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HISTOPATHOLOGICAL REVIEW OF SPLEEN SPECIMENS (200 CASES)

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ABSTRACT

This is a descriptive / retrospective crosssectional study. This study was carried out at the histopathology laboratory, Department of Pathology, B. J. Medical College, Ahmedabad from January 2008 to December 2009 on all splenectomy specimens and one splenuli biopsy. Total 200 cases were studied which were received already fixed in 10% neutral buffer formalin. Among the specimens the most common age group fell in 21-30 years (30%). Male to female sex ratio was 1:1.1. In 30% cases cause of splenomegaly was not identified. Most common known cause for splenomegaly was portal hypertension (23.5%) followed by trauma (12.5%). Most common diagnosis made after microscopy and correlating clinical and radiological findings was fibrocongestive splenomegaly (67%), which was most commonly due to hepatic cause. Most common cause identified later in unidentified cases of splenomegaly was also fibrocongestive splenomegaly (69%).

Keywords: splenectomy specimens, splenuli biopsy

INTRODUCTION

Spleen is mysterious organ, it can be troublesome specimen for surgical pathologist due to discordance between patient's clinical condition and perceived findings. Patients with a dramatic clinical presentation that point to splenic pathology not infrequently have no discernable or have barely perceptible histological abnormalities of the spleen. Similarly, patients whose spleens contain histological findings that seem to deviate significantly from the "norm" may have no clinically detectable haematological complains. This review presents practical aspects of splenic histopathology specimens and relates this to the pathologist's approach in evaluating the abnormal spleen & assists in resolving such discordance. Splenectomy dates back to 1549 when first reported by Zacarello in Italy. In 1826 Quittenbaum did first elective splenectomy for portal hypertension & in 1866, Bryant did first

splenectomy for leukemia. In 1892 emergency splenectomy was done for trauma in Germany. In 1911 & 1916 elective splenectomy was done for autoimmune haemolytic anemia & ITP respectively.⁶ The spleen, in healthy adult human is approximately 11 cms^{4,3} in length, usually weighs 150 grams and lies beneath 9th to 12th thoracic rib and between fundus of stomach & diaphragm. It filters foreign matter including old / damaged blood cells : participates in immune response to blood borne antigens; major repository of mononuclear phagocytic cells in red pulp ,lymphoid cells in white pulp and platelets & produces new blood cells in infants / children or adults with severe anemia. Composed of red pulp(76-79%) and white pulp(5-20%) separated by marginal zone (diag 2) Massive splenomegaly (Spleen > 1000 g) is due to CML, Gaucher's disease, hairy cell leukemia, marginal zone B cell lymphoma, myelofibrosis, plasmacytoma, prolymph

ocytic leukemia. Rupture is due to blunt trauma or abdominal surgery, causing haemoperitoneum and emergency splenectomy. Spleen only rarely ruptures spontaneously (associated with infectious mononucleosis, malaria, Typhoid fever, leukemia / Lymphoma, other tumours, subacute bacterial endocarditis, peliosis lienis, acute splenitis, pregnancy) Gross rupture may be a very small capsular tear, often in superior pole or hilum Micro: neutrophil below capsular tear with intraparenchymal haemorrhage ; also lymphoid hyperplasia with prominent marginal zone. Splenectomy is usually performed for traumatic rupture. Usually no clinical consequence in adults. In children, it is associated with increased incidence and severity of infections, particularly encapsulated bacteria such as Streptococcus pneumoniae, Neisseria meningitidis, Haemophilus influenzae; overwhelming infections may begin days to years after splenectomy, without an identifiable focus and have 50-80% mortality despite antibiotics. In children, splenectomy is avoided in favour of splenic repair, partial splenectomy is performed for haematological disorder. Howell-Jolly bodies are evidence of no splenic function.

OBJECTIVE:

To study incidence of splenectomy in relation to different age, sex, cause of splenomegaly & final diagnosis of splenectomised patients.

MATERIALS AND METHODS

This is a retrospective study carried out in histopathology laboratory of department of pathology, B.J. Medical College, Ahmedabad from January 2008 to December 2009 comprising of 200 cases. The parameters like age, sex, cause of splenomegaly and splenectomy, macroscopic appearance of spleen, final diagnosis of splenectomized patients were studied. All specimens were complete splenectomy samples except one which was a splenic biopsy specimen. The spleens were already fixed in 10%

neutral buffer formalin. Detailed clinical histories, clinical examinations and investigations done on patients were noted like personal history, past history, family history, clinical examinations, CBC, serum chemistry, coagulation profile, X-Ray, USG. Indication of splenectomy was noted. Spleens were sectioned serially by blade loading and re-fixed in 10% formalin saline for 24-48 hrs before sectioning and processing. Gross and microscopic findings were noted. Weight, size, gross and microscopic findings and finally the pathological diagnosis in respect of different pathologies. In addition to hematoxylin and eosin, stains such as Giemsa, Perl's, Prussian blue, Congo red and Periodic Acid Schiff were used when necessary.

