Original Research

Gross Morphological Features of Pancreas in Large White Yorkshire Pigs

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Abstract

The pancreas for the present study had been collected from different age groups of apparently healthy large white Yorkshire pigs slaughtered at local slaughter house. In large white Yorkshire pigs, the pancreas was located along the dorsal aspect of the abdominal cavity behind the stomach in left of the median plane. The pancreas appeared as a pale pink triangular shaped lobulated gland with irregular margins and consisted of splenic, duodenal and connecting lobes. The three lobes of pancreas and the connecting strands enclosed the portal ring. Among the three lobes, the duodenal lobe was thin and long, the splenic lobe was thick and longer and the connecting lobe was thickest and shortest. Pancreatico-duodenal lymphnodes and adipose tissue were found adjacent to all the lobes and in portal ring. The main pancreatic duct arose from duodenal lobe and it opened about 20 cm from the pylorus in the duodenum.

Key words: Large White Yorkshire, Morphology, Pancreas

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Introduction

The pancreas of vertebrates is considered as an accessory digestive gland which has two regions, one is an exocrine portion where digestive enzymes are synthesised and the other is an endocrine portion where regulatory hormones are produced and released into blood vessels. The similarities of the innate and adaptive systems of pigs and humans have led to the use of pigs as a livestock translational model for the study of various infectious diseases and in vaccine development (Roth and Tuggle, 2015). Most of the gross and histological researches about pancreas were in birds species only (Al-Agele and Mohammed, 2012).Though gross morphology of pancreas of some mammalian species are available, only scanty amount of literatures are available on pancreas of pigs in relation to age which prompted to take up the study.

Materials and Methods

The pancreas for the study had been collected from different age groups of apparently healthy large white Yorkshire pigs which were slaughtered at local slaughter house. Immediately after slaughter, the abdominal cavity was exposed to locate the pancreas and then its topographical relationship with other organs was studied. The pancreas was removed along with stomach, spleen and duodenum to reveal the pancreatic duct. The pancreata were separated, washed in normal saline and mopped with blotting paper. The macroanatomical features such as color, shape, weight, structure and number of lobes of pancreas were observed. The gross morphological age related changes of pancreas from four months of age to adult were studied in large white Yorkshire pigs.

Results and Discussion

Location of the Pancreas

In all age groups of large white Yorkshire pigs, the pancreas was located along the dorsal aspect of the abdominal cavity behind the stomach in left of the median plane as noted by Sisson and Grossman (1953) in pigs. Tsuchitani *et al.* (2016) also stated that the pancreas was extending transversely along the dorsal wall of the abdomen from the duodenum to the spleen in monkey and caudal to the liver in dog. In Indian donkey (Dhoolappa *et al.*, 2004), the pancreas was situated below the liver extending from 14^{th} to 16^{th} rib on right side of the median plane and in birds such as golden eagle (Al-Agele and Mohammed, 2012), native chicken (Parchami and Kusha, 2015) and mynah (Saadatfar and Asadian, 2009), it was located on right side of abdominal cavity between ascending and descending duodenal loops. These changes in location might be due to species variation.

Gross Morphology of the Pancreas

In the present study, the colour of the pancreas was observed as pale pink whereas in bovine it was pinkish yellow or yellowish brown (Dyce *et al*., 1971) and in camel it was found as greyish pink (Ali and Masaad, 2007). The pancreas was observed as a triangular lobulated gland with irregular margins as in Indian donkey (Dhoolappa *et al*., 2004) whereas it had the shape of caudally opened 'V' in dog (Tsuchitani *et al*., 2016). In large white Yorkshire, the mean weight of pancreas was gradually increased (Fig. 1) as the age advanced as reported by Ulrichs *et al.* (1995) in German landrace pig.

