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Gross and Microanatomical Study of Liver in Giraffe (Giraffacamelopardalis)

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ABSTRACT: Background:Liver is the largest digestive gland in the body and it has both endocrine and exocrine function which involves production, collection and concentration of bile in the gall bladder, before being drained into the duodenum. This study was aimed to investigate the anatomical structure of liver in giraffe and the study has been planned to describe and justify the functional importance and essentially of the liver, the largest single organ.

Methods:An 18 month old female giraffe liver was collected for its microanatomicaland gross study. Both routine and special staining techniques were employed for the study.Tissue samples were fixed in 10 percent formal saline for 48 hours before being processed for fixation and staining procedures.

Result: Gross study revealed that giraffe liver has two surfaces, and four edges other structures were also discussed. In the routine and special staining techniques microanatomical structure of giraffe liver explored well defined connective tissue capsule, distinct globular pattern and other cellular details were also discussed.

Key words: Giraffe, Liver, microanatomical study, staining techniques.

I. INTRODUCTION

The digestive system of giraffe demonstrates various structural and functional adaptations to their diverse feeding habits. The digestive tract also represents a functional link between foraging Activity and energy conservation through energy allocation for various activities (Dawood et al, 2017). The liver is the largest of the digestive gland, serving as a nutrient storage organ and producer of bile. Important function performed by the liver are synthesis of fibrinogen, prothrombin, albumin, globulin. The main objective of this study is to describe the digestive gland liver of giraffe.

II. MATERIALS AND METHODS

An 18 month old female giraffe liver was collected in 10 percent formal saline and kept for 48 hours. Fixed tissues were later washed in running tap water followed by dehydration in ascending grades of alcohol, cleaning, embedding in paraffin wax of melting point 58-60 degree celcius. Preparation of blocks, section cutting 5-6 micron thickness and the sections were mounted and dried for routine and special staining procedure demonstrate different components of liver the gross and microanatomical study was conducted in the department Veterinary Anatomy, Madras Veterinary College during the year 2014.Gross study was conducted in the giraffe liver by observing its surfaces, edges, lobes with an intact gallbladder over the liver (fig 1) .Tissue samples were fixed in 10 percent formal saline for its histological observation. Routine stain (Hematoxylin and Eosin) and special staining techniques included Gomori'sstain, Masson's trichrome stain, periodic acid Schiff stain and weigert's stain.

III. RESULTS AND DISCUSSION

Gross study

Gross study of giraffe liver revealed that it was positioned in the thoracic part of the abdomen, in the diaphragm. The extension of the liver started from the level of 7th to last rib as it was reported in equine (Koing2007). Liver had two fissured surfaces concave and convex the convex towards diaphragm and concave towards the abdomen as it was reported in jebeer gazelle(Dawoodet al., 2017)has two face visceral and parietal faces. Four edges are dorsal, ventral, right and left (Sajjadin et al 2015) as it is observed in Jebeer gazelle. The hepatic portal area was marked on the visceral surface throughout which the bile duct, portal vein and hepatic vessels enter or leave the liver these results were reported in equine (Kiong 2007)Parietal face is convex and visceral face is concave . Four lobes are distinct they are right, left,quardate and caudate lobe(fig 1) as it was reported by jebeer gazelle (Dawood et al, 2017)in addition to caudate process and papillary process. The gall bladder is a small pear shaped sac as it is observed in deer (shill et al 2014).

