

## Research Article

# Analysing the clinical and pathological aspects of splenectomy specimens

Carol D'Souza<sup>\*</sup>, Junu Rajan and K Pushpalatha Pai

Department of Pathology, Yenepoya Medical College, Mangalore-575018 India

### \*Correspondence Info:

Dr. Carol Paulette Dsouza

Final Year PG, Department of Pathology,

Yenepoya Medical College, Mangalore - 575018

E-mail: [dsouzacarol286@yahoo.co.in](mailto:dsouzacarol286@yahoo.co.in)

### Abstract

**Objectives:** The aim of this study is to find out various causes of splenic pathology in splenectomy specimens and to know their incidence, frequencies with their age and sex incidence and to match the clinical and the pathological diagnosis.

**Method:** All the splenectomy specimens were grossed and processed methodically in detail. Immunohistochemistry and special stains were carried out wherever indicated.

**Results:** Causes of splenectomy ranged from benign causes like traumatic rupture, cyst, hemolytic anaemias, chronic venous congestion (CVC), Immune thrombocytopenic purpura (ITP) and inflammatory lesions like tuberculosis to malignant lesion (splenic marginal zone lymphoma) which was confirmed by Immunohistochemistry (IHC) and cytogenetics. All cases were clinically, thoroughly investigated. Most common pathology was found to be hemolytic anaemias (28%), followed by tuberculosis (18%), ITP (18%), 9% each of splenic cyst, traumatic rupture, chronic venous congestion and splenic marginal zone lymphoma.

**Conclusion:** Most common etiology of splenic pathology leading to splenectomy was hemolytic anaemias followed by tuberculosis and ITP. Splenic cyst, traumatic rupture, chronic venous congestion and splenic marginal zone lymphoma were other rare lesions found in splenectomy specimens. The sex ratio was found to be slightly female predominance. Clinical diagnosis differed from pathological diagnosis in three cases. Pathological diagnosis helped in the post-operative management of the cases.

**Key words:** Splenectomy, pathologic diagnosis, splenic lymphoma, splenic lesions

## 1. Introduction

Splenectomy specimens are rare and uncommonly received for histopathological examination. Most of the splenectomies which are done for non-neoplastic conditions are Hemolytic anaemias, ITP, Tuberculosis, cyst, traumatic rupture, chronic venous congestion. Tumours of the spleen both primary and metastatic are rare compared to the incidence of such tumours in other major parenchymatous organs.

This study has been undertaken because till date not many studies have been carried out on the various splenic lesions. The present study aims in particular to know the incidence, frequency with age and sex incidence of different splenic lesions. Since the clinical and pathological diagnosis differed in few cases, it highlights the fact that the pathological diagnosis aided in the further management of the patient.

## 2. Materials and Methods

This is a retrospective and prospective study done over a period of seven years from May 2007 to April 2013. The demographic data and detailed clinical history of the patients were recorded. The splenectomy specimens were fixed in 10% formalin for 24-48 hours. Gross examination of the spleen weight and dimensions, presence of lymph nodes, capsule, secondary changes, as well as infiltration were studied.<sup>1</sup>

The tissue bits were taken from representative areas for histopathological examination and paraffin blocks were prepared. The number of blocks prepared depended upon the size and morphology of the tumours. Five micron thick sections were cut and stained with the routine haematoxylin and eosin stain. The histologic features of both the non-neoplastic and neoplastic lesions were studied and analysed histopathologically. Immunohistochemistry as well as special stain was performed wherever necessary. All the cases were analysed clinicopathologically.

## 3. Results

A total of 11 cases of splenectomy specimens were studied in detail. Among them 10 cases (91%) were non-neoplastic and only one was neoplastic (9%) which was diagnosed as splenic marginal zone lymphoma. The causes of splenectomy ranged from benign causes like traumatic rupture, cyst, hemolytic anaemia's due to hereditary spherocytosis and thalassemia, chronic venous congestion, idiopathic thrombocytopenic purpura and inflammatory lesion like tuberculosis to malignant lesion splenic marginal zone lymphoma which was confirmed by immunohistochemistry and cytogenetics.

All cases were clinically thoroughly investigated. The most common pathology was found to be hemolytic anaemias (28%), followed by tuberculosis (18%), idiopathic thrombocytic purpura (18%), 9% each of splenic cyst, traumatic rupture, chronic venous congestion and splenic marginal zone lymphoma.

