



A Study on the Anatomical Properties of Arteria Celiaca and Its Branches in Hasak Sheep *

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This research was carried out with the aim of macro-anatomical study of arteria celiaca and its branches in the Hasak sheep race. Six Hasak sheep were used in the study. Colored latex and polymethyl-methacrylate were injected from the aorta abdominalis. It was observed that the first branch of aorta abdominalis in cavum abdominis was arteria celiaca. It was determined that arteria celiaca first gave arteria lienalis and then arteria hepatica and arteria gastrica sinistra as a common root. Arteria lienalis rami pancreatici had ramus epiploicus, arteria ruminalis sinistra and arteria ruminalis dextra branches. It was found that arteria hepatica gave arteria cystica, arteria gastrica dextra and rami pancreatici and arteria gastroduodenalis. Arteria gastrica sinistra was the continuation of arteria celiaca. During the course, arteria reticularis, arteria gastroepiploica sinistra and arteria reticularis accessoria were separated from this vessel. It was observed that arteria reticularis has branches named ramus ruminalis and ramus reticularis. It was observed that arteria reticularis accessoria gave several branches to the parietal side of omasum and visceral face of reticulum. As a result; It was determined that the arteries originating from arteria celiaca in the Hasak sheep race have some differences. It was concluded that these differences may be related to the genetic make-up of the race.

Key Words: Arteria celiaca, macroanatomy, ramification

Hasak Koyununda Arteria Celiaca ve Dallarının Anatomik Özellikleri Üzerine Bir Araştırma

Bu araştırma, hasak koyun ırkının arteria celiaca ve verdiği dalların makro-anatomik olarak incelenmesi amacıyla yapıldı. Çalışmada altı adet hasmer koyunu kullanıldı. Aorta abdominalis'ten renklendirilmiş latex ve polymethyl-methacrylate enjekte edildi. Cavum abdominis'te aorta abdominalis'in verdiği ilk dalın arteria celiaca olduğu gözlemlendi. Arteria celiaca'nın ilk önce arteria lienalis'i ve daha sonra arteria hepatica ile arteria gastrica sinistra'yı ortak bir kök halinde verdiği belirlendi. Arteria lienalis rami pancreatici, ramus epiploicus, arteria ruminalis sinistra ve arteria ruminalis dextra isimli dallara sahipti. Arteria hepatica'nın, arteria cystica, arteria gastrica dextra ve rami pancreatici ile arteria gastroduodenalis'i verdiği tespit edildi. Arteria gastrica sinistra, arteria celiaca'nın devamı şeklindeydi. Seyri esnasında bu damardan arteria reticularis, arteria gastroepiploica sinistra ile arteria reticularis accessoria ayrılmaktaydı. Arteria reticularis'in, ramus ruminalis ve ramus reticularis isimli dallara sahip olduğu gözlemlendi. reticulum'un visceral yüzü ile omasum'un parietal yüzüne arteria reticularis accessoria'nın birkaç dal verdiği görüldü. Sonuç olarak; hasak koyun ırkında arteria celiaca'dan orijin alan damarların bazı farklılıklara sahip olduğu tespit edildi. Bu farklılıkların ırkın genetik yapısına bağlı olabileceği kanısına varıldı.

Anahtar Kelimeler: Arteria celiaca, makroanatomi, dallanma

Introduction

In order to increase the production of quality lamb meat, the Hasak genotype was obtained by crossing domestic breeds with low fattening and carcass quality in the Bahri Dagdas International Agricultural Research Institute and meat types with good meat yield and quality (1). In the cross-breeding and selection projects carried out between 1989-2000, F1s, ASB G1 and HD G1s were obtained from the crossbreeding of Akkaraman breed (AKK) with German Black Head (ASB) and Hampshire Down (HD) breeder breeds. A single type was created by applying a balanced seeding program to hybrids from these two paternal lines. Accordingly, this new type includes 31.25% HD, 31.25% ASB and 37.50% Akkaraman genotype. For this type, the name "Hasak" was formed by taking the letters H from HD, AS from ASB and AK from Akkaraman (1-3).

Arteria celiaca, which gives three main branches: arteria gastrica sinistra, arteria hepatica and arteria lienalis; nourishes the initial part of the liver, spleen, pancreas, stomach and duodenum (4-8). Some sheep species (6, 9-12) although there are work-related artery celiaca anatomy, an indigenous race, which Hasak sheep breeds in Turkey where there is not any study about the artery celiac and branches have been identified. With this research, it is aimed to fill the gap on the subject.