Microanatomical study

In the routine and special staining techniques the microanatomical structure of giraffe liver explored well defined connective tissue capsule was covered by an outer peritoneal and and the inner connectivetissue covering similar findings reported in domestic animals (Dellmann and Brown 1981) this connective tissue covering is called as glisson's capsule (Dellmann and Brown 1981) and the capsule is composed of collagen, an reticular fibres and smooth muscle cells as it was reported in sheep (Pareek 2000) (fig 2)connective tissue septa from the capsule were found to be minimal (fig 3). Connective tissue fibres extended in to the gland mass and formed stroma of the gland as it was reported in domestic animals (Dellmann and Brown 1981)(fig3) Cells appeared polygonal having centrally placed large size nucleus with one or more nucleoli similar to the findings of (Bamniya et al.,2020) (fig 4) in Goat.. Hepatic lobules made up of central vein, portal area and one cell thickness of cords were observed as it is reported in domestic animals (fig 5) (Dellmann and Brown 1981) periphery portal area and hepatic cords radiated from centre to the periphery(fig5) (Copenhaver et al., 1967)Observed in pig and camel However lobular pattern was distinct in some areas but presence of connective tissue septa from the capsule were around the portal area (fig 5)A portal area consisted of inter globular portal vein, hepatic artery, bile duct and lymphatic (fig 5) as it was discussed by (Dellmann and Brown 1981) in domestic animals. (Mahata et al., 2003) in spotted deer. Around the central vein hepatocytes were arranged in the form of hepatic cords (fig5)Nuclei of hepatocytes were round to oval in shape. Cytoplasm was highly eosinophilic(fig4). Sinusoids were spacebetween hepatocyte cords which communicate with central veins(fig6) as it was reported in domestic animals (Dellmann and Brown 1981).Discrete phagocytic cells called kupffer cells with distinct centrally placed nucleus (fig7)(Dellmann and Brown1981) in domestic animals (pareek 2000) in sheep and(Mahatha et al 2003) in spotted deer.

IV. CONCLUSION

The study concluded that the liver of giraffe was similar to that of ruminants in its colour, shape,edges and lobes and microanatomical study reveals that the structures were similar to that of small ruminants.

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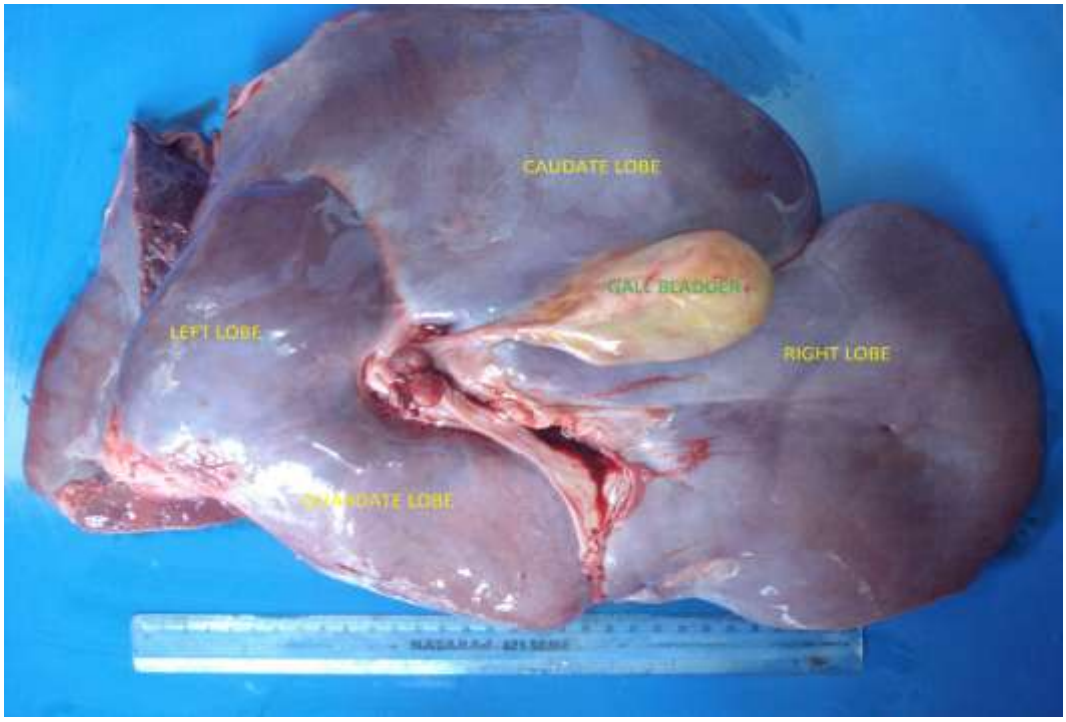

