DOI: 10.7860/JCDR/2025/80668.21943

Case Report

Pathology Section

Primary Splenic Mesothelioma: A Rare Entity

MONIKA KALYAN[1], NISHA MARWAH[2], SNEH BANWALA[3], SMRUTI SOUMYA PANIGRAHI[4], SANJAY MARWAH[5]

ABSTRACT

Malignant mesothelioma is a primary neoplasm that arises from the serous membranes lining the pleura, peritoneum, and pericardium. However, mesothelioma arising from the spleen is exceedingly rare and presents unique diagnostic and clinical challenges. A 59-year-old female came with a complaint of a lump in the abdomen and postprandial abdominal distension for one month. The Contrast-Enhanced Computed Tomography (CECT) abdomen showed a large cystic lesion with enhancing solid areas with specs of calcification. The probable diagnosis made radiologically was a splenic cyst or hydatid cyst. Cut-section of the splenectomy specimen had multiple papillary excrescences on the wall and a few areas of haemorrhage. The microscopic sections showed round to epitheloid tumour cells arranged diffusely, in the form of cords and sheets, ill-formed glands and papillary pattern. On Immunohistochemistry, these cells were Cytokeratin (CK), vimentin, Wilms' tumour suppressor gene1 (WT1) and calretinin positive. However, markers like CK7, CK20, Caudal-type homeobox transcription factor 2 (CDX2), Thyroid Transcription Factor-1 (TTF1), Melan A, Human Melanoma Black 45 (HMB45), CD31, CD34, CD10, Paired Box Gene 8 (PAX8), CD99, Estrogen Receptor (ER) and Epithelial Membrane Antigen (EMA) were negative. Based on both histomorphological and immunohistochemical features, the final diagnosis rendered was epitheloid mesothelioma. Primary malignant mesothelioma of the spleen is a rare entity that should be considered in patients with solitary splenic lesions. Histopathological examination and immunohistochemistry are vital for diagnosis. Complete surgical excision and close follow-up are recommended due to the uncertain prognosis and lack of established treatment guidelines.

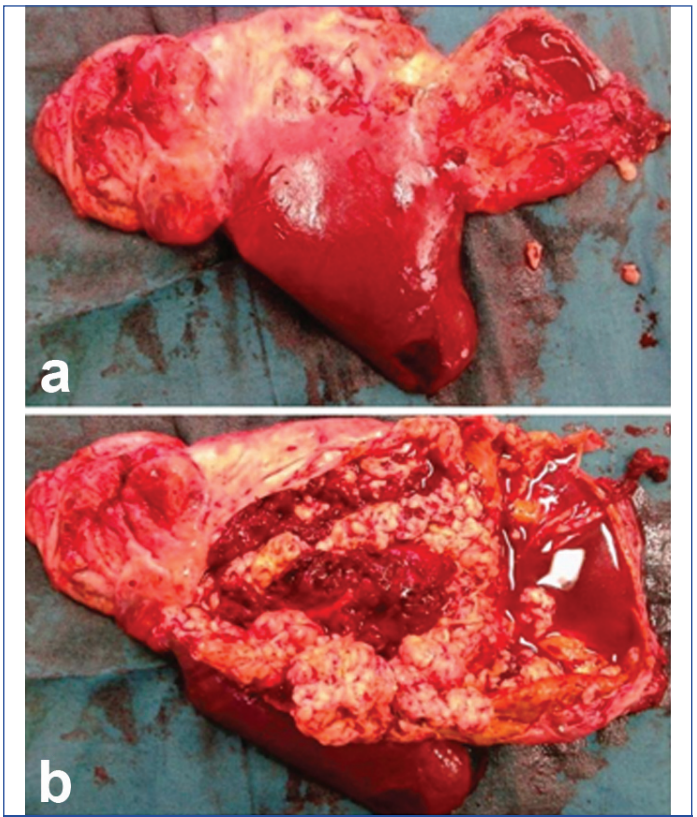
Keywords: Histopathology, Immunohistochemistry, Splenic cyst

