



Original article

Anatomical study of Accessory Sulci of Liver and its Clinical Significance In North Indian Population

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ABSTRACT

Abnormalities of liver are rare inspite of its complex development in the ventral mesogastrium; common abnormalities are irregularities in form, occurrence of Accessory sulci (AS) or presence of cysts. Anatomy textbooks lack data on the presence of AS of the liver, research reports being the only source of information. Research studies have mainly described the diaphragmatic sulci in the liver; however there are no research reports on the presence of accessory sulci on the inferior surface of the liver. Accessory sulcus can be incidentally detected during radiological procedures, routine autopsies or anatomical dissections. The main aim of the present study is to explore the presence of anomalous AS in cadaveric liver and to compare it with the normal liver. The present study was conducted in the department of Anatomy M.R.A. Medical College Ambedkar Nagar and S.R.M.S. Institute of Medical Sciences Bareilly U.P. The materials used for present study comprises 36 adult livers with age range from 18 to 70 years. Livers were carefully studied for the presence of AS and the findings were appropriately documented. In the present study we found accessory sulci and grooves in 8 cadavers (14.5%). The findings of the study may be gainfully utilised by imaging specialists and surgeons respectively, to avoid possible errors in interpretations and subsequent misdiagnosis, and for planning appropriate surgical approaches.

KEYWORDS: Morphology, Accessory sulci, Variations, Agenesis, Cysts.

INTRODUCTION

The liver is the largest abdominal viscera, occupying a substantial portion of upper abdominal cavity. The liver has four lobes or eight segments, depending on whether it is defined by its gross anatomical appearance or by its internal architecture. A sound knowledge of the normal and variant liver anatomy is a prerequisite for a favorable surgical outcome. Knowledge of commonly occurring variations assumes more

significance in the era of diagnostic imaging and minimally-invasive surgical approaches. Although segmental anatomy of liver has been extensively researched, very few studies have dealt with the surface variations of liver. Clinicians have opined that Accessory sulci (AS) or Accessory fissure (AF) may extend deep into the liver thereby mimicking a major sulcus or fissure.¹This may result in erroneous interpretation of skiagrams. Thus anatomical knowledge of the AS or AF is

important for radiologists in daily clinical practice. Objective of our research work is to study the presence of anomalous accessory sulcus detected in cadaveric livers and its clinical significance in North Indian Population and compare it with the normal.

MATERIALS AND METHODS

In the present study observations were made on the cadaveric livers while they were used for routine dissection classes for medical undergraduate students over a period of four years. The materials used for present study comprises 36 adult livers with age range from 18 to 70 years of North Indian origin. The embalmed livers were carefully studied for the presence of AS. Course of the hepatic veins were also observed and livers with features of cirrhosis or

any damage were excluded. This was an observational study with no usage of experimental instruments. Appropriate measurements were taken by calipers and measuring tape, the specimens were photographed and the findings were appropriately documented.

RESULTS

In the present study, out of 36 livers accessory sulci were observed in 8 cadavers (14.5%). AS was present on inferior surface of 4 livers (11.1%; figure 1, 2) diaphragmatic surface in 2 livers (5.5 %; figure 3), posterior surface on one liver (2.7%; figure 4) and right lateral surface in one liver (2.7%; figure 5) in North Indian population. Table: 1 shows percentage incidence of accessory sulci of livers.