Fig **1 lobes of Giraffe liver**

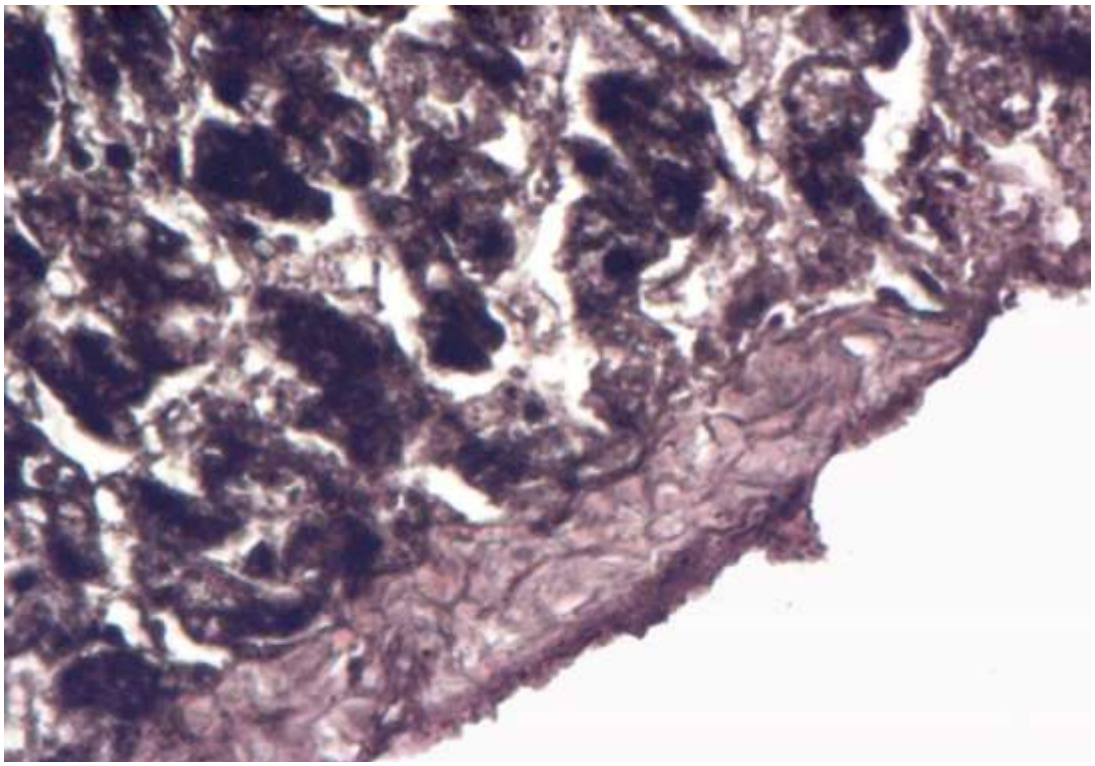

Fig 2 Capsule Gomori's stain 40 X

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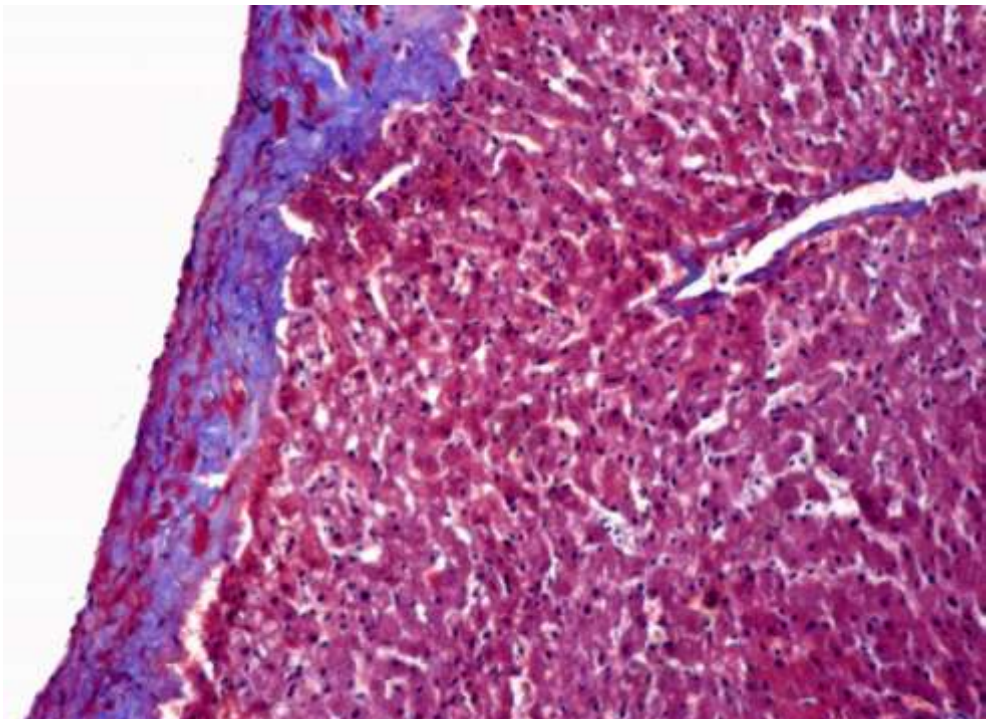

