serous cyst-adenocarcinoma, endometrial adenocarcinoma, mesotheliomas, somatostatinomas of pancreas and prolactinomas in pituitary gland. In central nervous system (CNS), its presence in mass lesions is often a red-herring for neuro-pathologist towards a diagnosis of meningioma as seen in present case report.

PB can however also be seen in certain non-neoplastic lesions such as endosalpingiosis of female genital tract [5], psammomatosusmelanotic schwannoma and even melanocytic naeavi.

Apart from meningiomas, in CNS; PB are associated with a rare benign vascular malformation arising in capillary telangiectasis—“Calcified telangiecta-
atichamartoma” or “hemangiomacalcificans.” Its association with (AVM) is rare as noted in present case report. The situation is confounded further by the fact that AVM have been found in association with a variety of intracranial neoplasms. The simultaneous occurrence is thought to be coincidental but at many times it may also reflect common origin.

Various hypothesis regarding synchronocity have been postulated such as AVM induce tumour development and vice-versa. Also it has been proposed that certain humoral factors secreted by tumours can induce AVM as an acquired condition and that any focus of chronic irritation arising out of haemorrhagic diathesis on the arachnoid cells could cause a meningioma to develop.

Although CT report did point towards a diagnosis of AVM, the presence of atypical looking meningothelial cells (later attributed to reactive gliosis) did create a diagnostic dilemma in setting of large number of PB on biopsy.

It was important to rule out a possibility of meningioma as the management is different in the setting of intracranial AVM associated with meningioma. IHC is a useful tool in such cases. Meningiomas exhibit (at least focally) membranous as well as diffuse cytoplasmic immunolabelling for EMA, a feature foreign to vascular neoplasms of CNS such as hemangio-pericytoma, nerve sheath tumours, solitary fibrous tumour and other fibroblastic tumours. Also on immunolabelling for cytokeratins, it is typically positive for CK-18 and negative for CK-20. Both these markers were negative in the present case thereby comprehensively ruling out any possibility of meningioma. Also all the endothelial markers were positive on IHC. The optimal therapy for AVM has many options such as surgery, neuro-surgical treatment with radiosurgery or embolization or a combination of surgical and non-surgical methods.

Present case report is worth publishing as it not only documents the presence of PB in setting of AVM, but also highlights the importance of utilizing IHC tool to conclusively diagnose or rule out meningiomas in all such settings. It is important because angiomatous variant of meningioma with presence of PB can closely mimic AVM leading to a wrong diagnosis and further wrong management of the patient.

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Benign Tumors of Skin
By Dr. Shivaprasad. P.N., Dr. Prabhu. M.H., Dr. Siraj Ahmed S.
& Dr. Aftab Begum
Rajiv Gandhi University of Health Sciences, India

Introduction- The skin is a complex and the largest organ in the body. Wide range of diseases can develop from the skin including tumors from surface epidermis. The vast diversity of these lesions and descriptive data, often overlapping produces confusion in the area of nomenclature and difficulty in diagnosis.1 Histopathological study is valuable means of diagnosis in dermatology. But it has limitations; sometimes, in case of tumors definitive diagnosis cannot be made.2 The distinction between benign and malignant neoplasm are rather more difficult to define when they appear in skin than when found elsewhere3 and histopathological examination is frequently required to establish a definitive diagnosis. Diagnosis of any skin tumors can be done by correlating clinical features and histological features, which can be supported by histochemistry, immuno-histochemistry and electron microscopy.

GJMR-C Classification : NLMC Code: QZ 310

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Benign Tumors of Skin

Dr. Shivaprasad. P.N. ‡, Dr. Prabhu. M.H. ‡, Dr. Siraj Ahmed S. ‡ & Dr. Aftab Begum ‡

I. Introduction

The skin is a complex and the largest organ in the body. Wide range of diseases can develop from the skin including tumors from surface epidermis. The vast diversity of these lesions and descriptive data, often overlapping produces confusion in the area of nomenclature and difficulty in diagnosis.¹

Histopathological study is valuable means of diagnosis in dermatology. But it has limitations; sometimes, in case of tumors definitive diagnosis cannot be made.²

The distinction between benign and malignant neoplasm are rather more difficult to define when they appear in skin than when found elsewhere³ and histopathological examination is frequently required to establish a definitive diagnosis.

Diagnosis of any skin tumors can be done by correlating clinical features and histological features, which can be supported by histochemistry, immunohistochemistry and electron microscopy.

II. Methodology

This study of “Tumors of the skin” was carried out from November 2005 to April 2007 over a period of 18 months.

Inclusion Criteria: All benign and malignant tumors of skin were included.

