

GROSS MORPHOLOGICAL OBSERVATIONS OF LIVER IN BUFFALO (*BUBALUS BUBALIS*)

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ABSTRACT

The liver was located in the cranial part of the abdomen, immediately behind the diaphragm, entirely to the right of the median plane, situated in an oblique downwards and forwards. The liver was consisted of two surfaces and four borders. The parietal surface was irregularly convex having falciform and coronary ligaments, which were attached to the diaphragm. The visceral surface was irregularly concave, which consisted an upper and large omasal impression, lower and narrow reticular impression, and abomasal impression was present in the right ventral area. The lesser omentum was extended from the esophageal notch to the portal fissure. The dorsal border was short and thick having deep renal impression on caudal lobe. Ventral border was short, thin and convex. The lateral border was thin and median border was thick to which esophageal notch was present.

Keywords: *Bubalus bubalis*, buffaloes, gross anatomy, liver

INTRODUCTION

Very scanty literature is available on the gross anatomy, of the liver in buffaloes. Hence the present study is made.

MATERIALS AND METHODS

The present study of 12 males and 12 females adult buffaloes (*Bubalus bubalis*) of Murrah breed was carried out on normal livers. In situ the liver was examined and all attachments and other details were documented. The specimens were collected at Deonar Abattoir, Mumbai, immediately following the slaughter. To allow experiments, the livers were removed from the pluck and cleaned by extracting the fascia, blood vessels, nerves, etc. Such separate livers were washed under running tap water to remove all exudates and tissue debris from the blood clot. The organs were carried in ice-cooled box to the laboratory for further study. The gross anatomical features like shape, colour, consistency, impressions and lobes of the liver were recorded. The gross anatomical photographs of various views and surfaces of the liver were taken to depict the anatomy.

RESULTS AND DISCUSSION

The present study was performed to determine the gross anatomy of the liver of 12 males and 12 females adult Murrah buffaloes. The liver was situated directly behind the diaphragm in the cranial part of the abdomen, entirely to the right of the median axis, in an obliquely downward and forward location. It was single, largest gland in the body and consisted main and caudate lobe. Similar observations have been reported by Raghavan (1964); Getty (1975), Prasad and Sinha (1982); Frandson (1986); Ommer and Harshan (1995);

Dyce *et al.* (1996); Ghosh (1998). However, Getty (1975) reported that in ruminants the liver being rotated 90 degree from its position in the embryo and in most mammals, so that the right lobe was dorsal and left lobe was ventral.

In the present study, the shape was irregularly rectangular with rounded corners and it was brownish red colour. This observation was in accordance with Frandson (1986).

It was extended obliquely downward and forward from the lumbo costal angle up to be level of the 7th to 8th rib with strongly curved and was in close contact with the abdominal face



Figure 1. Photograph of the liver (Parietal surface) Showing: 1 = Main Lobe; 2 = Caudate Lobe; 3 = Falciform Ligament; 4 = Esophageal Notch; 5 = Umbilical Fissure; 6 = Coronary Ligament; 7 = Medial Border; 8 = Lateral Border; 9 = Dorsal Border; 10 = Ventral Border.

of the diaphragm and right abdominal wall from the ventral end. These observations are similar to the observations reported by Ommer and Harshan (1995); Dyce *et al.* (1996); Ghosh (1998). In the present study, liver was consisted of main lobe and caudate lobe. Dyce *et al.* (1996) stated that the bovine liver consisted of four lobes, including the left lobe, right lobe, quadrate lobe and caudate lobe, while Frandson (1986) reported dorsal, ventral lobe and caudate process in bovine, while Prasad and Sinha (1982) reported that in buffalo the liver was composed of main lobe, caudate lobe with a distinct papillary process, while caudate lobe was

not prominent. This difference might be due to the breed variation.