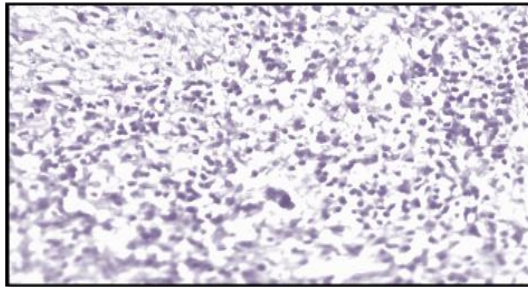
The age of the patients ranged from 9 to 48 years. Majority of the patients (54.5%) were between 10- 20 years. Among the 11 cases in our study 45% were males and 55% were females. Hence there was a slight female predominance with a sex ratio, M: F 1:1.2.

Most of them presented with fullness or pain abdomen including one case of splenic lymphoma (36.3%) followed by jaundice in 2 patients and bleeding in another 2 patients. Among the remaining 3 cases there was one patient who presented with cirrhosis and another had a history of trauma. Another patient who was diagnosed as congestive splenomegaly was an incidental finding on routine examination.

**3.1 Hemolytic Anaemias:** Among the 11 cases, 2 were due to hereditary spherocytosis and the other was a patient with thalassemia trait. The patients were 13 year old female & 24 year old male and a 26 year old male respectively. One case of hereditary spherocytosis had a family history among the mother and other siblings. On gross examinations all the three cases had splenomegaly and cut surface was congested. Microscopy in 2 cases of hereditary spherocytosis showed cords of Billroth filled with sequestered spherocytes and atrophic white pulp with increase in fibrous tissue which confirmed the clinical diagnosis. But the spleen of the patient with thalassemic trait showed Gamma  $\gamma$  and  $\gamma$  bodies which was diagnostic of congestive splenomegaly.

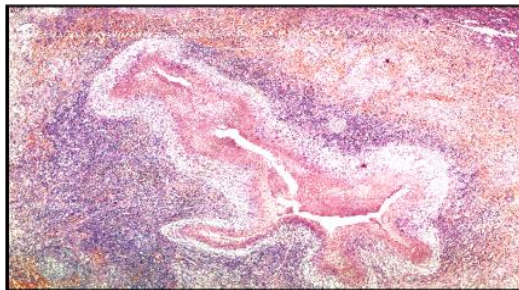
**3.2 ITP:** Two cases of immune thrombocytopenic purpura were reported in the present study. Both these patients were teenage girls (17 and 18 years) and presented with bleeding due to menorrhagia and one of them also had subconjunctival haemorrhage and purpuric patches. Platelet count was low with occasional giant cells in the peripheral blood. Grossly, spleen was reddish brown and microscopically showed lymphoid follicles in white pulp with foamy macrophages in red pulp with extramedullary hematopoiesis and megakaryocytes (Figure 1) which proved the clinical diagnosis of ITP.

**Figure 1: showing extramedullary haematopoiesis and a megakaryocyte in ITP (H & E X100)**



**3.3 Tuberculosis spleen:** There were 2 cases of tuberculosis of spleen, one was a 42 year male patient and the other a 48 year old female. Clinically both patients came with history of weight loss, pain abdomen and low grade fever. Ultrasound abdomen was done which showed a splenic abscess. Grossly, splenomegaly was present. Cut surface showed a cavity which contained necrotic material with few grey white areas. Histopathological examination revealed caseating epithelioid granulomas (Figure 2).

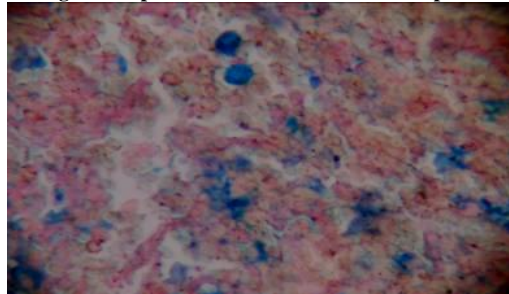
**Figure 2: Tuberculosis spleen showing caseating granuloma (H & E X100)**



**3.4 Traumatic rupture spleen:** In this study only one case of splenic rupture of a 15 year old boy with a history of trauma. On gross examination, the outer surface of spleen showed 2 areas of rupture. Cut surface was dark brown. Microscopically, a break in the capsule was noted with haemorrhagic areas in parenchyma and congestion of sinusoids. Pathological diagnosis confirmed the clinical diagnosis.

