

HISTOPATHOLOGICAL ANALYSIS OF SPLENECTOMY SPECIMENS IN A TERTIARY CARE HOSPITAL- A TWO-YEAR STUDY

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ABSTRACT

BACKGROUND

Splenectomy is a rare surgical procedure performed worldwide. It is performed as an emergency procedure, especially in cases of traumatic injury and as an elective procedure for other causes. Apart from primary pathology involving spleen, splenectomy is performed for other disorders like pancreatitis and malignancy of stomach when secondary involvement of spleen is suspected. Haematologic disorders, both malignant and non-malignant, are other important indications for splenectomy. Worldwide studies have shown that trauma (45 - 75%) is the leading cause of splenectomy in low income countries and during wars, while haematologic causes (20 - 35%) account for majority of splenectomy in high income countries. Very few studies have been carried out in India, especially South India to analyse splenectomy causes and histomorphology.

Aim- This study is a two-year retrospective descriptive study done on splenectomy specimens received during September 2014 to August 2016 in the Pathology Department of Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai. The aim of this study is to study the causes/ indications for splenectomy and to correlate the histomorphology with the clinical diagnosis.

MATERIALS AND METHODS

This is a retrospective descriptive study. All splenectomy specimens received during the two-year period from September 2014 to August 2016 were analysed. The splenectomy specimens were fixed in 10% buffered formalin, routinely processed and H and E sections were studied. Special stains and immunohistochemistry were done where necessary.

RESULTS

90 cases of splenectomy were received in the study period. The causes and indications varied widely. Most common cause was trauma causing laceration of the spleen (47) (52.2%). Next cause was pancreatic pathology associated with splenomegaly (13) (14.4%). Other causes were portal hypertension with splenomegaly (7) (7.8%), hypersplenism (6) (6.7%), hereditary spherocytosis (5) (5.6%), splenic abscess (4) (4.5%), splenic cyst (3) (3.3%), (one of which turned out to be Lymphangioma of spleen), splenic artery pseudoaneurysm (3) (3.3%) and one case each of carcinoma stomach and eventration of diaphragm.

CONCLUSION

Splenectomy is indicated in a wide spectrum of disorders. Histopathological examination and its clinical correlation is useful in the management of these cases. It helps to study the pathology of spleen in various disorders ranging from trauma, haematologic disorders, portal hypertension and primary splenic lesions. This study highlights the wide variety of lesions encountered in splenectomy specimens including very rare conditions like epithelial cyst and lymphangioma of spleen.

KEY WORDS

Splenectomy, Trauma, Hereditary Spherocytosis, Lymphangioma of Spleen, Epithelial Cyst of Spleen.

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BACKGROUND

Spleen is the largest organ of the mononuclear phagocytic system and is involved in all systemic inflammations, haematopoietic disorders as well as metabolic disturbances. Splenectomy is performed for various indications, which include primary splenic pathology or splenomegaly due to metabolic and systemic diseases, haematologic disorders, trauma and malignancies.

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The location of spleen in the abdomen where it is not protected by a bony cage makes it very prone to traumatic injury, especially in road traffic accidents.^(1,2) Trauma is the main indication for emergency splenectomy. Other causes of splenic enlargement varies with geographic location. Chronic malaria could be a cause of splenomegaly in endemic areas. Haematologic disorders with splenic involvement like hereditary haemolytic anaemias, idiopathic immune thrombocytopenia result in splenomegaly and may require splenectomy.⁽³⁾ Other disorders in which splenectomy is indicated include non-cirrhotic portal hypertension, pancreatic neoplasms, chronic calcific pancreatitis with portal hypertension and lesions in neighbouring organs. Primary splenic pathology for which splenectomy may be performed include abscess, cysts, sarcoidosis and tumours which are comparatively rare.

This study aims to highlight the histopathologic features in splenectomy specimens received in our centre and to correlate with clinical indications. The incidence, age and sex

distribution of various splenic lesions is studied and correlated with morphologic and histopathologic features.

MATERIALS AND METHODS

This is a retrospective descriptive study carried out in the Pathology Department of Madras Medical College, Chennai. All splenectomy specimens received during the period from September 2014 to August 2016 were included in the study. Relevant clinical data and imaging findings were collected and recorded for these cases. All specimens were fixed in 10% buffered formalin, routinely processed and paraffin sections stained with Haematoxylin and Eosin were studied. Special stains and immunohistochemical stains were employed as required. The histomorphology of the splenectomy specimens were studied and correlated with clinical data. The results were recorded and analysed.