RESULTS

Total 200 specimens of spleen were studied in histopathology department of B.J. Medical College, civil hospital, Ahmedabad in period of 2008 to 2009. Table 1 shows age and sex distribution of splenectomy and chart 1 shows bar diagram of age. The age range was 2 to 65 years. Highest incidence was in 21 – 30 yrs group which was 30%, next was 31-40 yrs in which was 24.5%. Incidence declined after 40 yrs & least number of cases were in 61-65 yr group. M:F ratio was almost equal except in 2-10 yr group in which it was 2.6:1 & 31-40 age ratio was 1:1.88

Macroscopic examination

Table 3 shows dimensions of spleen specimens. Dimension of spleen were varying from normal size and weight to massively enlarged spleen >1000 gm and huge in size in reactive follicular hyperplasia, hemangioma of spleen and splenomegaly due to other reasons. Out of 25 traumatic cases, laceration was found in 9 cases. Hemorrhagic area was found in 5 cases. Splenic infarct was found in 5 cases (2.5%), 2 in thalassemia patients, one each in tropical splenomegaly syndrome, ITP case and portal hypertension. Infarct like areas were noted in 30 spleens, one in

sickle cell anemia patients and all other due to large size of spleen.

Histopathological Diagnosis

Table 4 shows distribution of various diagnoses made by microscopy and correlating clinical and radiological findings. Fibrocongestive splenomegaly was the most common diagnosis made by microscopy. It was most commonly found in splenomegaly due to hepatic cause. congestion of red pulp & fibrosis was noted. In traumatic spleen no specific findings was noted except hemorrhage & necrosis. 9 cases were diagnosed as tropical splenomegaly – multiple eosinophils, sinusoidal dilation but no fibrosis or hemosiderin deposition led to this diagnosis. Extramedullary haematopoiesis was present in 10 cases in which 2 were of extensive degree found out to be myelofibrosis. In others it was due to chronic haemolytic conditions. Special mention is for a case of multinodular hemangioma found in 23 yr female in which grossly detected tumour of 10 cm size was present. Microscopically markedly proliferating & anastomosing vascular channels lined by endothelial cells showing vague hemangiopericytoma like pattern. At places vascular channels showed evidence of lobular pattern surrounded by hyalinised stroma. Two cases of solitary splenic lymphoma were found in 47 & 60 year males presented with provisional diagnosis of splenic abscess. Grossly multiple whitish nodule was present. Microscopically proliferation of white pulp was noted. There was formation of multiple nodules consisting of monomorphic small lymphocyte like cells having hyperchromatic vesicular nucleus and prominent nucleoli. Diagnosis of NHL of spleen – small lymphocytic variant was made which was confirmed on IHC. Two cases of TB were found having caseous inflammation & two of granulomatous inflammation with abscess formation. One case of reactive follicular hyperplasia was found.

Histopathology in undetermined causes of splenomegaly

Table 5 shows findings in splenomegaly due to undetermined causes.

Out of 59 cases in which no cause was determined clinically or radiologically, in 69 % cases diagnosis of fibrocongestive splenomegaly was given. Hepatic causes were found out in 15 % cases by liver biopsy. In 7 % cases diagnosis of Tropical splenomegaly was given. Liver biopsy was done with splenectomy in 27 cases out of 200 (13.5%) Table 6 shows various liver biopsy findings. Cirrhotic changes were present in 2% of cases. Chronic venous congestion was found in 19% cases. 9 biopsies (33.3 %) gave final diagnosis as hepatic cause of splenomegaly, which is a significant finding.