Exclusion Criteria: All non-neoplastic lesions and mesenchymal tumors were excluded.

Brief clinical history and findings were noted. Gross features were examined; Incisional or excisional biopsy study was done to assess nature of tumors, and fixed all specimens in 10% formalin for 12-36 hours. Further, tissue was processed and embedded in paraffin blocks. Sections of 6 micron thickness were taken and stained with hematoxylin and eosin and studied. Special stains were used whenever necessary. According to WHO classification of skin tumors (1974)⁴ cases were classified into:

1. Epidermal tumors and tumors-like lesions
2. Precancerous lesions
3. Infective conditions were omitted

Statistical Methods Applied
1. Cross tabs Procedure
2. Chi-square test
3. Descriptive statistics

III. Results

During the period of 18 months from November 2005 to April 2007, out of the total surgical specimens received in Department of Pathology, for histopathological study 790 were of tumors and out of these 54 were skin tumors.

Table 1: Incidence of skin tumors

<table>
<thead>
<tr>
<th>Total number of tumors</th>
<th>Number of skin tumors</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>790</td>
<td>54</td>
<td>6</td>
</tr>
</tbody>
</table>

Of the 54 cases, 14 were diagnosed as benign tumors and 40 as malignant tumors. The benign tumors constituted 25.92% and malignant tumors constituted 74.07%.

The study also showed there was male predominance and the male to female ratio was 2.7:1.
Table 2: Age incidence of tumors of skin

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-19</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>20-29</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>30-39</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>40-49</td>
<td>13</td>
<td>23.5</td>
</tr>
<tr>
<td>50-59</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>60-69</td>
<td>13</td>
<td>23.5</td>
</tr>
<tr>
<td>70-79</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>80-89</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2 = 30.741; p < 0.000$ (Highly Significant)

In the present study the peak age group was between 5th and 7th decade.

Table 3: Sex incidence of tumors of skin

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>40</td>
<td>74</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>100</td>
</tr>
</tbody>
</table>

$\chi^2 = 12.519; p < 0.000$ (Highly Significant)

The study showed there was male predominance with the male to female ratio of 2.7:1.

a) Benign tumors of skin

In the present study, benign tumors amounted to 14 (25.92%) out of total 54 skin tumors.

Table 4: Incidence of benign tumors of skin

<table>
<thead>
<tr>
<th>Tumor</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidermal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seborrheic Keratosis</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>Keratoacanthoma</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Warty dyskeratosis</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
</tr>
</tbody>
</table>

b) Benign tumors of epidermis

i. Seborrheic keratosis

In the present study, 8 cases (57%) of Seborrheic keratosis were encountered, out of which one is melanoacanthoma. Two male patients were between age group of 60-65 years.

Gross examination showed tumor within the epidermis limited by horizontal line. (Figure 4A and 4B)

Figure 4A: Seborrheic keratosis-Gross: shows excised tumor arising from the skin surface

Histologically, all the 8 lesions were of acanthotic type showing proliferation of basaloid cells with horn cysts and infiltration of dermis with chronic inflammatory cells. One case showed melanin pigment.

Figure 4B: Cut section of A showing tumor limited to the epidermis above a horizontal line in the basaloid cells. (Figure 5)
ii. **Keratoacanthoma**
   
   Four cases of keratoacanthoma were encountered. These were solitary lesions over the exposed area in old males of few months duration.
   
   Histologically, it showed a central keratin filled crater and proliferation of epidermis forming the base of the crater into the dermis. Dermis showed chronic inflammatory cell infiltrates.

iii. **Warty dyskeratoma**
   
   Two cases of warty dyskeratoma were encountered. These were solitary lesions over the scalp in old females.
   
   Histologically, it showed hyperkeratosis, acanthosis, parakeratosis and cup shaped invagination of the epidermis filled with keratinous material. Dermis showed chronic inflammatory cell infiltrates.

**IV. Discussion**

Skin tumors constitute a small but significant proportion of patients with cancer. Skin tumors are an ideal subject for study from clinical, morphological and therapeutic point of view and are so ubiquitous that they can affect people of all ages.

In this study, the WHO classification of skin tumors was followed. All non-neoplastic lesions and dermal tumors were excluded from this study. However, keratoacanthoma and warty dyskeratoma have been included under benign tumors of epidermis following the recent classification of tumors of epidermis by WHO.

During this 18 month study period (November 2005 to April 2007) a total of 790 specimens of neoplasms were received in the Department of Pathology, K.R. Hospital, Mysore. Out of these, tumors of epidermis, epidermal adnexal, and melanogenic system were 54, constituting 6.83%.