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Materials and Methods

In the research, six Hasak breeders, which were supplied from Konya Bahri Dagdas International Agricultural Research Institute Experimental Animal Unit, were used. After washing with 10% saline, colored latex and polymethyl-methacrylate were injected from the aorta abdominalis. The materials were kept in a 10% formaldehyde solution for 24 hours and dissected. The dissected materials were photographed with Nikon P900 83X Optical Zoom camera. Nomina Anatomica Veterinaria (N.A.V.) was based on terminology (13). The necessary permission for the study was obtained from the Atatürk University Veterinary Faculty Unit Ethics Committee (23.10.2015, 8/153).

Results

It was observed that aorta abdominalis passed from cavum thoracis to cavum abdominis through hiatus aorticus. It was determined that arteria celiaca, which was the first branch in cavum abdominis, was progressing towards the ventral at the first lumbar vertebra level. It was observed that the first vessel that left the arteria celiaca. Later, it was determined that arteria lienalis and arteria hepatica and arteria gastrica sinistra took origin as a common root, respectively (Figure 1).

Arteria lienalis: Arteria lienalis first gave the ramie pancreatici to the pancreas. It was later determined that he gave ramus epiploicus and arteria ruminalis sinistra, which fed the omentum majus during the course of the vessel. After giving arteria ruminalis dextra, it continued its course as arteria lienalis (Figure 1, 2).

Arteria ruminalis sinistra: Arteria ruminalis sinistra originated from the left side of arteria lienalis. It was observed that the artery reached the right side of the atrium ruminis by running caudoventrally. Afterwards, it was determined that vascularize the parietal face of saccus cecus craniodorsalis and saccus cecus cranioventralis (Figure 1, 2).



Figure 1. Arteria celiaca's branches. 1- a. abdominalis, 2- a.celiaca, 3- a.mesenterica cranialis, 4- a.phrenica caudalis, 5- a. lienalis, 6- a. gastrica sinistra, 7- a. hepatica.



Figure 2. Arteria lienalis, arteria gastrica sinistra and arteria hepatica's branches. 1- a. celiaca, 2- a.phrenica caudalis, 3- a. lienalis, 4- a. gastrica sinistra, 5- a. hepatica, 6- ramus pancreaticus, 7- ramus epiploicus, 8- a. ruminalis sinistra, 9- a. ruminalis dextra, 10- a. reticularis, 11- a. reticularis accessoria, 12- a. gastroepiploica sinistra, 13- a. cystica, 14- a. gastrica dextra, 15- rami pancreatici, 16- a. gastroduodenalis.

Arteria ruminalis dextra: It was determined that Arteria ruminalis dextra (Figure 1, 2) originated from the right side of the arteria lienalis and reached the visceral face of the rumen with a caudoventral course. It was observed that the arteria ruminalis dextra, which hovers within the sulcus longitudinalis dexter, was extended to the sulcus caudalis and ended in this groove passing to the parietal face of the rumen. During the course of a. ruminalis dextra, it was observed that this vessel gave coronary arteries vascularizing the saccus cecus on the parietal and visceral face.

Arteria hepatica: Arteria hepatica was originated from arteria celiaca as a common root with arteria gastrica sinistra. It was determined that the vessel progressed towards porta hepatis in the visceral aspect of liver and continued to progress as arteria gastroduodenalis after giving vessels named arteria cystica, arteria gastrica dextra and rami pancreatici (Figure 2). It was determined that arteria gastroduodenalis was named arteria gastroepiploica dextra after giving arteria pancreaticoduodenalis cranialis and it anastomosed with arteria gastroepiploica sinistra in the curvatura minor of abomasum.

Arteria cystica: After leaving arteria hepatica, it was determined that the arteria cystica, which travels on the visceral side of the liver, was distributed to vesica fellea (Figure 2).

Arteria gastrica dextra: It was determined that the arteria gastrica dextra (Figure 2), which was on the visceral side of the liver, gave the arteria lobi caudati for the caudal lobe of the liver and then anastomosed with arteria gastrica sinistra.

Arteria gastroduodenalis: Arteria gastroduodenalis, seen as the continuation of arteria hepatica, continued as arteria gastroepiploica dextra on

the *curvatura major* of *abomasum*, and it gave the *arteria pancreaticoduodenalis cranialis* (Figure 2). It was determined that *Arteria gastroepiploica dextra* was ended by anastomosis with *arteria gastroepiploica sinistra* and vascularized the *curvatura major* and *omentum majus* during the course of the vessel.

Arteria pancreaticoduodenalis cranialis: *Arteria pancreaticoduodenalis cranialis* (Figure 2), originating from *arteria gastroduodenalis*, gave branches feeding *pancreas* and *pars cranialis dudodeni*.