Fig 3 Masson's Trichrome stain 10 X

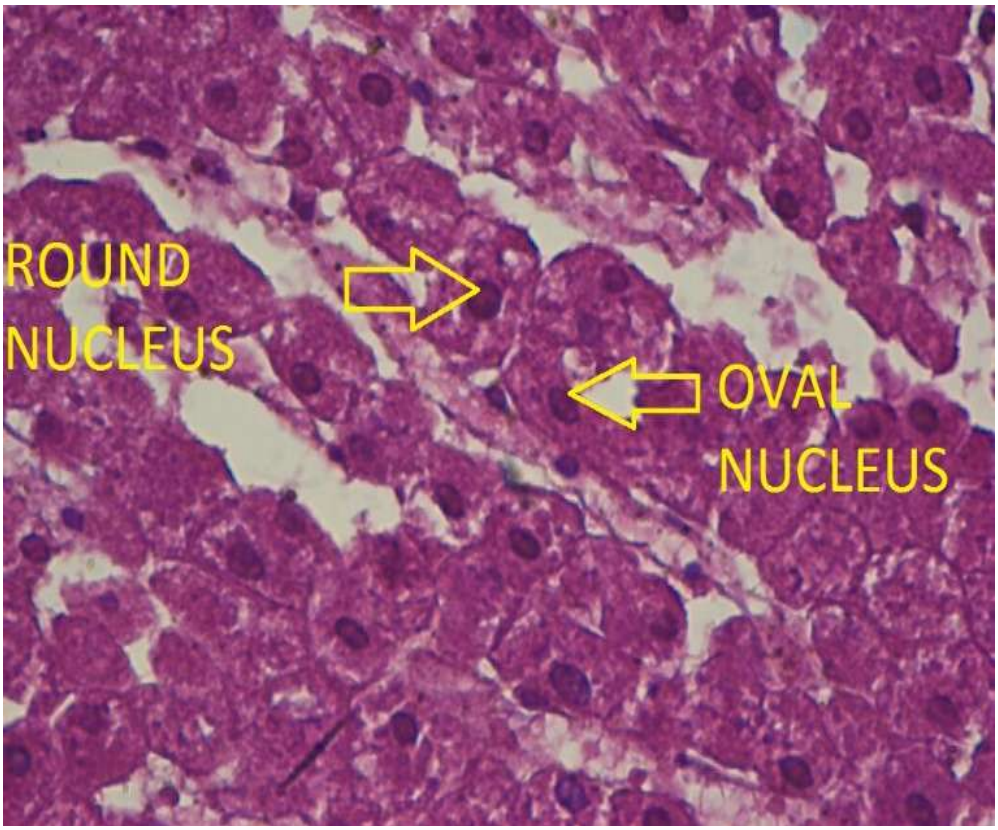

Fig 4 H & E 40 X

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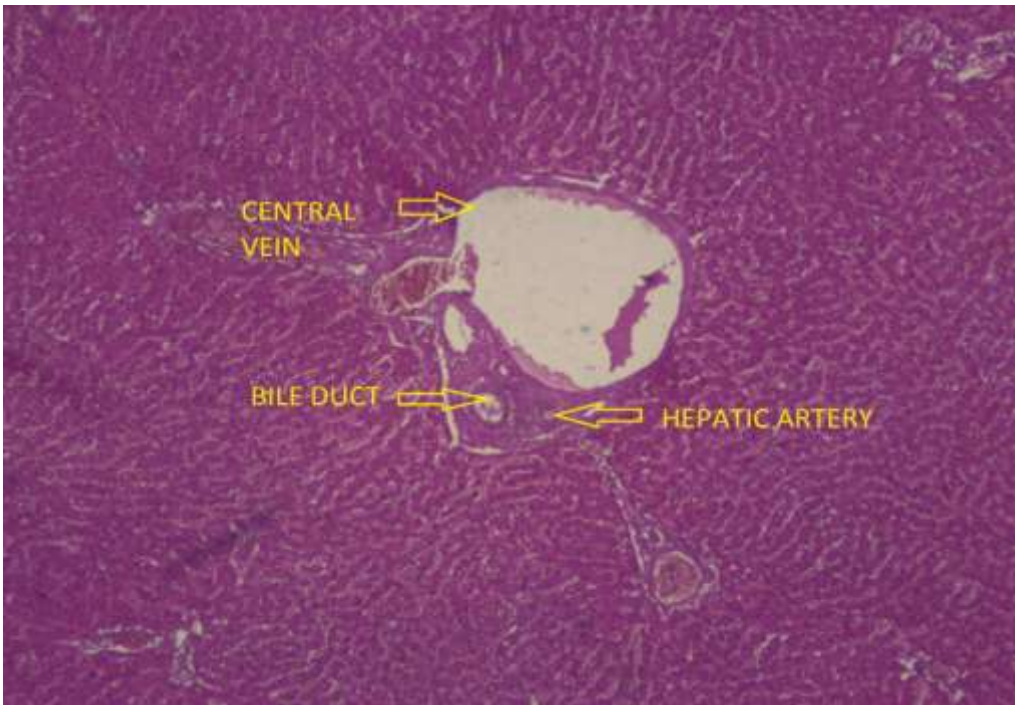

