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The Role of Bone Marrow Aspiration in Diagnosis of Hypersplenism and other Diseases in Kassala Area Eastern Sudan, October 2016-October 2017

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ABSTRACT

Introduction: Bone marrow aspiration (BMA) is an important tool in diagnosis of many haematological and non-haematological diseases. BMA usually done together with complete blood cell count (CBC) and peripheral blood picture. BMA needed for diagnosis of hypersplinsm. BMA alone is sufficient for diagnosis of megaloblastic anaemia, microcytic anaemia, acute leukaemia, chronic myeloid leukaemia, chronic lymphocytic leukaemia and immune thrombocytopenic purpura (ITP)**.** The objective of this study was to determine the indication of bone Aspiration (BMA) in Kassala state eastern Sudan. Identify the important of BMA in diagnosis of hyperslenism and other diseases in the area.

Methodology: All cases for BMA referred from different hospitals and health centres in Kassala state. Seventy-one cases of bone marrow aspiration conducted at the Department of Pathology Faculty of Medicine, Kassala University from October 2016 to October 2017. Blood cell count and peripheral blood picture done for all patients subjected for bone marrow aspiration. Clinical information, physical examination, BMA results and other investigations recorded in specially designed form. Data entered on SPSS version 15 and statistically analyse.

Results: In 71 of patients underwent BMA, 46 (64.8%) of them with splenomegaly. Twenty (44%) of patients with splenomegaly was due to bilharzia, 18 (39%) due to malaria, two due to malignancy (4%), two (4%) due Visceral Leishmaniosis and two unrevealed causes. Out of the cases with splenomegaly 34 (73.9%) showed features of hypersplenism. Non-splenomegaly cases, 8(32%), 3(12%), 2(8%), iron deficiency, haemolytic, aplastic, and megaloblastic anaemia respectively. 4 cases diagnosed as Idiopathic Thrombocytopenia (ITP). Two cases diagnosed as acute leukaemia.

Conclusion: Bone marrow aspiration was very important tool for diagnosis of hypersplenism, endemic diseases in the area and other haematological disorders.

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INTRODUCTION

Bone marrow aspiration (BMA) is an important tool in diagnosis of many haematological and non-haematological diseases. BMA usually done together with complete blood cell count (CBC) and peripheral blood picture. BMA needed for diagnosis of hypersplinsm. BMA alone is sufficient for diagnosis of megaloblastic anaemia,microcytic anaemia, acute leukaemia, chronic myeloid leukaemia, chronic lymphocytic leukaemia and immune thrombocytopenic purpura (ITP)(Bain BJ,Balaji JS2005, Chapman WC1999). BMA is important in diagnosis of Visceral Leishmaniasis (VL) and revealing Pyrexia of unknown origin (PUO) (Javier MD 2018). BMA in combination with bone marrow biopsy (BMB) help in diagnosis of granulomatous diseases, aplastic anaemia, myelodysplastic syndrome (MDS), myelofibrosis and metastatic solid tumours (Khan TA 2014). PMA play

major role in establishing haematological abnormalities in patients with hepatosplenicschistosomiasis (HS) and portal hypertension (Luiz A 2013). Other liver diseases especially viral infections need BMB together with BMA to identify the pathological changes (Bushra A 2012). BMA is a cost-effective safe diagnostic procedure in experienced hand when precautions considered. BMA used in recent cytogenetic and immune-phenotyping of many haematological malignancy (Bain BJ 2001). In this study, we determined the importance of bone marrow aspiration in diagnosis of hypersplenism among cases with splenomegaly. We also identify the indication of BMA and findings in Kassala area Eastern Sudan.

METHODOLOGY

This is a descriptive prospective study. All cases of bone marrow aspiration referred from hospitals, health centres and private clinics in Kassala and New Halfa area eastern Sudan from June 2017 to October 2018 included in this study.

Before BMA:

Request form checked. History completed. Thoroughly physical examination done. All these information put in specially designed form. Complete blood cell count and peripheral blood picture done. Any relevant investigations asked for in the request form and the blood kept if any further investigation needed.