In the present study it was observed that malignant epidermal tumors were the most common (61%), followed by benign tumors of epidermal appendages (13%), benign tumors of epidermis (11%), malignant melanogenic tumors (9%), malignant adnexal neoplasms (4%) and benign melanogenic tumor (2%).

Of these 54 cases studied, the ratio of benign (14) to malignant tumors (40) was 1:2.85.

In India, skin cancers constitute about 1-2% of all diagnosed cancers. Various cancer registries in India reported cumulative incidence of skin cancer varying from 0.5 to 2 per 1,00,000 population.

**V. Conclusion**

Skin tumors constitute a small but significant proportion of patients with cancer. The anxiety of the patients to differentiate benign from malignant tumors, can be solved by histopathology. Histopathological study is one of the most valuable means of diagnosis in dermatology and diagnosis of skin tumors can be done by correlating clinical features, gross and histological appearances. In this study advance age and male preponderance seen, maybe because of excess sun and irritants exposure.

In some cases rare entities and problems of differential diagnosis encountered maybe solved with the help of histochemical and/or electron microscopic studies.

**VI. Summary**

Out of 54 cases, histopathologically 40 were diagnosed as malignant and 14 as benign lesions.

The ratio of malignant to benign tumors was 2.8:1. The peak incidence of tumors was in 5th and 6th decades with a male to female ratio of 2.8:1.

Of the benign epidermal tumors, 8 (57%) were seborrheic keratosis, 4(29%) keratoacanthoma and 2(14%) warty dyskeratoma.

**References Références Referencias**

Argan Oil as A Novel Anti-Methicillin Resistance *Staphylococcus Aureus* (MRSA), Iraq

By Dr. Habeeb Saheb Naher, Anwar Kadhim Al-Saffar, Dr. Hussein Oleiwi Al-Dahmoshi, Noor Salman Al-Khafaji, Noor Saadallah Naji & Ahmed Abbas Abed Zuwaid

Babylon University, College of Medicine, Iraq

**Abstract** - Methicillin-resistant *Staphylococcus aureus* (MRSA) infections are most medically threat, hard to treat infection among medical care units. MRSA isolates emerged from *Staphylococcus aureus* strain how carry mecA gene which confer their resistance to methicillin. The standard drug of choice to resolve MRSA infections is vancomycin which late replaced by teicoplanin due to their renal toxicity. During this study 20 MRSA isolates were obtained from the Central Laboratory of Babylon Health Directorate and previously diagnosed as MRSA using both phenotypic (by VITEK 2 compact system) and genotypic (mecA gene detection) diagnostics methods. Teicoplanin disk diffusion were achieved according to CLSI 2012. Well diffusion method was used to test the effects of mixture of Argan Oil and 1.5% H2O2 with ratios: (1:1, 1:2, and 2:1 Argan oil: 1.5% H2O2). The effect of the mentioned mixtures in addition to the effect of 1.5% H2O2 alone and Argan oil alone were tested using well diffusion method according to CLSI 2012. The results of inhibition zone for mixture were recorded and compared with the inhibition of teicoplanin.

**Keywords**: argan oil, mrsa, teicoplanin, tocopherol.

**GJMR-C Classification :** NLMC Code: WC 204
Argan Oil as A Novel Anti-Methicillin Resistance
Staphylococcus Aureus (MRSA), Iraq

Dr. Habeeb Saheb Naher a, Anwar Kadhim Al-Saffar b, Dr. Hussein Olewi Al-Dahmoshi c, Noor Salman Al-Khafaji c, Noor Saadallah Najj d & Ahmed Abbas Abed Zuwaid e

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Keywords: argan oil, mrsa, teicoplanin, tocopherol.

I. INTRODUCTION

Methicillin-resistant Staphylococcus aureus (MRSA) is a bacterium accountable for several hard to treat infections among human. Any isolate of S. aureus that become resistant to β-lactam antibiotics, like penicillins (methicillin, dicloxacillin, nafcillin and oxacillin) and cephalosporins, called MRSA; while those isolates that incapable to resist these antibiotics are classified as methicillin-sensitive Staphylococcus aureus, or MSSA [1]. Staphylococcus aureus is one of the most frequent bacterial causes of skin infections including endocarditis, osteomyelitis and abscesses and MRSA responsible for skin infection cause severe damage to the patient. The bacteriologist regard Methicillin-resistant Staphylococcus aureus more virulent than methicillin-sensitive Staphylococcus aureus due to fact that the resistancecause MRSA infection more challenging to treat with usual types of antibiotics and thus more risky.

