NORMAL ARTERIAL SUPPLY TO THE RUMINANT (OVINE) STOMACH

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There is a paucity of literature concerning the detailed arterial supply and venous drainage of the ruminant stomach. Yoshikawa, Suzuki and Nakamura (1956), Habbel (1964) and Horowitz and Venske (1966) have recorded anatomic descriptions of the arterial system in the goat, sheep and cow. Because of increasing interest in the study of rumen physiology and surgical efforts to create the “monogastric” ruminant, it was felt that a study of this type should be undertaken.

Materials and Methods

Ten adult sheep were used in the anatomical portion of this study. Anatomical dissections of the arterial supply to the forestomach and stomach were performed. All animals were embalmed with 10% formalin using the monostat varistaltic pump followed in 36 hr. by latex injection of the arterial system. All illustrations were made while directly viewing the dissected cadavers and then partially schematized for the purpose of more effective illustration.

Results

It was noted, in all dissections, that the entire arterial supply to the ovine stomach and forestomach is derived from the celiac artery. Likewise, in all dissections, the celiac and cranial mesenteric arteries arose by a common trunk from the abdominal aorta. This has been reported as a common occurrence (Habel, 1964); however, in our dissections, it may be reported as a constant finding in 10 dissections. In the bovine, however, the more common situation is for the two vessels to arise individually from the aorta.

The right ruminal artery (figure 2) in both the ovine and bovine arises in common with the splenic as the splenoruminal trunk. The splenic artery, the smaller of the two, passes over the dorsal sac of the rumen to the spleen. The right ruminal artery descends caudal to its large companion vein to the origin of the right longitudinal groove, whereby it then passes in company with a branch of the dorsal vagal trunk caudally in this groove to supply the dorsal and ventral ruminal sacs. In the bovine, prominent dorsal and ventral caudal coronary pillars are present, while the ovine rumen does not have such well developed coronary grooves nor pillars.

The left ruminal artery (figure 3) is a large vessel which arises distal to the origin of the splenoruminal trunk. Shortly beyond its origin, the left ruminal artery gives off the reticular artery. This vessel descends on the left surface of the cardia and the area of the atrium ventriculi, supplying these areas as well as sending esophageal branches through the esophageal hiatus to the distal esophagus. In
Figure 1. Right surface of ruminant stomach (ovine) showing distribution of common hepatic artery (semi-diagrammatic).

Figure 2. Origin and distribution of right ruminal artery in the ovine (semi-diagrammatic).
the well injected specimen one can trace vasa nervorum from these branches into the meson-eurium of the dorsal and ventral vagal trunks. The dorsal vagal trunk also receives vasa nervorum from the phrenic artery, the first branch of the celiac trunk.

The left ruminal artery terminates (figure 4) by descending in the ruminoreticular groove deep to the serosa which binds the reticulum and cranial ventral sac of the rumen together, and continues caudally in the left longitudinal groove much like its counterpart on the right side.

The left gastric artery (figure 5) may be considered the continuation of the celiac after the common hepatic, splenic and ruminal arteries have been given off. The left gastric and its large left gastroepiploic branch are the
major vessels to the abomasal fundus and body. The left gastroepiploic artery sends branches to the omasal groove and terminates by anastomosing along the greater curvature of the abomasum with the right gastroepiploic from the common hepatic artery. The left gastric artery terminates by anastomosing along the lesser curvature of the abomasum with the right gastric artery, a branch of the common hepatic.

Discussion

While this study does not represent new knowledge in so far as the basic pattern of the rumen arterial system is concerned, it does contribute detailed anatomical data concerning these arteries which should be of value to the scientist as well as the clinician. The illustrations also simplify the understanding of this organ's complicated arterial supply by emphasizing the course of a single artery at a time rather than all vessels superimposed on each other. Also, the anastomoses of the arterial supply along the various visceral compartments are emphasized (figures 1, 2, 3, 4 and 5). The origin and course of the reticular artery to the distal esophagus and the tissue surrounding the cardia is illustrated (figure 2). Ligation of the left ruminal artery proximal to the origin of the reticular artery in rumenectomy could seriously compromise the arterial supply to the distal esophagus and area of the cardia.

Summary

From a study of 10 adult sheep it may be concluded that the rumen receives its entire arterial supply from two vessels, the right and left ruminal arteries. The abomasum is richly supplied by the common hepatic and left gastric arteries. In all 10 dissections, the entire arterial supply to the ruminant stomach originated from a single artery, the celiac-cranial mesenteric trunk.

Literature Cited