CASE REPORT

A 59-year-old female came to the Outpatient Department (OPD) of the surgery department with a complaint of a lump in the abdomen and postprandial abdominal distension for one month. She also reported a dull, non-radiating abdominal pain that worsened after meals. There was no history of hypertension, diabetes mellitus, tuberculosis, previous abdominal surgeries, or known malignancy. On physical examination, a firm to hard lump was felt on the left side of the abdomen extending from the left hypochondriac to the left iliac fossa. Peripheral lymphadenopathy was absent. CECT scan of the abdomen showed a large cystic lesion measuring 15×10×5 cm approximately with enhancing solid areas with specs of calcification extending from the subdiaphragmatic space to the left pelvis. A provisional clinical diagnosis of splenic cyst or hydatid cyst was made.

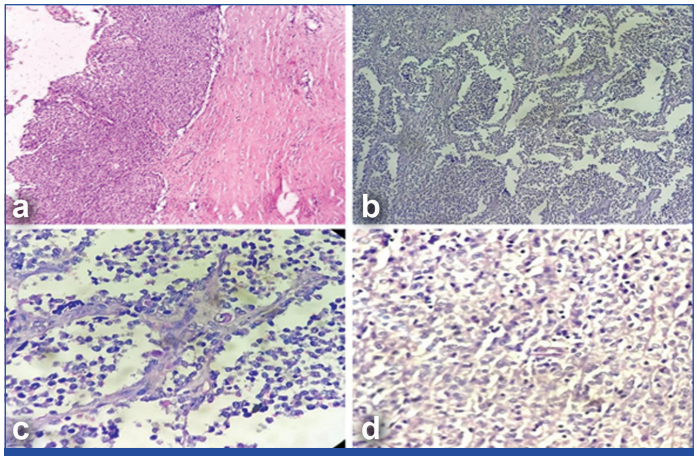
Surgical excision of the spleen along with the attached cystic mass measuring 15×9×6 cm was performed through an open approach via exploratory laparotomy [Table/Fig-1a]. On serial sectioning of the splenic mass, the splenic capsule was at a variable distance ranging from 3 mm to 2.5 cm. The external surface of the mass was encapsulated, multinodular and mildly congested without any evidence of capsular breach. The cut section of the mass had multiple papillary excrescences on the wall and a few areas of haemorrhage. The wall thickness varied from 0.2 to 2 cm [Table/Fig-1b].

The representative microsections examined from the splenectomy specimen showed an encapsulated tumour with cystic and solid areas revealing tumour cells arranged diffusely, in the form of cords and sheets, ill-formed glands and papillary pattern. Tumour cells were round to oval to epithelioid in shape with vesicular nuclei, conspicuous nucleoli, mild nuclear pleomorphism and a moderate amount of cytoplasm. Mitosis was low. Adjacent splenic parenchyma was unremarkable [Table/Fig-2].



[Table/Fig-1]: a) Gross appearance of the tumour with intact capsule, multinodular and underlying cystic structure; b) Cut surface of the spleen showed a solid and cystic areas with solid component having papillary projection on wall and filled by the haemorrhagic fluid.

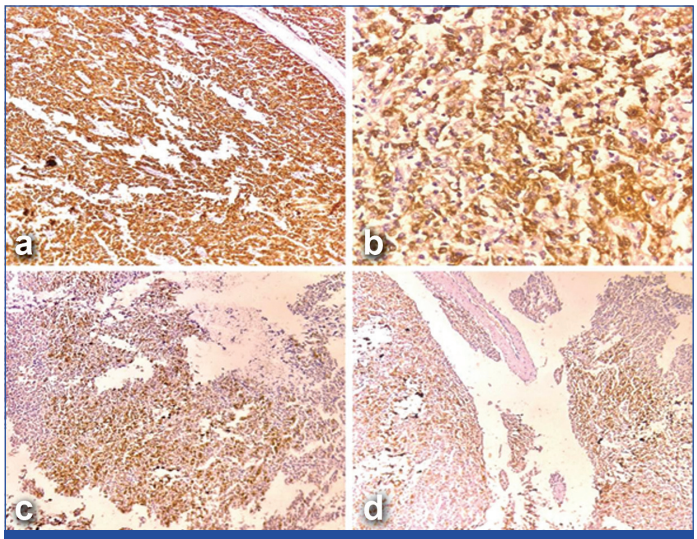
Based on histomorphological features, differential diagnoses were splenic vascular tumours (epithelioid haemangioendothelioma, littoral cell tumour and angiosarcoma) and metastatic adenocarcinoma (Primary gastric, colorectal, ovarian, lung, breast and melanoma). A