MRSA is particularly worrying in hospitals and nursing homes, where patients with open wounds, invasive de-roles, and weakened immune systems are at greater risk of infection than the general public [2]. Staphylococcus aureus mainly colonize nostrils; open wounds, intravenous catheters, and the urinary tract are also potential sites for infection. MRSA are often classified as Hospital-Associated MRSA (HA-MRSA) or Community-Associated MRSA (CA-MRSA), dependent upon the situations of disease acquisition [3].

Medical oils, essential oils and Plant extracts have importance to use for different purposes. Essential oils have been searched for their antibacterial, antifungal, antiviral, insecticidal, anticancer and antioxidant properties [4]. All these plant oils were proved to have antibacterial activity which is mainly attributed to the presence of two plant phenolic compounds, thymol and carvacrol [5]. The anti-MRSA effects of many essential oils like thymus and eucalyptus oils were studied and the results revealed high sensitivity of MRSA to these oils using both disk and well diffusion methods and these effects attributed to the presence of thymol and to eucalyptol in thymus and eucalyptus respectively [6].

Argan oil is a plant oil produced from the kernels of the Argan tree (Argania spinosa L.) that is endemic to Morocco. The fruits of the Argan tree are nut-sizes and may be round, oval or conical in shape. The fruits are covered by a thick peel which covers the fleshy pulp. The pulp surrounds a hard-shelled nut which represents approximately 25% of the weight of the fresh fruit. Contained within the nut are one to three Argan oil-rich kernels. Argan oil is extracted from the kernels, with yields varying from 30% to 55% depending on the extraction method used [7]. Argan oil consist of 42.8% oleic, 36.8% linoleic, 12% palmitic, 6% stearic and <0.5% Linolenic. Argan oil contains tocopherols (vitamin E), phenols, carotenoids, squalene, and fatty acids. (80% unsaturated fatty acids). The main natural phenols in argan oil are caffeic acid, oleuropein, vanillic acid, tyrosol, catechol, resorcinol, epicatchein and catechin. Depending on the extraction method, argan oil may be more resistant to oxidation than olive oil [8].

Until yet few studies concern antibacterial effect of Argan oil published. The positive antipseudomonal effect of Argan oil against pseudomonasaeruginosa isolated from burn was stated in Iraq previously [9]. While the antibacterial effect of argan oil against MRSA
not stated otherwise, the current study aimed to study the effect of argan oil against MRSA using well diffusion method in comparison with first choice antibiotics to get rid MRSA infection, Teicoplanin.

II. MATERIAL AND METHODS

a) Bacterial Isolates
Twenty MRSA isolates were used in this study. All isolates obtained from the Central Laboratory of Babylon Health Directorate and previously diagnosed as MRSA using both phenotypic and genotypic diagnostics methods. For more confirmation all isolates were rediagnosed using VITEK 2 compact system.

b) Well Diffusion Method
The virgin stock argan oils bring from Morocco and the mixture of Argan Oil and 1.5 % H2O2 were prepared with following ratios: (1:1, 1:2, and 2:1 Argan oil:1.5% H2O2). The effect of the mentioned mixtures in addition to the effect of 1.5% H2O2 alone and argan oil alone were tested using well diffusion method. According to CLSI 2012[10], the MRSA isolate suspension was standardized with 0.5 McFarland and the streaked on Muller Hinton agar plates and the wells made using cork poorer after inoculation of each plate with MRSA isolate. Each plate contains five wells for 1:1, 1:2, and 2:1 Argan oil: 1.5% H2O2 I addition to 1.5% H2O2 alone and Argan oil alone. The results recorder as diameter of inhibition zone and then comparing the results with the diameter of inhibition zone of commonly used antibiotic for Staphylococcus aureus treatment.

c) Disk diffusion Method
This method used to check the sensitivity of all MRSA isolates to teicoplanin according to CLSI 2012.

III. RESULTS
The effects of Argan oil on MRSA not studied in Iraq and most of Arabian countries yet. Effect of this oil on MRSA isolates were recorded as inhibition zone (mm) and the results revealed no effect of 1.5% H2O2 alone and Argan oil alone. The effect of Argan oil: An H2O2 mixture was positive and gives same results using different ratio (1:1, 1:2 and 2:1 of Argan oil: H2O2). The mean of inhibition zone were 13.2mm, 14mm and 14.4mm respectively (figure 1).

The percentage of sensitivity of MRSA isolates were 0.00%, 0.00%, 45.00%, 80.00% and 70.00% for (Argan oil, 1.5% H2O2, 1:1, 2:1 and 1:2 ratio of Argan oil:H2O2 respectively) (figure2). All MRSA isolates show no sensitivity to argan oil alone and to H2O2 alone while 45%, 80% and 70% of isolates were sensitive to 1:1, 2:1 and 1:2 of Argan oil: H2O2 respectively.

