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Accessory Spleen: A Very Rare Finding – A Cadaveric Study

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A B S T R A C T

Background: The spleen, a vital component of the lymphatic and immune systems, occasionally presents with congenital anomalies such as accessory spleens (splenunculi). These are ectopic nodules of splenic tissue that arise due to the failure of fusion of embryonic splenic buds. Although typically asymptomatic and discovered incidentally, accessory spleens hold significant clinical importance, especially in hematologic disorders requiring splenectomy and in radiological evaluations of abdominal masses. **Objective:** This study aimed to determine the incidence, anatomical location, and morphological features of accessory spleens through systematic cadaveric dissection in a tertiary medical teaching institution. **Methods:** A prospective observational study was conducted on 40 formalin-fixed adult human cadavers over a period of one year. The left hypochondriac region and associated peritoneal ligaments were carefully dissected. Identified nodules were examined for size, shape, vascularity, and histological features. **Results:** Accessory spleens were found in 2 out of 40 cadavers (5%). Both were located in typical perisplenic regions — one in the gastrosplenic ligament and the other at the splenic hilum. The nodules measured approximately 1.3 × 1.1 cm and displayed normal splenic architecture on histological examination. **Conclusion:** Although rare, the presence of accessory spleens must be carefully considered in anatomical, surgical, and radiological contexts. Their identification is vital to prevent misdiagnosis and ensure complete treatment in splenectomy-requiring conditions.

Keywords: Accessory spleen, Splenunculi, Splenic hilum, Gastrosplenic ligament, Hypersplenism.

1. INTRODUCTION

The spleen is a soft, vascular organ situated in the left upper quadrant of the abdomen, nestled between the stomach and the diaphragm. It is the largest secondary lymphoid organ in the human body and performs essential functions such as immune surveillance, hematopoiesis during fetal development, filtration of aged erythrocytes, and storage of platelets and iron [4][5]. Structurally and functionally integrated within the circulatory and lymphatic systems, the spleen is generally considered a single, well-defined organ. However, developmental anomalies such as accessory spleens (also known as splenunculi) can occur and may have critical clinical and surgical implications [1][3].

Accessory spleens are congenital nodules of ectopic splenic tissue that arise from the failure of fusion of multiple splenic anlagen in the dorsal mesogastrium during embryogenesis, typically around the fifth week of intrauterine life [5]. These nodules possess the same histological and functional attributes as the primary spleen and are usually supplied by branches of the splenic artery. Though most commonly found near the splenic hilum and gastrosplenic ligament, accessory spleens can also occur in atypical locations such as the tail of the pancreas, greater omentum, mesentery, pelvis, or even the scrotum, thereby sometimes complicating clinical and diagnostic interpretations [6][7].

While often asymptomatic and discovered incidentally during imaging, surgery, or autopsy, accessory spleens can have significant clinical consequences. They may mimic neoplastic masses on radiological imaging [8][9] or lead to recurrence of hematologic disorders, such as idiopathic thrombocytopenic purpura (ITP) or hereditary spherocytosis, if not completely removed during therapeutic splenectomy [1][2]. Additionally, torsion, infarction, or spontaneous rupture of an accessory spleen may present as acute abdomen and complicate differential diagnosis.

Despite the importance of this anatomical variant, the literature suggests considerable variation in the reported incidence of accessory spleens, ranging from 10% to 30% in radiologic and autopsy studies, but only 1% to 6% in cadaveric studies [1][2][3], possibly due to limited dissection exposure and detection methods. In the Indian context, limited large-scale cadaveric research has been conducted, particularly in Eastern India, making this study regionally relevant.

Therefore, the present cadaveric study was undertaken in a tertiary medical teaching institute in Odisha to determine the incidence, anatomical location, size, morphology, and histological features of accessory spleens. The findings aim to contribute to the anatomical knowledge base, improve diagnostic accuracy, and reduce surgical complications related to this often-overlooked anatomical variant.

2. MATERIALS AND METHODS

2.1 Study Design and Duration

This was a prospective, observational, descriptive cadaveric study conducted in the Department of Anatomy at a tertiary medical teaching institute in Odisha. The study was carried out over a period of 12 months from June 2023 to May 2024.

2.2 Sample Size and Cadaver Selection

A total of 40 formalin-fixed adult human cadavers (n = 40) were included. Each cadaver was dissected on both sides, making 80 hemi-abdominal regions available. Of these, 30 were male cadavers and 10 female, aged between 35 and 70 years.

