

Are Glands Present in Goose Pancreatic Ducts? A Light Microscope Study

Nurhayat Gulmez

Division of Histology and Embryology, Veterinary Faculty, Kafkas University. Kars, Turkey

ABSTRACT

Objective The objective of the present study was to investigate the histological structure of goose pancreatic ducts.

Design Tissue samples from the lobes and ducts of the pancreas were dissected under deep ether anesthesia.

Interventions Sections were stained using Crossmon's connective tissue method for general observations and Gomori's method for pancreatic islet cells.

Results The glands were found intermittently inside the connective tissue of the ducts starting from the interlobular ducts to the point where the pancreas emptied its contents into the duodenum as well as inside the muscular layer of the pancreatic ducts. Those glands contained centro-acinar cells and also had the same staining features as the acinus.

Conclusions To our knowledge, this was the first report of the presence of glands in the ducts of goose pancreas.

INTRODUCTION

The avian pancreas is located on the right side of the abdominal cavity in all birds. It is tightly bound by mesentery and blood vessels positioned between the descending and the ascending duodenal loops [1]. It is composed of two main lobes, dorsal and ventral, which

extend from the apex of the duodenal loop to the point where the pancreatic ducts enter the distal duodenum. Another smaller lobe, extending from the head of the pancreas towards the spleen has been termed as the splenic lobe [2]. A further subdivision of the lobes of the pancreas has been made by Mikami and Ono [3] who divide the ventral lobe into the ventral lobe proper and the third lobe on the basis of the latter's independent form and peculiar distribution of islets. Both dorsal and ventral lobes have ducts extending almost the full length of their course and there is also a third, smaller duct leading from the third lobe. Pancreatic ducts from the acinus to the point where it empties its contents into the duodenum are arranged in following order: intercalated ducts (the smallest in size), intralobular ducts, interlobular ducts and pancreatic ducts (main ducts) [4, 5]. The objective of the present study was to investigate the histological structure of goose pancreatic ducts.

MATERIALS AND METHODS

Five adult geese (*Anser anser*) obtained from the Kafkas University Veterinary Faculty Farm were used in the current study. Tissue samples from the lobes and ducts of the pancreas were dissected under deep ether anesthesia. Samples were fixed in Bouin's fluid and then routinely processed for embedding in paraffin. Tissue blocks were cut into 6-micrometer thick sections using a microtome. The sections were stained using Crossmon's connective tissue method for

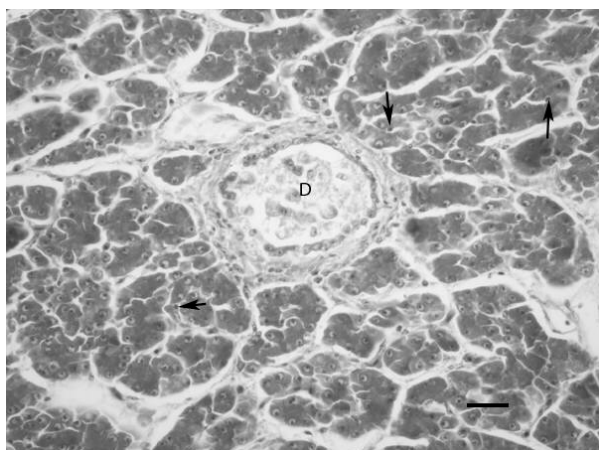


Figure 1. Intralobular duct (D). Centro-acinar cells (arrows). Crossmon's staining method (Bar: 50 μ m).

general observations and Gomori's method for pancreatic islet cells.

ETHICS

Tissues were harvested in compliance with an approved Kafkas University Animal Care and Use Committee Protocol.

RESULTS

In the present study, the goose pancreas was found to be located between the duodenal loops and had dorsal, ventral, third and splenic lobes. All the pancreatic lobes had

their own intercalated ducts, intralobular ducts (Figure 1) and interlobular ducts (Figure 2). In addition, there were only two main ducts (dorsal and ventral pancreatic ducts) extending from the pancreas (Figure 3) to the point where it emptied its contents into the duodenum.

