Accessory Spleen in Human Fetuses: A Cadaveric Study

Sonali Thomas, Devendra Nath Sinha, Arvind Kumar Singh, Deepa Deopa, Richa Niranjan

Introduction

The spleen is the largest lymphoid organ consisting of an encapsulated mass of lymphoid and vascular tissue. Spleen is essentially concerned with phagocytosis, immune responses, lymphopoiesis, and blood cell storage. The spleen appears at ~5th week of intrauterine life as a mesenchymal condensation between the two layers of the dorsal mesogastrium. The spleen is lobulated in the fetus, but the lobules normally disappear before birth. Accessory spleens (lienes accessorii, splenunculi) are accidental finding but they can be found in 10 to 30% of patients at autopsy. It results from the incomplete fusion of original splenic primordias in the dorsal mesogastrium. They may be single or multiple, but there are seldom more than six. Accessory spleens are usually the size of a cherry (1–1.5 cm in diameter). These may exist in one of the peritoneal folds, commonly in the hilum of the spleen or in the tail of the pancreas.

Due to limited literature available regarding histology and morphology of accessory spleen in human fetuses, this study was done to enlighten the existing literature regarding this congenital anomaly of spleen.

Materials and Methods

The study has been conducted on 40 human fetuses (19 males and 21 females) of gestational ages ranging from 14th to 40th gestational weeks, in the Department of Anatomy, Government Medical College, Haldwani, Uttarakhand, India. The fetuses were procured from the labor room and operation theaters of the Obstetrics and Gynecology Department, Dr. Sushila Tiwari Government Hospital (Uttarakhand, India) during a period of two years (2014–2016). After procurement of the fetuses with clearance from the institutional ethical committee, they were preserved in 10% formalin solution. An informed and written consent was obtained from the concerned families.

Twenty-four hours after the procurement of the fetus, dissection of the abdomen was performed; spleen was displayed in the left hypochondrium. Existence of accessory spleen was investigated along the splenic hilum, vessels, within the

Abstract

Background The aim of the study was to assess the morphological and histological features of accessory spleen in formalin-preserved human fetuses.

Methods The study was conducted on spleen of 40 human fetuses of varied gestational ages without any congenital anomalies with due clearance from the ethical committee. The existence of accessory spleen was investigated during dissection. These were then dissected, weighed, and stained by hematoxylin and eosin as well as Masson’s trichrome method and observed under compound light microscope.

Results In 5 (12.5%) cases, the accessory spleen was revealed in fetuses aged between 29th and 40th gestational weeks. These were located near the splenic hilum. On histological examination, the tissue of accessory spleen revealed a well-defined capsule. White pulp was less differentiated as compared with red pulp area.

Conclusion The accessory spleen is often misdiagnosed by the clinicians for neoplastic growth or lymph node enlargement; therefore, its awareness is important.
gastrosplenic or lienorenal ligaments, the pancreatic tail, the wall of the stomach or bowel, greater omentum, mesentry, in the pelvis, and so forth. The shape of the accessory spleen was observed. They were then dissected out by cutting the pedicle, and weighed using a digital weighing scale. The obtained tissue after thoroughly washing with tap water was embedded in the paraffin wax and thin sections were obtained with microtome. The sections of the accessory spleen were stained with hematoxylin and eosin as well as Masson’s trichrome stain and observed under compound microscope.

Observation and Results

The accessory spleen was observed in \( n = 5 \) (12.5%) fetuses with gestational age ranging from 22 to 40 weeks. They were all located near the splenic hilum (►Fig. 1a, b). They were in the form of round to oval well-defined nodules with similar color to that of the spleen. Their weight ranged from 1.5 to 8 mg (►Table 1).

The Histological Examination of Accessory Spleens Revealed

**Parenchyma:** Well defined but thin fibrous capsule was seen surrounding the tissue. Connective tissue was extensive. No trabeculae were seen.

**Red pulp:** It was larger in amount consisting of sinusoids, as compared with white pulp area with extensive erythrocytes in the interstitium (►Fig. 2). Hematopoietic tissue was abundant.