BMA:

The procedure explained for the patient and verbal consent taken. Usually we choose the posterior superior iliac crest. In case of sacral oedema, recombinant and very obese we chose the anterior iliac crest. We take all universal infection precautions. The site cleaned with alcohol, infiltrated with local anaesthesia up to the periosteum and left for about 3 minutes. We aspirate about 0.25 ml and spread immediately on five microscopic slides. The slides, left to dry labelled and fixed with concentrated alcohol. One film stained with Gimsa stain, one stained by a Perl's stain (iron stain). Three films kept unstained. The films examined first by low power to assess cellularity, content of fragments and megakaryocyte number. Examined by X 40 objective to assess cytological detail of all lineages. X100 oil objective used to assess fine cytological details and Leishman Donovan body (LD body). The bone marrow aspiration report send to the clinician in special form. The important findings together with the peripheral blood film findings and others investigation results put in especial designed form for this study. We did not encounter severe complication a part from local pain. Few patients experienced bleeding stopped by pressing.

Statistical analysis

Data analysed using statistical Package for Social Science (SPSS). Pearson chi squared used to test for significance between proportions; p value below 0.5 considered statistically significant. We analysed the age, sex, indication for bone marrow aspiration findings,

Ethical Approval

An ethical clearance of the research obtained from combined Ethical Committee between Faculty of Medicine University of Kassala and Ministry of Health Kassala State. Oral consent taken from each patient.

RESULTS

Indication of BMA

Out of 71 patients 46 (64%) of them with splenomegaly. Fifteen (21%) with anaemia. Two patients suspected immune thrombocytopenic purpura (ITP). Six with other indications (see table 1).

BMA findings in patients with splenomegaly

Twenty (44%) of them with hepatosplenic schistosomiasis. 18 (39%) due to malaria. Two patients with chronic myeloid leukaemia (CML). Six (13%) of patients with splenomegaly the cause was not known (see Fig1).

Hypersplenism

Thirty-four (74%) of patients with splenomegaly showed features of hypersplenism. Thirty (88.2%) of them adult and four (11.8%) paediatric. 24 (70%) and 10 (39%) were male and female respectively (See Table 2). Twenty-five patients with hypersplenism had huge splenomegaly (below the umbilicus. Nine (26 %) with moderate size splenomegaly. No significant relation between hypersplenism and hepatomegaly among our cases (See Table 2).

BMA findings in non-splenomegaly patients

Eight (32%), two (8%), three (12% and three (12%), iron deficiency, megaloblastic, haemolytic and aplastic anaemia respectively. Four (16%) patient with ITP. Two (8%) patients with acute leukaemia. Three patients showed feature of bone marrow depression (See Table 3).

Table 1. Bone marrow indication (n 71)

Indication	4 -15 years	➢ 15 years	Total
Spelenomegaly	6 (35.3%)	40 (74.1%)	46 (64.8%)
Anaemia	8 (47%)	7 (13.0%)	15 (21%)
ITP	2 (11.8%)	2 (3.7%)	4 (5.6%)
Others	1 (5.9%)	5 (9.3%)	6 (8.5%)
Total	17 (100%)	54 (100%)	71 (100%)

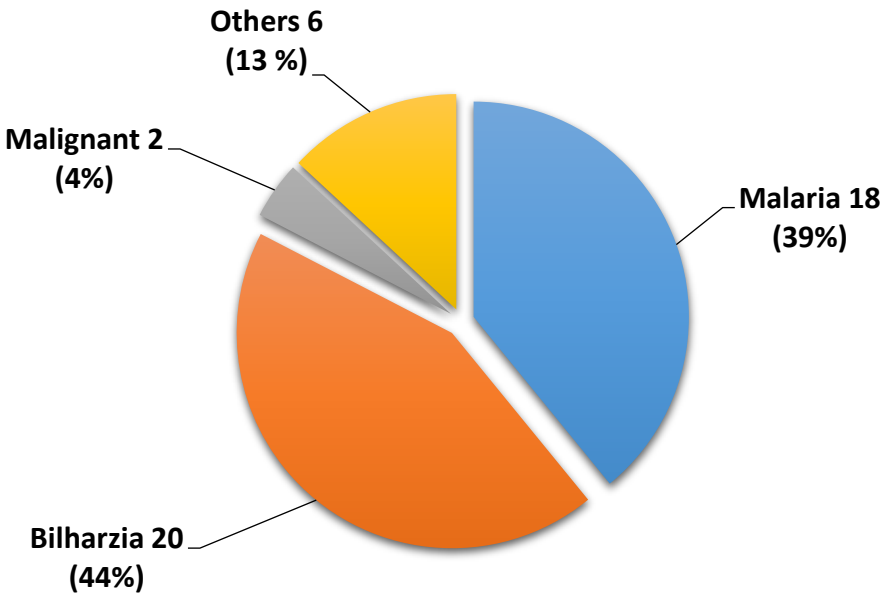

Fig 1.Causes ofsplenomegly (n 46)
Bilharzia 20 (44%), malaria 18 (39%), malignant 2 (4%) and others 6 (13%)