Fig 5 Portal triad H & E 10X

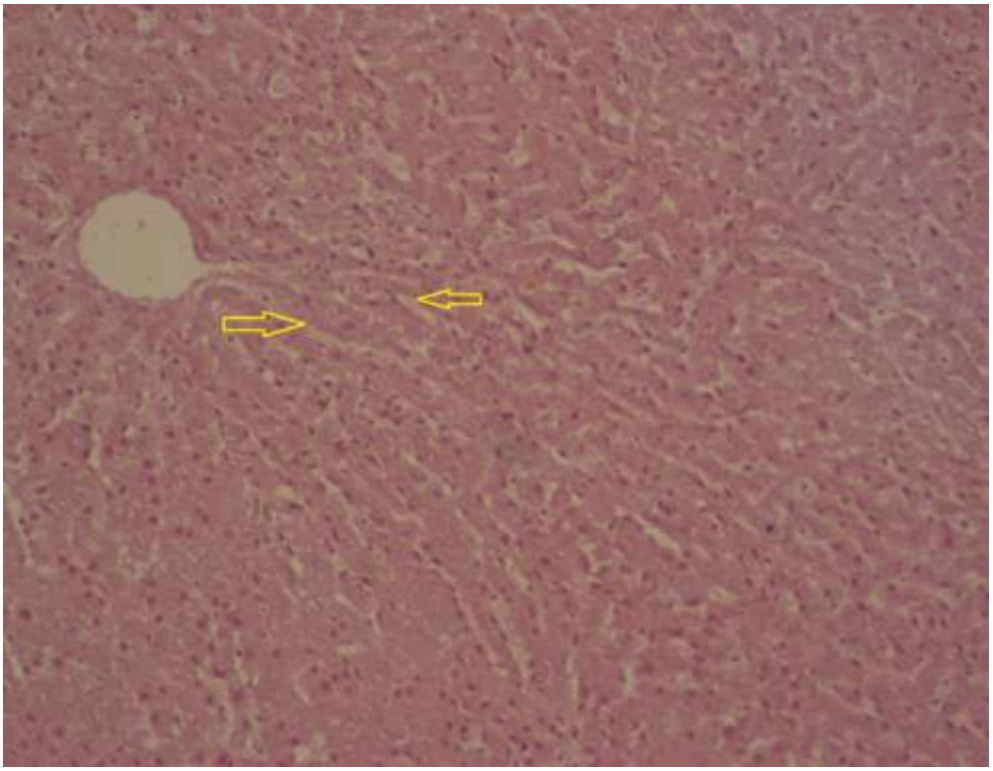

Fig 6 Sinusoids PAS 10 X