**White pulp:** It was not much differentiated. Lymphocytes were present, some of which were larger than those found in normal spleen. No central arteriole was present.

Discussion

In the present study \( n = 5 \) accessory spleens (12.5%) were observed. All of them were located near the splenic hilum. There was no association with the gestational age but most of them were observed in the fetuses of 3rd trimester (29–40 gestational weeks).

During routine adult cadaveric dissections, the incidence of accessory spleens were found to be from about \( \sim 4\% \) (Chaware et al\(^7\)) to as high as \( \sim 24\% \) (Rayhan et al).\(^8\) Unver Dogan et al\(^9\) performed 720 autopsy cases (3 months–62 years) and found 54 accessory spleens in 48 cases (6.7%).

During fetal dissections the incidence of finding accessory spleen was found in 14% \(( n = 25 \) ) by Ungor et al.\(^10\) They found majority (64%) of the accessory spleens near splenic hilum and its incidence was highest (42%) in their 4th group similar to the present study. Radhika and Vijayanirmala\(^11\) found 1 accessory spleen during dissections of 50 adult and 50 fetal spleens.

<table>
<thead>
<tr>
<th>Gestational age of the fetus</th>
<th>Location of accessory spleen</th>
<th>Number of accessory spleen</th>
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<tbody>
<tr>
<td>22 weeks</td>
<td>Splenic hilum</td>
<td>1</td>
</tr>
<tr>
<td>29 weeks</td>
<td>Splenic hilum</td>
<td>1</td>
</tr>
<tr>
<td>33 weeks</td>
<td>Splenic hilum</td>
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</tr>
<tr>
<td>34 weeks</td>
<td>Splenic hilum</td>
<td>1</td>
</tr>
<tr>
<td>40 weeks</td>
<td>Splenic hilum</td>
<td>1</td>
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</tbody>
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Fig. 1 (a,b) Photographs showing the location of accessory spleens in dissected fetuses (near splenic hilum).

Fig. 2 Photomicrograph of an accessory spleen showing a well-defined capsule (arrow) and a coarse fibrous framework with ill-defined white pulp area (Masson’s trichrome × 400).
The connective tissue of the trabecula as well as the capsule is derived from the original mesenchyme. Further development of the substance of the spleen consists of the formation of the red and white pulp. During human ontogenesis hematopoiesis changes its localization several times. The migration of blood progenitor cells is essential for the later establishment of hematopoiesis in bone marrow. Hematopoietic stem cells migrate into the spleen primordia during the 1st trimester of pregnancy. The preliminary stage lasts up to 12th week, known as the stage of the primary vascular reticulum where red and white pulp is not distinguishable. The spleen functions as a hematopoietic center until late fetal life. The lymphoid colonization stage of the organ follows later, between the 15th and 18th weeks, and at this time it assumes its characteristic lobular shape. From the 23 week characteristic lymphatic follicles are formed by B-lymphocytes. In the present study the accessory spleen has abundant hematopoietic cells suggesting persisting hematopoietic activity. White pulp is not differentiated, suggesting that the lymphoid colonization stage has not followed after the differentiation of red pulp area. Morphologically and functionally, the accessory spleens are similar to the normal spleen. These can imitate enlarged lymphatic nodules or tumors in the adrenal gland, pancreas stomach, and intestines; therefore, they should be differentiated with the aid of newer medical imaging techniques.

**Conclusion**

Accessory spleens are usually asymptomatic and are often accidental findings during routine autopsy or radiological investigations done for other reasons. During splenectomy performed due to hematological disorder, the location of accessory spleens should be looked for and these be removed promptly else there be recurrence of symptoms due to tissue enlargement which in some cases may undergo torsion or rupture.

**Note**

The content of the manuscript has not been published or submitted for publication elsewhere. A written consent from the families and an approval from the ethics board of Government Medical College, Haldwani (Uttarakhand, India) were obtained prior to the commencement of the study.

**Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Conflicts of Interests**

None.

**Acknowledgments**

We would like to thank our histology laboratory technician (Mr. Anand) for helping us through the histological procedures and Dr. N.K. Arora (HOD, SRMS IMS) for his constant help for the article.

**References**