DISCUSSION

There are very few studies based on Histopathological findings in spleen. This study is a novel study as it involves 200 cases and focussed on histopathological correlation of clinical findings. It revealed cause of splenomegaly in 31 % cases in which no diagnosis was made clinically which is quite significant. A hospital based study of splenomegaly with special reference to the group of indeterminate origin was done in March 2008 by Sundaresan JB, Dutta TK, and *et. Al.*¹ at Department of Medicine, JIPMER, Pondicherry. But it was a clinical study. The common causes of splenomegaly in this study were malaria (22%), chronic myeloid leukemia (11%), NCPF(9%), enteric fever (9%), cirrhosis of liver (8%) and HMS (7%). This is significantly different from the observations in previous studies^{2,3} on splenomegaly from India. Malaria was observed in 3 patients (4%) only. In 32 patients (42.7%) the cause of splenomegaly could not be determined. In the study of Chandra *et al* (4) the common cause found were again cirrhosis of liver and chronic myeloid leukemia. Idiopathic splenomegaly was found in 15 patients (18.1%) Histopathological study and audit of the spleen in

Nigerians was done by Kayode *et.al*⁵ during the period of 18 yrs between 1988 & 2005. Only 123 specimens of spleen were received. 119 had adequate data to be included in this study. There were 76 males & 43 females. The age range was 1 yr to 86 yrs. The highest number of splenectomy was in the age group 11-20 (16 male, 6 females). The incidence declined after age of 60. Table 7 shows age wise distribution of various causes of splenomegaly (clinical causes) Thalassemia was most common cause of splenectomy in 2-10 year age group. Portal hypertension and Trauma being the leading cause of splenectomy in 21-30 yr age group Tropical splenomegaly was found out to be most common in 31-40 yr age group. ITP being most common in 31-40 yr age group and male female ratio was 1:5. Lymphoma is common in old age as expected. In present study most common cause of splenomegaly as well as indication of splenectomy comes out to be hepatic. Portal Hypertension is very common in Gujarat, Rajasthan, Maharashtra and M.P. which forms our main patient group. Malaria is common but splenomegaly is rarely needed as diagnosis is earlier & antimalarial are given. Haematological malignancies like CML, is not included our study as most malignancies are referred to Gujarat Cancer Research Institute(GCRI) which is not part of this study. In SB *et.al* (1) study only causes of splenomegaly are enumerated. It is not based on splenectomy specimens. Trauma is not included in this study. However if we exclude trauma & splenectomy due to other reasons then out of 168 splenectomy cases, as Table 11 shows comparison between present and SB *et al* study for causes of splenomegaly (clinical only): hepatic cause are the predominant one. Almost 25% cases remain

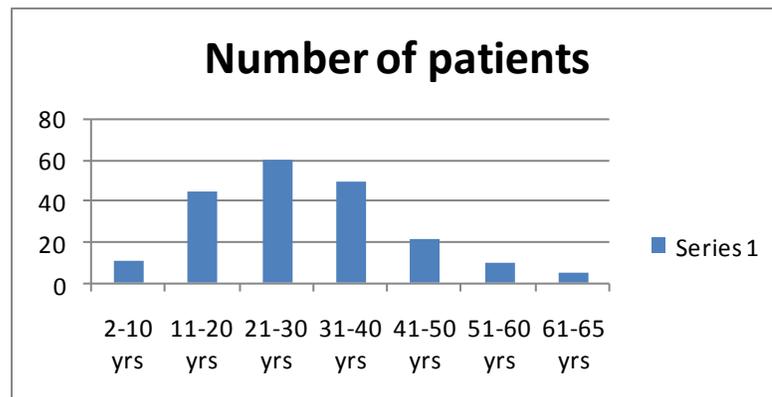
undetermined and no specific cause is identified. Infectious diseases like TB, Hydatid disease, Typhoid are common but typhoid rarely needs splenectomy but it is not present in SB *et al* study. Hemangioma is most common primary tumour of spleen & it is included in our study.

SUMMARY

For the pathologist in training and attending alike, the spleen can be deceptively simple. It is rare as a surgical specimen and when it is encountered, it seldom contains an abnormality. However occasionally the spleen's troublingly complex nature is unmasked when findings do not correspond to a well defined category of disease or the splenic parenchyma obscures diagnostic features. In our study due to large number of cases the results are fairly significant. Hepatic disease remains the top of all. Trauma is also common indication for splenectomy. Primary splenic tumours like hemangioma are rare but can be encountered. Lymphoma can also be underdiagnosed as reactive so pathologists should be alert. Hydatid disease, TB, Abscess formation are also not very uncommon. Inevitably, it is these cases in which there is often great clinical pressure and the temptation may be great to force the findings into an existing category of node based or soft tissue based nosology. The key to timely and accurate diagnosis in such situations lays in preparations: obtaining complete clinical information about the patient, taking a systematic approach to prosection, preparing thin sections from well fixed tissue and becoming familiar with the stains and studies that define the intactness of splenic immunoarchitecture.