Figure 1 : Mean of inhibition zone diameter (mm)
To increase the acceptability of Argan oil as anti-MRSA, the comparison of their effect with common antibiotics used to treat MRSA infections must be achieved. Both teicoplanin and vancomycin are effective against MRSA, but there is an apprehension that vancomycin may be more toxic, especially for the kidneys and so the comparison is with effect of teicoplanin and argan oil. The results display that all isolates (100%) were sensitive to teicoplanin (inhibition zone ≥14mm) while 6(30%), 16(80%) and 11(55%) of isolates were sensitive (gave same results for teicoplanin (inhibition zone ≥14mm)) to 1:1, 2:1 and 1:2 of Argan oil: H2O2 respectively table (1). The results show the similar effects of argan oil and teicoplanin especially for 2:1 Argan oil: H2O2 (high argan oil concentration mixture).

### Table 1: Teicoplanin and argan oil mixture effects on MRSA isolates

<table>
<thead>
<tr>
<th>Agent</th>
<th>Inhibition zone (mm)</th>
<th>Sensitivity No.</th>
<th>Sensitivity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teicoplanin</td>
<td>≥14</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>1:1 Argan oil:H2O2</td>
<td>≥14</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>2:1 Argan oil:H2O2</td>
<td>≥14</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>1:2 Argan oil:H2O2</td>
<td>≥14</td>
<td>11</td>
<td>55</td>
</tr>
</tbody>
</table>

### IV. Discussion

The central dogmas of using Argan oil as anti-MRSA agents that, herbal oil with great medical value, safe, cheap and available. The real needs to use medical or herbal oil emerged from the fact that there is little or no resistance along with reducing their disadvantageous side effects of the routine antibiotics [11]. There is no value for H2O2 as anti-MRSA and be used as solubilizer to facilitate dissemination and dispersion of Argan oil through the Muller Hinton agar plate and have the same effect as tween 20 [6].

The glycopeptides antibiotics vancomycin and teicoplanin remain the standards for treating most MRSA infections but the toxicity of vancomycin push the teicoplanin to be first choice against MRSA infections and the teicoplanin was superior in terms of antibacterial effects [12]. The great findings that the argan oil has similar in vitro effect of teicoplanin and can be used as safely alternative medication to get rid such infections.

Argan oil consists of 42.8% oleic acid, 36.8% linoleic acid, 12% palmitic acid, 6% stearic acid and 0.5% Linolenic acid. It is also contain Unsaponifiable matter, Such as carotenes, tocopherols, triterpene alcohols, sterols, and xanthophylls. Specific health benefits of argan oils are attributed to its composition of unsaponifiable matter and high tocopherol content [13]. Gamma-Tocopherol comprises 69% of Argan oil total tocopherol content. Because tocopherols and sterols can act synergistically, the specific combination of molecules found in the unsaponifiable matter is theorized to contribute to the therapeutic aspects of Argan oil [14]. Previous studies revealed great effect of Argan oil on Pseudomonasaeruginosa isolates in Iraq [9].

### V. Conclusion

Current study reveal the beneficially effect of argan oil to treat MRSA infections beside their safety for human use and accessibility in addition to their role as antioxidants.


Should FNAC be Restricted to an Elite Estigation—an Experience of 20,237 Aspirations Including More than 8000 Aspirations from Head and Neck Region

By Sudip Kumar Das, Sanjay Sengupta, Senjuti Dasgupta, Malabika Misra, Mamata Guha Mallick & Pranab Kumar Biswas

Abstract: Objectives: Cytological evaluations of a vast number of cases were presented in this study. More than 2/5th of the cases were reported from head and neck region. Our objectives were to prove the diagnostic value of FNAC and to judge its feasibility in peripheral health institutes.

Method: this study was done in pathology department of Medical College & Hospital, Kolkata for a period of 10 years. Aspirates were classified into one of the three interpretation groups (easy, moderately difficult, and highly difficult) according to set up criteria. Cytohistological correlations were done in all possible cases.

Results: out of total 20,237 cases undergoing cytological evaluation during study period, 1774 cases (8.77%) needed guidance for aspiration. 3.16% of the rest 18,463 cases could not be reported for lack of adequate aspirate.

Keywords: fnac, interpretative categorization, large series.