2.3 Inclusion and Exclusion Criteria

Inclusion:

- Adult cadavers of both sexes with intact abdominal viscera
- Formalin-fixed specimens used for routine dissection
- No history of abdominal surgery or trauma

Exclusion:

- Cadavers with prior surgery, trauma, or distorted anatomy in the left hypochondriac region
- Decomposed or poorly preserved cadavers

2.4 Ethical Considerations

Ethical approval was obtained from the Institutional Ethical Committee (IEC), Government Medical College, Odisha. Ethical approval number: GMC/IEC/2023/78.

2.5 Dissection Protocol

Standard dissection per Cunningham's Manual of Practical Anatomy was followed [4]. Left hypochondriac regions were exposed by removing the anterior abdominal wall and retracting the stomach and colon. The spleen and adjacent structures were examined for accessory spleens.

2.6 Morphometric and Topographic Analysis

Accessory spleens were measured with digital calipers, photographed, and diagrammed. Capsular integrity, vascular pedicle, and spatial relation to the main spleen were recorded.

2.7 Histological Examination

Suspected nodules were fixed in 10% buffered formalin, processed using paraffin-embedding, sectioned at 4–5 microns, stained with H&E, and compared with sections of the primary spleen [5].

2.8 Data Analysis

Descriptive statistics were calculated. Incidence was presented as percentages; morphometric values as means and ranges.

3. RESULTS

3.1 Incidence

Accessory spleens were found in 2 out of 40 cadavers (5%), both in male specimens. Each had one accessory spleen.

3.2 Location

- **Cadaver 1**: Gastrosplenic ligament
- **Cadaver 2**: Splenic hilum
  These match common locations reported in earlier studies [1][3].

3.3 Morphological Characteristics

Parameter	Cadaver 1	Cadaver 2
Location	Gastrosplenic ligament	Splenic hilum
Shape	Oval	Round
Color	Dark reddish-brown	Reddish-purple
Size (cm)	1.5 × 1.2	1.2 × 1.0
Consistency	Firm	Firm
Capsule	Intact	Intact
Vascular Pedicle	Present	Present

Average size: ~1.35 × 1.1 cm

3.4 Table 1: Summary of Accessory Spleen Findings

Cadaver No.	Sex	Location	Size (cm)	Shape	Vascular Pedicle	Histology
1	Male	Gastrosplenic ligament	1.5 × 1.2	Oval	Present	Normal
2	Male	Splenic hilum	1.2 × 1.0	Round	Present	Normal

3.5 Histological Features

Confirmed splenic architecture:

- White pulp: Germinal centers
- Red pulp: Sinusoids and splenic cords
- Fibrous trabeculae from a capsule [5]

3.6 Side Distribution

Both accessory spleens were on the **left** side. None were found in the pancreatic tail, mesentery, or pelvic regions [2][3].

3.7 Table 2: Comparative Literature Review

Study	Sample Size	Incidence (%)	Common Locations
Prakash et al. (2018) [1]	50 cadavers	4.0%	Hilum, gastrosplenic ligament
Khan et al. (2020) [2]	60 cadavers	6.6%	Pancreatic tail
Patel et al. (2016) [3]	30 cadavers	3.3%	Hilum
Present Study (2024)	40 cadavers	5.0%	Hilum, gastrosplenic ligament

4. DISCUSSION

This study found accessory spleens in 5% of cadavers, consistent with Indian studies like Prakash et al. (4%), Khan et al. (6.6%), and Patel et al. (3.3%) [1][2][3].

Both accessory spleens were in typical sites: the hilum and gastrosplenic ligament. No spleens were found in the pancreatic tail, pelvis, or scrotum, likely due to routine dissection limits [6].

Histological analysis confirmed the presence of normal splenic tissue, including white and red pulp, capsule, and vascular pedicle [5][9]. The average size and morphology matched previously reported findings [1][3].

Clinically, their importance lies in hematologic diseases such as ITP or hereditary spherocytosis—where retained accessory spleens post-splenectomy may cause recurrence [2][7]. They also complicate radiological diagnoses, mimicking lymphadenopathy or tumors [6][8]. Additionally, complications such as infarction or torsion of accessory spleens can present as surgical emergencies [9].

Limitations include modest sample size and restricted anatomical exposure. Functional evaluation (e.g., perfusion or immunological tests) was not feasible.

Still, this study enhances awareness and documentation of accessory spleens in Eastern India. Radiologists, surgeons, and anatomists must remain vigilant during imaging, surgical procedures, and dissection-based training [4][6].

5. CONCLUSION

This cadaveric study found a 5% incidence of accessory spleens, all located in perisplenic regions. Their morphology and histology matched that of normal spleen tissue. The clinical relevance of identifying accessory spleens cannot be overstated, especially in radiology and splenectomy-related procedures.

Future studies with broader anatomical exposure and imaging correlation are needed to capture atypical variants and expand anatomical databases.

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