Arteria gastrica sinistra, originating from *arteria celiaca* as a common root with *arteria hepatica*, was the continuation of the vessel. It was noteworthy as the thickest branch of *arteria celiaca*. During the course of the vessel, it gave first *arteria reticularis*, *arteria gastroepiploica sinistra* and *arteria reticularis accessoria* in the area between *omasum* and *reticulum*. Then, it was determined that continued its course by giving left and right branches on visceral face of *omasum* (Figure 2). It was ended by anastomosis with *arteria gastrica dextra* on the *curvatura minor* of *abomasum*.

Arteria reticularis: *Arteria reticularis* (Figure 2), originating from *arteria gastrica sinistra*, in the *sulcus reticuloruminalis* it gave branches named *ramus ruminalis* and *ramus reticularis*.

Arteria gastroepiploica sinistra: *Arteria gastroepiploica sinistra* (Figure 2), originating from the *arteria gastrica sinistra* on the *atrium ruminis*, cranioventrally, passed through the *sulcus reticulo-omasi* and anastomosed with the *arteria gastroepiploica dextra* on the *curvatura major* and the *omentum majus*. It has been determined that it gave branches to *reticulum*, *omasum* and *abomasum*.

Arteria reticularis accessoria: *Arteria reticularis accessoria* originating from *arteria gastrica sinistra*, immediately after the *arteria gastroepiploica sinistra* (Figure 2), gave a number of branches on the visceral face of the *reticulum* and the parietal face of *omasum*.

Discussion

It was determined that *arteria celiaca* was the first branch of *aorta abdominalis*, which passed from *cavum thoracis* to *cavum abdominis* via *hiatus aorticus*. It was observed that *arteria celiaca* sailed towards the ventral at the first lumbar vertebra level. Findings that the origin of *arteria celiaca* and the first branch of *aorta abdominalis* were also found in some sheep (11) and goat breeds (14, 15). Ozudogru et al. (16) in Konya merino; Dursun (5) and Turkmenoglu (12) in ruminant, reported that *arteria celiaca* originated between the last thoracic and the first lumbar vertebra, while Alsafy (17) and El Gendy (18) reported that the *aorta abdominalis* originated from the ventral at the 1st and 2nd Lumbar vertebrae levels in the goat.

Some researchers (6, 9, 10, 17, 19) reported that in some of the materials, *arteria celiaca* originated from *aorta abdominalis* as a common root with *arteria mesenterica cranialis*. Ozudogru et al. (16) in Konya merino sheep, Turkmenoglu (12) in three of the sheep used as material, *arteria hepatica* and *arteria gastrica sinistra* emerged as a common root and Maala et al. (20) reported that the branching of *arteria celiaca* in goat has six different forms and in one of them, *arteria gastrica sinistra* and *arteria hepatica* emerged as a common root. In this study, it was found that *arteria gastrica sinistra* and *arteria hepatica* originated from *arteria celiaca* as a common root. Some authors (4, 6-10) come from *arteria celiaca*; they stated that *arteria lienalis*, *arteria gastrica sinistra* and *arteria hepatica* emerged as three branches. Some researchers (17, 21) from *arteria celiaca*; they stated that they were divided into four separate branches: *arteria lienalis*, *arteria hepatica*, *arteria gastrica sinistra* and *arteria ruminalis sinistra*.

A. *lienalis*; after giving *ramus epiploicus*, *arteria ruminalis sinistra* and *arteria ruminalis dextra*, it was found to end in the spleen as *arteria lienalis*. Similar findings were reported to be observed in goat (17) and buffalo (19). The determination that *arteria gastrica sinistra* is the thickest branch given by *arteria celiaca* and at the same time is the continuation of the vessel. Kuru (22), Boccaletti and Borelli (23) and Mohamed et al. (14) reported the same findings.

In the literature (5), it was reported that *arteria hepatica* is a thicker vein than *arteria gastrica sinistra*. In this study, it was determined that *arteria hepatica* was thinner than *arteria gastrica sinistra*.

The report of *Arteria cystica* is similar to the findings of the research that the goat (17), ruminant and sus (24) watched on the visceral face of the liver after extending from *arteria hepatica* and extended to *vesica fellea*.

It was determined that *arteria reticularis*, which feeds the caudal face of the *reticulum* and the *atrium ruminis*, originated from the *arteria gastrica sinistra*. Nayar et al. (25) in goat, Turkmenoglu (12) in sheep, Smuts and Bezuidenhout (8) in camel, Machado et al. (19) in buffalo, Alsafy (17) in goat, reported that *arteria reticularis* was originated from *arteria gastrica sinistra*. Mohamed et al. (11) reported that *arteria reticularis* was originated *arteria gastrica sinistra* or *arteria ruminalis sinistra*.

As a result in Hasak sheep, which is used as research material, a number of differences were determined from the beginning of *arteria celiaca* in *aorta abdominalis* to the branches that vascularize the organs. It was concluded that the detected differences could be caused by race.

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