RESULTS

A total of 90 splenectomy specimens were received during the study period. The indications for splenectomy along with age and sex distribution is given in Table 1.

Sl. No.	Clinical Diagnosis	No. of Cases	%	Male	Female	Age Range
1	Splenic Injury	47	52.2%	42	5	13 - 65 yrs.
2	Pancreatic Pathology	13	14.4%	11	2	18 - 41 yrs.
3	Non-Cirrhotic Portal Hypertension	7	7.8%	5	2	18 - 48 yrs.
4	Hypersplenism	6	6.7%	3	3	16 - 62 yrs.
5	Hereditary Spherocytosis	5	5.6%	2	3	15 - 22 yrs.
6	Splenic Abscess	4	4.5%	3	1	45 - 72 yrs.
7	Splenic Cyst	3	3.3%	2	1	46 - 48 yrs.
8	Splenic Artery Pseudoaneurysm	3	3.3%	3	0	30 - 68 yrs.
9	Carcinoma Stomach	1	1.1%	0	1	70 yrs.
10	Eventration of Diaphragm	1	1.1%	0	1	54 yrs.
Total		90	100	71	19	

Table 1

Out of 90 cases, 71 were males and 19 were females. Traumatic injury constituted more than 50% of cases. Males were affected more in trauma, pancreatic pathology and non-cirrhotic portal hypertension.

In cases of hypersplenism, hereditary spherocytosis, splenic abscess and splenic cysts, the male-to-female ratio was almost equal.

On analysing the age of presentation, it was observed that patients with hereditary spherocytosis presented in 2nd and 3rd decades. Traumatic injury was seen in a wide range of ages from 13 - 65 years. Patients with splenic abscess and cysts presented above 45 years of age. Patients with pancreatic pathology and portal hypertension were below 50 years of age.

The size of the spleen varied markedly from normal to massive splenomegaly in different conditions (Table 2).

Sl. No.	Clinical Diagnosis	Size of Spleen			
		< 11 cm	11 - 15 cm	15 - 20 cm	>20 cm
1	Splenic Injury	24 (51.1%)	14 (29.7%)	7 (14.9%)	2 (4.3%)
2	Pancreatic Pathology	7 (53.8%)	3 (23.0%)	2 (15.4%)	1 (7.8%)
3	Portal Hypertension	0	1 (14.3%)	2 (28.6%)	4 (57.1%)
4	Hypersplenism	0	0	1 (16.7%)	5 (83.3%)
5	Hereditary Spherocytosis	0	1 (20%)	0	4 (80%)
6	Splenic Abscess	0	3 (75%)	1 (25%)	0
7	Splenic Cyst	0	3 (100%)	0	0
8	Splenic Artery Pseudoaneurysm	1 (33.3%)	2 (66.7%)	0	0
9	Carcinoma Stomach	1 (100%)	0	0	0
10	Eventration of Diaphragm	1 (100%)	0	0	0
Total		34 (37.8%)	27 (30%)	13 (14.4%)	16 (17.8%)

Table 2

When the size of the splenectomy specimens received was analysed it was found that patients with portal hypertension, hereditary spherocytosis and hypersplenism presented more often with massive splenomegaly (Fig. 1), i.e. more than 20 cm in the largest dimension. Mild-to-moderate splenomegaly was observed in patients with splenic abscess or splenic cysts, i.e. primary splenic lesions. Among the cases in which pancreatic pathology was primary, spleen was of normal size or mildly enlarged. In trauma cases, more than 50% were of normal size. Mild-to-moderate splenomegaly was observed in the rest of the trauma cases with 2 of them being more than 20 cm. The histopathologic diagnosis of the 90 splenectomy specimens received is given in Table 3.