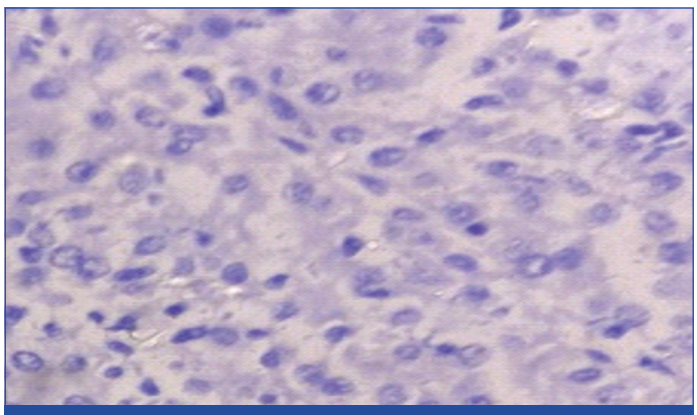
[Table/Fig-2]: a) Low power appearance of the encapsulated intraspenic mass {Haematoxylin and Eosin (H&E, 40x)}; Tumour cells arranged (b) Diffusely, cords and sheets papillary pattern (H&E, 40x); (c) Ill formed glands (H&E, 40x); (d) Atypical epitheloid cells with round vesicular nuclei, conspicous nucleoli and moderate amount of cytoplasm (H&E; 400x).

primary panel of immunohistochemical markers was applied, which showed CK and vimentin positivity while the tumour cells were negative for CK7, CK20, CDX2, TTF1, Melan A, HMB45, CD31 and CD34.

Based on these findings, the differential diagnosis of large round/epithelioid cells with co-expression of CK and vimentin was considered and a secondary panel of immunohistochemical markers was applied. The secondary panel revealed WT1 and calretinin positivity [Table/Fig-3]. CD10, PAX8, CD99 and EMA were negative. The Ki-67 proliferation index was low. These findings were suggestive of papillary serous carcinoma of the ovary and epithelioid mesothelioma, which were further differentiated on the basis of ER expression. The tumour was ER-negative [Table/Fig 4].



[Table/Fig-3]: Tumours cells immunohistochemically positive for: a) CK; b) Vimentin; c) WT1 and d) Calretinin {Immunohistochemistry (IHC; 100x)}.



[Table/Fig-4]: Immunohistochemically tumours cells were ER negative (IHC; 400x).

Based on both histomorphological and immunohistochemical features, the final diagnosis rendered was epithelioid mesothelioma. The patient was referred to the oncology department for further management. She was started on a Hyperthermic Intraperitoneal Chemotherapy (HIPEC) regimen. Regular follow-up was advised with periodic imaging and clinical evaluation to monitor for disease recurrence or progression.

DISCUSSION

Malignant mesothelioma is a primary neoplasm that arises from the serous membranes lining the pleura, peritoneum, and pericardium. It typically manifests as diffuse involvement of these membranes, although in some cases, it may present as discrete or localised masses. The pleura is the most commonly affected site, while peritoneal mesotheliomas are relatively rare, accounting for fewer than 30% of all diagnosed mesothelioma cases [1,2]. The occurrence of primary malignant mesothelioma within solid organs, without any involvement of adjacent serous membranes, is exceptionally rare. Only a small number of confirmed cases have been reported in organs such as the liver, lungs, gonads and pancreas [3].