GJMR-C Classification : NLMC Code: WC 209
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Results: out of total 20,237 cases undergoing cytological evaluation during study period, 1774 cases (8.77%) needed guidance for aspiration.3.16% of the rest 18,463 cases could not be reported for lack of adequate aspirate. Rest 17879 cases were categorized in 3 interpretation groups as follows: easy- 90.03% (16098 cases), moderately difficult- 6.72% (1203 cases), highly difficult- 3.25% (578 cases). Breast aspirates seemed comparatively easier to interpret whereas salivary aspirates were much difficult. Cytohistological correlations were possible in 5807 cases yielding 84.78% correlation. The study was also quite sensitive and specific in detecting malignancy with 14.93% false positive and 10.48% false negative results.

Conclusion: it is evident from the present study that FNAC is not only a useful method of tissue diagnosis but also the only cheap method requiring moderately trained personnel for interpretation in majority of cases. So its blessings should be extended to the block level.

Keywords: fnac, interpretative categorization, large series.

I. Introduction

Needle aspiration cytology was successfully utilized by Greig and Gutheri as early as 1904 for diagnosis of sleeping sickness from cervical lymphnode aspirates but for the next 50 years this method of diagnosis was largely ignored due to complications like tissue injury and needle track dissemination. Later on Cardoza (1954), Franzen, Geirtz and Zajicek (1960) etc. workers introduced the technique of FNAC with lesser complications and reasonable success rate.

Last 4 decades experienced spectacular developments in the field of aspiration cytology and now it has emerged as diagnostic method of preoperative assessment any type of swelling. Use of thinner needle has reduced tissue injury to a minimum enabling aspiration from vascular hamartomas or large thyroid lesions. Reported incidence of needle track dissemination after FNAC was also negligible. Even testicular malignancies can now be aspirated safely.

FNAC is also a reasonably accurate method of diagnosis. Different workers reported more than 75% accuracy in predicting a definite diagnosis on cytological evaluation. This is quite comparable with success rate of modern radiological or serological investigations. FNAC can also be used in tandem with modern radiological procedures like USG, mammography, CT scans with improved diagnostic accuracy in comparison to outcome of any single procedure employed.

Principal limiting factor of accurate cytodagnosis is adequacy of aspirate. In spite of repeated aspirations every worker has reported variable percentage of failed aspirations in their series. Radiological guidance often helps in obtaining enhanced amount of aspirates at the cost of increased expenditure. Another major handicap of FNAC is diagnosis of large lesion with heterogeneous tissue composition. In those cases variability of aspirates from different sites causes considerable confusion. Guiding methods can be helpful in choosing appropriate site/sites for aspiration in these cases.

In spite of those two serious drawbacks, FNAC became an important wing of diagnostic medicine because it delivers report with minimum expenditure of money and time in comparison to any other method with comparable safety and accuracy. In our series, a large number of aspirate from all parts of body were evaluated to establish the reliability of this method of diagnosis. Aspirates from head and neck region accounted for almost half of the cases. Our main objectives were:
• To show that interpretation of aspiration in majority of the cases are simple and straight forward.
• To establish that FNAC is a cheap procedure capable of predicting final tissue diagnosis with reasonable accuracy and should be encouraged to be done at grass root level.

II. MATERIAL AND METHODS

This method was conducted in the Pathology department of Medical College Hospital, Kolkata for a period of 10 years (1st January, 2000 to 31st December 2010). All cases coming to pathology department for FNAC during the mentioned period were included in our study group. FNAC was done using standard procedures and aspirates were stained with May-Grünwald–Giemsa (MGG) stain, Haematoxylin and Eosin (E & O) stain, Papanicolaou stain\(^1\)\(^2\). Stained slides of each case were evaluated by two separate observers simultaneously to be categorized into one of the three groups mentioned below:

• Interpretation easy: Two observers reached same definitive diagnosis on initial assessment separately without consultation of any reference material.
• Interpretation moderately difficult: two observers reached same definitive diagnosis only after consultation of reference books or journals individually and / after discussion between each other.
• Interpretation highly difficult: two observers failed to substantiate a unanimous definitive diagnosis even after consultation of books and discussion between each other.

Cytological correlations were done in all the cases with available histology considering histological diagnosis as 100% accurate.