Sl. No.	Clinical Diagnosis	Histopathologic Diagnosis	No. of Cases
1	Splenic Injury	Splenic Laceration Laceration + Infarct Congested Spleen Splenic Haematoma	33 11 2 1
2	Pancreatic Pathology CCP with PHT - 7 Pancreatitis - 2 Pancreatic Tumour - 2 Pancreatic Pseudocyst - 1 Pancreatic Abscess - 1	Congested Spleen Pseudocyst Spleen Congested Spleen Congestion + Infarct Congested Spleen Congested Spleen Congested Spleen Perisplenic Abscess	6 1 1 1 2 1 1 1

3	Non-Cirrhotic Portal Hypertension	CVC Spleen One case also showed EMH and presented clinically with Hypersplenism	7
4	Hypersplenism	CVC Spleen EMH One case with EMH also showed Infarct	4 2
5	Hereditary Spherocytosis	Congestion of Cords of Billroth, haemosiderin laden macrophages One case showed Infarct in addition	5
6	Splenic Abscess	Perisplenic Abscess Tuberculous Abscess Pyemic Abscess	1 1 2
7	Splenic Cyst	Primary Epithelial Cyst Lymphangioma of Spleen	2 1
8	Splenic Artery Pseudoaneurysm	CVC Spleen Haematoma Infarct + Perisplenic Abscess	1 1 1
9	Carcinoma Stomach	Congested Spleen	1
10	Eventration of Diaphragm	Congested Spleen	1

Table 3

Abbreviations

CCP - Chronic Calcific Pancreatitis, PHT - Portal Hypertension, CVC - Chronic Venous Congestion, EMH - Extramedullary Haematopoiesis.

All the splenectomy specimens done for splenic injury showed laceration with some cases showing infarction (Fig. 2) and one case showed haematoma (Fig. 3). Among splenectomy done for pancreatic pathology, one showed pseudocyst of spleen, while one other showed perisplenic abscess. All the others showed features of congestion of spleen.

All the cases of non-cirrhotic portal hypertension showed features of chronic venous congestion of spleen with one showing extramedullary haematopoiesis (Fig. 4). In cases of hypersplenism, all showed chronic venous congestion with 2 of them showing features of extramedullary haematopoiesis and one showing foci of infarct as well.

All the cases of Hereditary Spherocytosis showed features of congestion with cords of Billroth filled with sequestered spherocytes, atrophy of white pulp, haemosiderin deposition and increased fibrous tissue. Out of the 4-splenectomy specimens received for abscess, one revealed the features of tuberculous abscess with caseation necrosis and multiple epithelioid granulomata with Langhans type of multinucleated giant cells (Fig. 5, 6). One case showed perisplenic abscess and the other 2 showed pyemic abscess (Fig. 7).

Among the 3 cases of splenic cysts, 2 were primary epithelial cyst of spleen composed of thin fibrocollagenous cyst wall lined by a single layer of flattened to cuboidal epithelium (Fig. 8, 9). One showed the features of lymphangioma of spleen. Grossly, multiple cysts of varying sizes was noted which was filled with pale whitish fluid material (Fig. 10, 11). Microscopically, multiple cystic spaces lined by flattened epithelium and containing eosinophilic fluid material (lymph) was noted (Fig. 12, 13, 14).

In cases of splenic artery pseudoaneurysm, one case showed haematoma and rupture of spleen. Second one showed perisplenic abscess and infarct, while the third was congested spleen. Splenectomy done in case of carcinoma stomach and eventration of diaphragm showed congested spleen.



Figure 1. Hereditary Spherocytosis; Massive Splenomegaly



Figure 2. Grey White Infarct of Spleen



Figure 3. Spleen Laceration with Haematoma (Arrow)

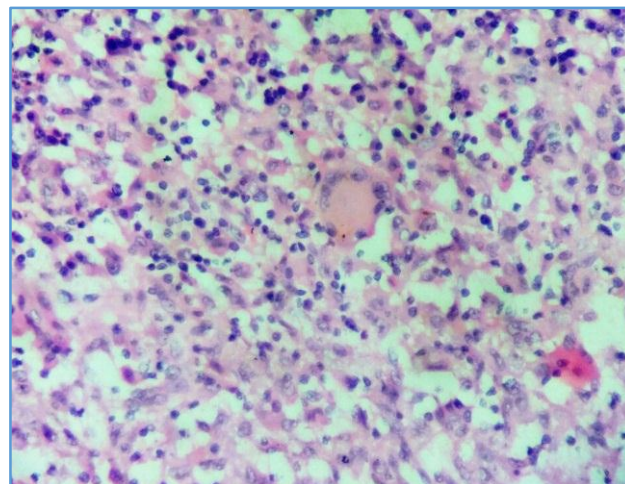


Figure 6. 40X H and E - Epithelioid Granuloma with Langhans Giant Cell; Tuberculous Abscess