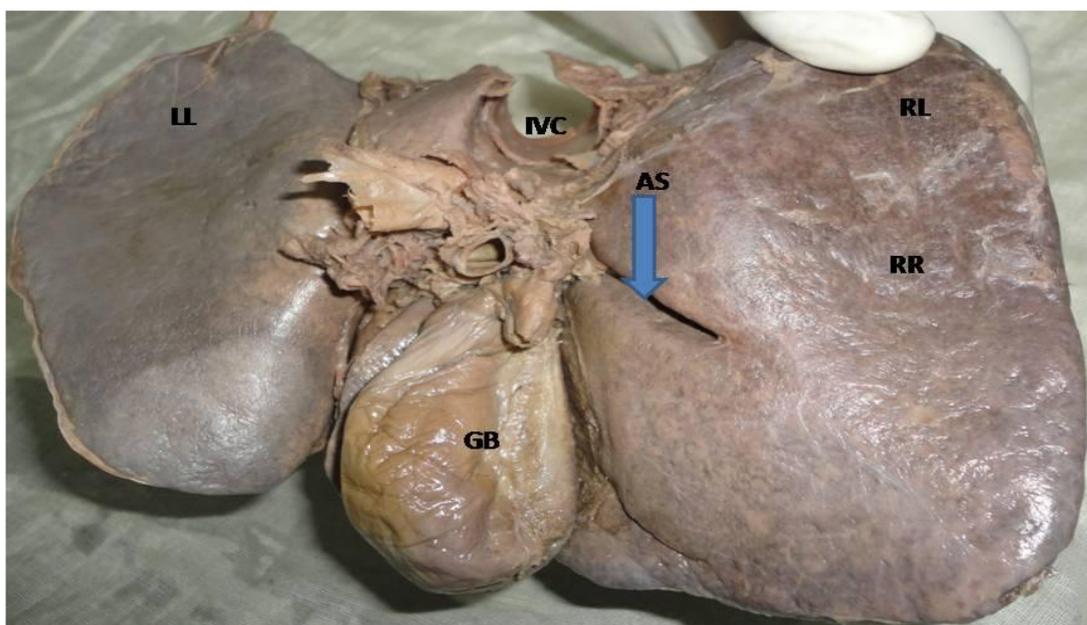


Figure 1. Inferior surface of liver showing accessory sulcus (AS) with arrow . (RL: Right Lobe; LL: Left Lobe; GB: Gall Bladder; IVC: Inferior Vena Cava; RR: Right Renal Impression)

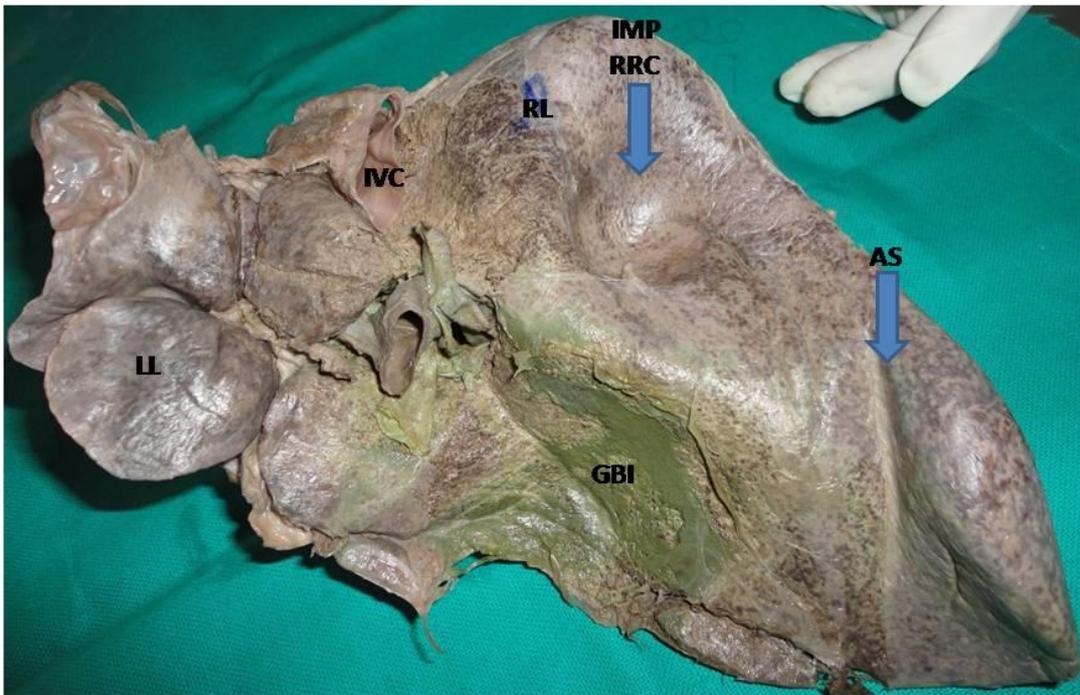


Figure 2. Inferior surface of liver showing accessory sulcus (AS) Impression of Right Renal Cyst (RRC) with arrow and Atrophy of left lobe .(RL: Right Lobe; LL: Left Lobe; GBI: Gall Bladder Impression; IVC: Inferior Vena Cava)