However, mesothelioma arising from the spleen is exceedingly rare and presents unique diagnostic and clinical challenges. Only a few isolated cases have been reported in the literature, making this condition a diagnostic enigma. The spleen is not lined by mesothelial cells, raising questions about the origin and pathogenesis of such neoplasms. This report presents a rare case of primary malignant mesothelioma confined to the spleen, with a comprehensive review of available literature to better understand its clinical course, pathology and therapeutic approach.

Benign Multicystic Peritoneal Mesothelioma (BMPM) is a localised tumour arising from the mesenchymal and epithelial components of mesothelial cells and is characterised by its non-metastatic behaviour. The first case of BMPM was discovered in 1928 by Plaut; however, Mennemeyer R and Smith H, in 1979, discovered its mesothelial nature [4]. The exact pathogenesis of it remains debated. Some researchers regard it as a neoplastic process, while others view it as a reactive lesion. The argument for a neoplastic origin is supported by its slow but progressive growth, frequent recurrence following surgical excision, association with poor outcomes in advanced stages, and rare instances of malignant transformation [5]. Several potential risk factors have been identified, including a history of abdominal surgery or chronic inflammatory conditions such as endometriosis [6].

The peritoneal mesothelioma is much less common than its pleural counterpart, accounting for 10-20% of all malignant mesothelioma. These are most commonly seen in middle-aged or elderly individuals, occasionally in young adults and children. Its association with asbestos exposure is still a debate [2]. The diagnosis is difficult due to vague symptoms like abdominal discomfort, digestive symptoms and weight loss. These usually present as diffuse involvement and a localised form as a solitary circumscribed nodular mass is rare. Primary mesothelioma in the parenchyma of solid organs (in the absence of serous involvement) is rarely seen. Few cases have been reported in organs like the lung, testis, ovary, liver and pancreas. Primary malignant mesothelioma of the spleen is an extremely rare entity, with fewer than five cases reported in the literature to date [3].

The pathogenesis of intrasplenic mesothelioma is not fully understood, but several theories have been proposed to explain its rare intraparenchymal location. One hypothesis suggests that during embryonic development, the splenic capsule may undergo invagination, allowing mesothelial cells to become embedded within the splenic parenchyma, where they later proliferate. Another possibility is that the tumour arises from the epithelial lining of a pre-existing mesothelial inclusion cyst or through metaplastic transformation of native epithelial cells within the spleen [7].

Fine-Needle Aspiration Cytology (FNAC) may be employed as a diagnostic tool; however, it often proves inconclusive in most cases. To date, no clinical or imaging modality has been able to establish a definitive diagnosis of this condition. While Ultrasound (USG), Computed Tomography (CT), and Magnetic Resonance Imaging (MRI) are all utilised in the diagnostic process, MRI is generally considered the most informative and reliable imaging technique [5].

The differential diagnosis for primary malignant mesothelioma of the spleen includes a wide range of both benign and malignant conditions. These may encompass secondary splenic involvement from peritoneal or pleural mesothelioma, localised mesothelioma, primary splenic neoplasms, lymphomas, epithelioid angiosarcoma, lymphangioma, cystic adenomatoid tumour, and metastatic lesions. Histologically and immunohistochemically, localised malignant mesotheliomas closely resemble their diffuse counterparts and are often detected incidentally or present with vague, nonspecific symptoms. Lymphangioma, although congenital, can manifest later in life and may mimic BMPM on imaging studies. A definitive diagnosis between these entities typically requires histopathological evaluation via biopsy. Another vascular neoplasm, such as epithelioid angiosarcoma, can pose significant diagnostic challenges. However, in the present case, the absence of intracytoplasmic lumina- a key morphological feature of epithelioid angiosarcoma- along with an immunohistochemical profile inconsistent with vascular origin, helped exclude this diagnosis [8,9].