Intercalated ducts lined with a simple flattened epithelium reach intralobular ducts lined with tall columnar epithelium. Intralobular and interlobular ducts are composed of two main tissues, a columnar epithelium which lines up inside the ducts and connective tissue surrounding outside the ducts. Furthermore, interlobular ducts have thin muscle layers surrounding the connective tissue. However, the main ducts of the pancreas are composed of three layers: first, the mucosa lined with columnar epithelial tissue, then inside longitudinally and outside circularly arranged muscle tissue and, finally, externally adventitial connective tissue. Furthermore, basophilic staining on the apical surface of the goose pancreatic ducts starting from the interlobular ducts (Figure 2) to the pancreatic ducts (Figures 3 and 4) indicates possible secreting functions of those tissues. Interestingly, the glands were found intermittently inside the connective tissue of the ducts starting from the interlobular ducts (Figure 2) to the point where the pancreas emptied its contents into the duodenum

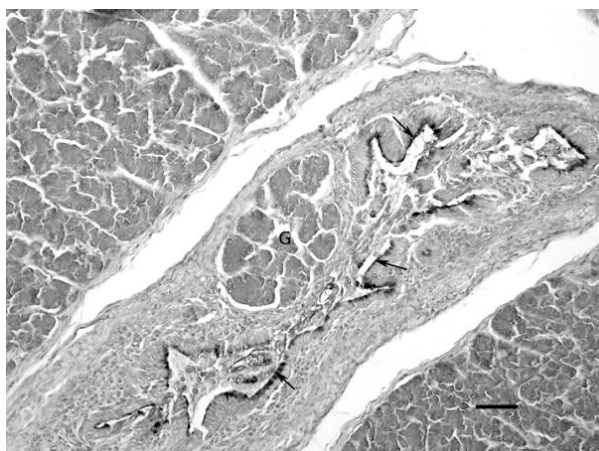


Figure 2. Glands (G) in the interlobular duct and basophil staining on the apical surface of the ductus epithelium (arrows), indicating secretory functions of these cells. Gomori's staining method (Bar: 100 μ m).

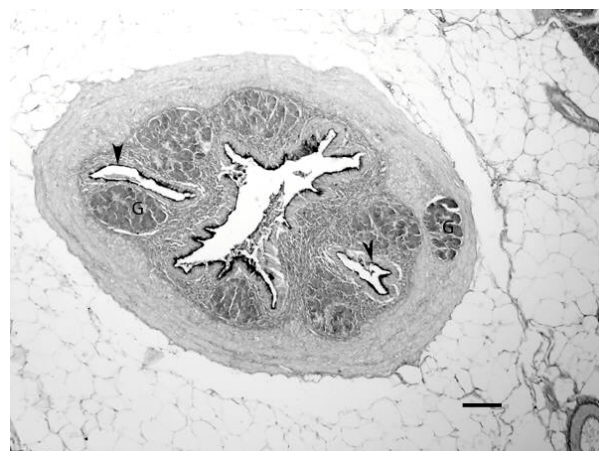


Figure 3. Glands (G) inside the connective and muscular tissues of the pancreatic duct and their own interlobular ducts (arrow heads). Gomori's staining method (Bar: 200 μ m).

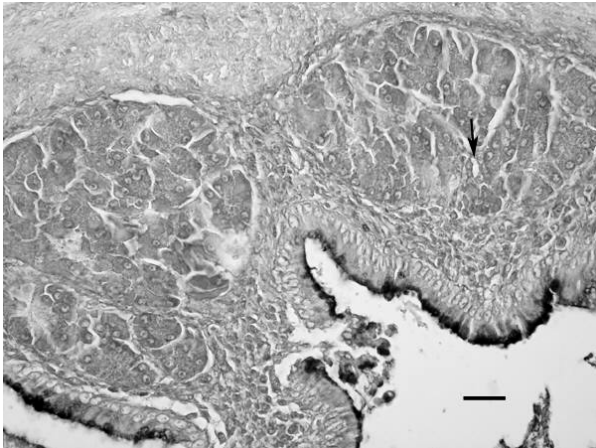


Figure 4. Intercalated duct (arrow) inside the glands of the pancreatic duct. Gomori's staining method (Bar: 50 μ m).

(Figure 5) as well as inside the muscular layer of the pancreatic ducts (Figure 3). Those glands contained centro-acinar cells (Figure 6) and also had the same staining features as the acinus. Moreover, those glands had their own intercalated ducts (Figure 4), intralobular ducts (Figure 5) and interlobular ducts (Figure 3). It appeared that the glands inside the wall of the ducts were structurally similar to the exocrine part of the goose pancreas. Furthermore, no endocrine island was noticed among those glands.