Table 1: Age and sex distribution for splenectomy

Age of patients (years)	Number of patients	Male	Female	Percentage(%)
2-10	11	8	3	5.5
11-20	44	22	22	22
21-30	60	29	31	30
31-40	49	17	32	24.5
41-50	21	12	9	10.5
51-60	10	5	5	5
61-65	5	2	3	2.5
Total	200	95	105	100

**Diagram 1: Bar diagram for age distribution in series 1****Table 2: Clinical indications of splenectomy**

S.No.	Provisional Diagnosis/Indication	Number	%
1	No cause identified	59	29.5
2	Portal hypertension	47	23.5
3	Trauma	25	12.5
4	Hypersplenism/pancytopenia	15	7.5
5	Thalassemia	9	4.5
6	Tropical splenomegaly?malaria	10	5
7	Causes other than spleen	7	3.5
8	NCPF	7	3.5
9	ITP	6	3
10	Hydatid Cyst	4	2
11	Abscess	4	2
12	TB	1	0.5
13	Myeloproliferative disease	1	0.5
14	Hemoglobinopathy	2	1
15	AIHA	1	0.5
16	Space occupying lesion/Hemangioma	1	0.5
17	Splenic vein thrombosis	1	0.5
	Total	200	100

Table 3: Dimensions of spleen on gross specimen

Sr.No.	Size(in cms)	Number of Specimens	Percentage(%)
1	Pieces	1	0.5
2	Splenculi Bx 2cms	1	0.5
3	6-10	28	14
4	11-15	40	20
5	16-20	80	40
6	21-25	38	19
7	26-30	10	5
8	31-35	2	1
9	Total	200	100

Table 4: Distribution of diagnosis made by microscopy with correlation of clinical and radiological findings

Sr.No.	Diagnosis	Total no of patients	%
1	Fibrocongestive splenomegaly	134	67
2	Traumatic spleen	25	12.5
3	Tropical splenomegaly	9	4.5
4	Splenomegaly with extramedullary Haematopoiesis	8	4
5	Normal histology of spleen	7	3.5
6	Hydatid disease of spleen	4	2
7	Extensive myloid metaplasia s/o Myeloproliferative disease	2	1
8	Abscess formation of spleen	2	1
9	Granulomatous inflammation with Abscess formation	2	1
10	TB spleen	2	1
11	Lymphoma of spleen	2	1
12	Hemangioma of spleen	1	0.5
13	Sickle cell disease	1	0.5
14	Reactive follicular hyperplasia	1	0.5
15	Total	200	100

Table 5: HPE findings in splenomegaly due to undetermined causes.

Diagnosis	Number	Percentage (%)
Fibrocongestive splenomegaly (no specific cause)	41	69
Hepatic cause (by liver biopsy findings)	9	15
Tropical splenomegaly	4	7
Extramedullary Haematopoiesis (chronic haemolysis)	2	3
TB spleen	1	2
Granulomatous inflammation with abscess formation	1	2
Splenic abscess	1	2
Total	59	100

Table 6: Liver biopsy findings

Histopathological finding	Number	Percentage(%)
Fatty changes , ballooning degeneration ,portal triditis	9	33
Cirrhotic changes	6	22
Chronic Venous congestion	5	19
Normal histology	5	19
Pigmentory Degeneration	1	0.5
Haematopoiesis	1	0.5
Total	27	100

Table 7: Age wise distribution of causes of splenomegaly (clinical causes)

S.no	Provisional diagnosis/ Indication	2-10 yrs	11-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs	61-65 yrs	Number
1	No cause identified	1	16	17	16	4	2	2	58
2	Portal hypertension	3	7	15	13	4	5	-	47
3	Trauma	1	4	12	4	3	-	1	25
4	Hypersplenism? Cirrhosis	-	6	5	-	2	1	1	15
5	Thalassemia	5	4	-	-	-	-	-	9
6	Tropical splenomegaly ? Malaria	1	-	1	6	-	-	-	8
7	Causes other than spleen	-	1	2	-	4	-	-	7
8	NCPF	-	2	4	1	-	-	-	7
9	ITP	-	2	-	3	1	-	-	6
10	Hydatid Cyst	-	1	-	2	-	1	-	4
11	Abscess	-	-	1	1	-	-	1	3
12	TB	-	-	-	2	-	-	-	2
13	Myeloproliferative Disease	-	-	-	1	1	-	-	2
14	Sickle cell anemia	-	-	1	-	-	-	-	1
15	Hemoglobinopathy	-	1	-	-	-	-	-	1
16	AIHA	-	1	-	-	-	-	-	1
17	Lymphoma	-	-	-	-	-	1	-	2
18	Space occupying lesion / Hemangioma	-	-	1	-	-	-	-	1
19	Splenic vein thrombosis	-	-	-	-	-	-	-	1
	Total	11	45	60	49	20	10	5	200