III. OBSERVATION

\[\text{Table 1: No of cases}\]

<table>
<thead>
<tr>
<th>Total cases</th>
<th>No. of cases needed guidance</th>
<th>%</th>
<th>No of cases without guidance</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20237(100%)</td>
<td>1774</td>
<td>8.77</td>
<td>18463</td>
<td>91.23</td>
</tr>
</tbody>
</table>

Out of 20237 cases 1774 (8.77%) needed guided aspiration.

\[\text{Table 2: adequacy of aspiration}\]

<table>
<thead>
<tr>
<th>No of cases aspirated without guidance</th>
<th>No. of inadequate aspirates</th>
<th>%</th>
<th>No. of adequate aspirate</th>
</tr>
</thead>
<tbody>
<tr>
<td>18463(100%)</td>
<td>584</td>
<td>3.16</td>
<td>17879</td>
</tr>
</tbody>
</table>

Despite repeated aspiration 584 (3.16%) cases was failed.

\[\text{Table 3: Categorization of aspirates}\]

<table>
<thead>
<tr>
<th>No. of adequate aspirate</th>
<th>Interpretative categorization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interpretation easy</td>
</tr>
<tr>
<td>17879 (100%)</td>
<td>No</td>
</tr>
<tr>
<td>16998</td>
<td>90.03</td>
</tr>
</tbody>
</table>

Moderately difficult interpretation was in 6.72% (1203) and highly difficult in 3.25% (578).

\[\text{Table 4: region wise distribution of cases}\]

<table>
<thead>
<tr>
<th>No. of cases adequately aspiration</th>
<th>Regions aspirated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head and neck</td>
</tr>
<tr>
<td>17879(100%)</td>
<td>8466 (47.30%)</td>
</tr>
</tbody>
</table>

Maximum no of cases (8466 / 17879) 47.30% were done from head and neck region followed by thorax (23.1%) & superior extremity (15.1%). Out of the 8466 head and neck aspirates lymph node biopsy are the most common (37.8%). Closely followed by thyroid (34.5%).
Table 5: Organ wise distribution of head and neck lesion

<table>
<thead>
<tr>
<th>Total no. of aspirates from head and neck region</th>
<th>Organ wise distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lymph node</td>
</tr>
<tr>
<td>8466 (100%)</td>
<td>3205 (37.8%)</td>
</tr>
</tbody>
</table>

Table 6: Organ wise distribution of all cases with interpretation categorization

<table>
<thead>
<tr>
<th>No of adequate aspirates</th>
<th>Sites of aspiration</th>
<th>No of cases</th>
<th>%</th>
<th>Interpretation categorization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Easy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Moderately difficult</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Highly difficult</td>
</tr>
<tr>
<td>17879 (100%)</td>
<td>Lymph node</td>
<td>5134</td>
<td>28.71</td>
<td>4433</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>3961</td>
<td>22.15</td>
<td>3749</td>
</tr>
<tr>
<td></td>
<td>Thyroid</td>
<td>2923</td>
<td>16.35</td>
<td>2648</td>
</tr>
<tr>
<td></td>
<td>Skin and soft tissue</td>
<td>1957</td>
<td>10.94</td>
<td>1836</td>
</tr>
<tr>
<td></td>
<td>Bone and joints</td>
<td>1186</td>
<td>6.63</td>
<td>1076</td>
</tr>
<tr>
<td></td>
<td>Salivary glands</td>
<td>978</td>
<td>5.47</td>
<td>761</td>
</tr>
<tr>
<td></td>
<td>Nasal &amp; naso/oropharyngeal</td>
<td>439</td>
<td>2.45</td>
<td>396</td>
</tr>
<tr>
<td></td>
<td>Orbital</td>
<td>276</td>
<td>1.54</td>
<td>257</td>
</tr>
<tr>
<td></td>
<td>Intra-abdominal</td>
<td>138</td>
<td>0.77</td>
<td>117</td>
</tr>
<tr>
<td></td>
<td>Intra-thoracic</td>
<td>65</td>
<td>0.36</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Multiple sites</td>
<td>822</td>
<td>4.59</td>
<td>771</td>
</tr>
</tbody>
</table>

Lymph nodes were the single most common target of aspiration (28.71%), followed by breast; thyroid, skin etc. intra-abdominal, intra-thoracic sites are the least common. Breast aspirates are easier to interpret (94.64%) but salivary gland aspirates are least easy to interpret (77.8%). Intra-abdominal cases are the most difficult (8.70%) to interpret.

Table 7: Cytohistological correction

<table>
<thead>
<tr>
<th>No. of cases with histology</th>
<th>cytdiagnosis</th>
<th>No of cases</th>
<th>Histological diagnosis</th>
<th>Cases with correction</th>
<th>Cases with disparity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-neoplastic</td>
<td>Benign</td>
<td>Malignant</td>
</tr>
<tr>
<td>5807 (100%)</td>
<td>Non-neoplastic</td>
<td>906</td>
<td>752</td>
<td>109</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Benign</td>
<td>2282</td>
<td>50</td>
<td>1943</td>
<td>289</td>
</tr>
<tr>
<td></td>
<td>Malignant</td>
<td>2619</td>
<td>38</td>
<td>353</td>
<td>2228</td>
</tr>
</tbody>
</table>