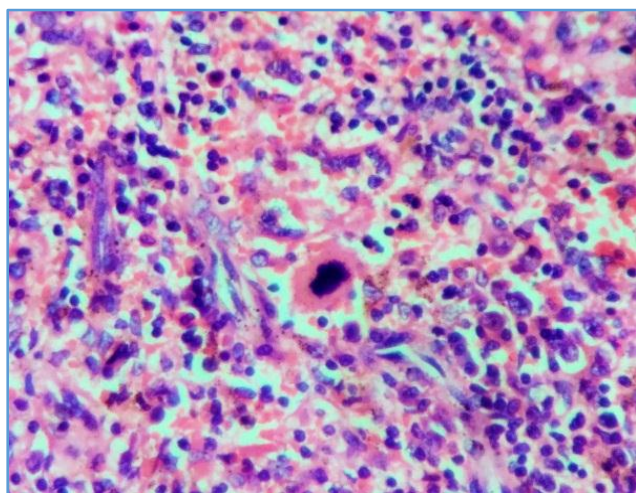


Figure 4. 40X H and E - EMH; Megakaryocyte with Haematopoietic Elements

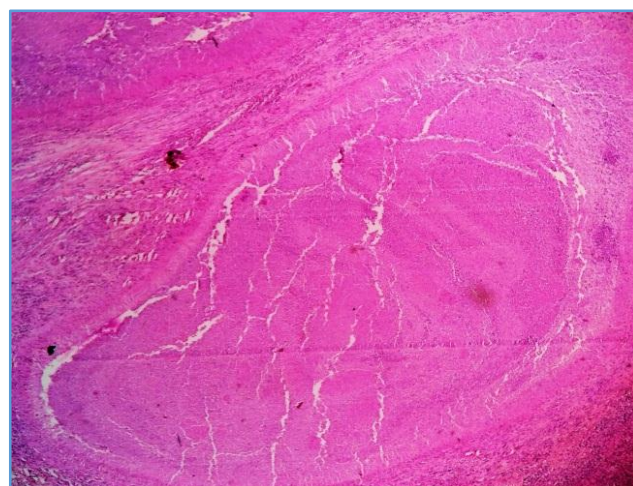


Figure 7. 10X H and E - Abscess with Necrotic Exudate



Figure 5. Spleen with Tuberculous Abscess (Arrows)

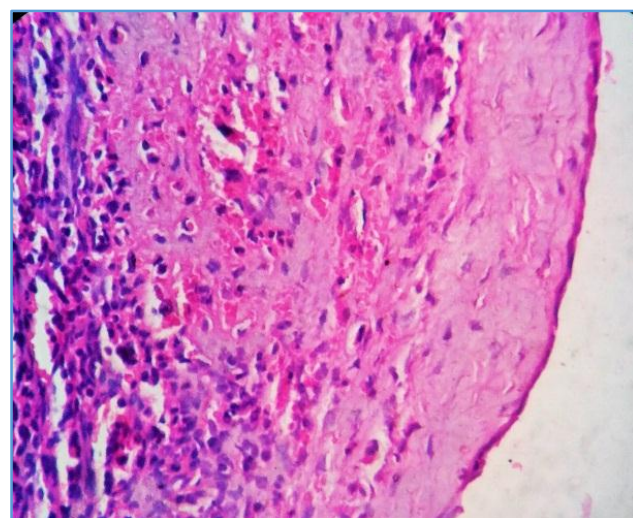


Figure 8. 40X H and E - Spleen with Cyst Wall Lined by Flattened Epithelial Cells