**3.5 Chronic venous congestion (CVC) spleen:** A single case of CVC spleen of boy who was 18 years was due to portal hypertension. Grossly, there was splenomegaly. Sections were taken from the periphery of the spleen which was dark and firm and central part was autolysed. Microscopy showed thickened capsule with atrophic white pulp and expanded red pulp due to severe congestion of the sinusoids and blood vessels. Areas of haemorrhage and hemosiderin laden macrophages were noted. Perls stain (Figure 3) was performed on this which confirmed the clinical diagnosis.

**Figure 3: Special stain-Perls stain in CVC spleen**

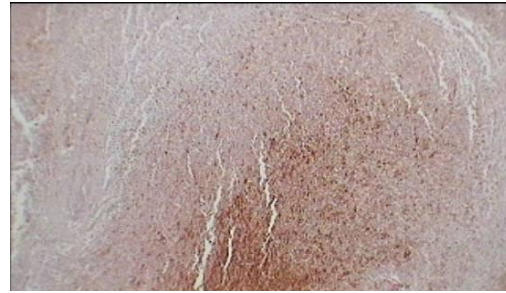


**3.6 Splenic Lymphoma:** 37 year old female presented with pain abdomen. On examination massive splenomegaly was present. Peripheral smear revealed pancytopenia with 5-8% of villous lymphocytes. Cytogenetic study of marrow aspirate of splenic lymphoma showed 46xx pattern, without any deletion of p53 or IGH (immunoglobulin gene locus) which excludes (t14;18) (q32;21). Kappa and lambda light chain were negative. Grossly, the splenic capsule was thinned out and broken in areas. Cut surface was homogenous grey white and fleshy and showed diffuse multiple small white nodules (Figure 4). Immunophenotyping of Bone marrow aspirate was done. Cells were positive for CD 19, CD 20 and negative for CD5, CD10, CyclinD1, Bcl6. CD21 was found to be positive (Figure 5). These findings confirmed the diagnosis of splenic marginal zone lymphoma.

**Figure 4: Gross photograph of splenic marginal zone lymphoma and cut surface shows multiple small white nodules. Inset shows monotonous, medium sized cells with moderate amount of pale cytoplasm with folded reniform nuclei (H & E X 100)**



**Figure 5: Immunohistochemistry-Splenic marginal zone lymphoma showing CD 21 positivity**



**3.7 Splenic cyst:** This was a giant mesothelial cyst in a 9 year old girl which was clinically and radiologically mistaken for a cyst arising from the left lobe of liver. Laprotomy revealed a large cyst arising from spleen compressing the left lobe of the liver. About 1500ml of serosanguinous fluid was aspirated. The cyst was thin walled, inner surface was smooth. Microscopically the cyst wall showed a single layer of cuboidal cells which was disrupted in some areas (Figure 6). Wall showed compressed splenic parenchyma.

**Figure 6: Photograph showing cyst in splenic parenchyma. Inset shows microscopic appearance**



## 4. Discussion

**4.1 Tuberculosis spleen:** Splenic abscess is an extremely rare condition which could be due to result of trauma, metastatic spread of infection from other site or due to a secondary cause<sup>2</sup>. But in this study we had 2 cases of clinically diagnosed splenic abscesses and both cases revealed caseating granulomas histopathologically. Reports say that granulomatous inflammation is relatively common finding in splenectomy specimens<sup>3</sup>. Kuo T *et al*<sup>4</sup> evaluated 20 cases of splenectomies in which the only major pathological finding was presence of active granulomas of either tuberculoid or sarcoid like. All patients were adults and presented with fever, weight loss and splenomegaly. But in most cases despite the performance of special stains and cultures the etiology remained unknown in all but three cases and the organisms identified were histoplasma capsulatum, an atypical mycobacterium and sporotrichum schenkii. Our 2 cases showed typical caseating granulomas of tuberculosis in spleen. Most of these findings correlated with our study.

**4.2 CVC spleen:** Congested spleen is a major pathologic finding in patients with hypersplenism. According to concepts of Rappaport there are 2 pathologic mechanisms one due to hemolytic anaemias and the other a direct consequence of portal hypertension where the splenic cords are abnormal<sup>5</sup> and can be referred to as Banti's syndrome. In this study of a young boy the cause was portal hypertension. We had another case of a patient with a *thalassemic trait* whose microscopy showed congested spleen. This correlates with the reports in the literature that another cause of congestion is a hemolytic anaemia<sup>6</sup>.