Table 8: Detection of malignancy

<table>
<thead>
<tr>
<th>No of cases with histology</th>
<th>cytdiagnosis</th>
<th>No of histological diagnosis</th>
<th>False positive malignant cases</th>
<th>False negative malignant cases</th>
<th>sensitivity</th>
<th>specificity</th>
<th>Predictive value</th>
<th>Negative predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Non malignant</td>
<td>Malignant</td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>5807 (100%)</td>
<td>Nonmalignant</td>
<td>3188</td>
<td>285</td>
<td>334</td>
<td>39</td>
<td>14.93</td>
<td>334</td>
<td>10.48</td>
</tr>
<tr>
<td></td>
<td>Malignant</td>
<td>2619</td>
<td>391</td>
<td>2228</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It shows the efficacy in detecting malignancy of FNAC. It has sensitivity of 85.07% and specificity of 59.52%.
IV. Discussion

In the present study, 1774 cases (8.77%) were aspirated under various radiological guidance (CT scan, USG, fluoroscopy). These cases were not included in final analysis because of higher expenditure and poor availability of the guiding techniques at peripheral levels. Among the cases aspirated without guidance (18463), 3.16% (584 cases) could not be reported due to inadequate aspirate. Reported incidence of inadequate aspirate in various studies ranges from 32.2% to 2.5%17,8,14. Comparatively lower incidence in our series could be attributable to repeated aspiration attempts by multiple persons in more than one setting.

More than 90% cases (16098 out of 17879) of present group were categorized into easy to interpret, 6.72% cases were moderately difficult and 3.25% were highly difficult demanding highest level of collective expertise – only available at referral centers. Different workers reported incidence of misdiagnosis during cytological evaluation of large number of cases in their series ranging from 0% to as high as 33%10.9,15,16.

Head and neck lesion accumulated for majority of the cases (47.3%) in our series. Lymph nodes were the commonest target (37.8%) among head and neck aspirates. Similar data was also published by other researchers10,12.

In our study breast aspirates were comparatively easy with less than 2% cases belonging to highly difficult. Similar results were shared by other workers8,9. We faced maximum difficulty during distinction between proliferative breast disease with variable dysplasia and breast carcinoma in situ as also by other researchers17. In cases of salivary glands only 77.8% were easy to interpret. Different workers admitted various pitfalls and problems during salivary gland aspiration study18,19. 8.7% of abdominal aspirates were highly difficult to interpret.

In this study we achieved almost 85% Cytohistological correction. Reported incidences of false positive and false negative malignant cases were 14.93% and 10.48% respectively. Sensitivity, specificity, positive and negative predictive value for detection of malignancy was between 85.07% to 89.52%. These data’s quite clearly establish the diagnostic value of aspiration cytology. Comparable results were published by a lot of cytopathologists dealing with large number of cases7,8,10,16.

V. Conclusion

From the above discussion it is quite clear that FNAC is a reliable method of pathological diagnosis, for lesion of all parts of body including head and neck region. But we want to interpret our results from another angle. During the last 4 decades diagnostic medicine has undergone a sea of changes. Unfortunately all the diagnostic approaches of recent discovery are much costly. But apart from human resources one has to spend less than Rs 1000 for FNAC. But with routine stains cost is less than Rs 20. FNAC can quickly diagnose malignancy around 90% of cases. In developing countries FNAC is a very useful tool for tissue diagnosis.

Cytopathology should not be treated as a highly sophisticated diagnostic procedure but a cheap and efficient measure that can be used routinely by trained persons. Hope this change of approach should come soon from our community to bloom the fullest potentiality of this unique diagnostic tool.

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**Final Points:**

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.
Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

**General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

- Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

- Use standard writing style including articles ("a", "the," etc.)
- Keep on paying attention on the research topic of the paper
- Use paragraphs to split each significant point (excluding for the abstract)
- Align the primary line of each section
- Present your points in sound order
- Use present tense to report well accepted
- Use past tense to describe specific results
- Shun familiar wording, don’t address the reviewer directly, and don’t use slang, slang language, or superlatives
- Shun use of extra pictures - include only those figures essential to presenting results

**Title Page:**

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.
Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The Introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufactures one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.
**Procedures (Methods and Materials):**

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replace your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

**Materials:**

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

**Methods:**

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

**Approach:**

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

**What to keep away from**

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently. You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.
Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report.
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts.
- Despite of position, each figure must be numbered one after the other and complete with subtitle.
- In spite of position, each table must be titled, numbered one after the other and complete with heading.
- All figure and table must be adequately complete that it could situate on its own, divide from text.

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as “uncertain.”
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information.
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.
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