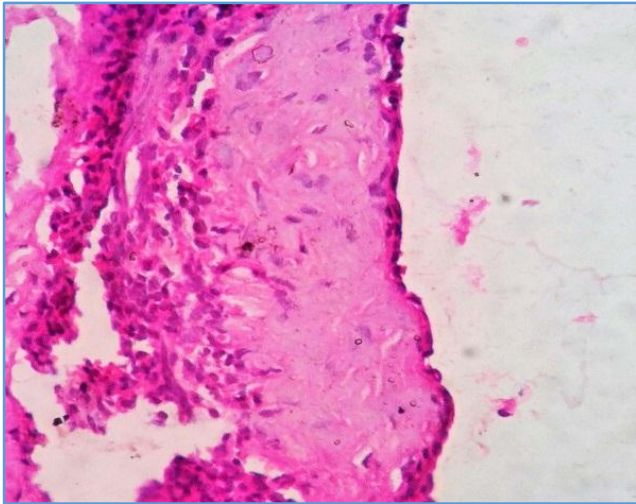


Figure 9. 40X H and E - Cyst Wall Lined by Flattened Epithelium; Epithelial Cyst

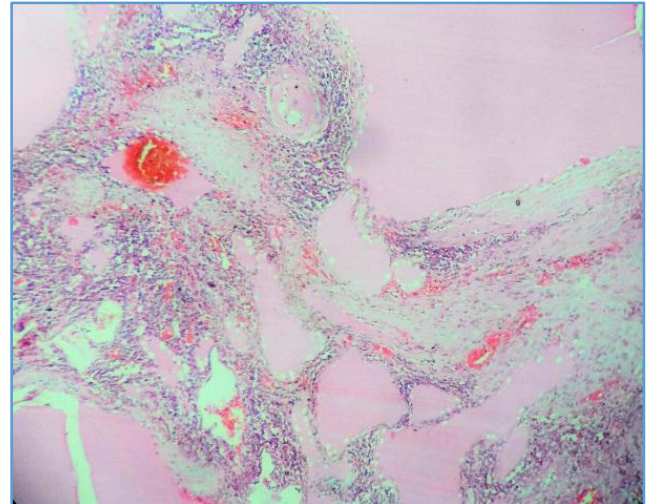


Figure 12. 10X H and E - Cistically Dilated Lymph Filled Spaces



Figure 10. Spleen with Multiple Cysts

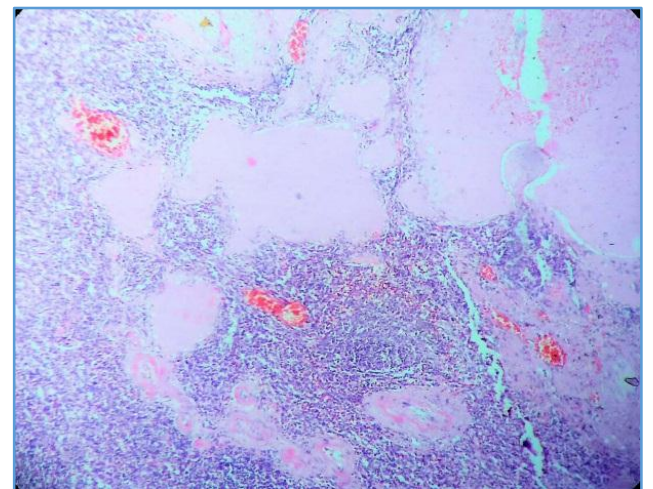


Figure 13. 10X H and E - Cistically Dilated Lymph Filled Spaces



Figure 11. Spleen with Multiple Dilated and Cystic Spaces Filled with Whitish Material; Lymphangioma