Table 8: Age wise distribution of causes of splenomegaly (pathological diagnosis)

S.no	Age in years	2 to 10	11-20	21-30	31-40	41-50	51-60	61-65	Total patients
	Diagnosis								
1	Fibrocongestive splenomegaly	7	36	40	31	10	7	4	135
2	Traumatic spleen	1	4	12	4	3	-	1	25
3	Tropical splenomegaly	1	2	3	2	1	-	-	9
4	Splenomegaly with extramedullary Haematopoiesis	1	2	1	2	2	-	-	8
5	Normal histology of spleen	1	-	2	1	2	1	-	7
6	Hydatid disease of spleen	-	1	-	2	-	1	-	4
7	Extensive myloid metaplasia	-	-	-	1	1	-	-	2

	s/o Myeloproliferative disease								
8	Abscess formation of spleen	-	-	1	1	-	-	-	2
9	Granulomatous inflammation with Abscess formation	-	-	-	2	-	-	-	2
10	TB spleen	-	-	-	2	-	-	-	2
11	Lymphoma of spleen	-	-	-	-	1	1	-	2
12	Hemangioma of spleen	-	-	1	-	-	-	-	1
13	Reactive follicular hyperplasia	-	-	-	1	-	-	-	1
	Total	11	45	60	49	20	10	5	200

Table: 9 shows comparison between age distribution between present study and kayoed et al and SB et al study.

Age in years	Present study 2012 (%)	Kayode et.al 2005(%)	SB et.al (2008) (%)
2-10	5.5	11	-
11-20	22.5	18	-
21-30	30	18	31%
31-40	24.5	14	26%
41-50	10	12	-
51-60	5	14	-
61-65	2.5	4	-

Table: 10 Presents comparison between histological diagnosis of present study and Kayode et.al study.

Histopathological diagnosis	Present study (%)	Kayode et.al (%)
Fibrocongestive splenomegaly	67.5	10.9
Traumatic spleen	12.5	62
Tropical splenomegaly	4.5	2.5
Hematological malignancy	1	16
Infectious cause (hydatid ,TB , abscess)	5	2.5
Sickle cell disease	0.5	3.4
Primary splenic tumour (lymphoma,hemangioma)	1.5	-
Normal spleen (lesion of other site)	3.5	2.5
Extramedullary Haematopoiesis	4	-
Follicular hyperplasia	0.5	-
Total	100	100

Table: 11- is the comparison between causes of splenomegaly(clinical only)

Cause of splenomegaly	Present study (%)	SB et al (%)
Hepatic cause	36.5	20
Undetermined	24.4	23
Tropical	9	7
TB and granulomatous inflammation	2.3	-

Hydatid disease	2.3	-
Myeloproliferative disorder	1.1	-
Hemolytic disease	7.7	2
Lymphoma	1	6
Malaria	5	22
ITP	3.5	-
Other	6.7	-
CML	-	11
Hemangioma	0.5	-
Typhoid	-	9