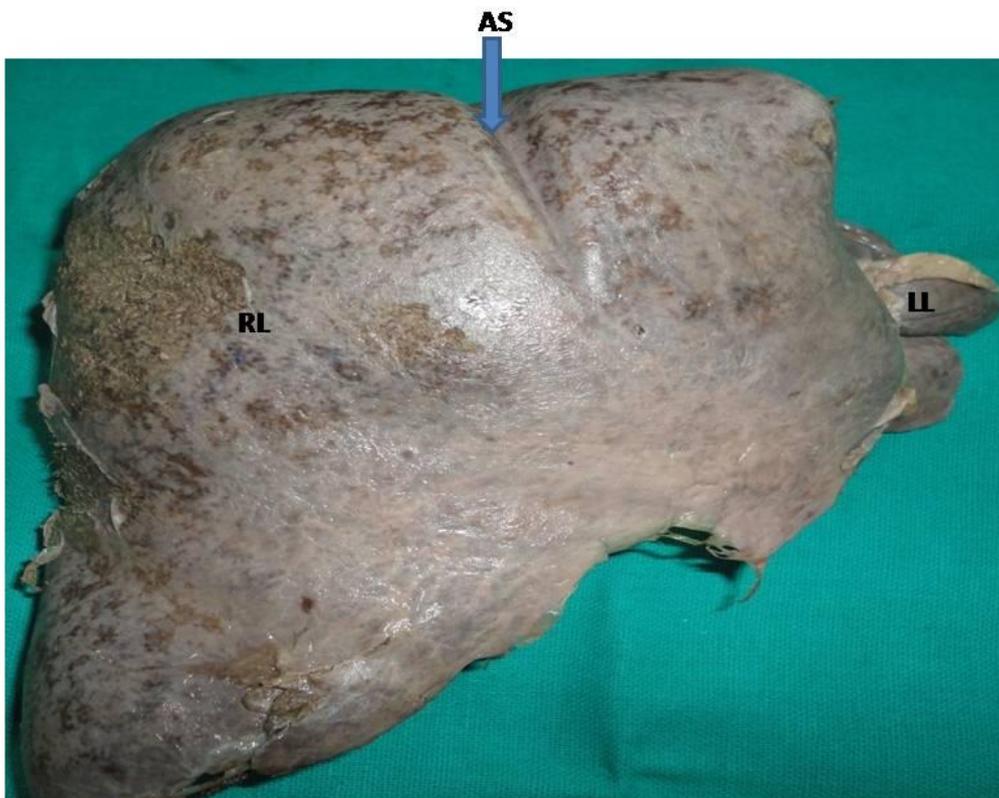


Figure 3. Diaphragmatic surface of liver showing accessory sulcus (AS) with arrow and atrophy of left lobe of liver . (RL: Right Lobe; LL: Left Lobe)

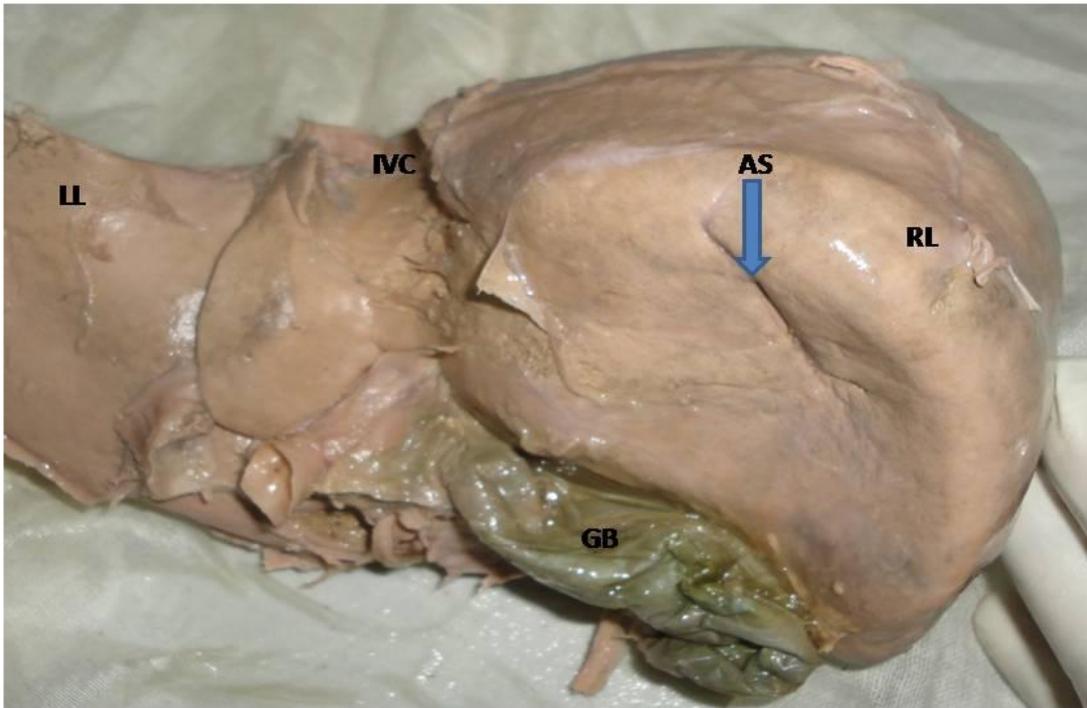


Figure 4. Posterior surface of liver showing accessory sulcus (AS) with arrow . (RL: Right Lobe; LL: Left Lobe ; GB: Gall Bladder; IVC: Inferior Vena Cava)



Figure 5. Right lateral surface of liver showing accessory sulcus (AS) with arrow . (RL: Right Lobe; LL: Left Lobe of liver)

Table 1: Percentage incidence of accessory sulci on the liver surfaces out of 36 cadaveric livers.