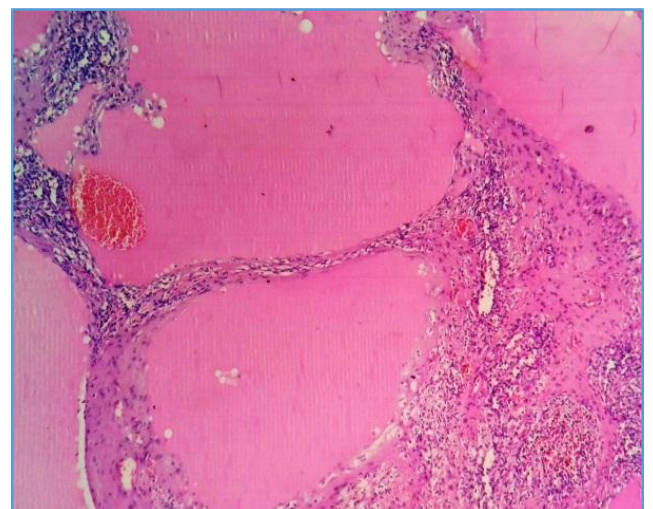


Figure 14. 40X H and E Dilated Spaces Lined by Flattened Cells - Lymphangioma

DISCUSSION

Various studies worldwide have reported different proportion of splenectomy following trauma, varying from 15 - 75% in different countries. In high income countries like USA, Australia and European nations, splenectomy following traumatic injury is 15 - 30%.^(4,5) In Iran, Khamechian⁽⁶⁾ reported 75% of traumatic causes and Deodhar⁽⁷⁾ from India reported similar results. In our study, trauma accounted for 52.2% of splenectomies. This correlates with other studies in which it was observed that in low income countries and during wars there was a higher incidence of splenectomy following traumatic injury. The reason for this could be that trauma, mainly road traffic accidents are more common in big metropolitan cities in India. Blunt injury and trauma causes laceration, capsular tear and intraperitoneal haemorrhage. Farhi et al found that germinal centres with an expanded marginal zone and other signs of lymphoid hyperplasia were seen more commonly in ruptured spleens than in controlled cases.⁽⁸⁾ Similar results were reported by Barnard et al and van Krieken et al who found that when compared with controls, spleens with traumatic injury showed more white pulp and lymphoid tissue with alteration in the lymphocyte population in different compartments.^(9,10) In this study, no such significant lymphoid hyperplasia was observed. About one-fourth of the injured spleens showed infarction in addition to the laceration and haemorrhage. Spleens which were moderately to severely enlarged showed features of congestion.

Congestive splenomegaly occurs due to chronic venous outflow obstruction which can be as a result of intrahepatic disorders, extrahepatic disorders or systemic venous congestion. Common causes include portal hypertension, which can be either due to cirrhosis or non-cirrhotic portal fibrosis. In Chinese and Asian population portal hypertension and hypersplenism secondary to cirrhosis is an important cause for splenectomy,^(11,12) ranging from 10 - 21%. In similar Italian studies, portal hypertension does not appear to be a cause of splenectomy,⁽¹³⁾ accounting for only 1 - 2%. In this study, it accounted for 21% similar to that of other Asian and Chinese studies. Microscopically, it is characterised by marked dilation of veins and sinuses, atretic lymphoid follicles, haemosiderin laden macrophages and Gamna-Gandy bodies which are sclerosiderotic nodules. In this study, all the cases with portal hypertension and chronic pancreatitis associated with portal hypertension showed features of chronic venous congestion of spleen with some of them showing Gamna-Gandy bodies.

Among the non-traumatic splenectomy, haematologic indications vary in different countries and in different series. In American and British studies, haematologic malignancies (20 - 52%) top the indications, while in Sweden it is ITP and in Asia and Africa it is haemoglobin disorders.^(14,15,16) This may be due to the fact that in endemic areas of malaria, haemoglobin abnormalities may give some protection and hence haemoglobin disorders are more prevalent in Africa and parts of Asia. Splenectomy for non-malignant haematologic disorders varies from 9 - 35% in different studies in different parts of the world. In a study from North-Eastern part of India, which is a thalassaemic belt 40% of non-malignant haematologic indications for splenectomy was thalassaemia.⁽¹⁷⁾ This correlated with another Indian study in paediatric age group.⁽¹⁸⁾ Another study from South India reported 18% of

hereditary spherocytosis and 9% of thalassaemia leading to splenectomy.⁽¹⁹⁾ In our study, Hereditary Spherocytosis was the only haematologic disorder encountered as a cause for splenectomy accounting for 5.6%. Hereditary spherocytosis is associated with moderate-to-massive splenomegaly. Microscopically, spleen shows congestion of Billroth and increased number of phagocytes. Sinusoids may appear empty, because of the presence of ghost RBCs. Haemosiderin deposition and foci of infarct may be seen. In our study, all cases of hereditary spherocytosis showed massive congestion of cords of Billroth with increased phagocytosis and one case showed infarct which correlates with other studies.

Extramedullary Haematopoiesis (EMH) can occur in spleen in both neoplastic and non-neoplastic conditions. Haematologic neoplasms, both myeloid and lymphoid may be associated with EMH in spleen. Among the non-neoplastic conditions autoimmune haemolytic anaemia, TTP and other conditions predominate.⁽²⁰⁾ In this study, EMH was observed in patients who presented with hypersplenism. JB Sundaresan et al reported that 60% of patients of hypersplenism had splenomegaly of congestive origin due to cirrhotic or non-cirrhotic portal hypertension, 7% were of idiopathic origin.⁽²¹⁾ In our study one case was due to portal hypertension, (33%) while the other cases were idiopathic (67%).