Cystic adenomatoid tumour and malignant peritoneal mesothelioma are also important considerations in the differential diagnosis. The former is a benign lesion that typically arises from the serosal surfaces, most commonly of the uterus or epididymis. In contrast, malignant peritoneal mesothelioma usually presents as a solid mass with irregular margins. In women, additional conditions such as endometriosis, cystic variants of endosalpingiosis and papillary serous carcinoma of the ovary should also be considered, as they can mimic similar clinical and radiological features [3]. In the present case, the lesion appears to represent a localised transformation of a splenic mesothelial inclusion cyst. The tumour developed within the splenic parenchyma, without involvement of the fibrous capsule or mesothelial surface. Radiological findings and intraoperative macroscopic assessment effectively excluded the possibility of secondary involvement from a peritoneal or pleural mesothelioma. To establish a definitive diagnosis, a comprehensive immunohistochemical panel was employed. This included markers for various cellular lineages: cytokeratin (epithelial origin), vimentin (mesenchymal origin), common leukocyte antigen (lymphoid lineage), and melanocytic markers such as HMB45 and Melan-A. These were used alongside conventional mesothelial markers to ensure diagnostic accuracy.

Treatment for this condition typically involves complete surgical resection and cytoreduction, followed by HIPEC. While there are no established guidelines for postoperative follow-up, some centres recommend abdominal CT scans every three months during the first year, followed by annual scans for the next five years, due to the high recurrence risk- estimated at 50% in women and 33% in men. Despite the risk of recurrence, the prognosis has generally been excellent, regardless of the treatment approach [10].

Radiologically, the lesion appeared as a large, well-defined cystic mass with solid enhancing areas and focal calcifications, extending from the subdiaphragmatic space to the pelvis. These features are somewhat consistent with those reported in peritoneal mesothelioma cases, where imaging typically reveals heterogeneous cystic-solid masses, sometimes with calcific foci or peritoneal thickening [11,12]. However, the solitary nature and splenic origin of the lesion diverge from the diffuse, plaque-like or nodular peritoneal thickening typically observed.

Grossly, the mass was multinodular, encapsulated, and displayed papillary excrescences on the internal wall, with varying wall thickness and areas of haemorrhage. Most peritoneal mesotheliomas described in the literature present with diffuse peritoneal thickening and omental caking rather than discrete encapsulated masses [13]. Therefore, this case poses a diagnostic challenge, mimicking other splenic pathologies such as primary splenic cysts, hydatid disease, or splenic vascular tumours.

Only a few cases in the literature describe mesothelioma presenting as a localised cystic lesion associated with the spleen. For instance, Baratti D et al., [14] and Sugarbaker PH [15] have reported localised peritoneal mesotheliomas that mimicked benign cysts or ovarian tumours. However, to the best of our knowledge, such isolated involvement of the spleen with an encapsulated, cystic presentation and definitive mesothelioma diagnosis remains exceedingly rare.

Thus, this case is unique not only because of its anatomical localisation and gross presentation, but also for its challenging differential diagnosis. It underscores the importance of a thorough histopathological and immunohistochemical evaluation in diagnosing unusual presentations of mesothelioma. The use of extended immunopanels and a multidisciplinary approach involving surgery, pathology, and oncology is essential in ensuring accurate diagnosis and optimal treatment planning.

CONCLUSION(S)

Primary malignant mesothelioma of the spleen is a rare entity that should be considered in patients with solitary splenic lesions. Histopathological examination and immunohistochemistry are vital for diagnosis. Complete surgical excision and close follow-up are recommended due to the uncertain prognosis and lack of established treatment guidelines.