S.No.	Liver Surfaces	No of Cadaveric livers	% Percent of AS
1.	Inferior	4	11.1%
2.	Diaphragmatic	2	5.5%
3.	Posterior	1	2.7%
4.	Right lateral	1	2.7%
5.	Anterior	0	0

DISCUSSION

Major fissures on the surface of the liver are important landmarks for interpreting the lobar anatomy and for locating the liver lesions. In this era of imaging and minimally-invasive approaches, it is imperative on the part of both the radiologists and operating surgeons to have a thorough knowledge of the anatomy and the commonly occurring variations of this organ. The AS have been described to be located at the boundaries, between the ramifications of the terminal branches of the hepatic veins.[2] Faizah B et al studied presence of AS in 40 embalmed livers, observed AS in 2 specimens 5%. The AS was located in inferior and posterior surfaces of the right lobes in 2 specimens.[3] In the study conducted by Joshi et al on variations of liver, notching along the inferior border of caudate lobe was present in 18% of liver, a vertical fissure was found in 30% of livers and prominent papillary process was found in 32% of cases.[4]

Adequate knowledge of normal morphology of liver may prevent erroneous diagnosis of a focal intrahepatic lesion. The surface of liver showed 1–3 fissures distributed on all lobes in 70% specimens demarcating the vascular segments, which may help the surgeon during resection of liver. The AS may be due to a developmental defect, or may be acquired as a result of pressure by any superficial structure. The incidence of the AS is more common in autopsy findings.[5] In fact the higher incidences of the AS in autopsy findings have compelled the researchers to ponder over the fact, if they are really related to post mortem artifacts.[6] Perhaps, this may be the reason why AS may be important for forensic personnel. Accessory sulcus can be incidentally detected during radiological scanning, routine

autopsies, or anatomical dissections. Usually the diaphragm which is related to the superior surface may exert costal pressure to give rise to diaphragmatic sulci.

A thorough review of the literature revealed that majority of the diaphragmatic sulci (DS) had been frequently detected during radiological investigations. [1] The DS is located on the diaphragmatic surface of the liver. A high frequency of the DS that are observed during autopsy studies is attributed to the pressure exerted by the ribs and the diaphragm, and they are usually located on the superficial surface of the liver. [5] Auh Y H et al reported that the accessory fissures on the liver are due to invagination of the liver by the diaphragm, and often they resemble the major hepatic fissure on sectional images which make it more difficult to interpret. It is also reported, that only 25% cases may be detected on any CT scan, and often it may be mistaken as a pathological nodule of the liver.[1] Interestingly, if the morphogenesis of the mammalian liver is far from complete at birth, then the chances of variations existing in post natal life is rare.[7] Anterior fissure of the liver may be regarded as the third door of the liver exposing all the Glissonian pedicles.[8] Considering the fact that the fissures corresponds to the ramifications of the portal vein in liver, a thorough knowledge would be beneficial for surgeons performing resection surgeries. Accessory sulcus may not be detected in the absence of any symptoms.

A past study had defined the anomalous branching of the intrahepatic portal veins and a round ligament in a 70-year- old cadaver. [9] The same study had opined that presence of variations in the liver may cause complications during

transplantation surgeries, undoubtedly, these are incidental findings at autopsy, and they should not be ignored. In our study the inferior surfaces of the right lobe were the most common site of accessory fissures other than the diaphragmatic fissures. In a recent case reported by Satheesha Nayak et al, the right lobe of liver had two large notches and the left lobe was larger than right lobe. [10] The accessory hepatic fissures are potential sources of diagnostic errors during imaging. Any collection of fluid in these fissures may be mistaken for a liver cyst, intrahepatic haematoma or liver abscess. Implantation of peritoneally-disseminated tumor cells into these spaces may mimic intrahepatic focal lesions. [11]

CONCLUSION

This study highlights the occurrence of morphological variations on the liver surface. The findings of the study may be gainfully utilised by imaging specialists and surgeons, respectively to avoid possible errors in interpretations and subsequent misdiagnosis, and to assist in planning appropriate surgical approaches. The presence of the AS may represent the deep course of the hepatic veins superficially, thus proving to be more beneficial to the hepatobiliary surgeons and radiologists.

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