**4.3 Hereditary spherocytosis:** is the most common inherited, autosomal dominant hemolytic anaemia. Mild splenomegaly, venostasis and decrease in white pulp is a common characteristic<sup>7</sup>. A study conducted by Jenson M *et al*<sup>8</sup> in 18 patients with hereditary spherocytosis showed increase involvement of red pulp when compared to patients with immune thrombocytopenia without hemolysis. In our study of 2 cases of hemolytic anaemia due to hereditary spherocytosis had presented with jaundice with splenomegaly showed involvement of red pulp with sequestered spherocytes with an atrophic white pulp which was similar to reports in the literature.

**4.4 ITP:** The typical histological features of spleens removed from patients with ITP are reported to be lymphoid hyperplasia with formation of germinal centers, infiltration of the splenic cords with myeloid cells and variable proliferation of histiocytes in red pulp. Hayes<sup>9</sup> analysed 73 cases of splenic pathology among them germinal centers in lymphoid tissue of white pulp was found in 40 cases, histiocytes in red pulp in 18 cases and infiltration of neutrophils in same area in 49 cases. The presence of extramedullary haematopoiesis in spleen has been previously reported<sup>10</sup>. Hayes study found the prevalence of haematopoietic tissue with megakaryocytes. Both the cases in our study also showed a similar finding including megakaryocytes.

**4.5 Rupture spleen:** The spleen is the most common injured abdominal organ from non-penetrating injuries due to its location and anatomic features. The cause includes traumatic ruptures which include automobile accidents and non-traumatic causes are infectious mononucleosis, AIDS, malignancies, granulomas<sup>11</sup>. Our study had only one such case of traumatic rupture spleen in a young boy. Kindi *et al*<sup>12</sup> found 17 cases that resulted from road traffic accidents during a 5 year period, 13 were males and 4 females and 10 patients were in the age group of 10-40 years. Microscopically, all cases showed congestion of the red pulp and haemorrhage. Granulomas were found in 2 cases, 1 case with amyloid deposition and other with arteriosclerosis with calcification. Our case did not have any other finding except for sinusoidal congestion and haemorrhage.

**4.6 Splenic cyst:** Histogenesis of epithelial cyst of spleen is unknown. Embryonic inclusion of epithelial cells from adjacent structures, invagination of capsular surface, invagination of capsular surface mesothelium and a monodermal teratomatous nature have been proposed<sup>13,14</sup>. The immunohistochemical profile of some is in keeping with teratomatous derivation of origin, whereas others have the profile of mesothelial cells<sup>15,16</sup>. All types of cysts of spleen are rare. A previous case reported on an 8 year old boy with fever and pain in upper abdomen, which was diagnosed as a epithelial (primary) splenic cyst<sup>17</sup>. Our case of this 9 year old girl also presented in a similar way, though a hydatid cyst of liver was suspected clinically, histopathology confirmed it to be a mesothelial cyst of spleen.

**4.7 Splenic lymphoma:** Splenic Marginal Zone NHL is a distinct form of indolent B cell lymphoma, originating in the spleen and comprising only 2% of all lymphoid neoplasms, characterized by prominent splenomegaly and variable involvement of lymph nodes, bone marrow, peripheral blood and rarely other

organs. Its recent description by WHO and its rarity is of interest. Splenic marginal zone lymphoma has been described as a rare distinct low grade primary B cell lymphoma of spleen, occurring in elderly males with an indolent behavior<sup>18</sup>. The present case in our study observed in a female with involvement of hilar lymph nodes and pancreatic tail deposits suggests that the clinical and behavioural pattern of these lymphomas needs to be analyzed further with a large case series to arrive at a conclusion for the Indian context of these types of lymphomas. IHC and cytogenetics was performed. The cells were positive for B cell markers like CD19, CD20. Cells were negative for CD 5 - rules out mantle zone lymphoma, splenic infiltration by B cell CLL, small lymphocytic lymphoma; CD10 negativity - rules out follicular lymphoma; cyclin D1 was negative -rules out mantle cell lymphoma; Bcl-6 negativity - rules out follicular lymphoma. Absence of CD5 and CD10 is most helpful in distinguishing marginal zone lymphoma from other small B cell lymphomas. CD21 positivity confirmed the diagnosis of splenic marginal zone lymphoma in the present case. No deletion of p53 or IgH noted which excludes t (14; 18) (q32; q21). This translocation from the bcl 2 gene on chromosome 18q21 locus on the chromosome 14q32 and leads to inappropriate expression of bcl2 protein which function to prevent apoptosis. The translocation is more frequently seen in non-gastric malt lymphoma (a extranodal marginal zone lymphoma).