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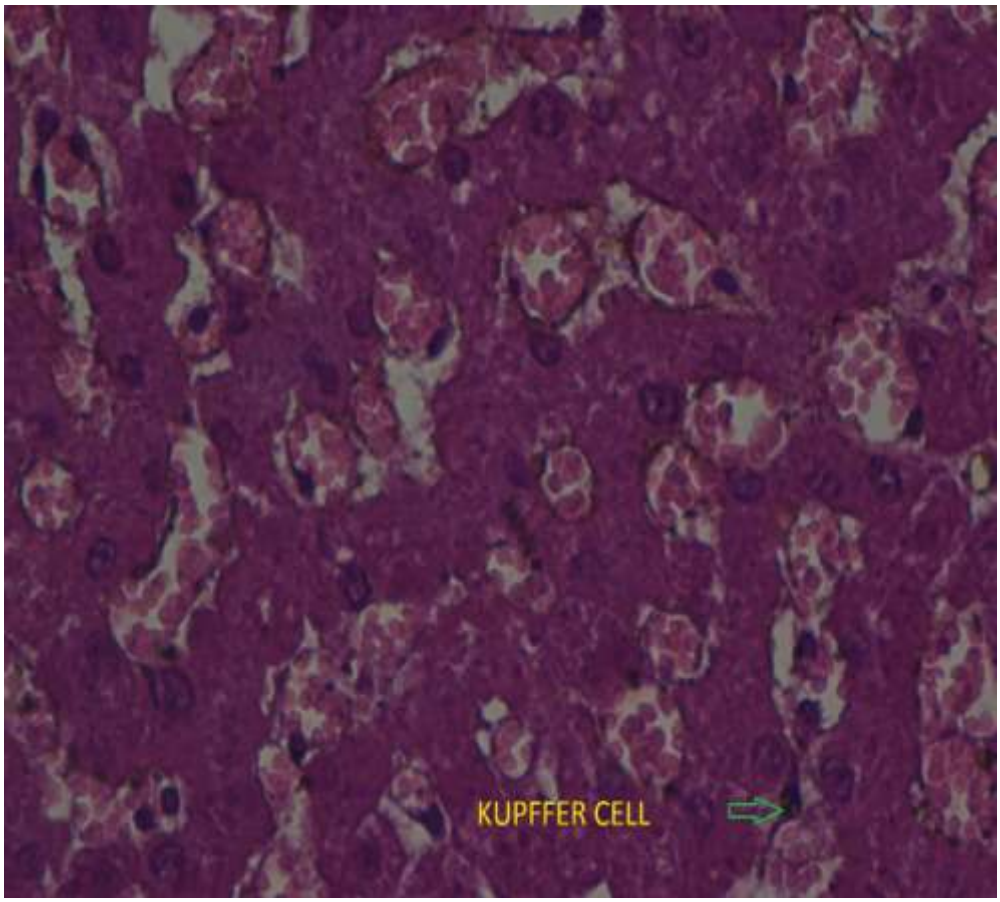

Fig 7 Kupffer cells H & E 40 X