Table 2. Hypersplenism (n 34)

	Hypersplenism		p-value
	Yes (n=34)	No (n=37)	
Age			
Paediatrics	4 (11.8%)	13 (35.1%)	0.043
Adults	30 (88.2%)	24 (64.9%)	
Gender			
Male	24 (70.6%)	23 (62.2%)	0.618
Female	10 (29.4%)	14 (37.8%)	
Splenomegaly			
None	0 (0%)	25 (67.6%)	<0.001
Small	0 (0%)	3 (8.1%)	
Moderate	9 (26.5%)	4 (10.8%)	
Huge	25 (73.5%)	5 (13.5%)	
Hepatomegaly			
None	30 (88.2%)	29 (78.4)	0.464
Small	2 (5.9%)	4 (10.8%)	
Moderate	2 (5.9%)	2 (5.4%)	
Huge	0 (0%)	2 (5.4%)	

Table 3. Bone marrow aspiration findings in non-splenomegaly patients (N= 25)

BMA Findings	No. Of Patients	%
Iron deficiency anaemia (IDA)	8	32%
Megaloblastic anaemia (MA)	2	8%
Haemolytic anaemia	3	12%
Aplastic anaemia (AA)	3	12%
Idiopathic Thrombocytopenic Purpura	4	16%
Bone marrow depression	3	12%
Acute Leukaemia	2	8%
Total	25	100%

DISCUSSION

The commonest indications for bone marrow in this study were splenomegaly (64%), unlike BMA in North Sudan where constitute only (2.7%) (Wadie 2015). This due to schistosomiasis endemic in New Halfa Irrigation scheme. In study comparing BMA and BMB at King Hussain Medical Centre, cases for BMA with splenomegaly constitute only six percent (Majdi H 2015). The second common indication for BMA in our study were patients with anaemia. In our study, they constitute 21 % of all cases, almost the same as in King Hussain Medical centre (Majdi H 2015). In North Sudan the the patients with anaemia constitute 34% of all cases, more than ours (Wadie 2015). 94.4 % of nutritional anaemic patients diagnosed by BMA in study of diagnostic role of BMA and BMB in haematological practice in Leady Reading Hospital, Beshawar – Pakistan (Khan TA 2014). One of the important utility of BMA is diagnosis of ITP. In this study, 5.6 % of all cases diagnosed as ITP same as finding in Pashawar – Pakistan (Khan TA 2014). Forty-four cases of splenomegaly in this study was due to hepatosplenic effect of bilharziasis, followed by malaria (39%). This finding almost the same in tropical with bilharzia endemic area (LuizArthur 2013,Bushra Anwar 2012). As regard the diagnosis of malignancy, we encountered two cases of acute leukaemia and two cases of chronic myeloid leukaemia. This lower rate of cases diagnosed by BMA in specialized centres (Winfield DA 1992). Many cases of haematological malignancy in our area, diagnosed by full blood count and peripheral blood picture and sent to Khartoum for confirmation of the diagnosis and underwent bone BMA and did immune-phenotyping and immune-genetic study together. In this study out of 46 cases with splenomegaly showed features of hypersplenism. Almost the same as findings by Balagi et al in their study of effect of splenectomy on patients with hypersplenism (Balaji JS 2005). In this study, the major cause of hypersplenism was hepatosplenic complications of schistosomiasis. In study of splenomegaly in liver diseases McCormick and Murphy, found hypersplenism was one of the complications (McComick PA 2000). BMB together with BMA is important for diagnosis of diseases such as granuloma, metastatic solid tumours and myelofibrosis (Nanda A). We did not introduce BMB in this study but when clinically indicated, we refer the patient to Khartoum.

Limitation of our study was that the short duration and small numbers of cases of BMA to generalize for all Sudan but it is important base for further study in the area.

We recommend further study of hepatosplenomegaly of schistosomiases. The effect of splenectomy in patients with hepatosplenomegaly of schistosomiases.

CONCLUSION

BMA is useful in diagnosis and follow up of many haematological and non-haematological in the area. It also important in evaluation of patients with splenomegaly candidate for splenectomy.

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