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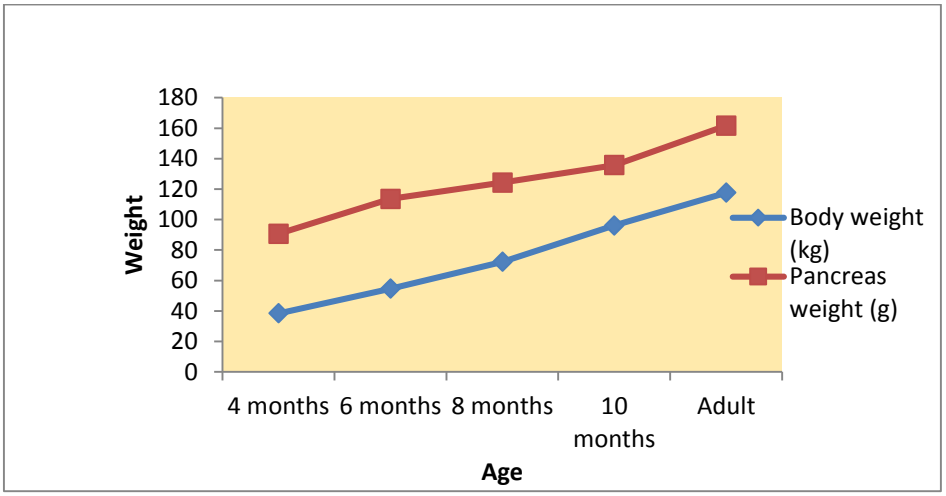

Fig. 1: Comparison of body weight and pancreas weight in relation to age in large white Yorkshire

The pancreas of large white Yorkshire pigs of all age groups consisted of three lobes *viz*., splenic, duodenal and connecting lobe (Ferrer *et al*., 2008). In contrary, the lobes were mentioned as right and left with centrally placed body in pig (Nickel *et al.*, 1973) and the pancreas had head, body and tail in monkey (Tsuchitani *et al*., 2016). Whereas, Deprem *et al*. (2015) described that the pancreas in goose was divided into four lobes *viz*., dorsal, ventral, third and splenic lobes. The three pancreatic lobes with connecting strands enclosed the portal ring as observed by Liebich and Konig (2004) in horse and pig (Plate 1).

Plate 1: Photograph showing the three lobes of pancreas of Large White Yorkshire Pigs

Among the three lobes of pancreas, it was observed that the duodenal lobe was thin and long, the splenic lobe was thick and longer and the connecting lobe was thickest and shortest in all the age groups. In accordance, Tsuchitani *et al*. (2016) also mentioned thin and slender right lobe and thicker and wider left lobe in dog. A thicker capsule was found around the proximal free end of the splenic lobe and a thinner capsule was noticed around the duodenal and connecting lobes as reported by Dhoolappa *et al*. (2004) in

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Indian donkey. Small pancreatico-duodenal lymph nodes and adipose tissue were observed adjacent to all the pancreatic lobes and portal ring. Similar finding was also recorded by Dyce *et al.* (1996) in pigs.

Topography of the Pancreas

The splenic lobe of pancreas was located towards the left in contact with the dorsal end of the spleen, left kidney and was also related to the ascending and transverse colon. In concurrence, Nickel *et al.* (1973) also observed that the left lobe in pig was related to the dorso-caudal border of the spleen, cranial pole of left kidney and left abdominal wall. The duodenal lobe was located against the lesser curvature of the stomach and attached along the first part of the duodenum. The connecting lobe was related to the portal vein, ascending and transverse colon and it ended at the level of right kidney. These observations are in accordance with the location of right lobe and body of pancreas in pigs (Sisson and Grossman, 1953).

Pancreatic Duct

The pancreas of the pigs had only one pancreatic duct as in bovines, sheep and goat (Dyce *et al.*, 1996). The main pancreatic duct from duodenal lobe opened about 20 cm from the pylorus in the second part of the duodenum as stated by Ferrer *et al*. (2008) in pigs. But in sheep and goat the pancreatic duct joined the common bile duct before it reached the duodenum (Nickel *et al.*, 1973).

Conclusion

The pancreas of large white Yorkshire pigs collected from different age groups was located along the dorsal aspect of the abdominal cavity and appeared as a pale pink triangular shaped lobulated gland with splenic, duodenal and connecting lobes. The main pancreatic duct arose from duodenal lobe and it opened about 20 cm from the pylorus in the duodenum.

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