REFERENCES

[1] Allen TC, Cagle PT, Churg AM, Colby TV, Gibbs AR, Hammar SP, et al. Localized malignant mesothelioma. Am J Surg Pathol. 2005;29(7):866-73.
[2] D'Abbicco D, Conversano A, Epifania BR, Indellicato R, Margari A. Splenic localization of the peritoneal mesothelioma: Case report and literature review. Updates Surg. 2012;64(2):157-60.
[3] Giansanti M, Bellezza G, Guerriero A, Pireddu A, Sidoni A. Localized Intrasplenic Mesothelioma: A Case Report. Int J Surg Pathol. 2014;22(5):451-55.
[4] Mennemeyer R, Smith M. Multicystic, peritoneal mesothelioma: A report with electron microscopy of a case mimicking intra-abdominal cystic hygroma (lymphangioma). Cancer. 1979;44(2):692-98.
[5] Somasundaram S, Khajanchi M, Vaja T, Jajoo B, Dey AK. Benign multicystic peritoneal mesothelioma: A rare tumour of the abdomen. Case Rep Surg. 2015;2015:613148.
[6] Kelarji AB, Alshutaihi MS, Ghazal A, Mahli N, Agha S. A rare case of benign multicystic peritoneal mesothelioma misdiagnosed as hydatid cyst found in the liver parenchyma and abdomen cavity of a male with asbestos exposure. BMC Gastroenterol. 2021;21(1):374.
[7] Kuwabara S, Hohjoh H, Nakano M, Ebihara Y, Toyama K. Mesothelial splenic cyst. Intern Med. 1993;32:672-74.
[8] Noiret B, Renaud F, Piessen G, Eveno C. Multicystic peritoneal mesothelioma: A systematic review of the literature. Pleura Peritoneum. 2019;4:20190024.
[9] Liu YC, Kuo YL, Yu CP, Wu HS, Yu JC, Chen CJ, et al. Primary malignant mesothelioma of the greater omentum: Report of a case. Surg Today. 2004;34(9):780-83.
[10] Price MD, Nair S, Harris J. Primary splenic multicystic peritoneal mesothelioma in a young healthy male. J Surg Case Rep. 2023;2023(10):rjad551.
[11] Sharma S, Vashistha RK, Sen R, Nada R. Primary peritoneal malignant mesothelioma: Arare cause of ascites. J Cytol. 2012;29(2):121-23.
[12] Schaub NP, Alvarado-Cabrero I, Tornos C, Malpica A. Clinicopathologic study of 12 cases of malignant peritoneal mesothelioma in women. Int J Gynecol Pathol. 2006;25(4):321-29.
[13] Antman KH, Blum RH. Malignant mesothelioma. In: Cancer: Principles and Practice of Oncology. DeVita VT, Hellman S, Rosenberg SA, editors. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2001. p. 1989-2007.
[14] Baratti D, Kusamura S, Cabras AD, Bertulli R, Hutanu I, Deraco M. Diffuse malignant peritoneal mesothelioma: Long-term survival with complete cytoreductive surgery followed by Hyperthermic Intraperitoneal Chemotherapy (HIPEC). Eur J Cancer. 2013;49(15):3140-48.
[15] Sugarbaker PH. Peritonectomy procedures. Ann Surg. 1995;221(1):29-42.

PARTICULARS OF CONTRIBUTORS:
1. Senior Resident, Department of Pathology, PGIMS, Rohtak, Haryana, India.
2. Senior Professor, Department of Pathology, PGIMS, Rohtak, Haryana, India.
3. Senior Resident, Department of Pathology, PGIMS, Rohtak, Haryana, India.
4. Junior Resident, Department of Pathology, PGIMS, Rohtak, Haryana, India.
5. Senior Professor, Department of Surgery, PGIMS, Rohtak, Haryana, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Monika Kalyan,
Senior Resident, Department of Pathology, PGIMS, Rohtak-124001, Haryana, India.
E-mail: monika.kalyan.39@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: May 18, 2025
- Manual Googling: Jul 08, 2025
- iThenticate Software: Jul 19, 2025 (6%)

ETYMOLOGY: Author Origin

EMENDATIONS: 5

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **May 17, 2025**
Date of Peer Review: **Jun 21, 2025**
Date of Acceptance: **Jul 21, 2025**
Date of Publishing: **Nov 01, 2025**