Figure 1: Gross specimen of spleen – Splenomegaly

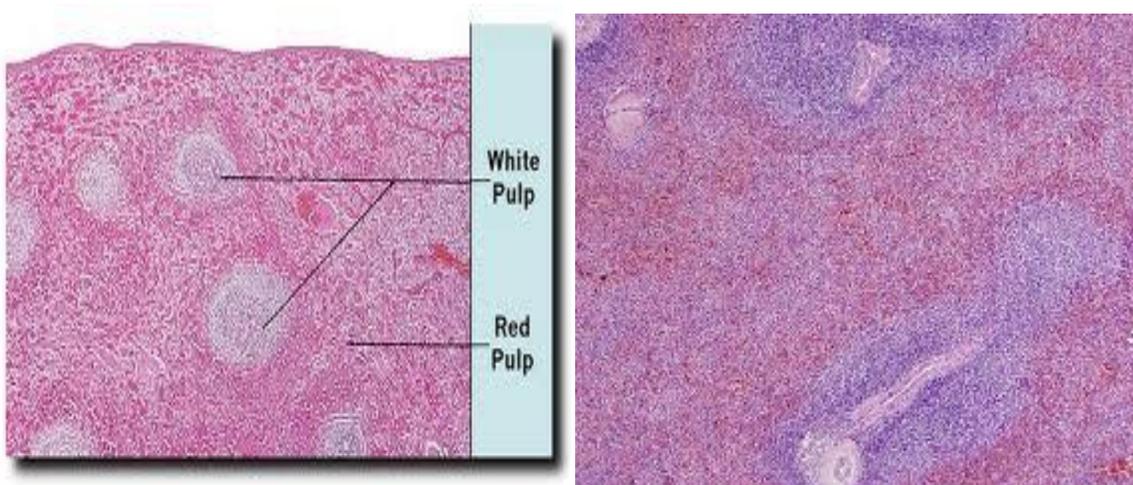


Figure 2: Histology of normal spleen

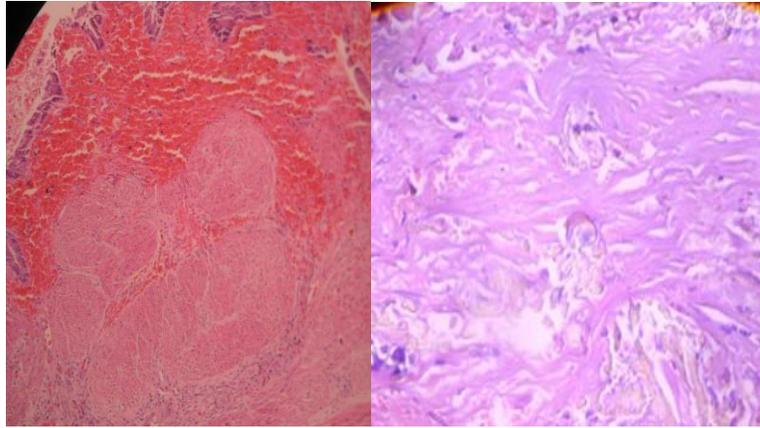


Figure 3: Fibrocongestive splenomegaly

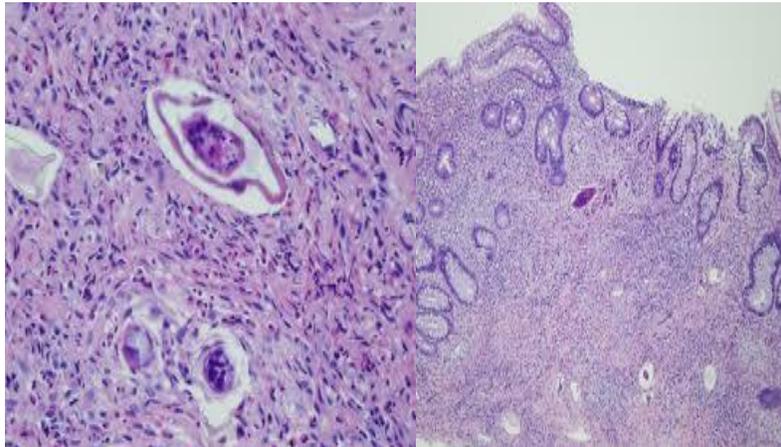


Figure 4: Tropical splenomegaly

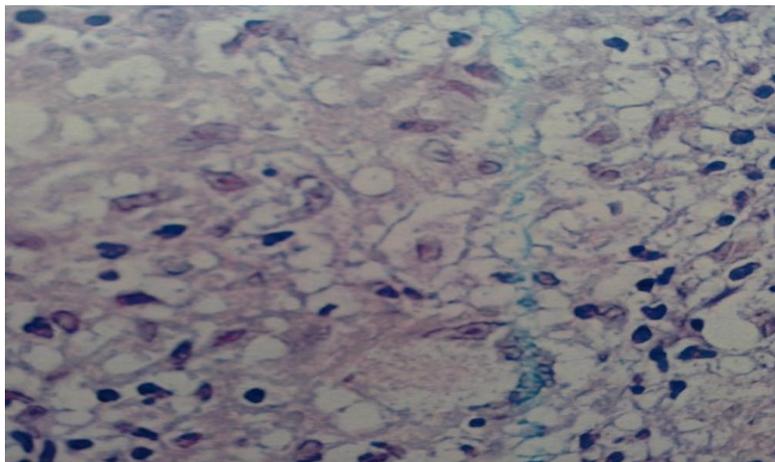


Figure 5: Tuberculosis of spleen

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