The liver was consisted two surfaces and four borders. The parietal surface was directed dorsally and cranially on the right side. It was irregularly convex and most of the anterior part conformed / moulded with the right abdominal surface of the diaphragm, however, small part was in contact with the last two or three ribs. The falciform ligament was extended from esophageal notch to the umbilical fissure along with this surface and extended from liver to the diaphragm, while the coronary ligaments was attached to

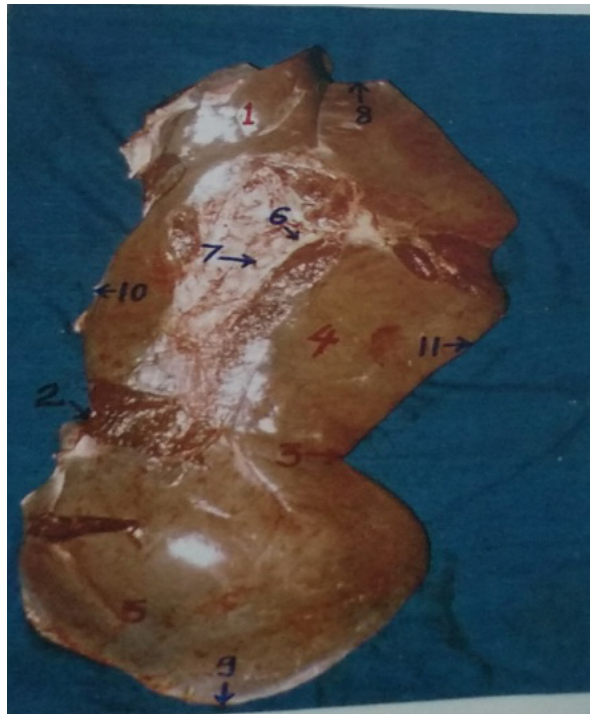


Figure 2. Photograph of the liver (Viseral surface) Showing: 1 = Caudate Lobe; 2 = Esophageal Notch; 3 = Umbilical Fissure; 4 = Omasal Impression; 5 = Reticular Impression; 6 = Portal Vein; 7 = Hepatic Artery; 8 = Dorsal Border; 9 = Ventral Border; 10 = Medial Border; 11 = Lateral Border.

the tendinous centre of the diaphragm. A long triangular area on the dorsal part of this surface was devoid of serous covering since it was attached to the diaphragm. Such findings are consistent with the Raghavan (1964); Getty (1975); Ghosh (1998); Dyce *et al.* (1996) findings. Getty (1975) referred to parietal surface as diaphragm surface, Raghavan (1964) referred to as parietal or anterior surface, while Dyce *et al.* (1996) referred to cranial surface.

The visceral surface was concave and irregular due to various impression of visceral organs. Raghavan (1964) referred this surface as a posterior surface. Below the portal fissure, there was large impression formed by the omasum and just below the esophageal notch, there as narrow and shallow impression formed by the reticulum, while an abomasal impression was present in the right ventral area. Such remarks are in line with the findings of Raghavan (1964), Getty (1975); Ghosh (1998). In the present, study the gall bladder fossa was not observed, whereas Getty (1975) reported the gall bladder fossa between the porta and ventral border of the liver in exotic cattle. This discrepancy may have been due to the variability in the species. There was a portal fissure above the omasal impression, from which the portal vein, hepatic artery, and hepatic nerve plexus entered the liver while hepatic lymph and hepatic duct left the liver. It also consisted the hepatic lymph glands. The lesser omentum was extended from the esophageal notch to the portal fissure and gave the attachment to the omasum, abomasums, pancreas and anterior part of duodenum. Such statements align with the observations reported by Raghavan (1964); Getty (1975) reported the falciform, round, right and left triangular coronary hepato-renal ligaments and lesser omentum in bovines. Frandson (1986) reported the falciform, coronary, round, lateral and caudate ligaments in cow. Dyce *et al.* (1996)

In bovine animals, the round, right and left triangular ligaments and the lower omentum were identified, while Ghosh (1998) identified falciform, right lateral, round, caudate and lesser omentum. in bovines. In the present study, the duodenal impression was not observed, while Dyce *et al.* (1996) reported the duodenal impression in exotic cattle. This might be due to species and breed variation.

The dorsal border was short and thick. It presented the caudate lobe and formed the deep renal impression where right kidney was fixed by caudate ligament. The ventral border was short, thin and convex. The lateral border was thin and was marked by the umbilical fissure to which the round ligament was attached. Medial border was thick and was almost median in position and presented a notch for the passage of esophagus. Above the esophageal notch, it lodged the posterior vena cava, which passed caudally through the wide sulcus in the body of the liver. Such remarks concur with the conclusions of the Raghavan (1964); Getty (1975); Frandson (1986); Ghosh (1998).

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