#### 4. Conclusion

In conclusion, the most common etiology of splenic pathology leading to splenectomy was hemolytic anaemias followed by tuberculosis and ITP. Splenic cyst, traumatic rupture, chronic venous congestion and splenic lymphoma were other rare lesions found in splenectomy specimens. The sex ratio was found to be slightly female predominance. Clinical diagnosis differed from pathological diagnosis in three cases. Pathological diagnosis helped in the post-operative management of the cases.

#### References

- Rosai J. Appendix D-Standardized Surgical Pathology Reporting for Major Tumour Types. In: Ackerman Surgical Pathology. 9<sup>th</sup> ed. Missouri: Mosby, 2004; 2969.
- Hermann RE, Deltaven KE, Hawk WA. Splenectomy for the diagnosis of splenomegaly. *Ann Surg* 1968; 168:896-900.
- Millikin PD. Epitheloid germinal centers in human spleen. *Arch Pathol* 1970; 89:314-20.
- Kuo T, Rosai J. Granulomatous inflammation in splenectomy specimens. Clinicopathologic study of 20 cases. *Arch Pathol* 1974; 98:261-268.
- Rappaport H. The pathologic anatomy of the splenic red pulp. In: Lennert K, Harms D, eds. The spleen. Berlin: Springer-Verlag, 1970:24-41.
- Burke JS. The Spleen. In: Mills SE, ed. Sternberg's Diagnostic Surgical Pathology. 5<sup>th</sup> ed. Philadelphia: Lippincott Williams and Wilkins; 2010; p.757.
- Gregor P, Hromec A, Jakubovsky J *et al*. The spleen in hereditary spherocytosis. *Cesk Patol* 1996 32:7-11.
- Myhre JO, Kristensen J. Red pulp of the spleen in autoimmune haemolytic anaemia and hereditary spherocytosis: morphometric light and electron microscopy studies. *Scand J Haematol*. 1986; 36:263-6.
- Hayes MM, Jacobs P, Wood JL, Dentf DM. Splenic pathology in immune thrombocytopenia. *J Clin Pathol* 1985; 38:985-88.
- Saltzstein SL. Phospholipid accumulation in histiocytes of splenic pulp associated with thrombocytopenic purpura. *Blood* 1961; 18: 73-88.
- Parsons L, Thompson JE. Traumatic rupture of the spleen from non-penetrating injuries. *Ann Surg* 1958; 147:214-23.
- Kindi HA, Devi L, George M. Splenic Pathology in Traumatic Rupture of the Spleen: A five year study. *Oman Med J*. 2009; 81-3
- Burring K-F. Epithelial (true) splenic cysts. Pathogenesis of the mesothelial and so-called epidermoid cyst of the spleen. *Am J surg Pathol* 1988; 12: 275-81.
- Ough YD, Nash HR, Wood DA. Mesothelial cysts of the spleen with squamous metaplasia. *Am J clin pathol* 1981; 76:666-9.
- Arber DA, Strickler JG, Weiss LM. Splenic mesothelial cysts mimicking lymphangiomas. *Am J surg pathol* 1997; 21: 334-8.
- Lifschitz-Mercer B, Open M, Kushnir I, Czernobilsky B. Epidermoid cyst of the spleen. A cytokeratin profile with comparison to squamous epithelia. *Virchows Arch* 1994, 424:213-6.
- Daga G, Mittal V, Singh RJ, Sood N. Epithelial cyst of spleen. *J Indian Assoc Pediatr Surg* 2011; 16:18-20.
- Isaacson PG, Piris MA, Berger F, Swerdlow SH, Thieblemont C, Pittaluga S, Harris NL. Splenic marginal zone lymphoma. In: Swerdlow SH, Campo E, Harris NL, Jaffe ES, Pileri SA, Stein H, Thiele, Vardiman JW, eds. WHO classification of Tumours of Haematopoietic and Lymphoid tissues. IARC Press, Lyon 2008;p185-7