Splenic abscess is rare and incidence varies in different series. Autopsy series have placed the incidence of splenic abscess at 0.2 - 0.07%.^(22,23) In Denmark, the incidence is 0.05% per 1000 hospital discharges per year. The incidence of splenectomy for splenic abscess is decreasing, because of the advances in health and hygienic practices in the Western world. In India, a few cases of tuberculous abscess in immunocompetent hosts has been reported.⁽²⁴⁾ In adults, splenic abscess is usually solitary.⁽²⁵⁾ In this study, all 3 cases showed multiple abscesses. The most common aetiology is haematogenous spread from infection elsewhere in the body. The infectious agents could be bacterial, fungal or mycobacterium tuberculosis.⁽²⁶⁾ In this study, one case revealed tuberculous abscess which was confirmed by AFB staining for tubercle bacilli. Tuberculous abscess, though more common in immunocompromised host, can also occur in immunocompetent patients. In this study, the patient was not immunocompromised. Two cases showed multiple abscesses, which were suppurative in nature. One case showed perisplenic abscess with predominant involvement of capsular and extracapsular foci. There was no history of trauma in this case. Another case of perisplenic abscess had a ruptured pseudoaneurysm of splenic artery.

Splenic cysts are very rare with an incidence of 0.07%.⁽²⁷⁾ So far about 800 cases only have been reported in literature. They were classified by Martin as primary or true cysts and secondary or pseudocysts.⁽²⁸⁾ Pseudocysts form 75% of non-parasitic cysts of spleen.⁽²⁹⁾ They do not have an epithelial lining. Cyst wall is composed of dense fibrous tissue. They occur secondary to trauma, infection or infarction. In our study we came across one case of pseudocyst of spleen, which was secondary to chronic calcific pancreatitis. Primary cysts are seen mostly in children and young adults. They are usually solitary and show a lining of columnar, cuboidal or squamous cells. In this study 2 cases of primary epithelial cysts (3%) were identified, both of which were solitary and had a flattened-to-cuboidal lining. Golmohammadzadeh et al in their

study reported 6.25% of pseudocyst and 26.6% of epithelial cyst.⁽³⁰⁾

Lymphangioma of spleen is a relatively rare benign neoplasm, which corresponds to malformation of the lymphoid system. It constitutes < 1% of lymphangiomas. The first case was reported in 1885 by Frink.⁽³¹⁾ Obstruction or agenesis of the lymphatic system results in lymphangiectasia leading to formation of lymphangioma. Though most cases are seen in children, a few cases have been reported in adults.⁽³²⁾ Lymphangioma may be subcapsular or may involve the entire organ.⁽³³⁾ They are most often of cavernous type, other types being capillary and macrocystic. Immunohistochemically, they are positive for CD31, CD34, Factor VIII related antigen and negative for keratin and mesothelial markers.⁽³⁴⁾ So far less than 200 cases have been reported in the literature. In this study, one case of lymphangioma of spleen was identified in a 48-year-old female patient. Clinically and radiologically, a diagnosis of splenic cyst was made in this patient. Grossly, spleen showed a lesion consisting of multiple cystic spaces of varying sizes filled with pale whitish fluid material. Microscopically, it showed the features of lymphangioma of cavernous type. Immunohistochemistry showed positive staining for CD31 and CD34 and was negative for cytokeratin and calretinin.

CONCLUSION

This study highlights the fact that splenectomy, though a rare procedure, is performed for a variety of conditions. The most common indication in this study was traumatic injury of spleen. Portal hypertension due to hepatic and non-hepatic causes constituted the second most common indication. Primary lesions of spleen are rare and most of them are benign. Rare lesions like lymphangioma of spleen have been reported in this study. The histopathologic examination and its clinical correlation are useful in the management of these cases, especially tuberculous abscess where specific therapy has to be administered. To conclude, this study helps to understand the pathology of spleen in various disorders including trauma, haematologic disorders, portal hypertension and primary splenic lesions which are rare like cysts and lymphangioma of spleen.

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