DISCUSSION

We found that the goose pancreas, as in other avian species [2], was located between the

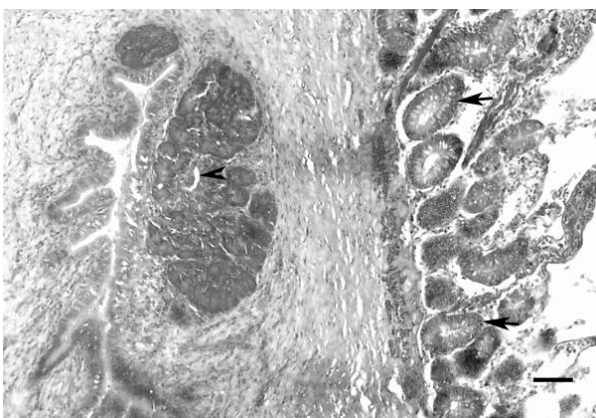


Figure 5. Glands and their own intralobular duct (arrow head) inside the wall of the pancreatic duct where it opens into the duodenum. Arrows indicate intestinal glands (Liberkuhn). Crossmon's staining method (Bar: 100 μ m).

duodenal loops and had dorsal, ventral, third and splenic lobes. Mikami and Ono [3] demonstrated that the dorsal, ventral and third lobes had their own ducts, whereas McLeod *et al.* [6] showed that the third lobe occasionally consisted of its own duct. Additionally, it was shown that there were usually two pancreatic ducts (main ducts) in the goose pancreas, even though the presence of a third one was reported [7].

We also demonstrated that, in the goose pancreas, there were only two main ducts extending from the pancreas to the duodenum. This finding is in agreement with the results of McLeod *et al.* [6], and Nickel-Schummer and Seiferle [7].

The structure of the goose exocrine glands found in the present study agrees with the results of previous studies [3, 4, 8, 9, 10]. In fact, as in other vertebrates, the avian pancreas was mainly composed of exocrine glands (about 99%), [3, 8]. Those glands consisted of tall columnar epithelial tissues which had acidophilic zymogen granules on their apical surface [4, 9, 10]. Moreover, small centro-acinar cells without granules were observed in the central lumen of the acinus [10].

The structure of the ducts in the goose pancreas was found to be similar to that described in previous studies [4, 11]. In addition, the presence of basophilic staining on the apical surface of the goose pancreatic

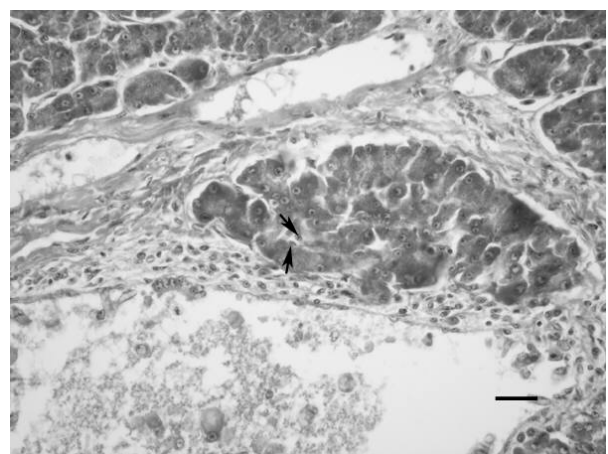


Figure 6. Centro-acinar cells (arrows) inside the glands of the interlobular duct. Crossmon's staining method (Bar: 50 μ m).

ducts starting from the interlobular ducts to the pancreatic ducts was also found in chickens [12].

To our knowledge, this was the first report of the presence of glands in the ducts of the goose pancreas. Thus, it would be of interest to study in more detail the structure of those glands using either electron microscopic or immunohistochemical techniques to clarify their possible functions.

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Correspondence

Nurhayat Gulmez
Kafkas Üniversitesi
Veteriner Fakültesi
Histoloji-Embriyoloji Anabilim Dalı
Kars, 36100
Turkey
Phone: +90-474-242.6800 Ext: 1121
Fax: +90-474-242.6853
E-mail address: ngulmez@hotmail.com

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