Histological studies on the common hepatic artery of sheep

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Abstract
The present study was performed to illustration of common hepatic artery histological characteristics in six apparently healthy sheep. It was found that the common hepatic artery of sheep resembled microscopic features of a muscular artery. The endothelium of common hepatic artery rested on thin basement membrane. The subendothelial layer was very thin, the tunica media was composed smooth muscle cells interspersed with collagen and few scattered elastic fibers. The number of smooth muscle cell layers ranged from 25 to 30. The wavy external elastic lamina was broken and discontinuous. The tunica externa consisted of irregularly arranged connective tissue having collagen, elastic fibers and few fibroblasts which were intermingled.

Keywords: Sheep, Common hepatic artery, Histological study

Introduction
The liver has a complicated circulatory system than any other organ in the body. The dual blood supply of the liver is a unique feature and it receives 25% of the cardiac output through portal vein and the hepatic artery in all animals. The hepatic artery is branch of coeliac artery which performs an autoregulation function for blood flow into liver (Getty, 1975; Nickel et al., 1979; Konig et al., 2004). Hence, lobulation pattern decides the hepatic arterial distribution in the liver lobes (Azevedo et al., 2008; Bianchi et al., 2015). The three-dimensional vessel arrangement is of great importance for analysing the anatomical variations of the vascular structures within the organ (Schmidt et al., 2004). This approach will be of practical importance in hepatic surgery because dissection planes and incisions depend to a greater extent upon vascular anatomy of the liver (Niza et al., 2004). The arteries histomorphological organization determines their physico-mechanical properties and is influenced by hemodynamic forces of the luminal blood flow including, pulse rate, arterial flow velocity and resistance to flow in vascular segments and supplied organs (Labarbera, 1990). There is no information available on the histological structure of common hepatic artery of sheep. Hence, the study was designed to establish a more precise and detailed information on the histomorphology of hepatic artery in sheep.

Materials and Methods
Samples of hepatic artery were collected at the different places. They were fixed in 10% neutral buffered formalin and processed by routine paraffin method (Singh and Sulochana, 1998). About 5-6 µm thick sections were cut and subjected to the following routine and special staining techniques. Harris haematoxylin and eosin staining for micro-architecture (Singh and Sulochana, 1998), Masson’s trichrome method for collagen and muscle fibers (Singh and Sulochana, 1998), Verhoeff’s method for demonstration of elastic fibers (Singh and Sulochana, 1998) and Van-Giesons method for demonstration of collagen fibers (Singh and Sulochana, 1998).

Results and Discussion
In the present investigation hepatic vessels of sheep resembled microscopic features of a muscular artery comprising three layers within outwards viz., tunica intima, tunica media and tunica adventitia (Fig.1) which is in concurrence with the description of several authors like Burkel, (1970) in rats; Bacha and Bacha, (2000) in domestic animals; Kimani et al., (2011) in humans; Krus et al., (2000a) in humans; Augey and Frye, (2001) in domestic animals; Eurell and Frappier, (2006) in domestic animals; Dyce et al., (2010) in domestic animals. The common hepatic artery of sheep in the present study showed tunica intima consisted of three sub layers viz., endothelium, subendothelial layer and internal elastic membrane or lamina.
The endothelium was lined by a single layer of flat squamous cells which were placed on thin basement membrane. The nucleus shape was oblong and resembled tear drop which protruded into the lumen (Fig.2). The endothelial layer rested on thin basement membrane. The subendothelial layer was very thin and appeared as wavy layer attached to continuous internal elastic membrane (IEM) (Fig.3). The intima was separated from media by this IEM which seldom protruded into tunica media. The veracity of the present findings could be confirmed with the observations of Kimani et al., (2011) in humans, Krus et al., (2000a) in humans, Aughey and Frye, (2001) in domestic animals and Dyce et al., (2010) in domestic animals.

The tunica media in present study was composed of predominantly smooth muscle cells interspersed with collagen and few scattered elastic fibers (Fig.4). The smooth muscle cells were spindle shaped with centrally located nucleus. These cells were circularly arranged and concentrically held together by collagen and elastic fibers. The number of smooth muscle cell layers ranged from 25 to 30. These findings are in complete confirmation with reports of Aughey and Frye, (2001) in domestic animals; Eurell and Frappier, (2006) in domestic animals, Janiuk et al., (2007) in pigs, Janiuk et al., (2009) in cows.

The wavy external elastic lamina in the present study was broken and discontinuous which separated the tunica media from externa (Fig.3, 4 & 5). These observations are in agreement with findings of Aughey and Frye, (2001) in domestic animals and Eurell and Frappier, (2006) in domestic animals.

The prominent tunica externa consisted of irregularly arranged collagen, elastic fibers and few fibroblasts which were intermingled. There was no evidence of vasa vasorum and nervi vasorum amongst collagen fibers of this layer (Fig.3 & 5). These findings are in complete acceptance with Eurell and Frappier, (2006) and Dyce et al., (2010) while in partial acceptance with Aughey and Frye, (2001) in domestic animals. Arteries with predominant tunica adventitia would have the feature of limited expansion properties with artery.
Fig 5: Photomicrograph of common hepatic artery showing external elastic membrane

Tunica media (TM), Tunica externa (TE), External elastic membrane (EEM). Vangieson X 60

References
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