

**ORIGIN, COURSE AND DISTRIBUTION OF THE VENAE  
CORDIS IN THE RABBIT AND GOAT.  
(COMPARATIVE STUDY).**

BY

**Z.A. YADM AND M.R. GAD.**

Dept. Of Anatomy and Histology, Fac. of Vet. Med.  
Cairo University, Beni-Suef Branch.

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**INTRODUCTION**

The venae cordis were previously commented in the dog and pig by Christensen and Campeti (1959) and briefly described in some domestic animals by Ghoshal, Koch and Popesko (1981) as well as in the buffalo by Hemmoda and Amin (1989). In the rabbit and goat on the other hand, the meagre informations about the cardiovascular architecture, prompted the authors to afford a comprehensive report about the venae cordis which may did in the medicinal interferences as well as to understand some cardiac defects.

**MATERIALS  
AND METHODS**

A total of twenty hearts of apparently normal rabbits and goats, of both sexes and of different ages, were obtained. As injection of warm normal saline followed by coloured Gum milk, via the V. cava caudalis as well as the V. cordis magna was performed. The

specimens were preserved in 10% formaline solution for 24 hours to be ready for dissection. The use of a magnifying lens during dissection was of great help to persuade the fine ramifications particularly those of the Vv. cordis minimae. Nomenclature was adopted according to the N.A. A. V. (1983) as well as Hemmoda and Amin (1989) as possible.

**RESULTS**

In the goat, the Sinus coronarius (Fig. 4/1) was relatively long (2-2.5 cm.) and derived from the caudal portion of the Atrium dextrum, just above the Sulcus interventricularis subsinuus. It contributed the V. cordis magna for vascularizing the Ventriculus sinister via 2 to 3 small tributaries. On the other hand, in the rabbit, the Sinus coronarius was absent in all dissected specimens.

**I-V. Cordis magna:** Tend to be a large chief vessel. In the rabbit (Fig. 2/1), it diverged from the ven-



tral aspect of the V. cava cranialis sinistra, however, in the goat (Fig. 4/3) it constituted the cranial continuation of the Sinus coronarius. It continued within the Sulcus coronarius, being concealed by the Atrium sinistrum as well as the coronary fat to gain the Sulcus interventricularis paraconalis.

Along its course, the V. cordis magna departed the following branches:

1. Ramus intermedium (R. marginis ventricularis sinistri), (Figs 2/2, 3/1 & 4/4, 6/2): Was represented by a well developed vessel, arose approximately 0.2 - 0.5 cm. from the origin of the parent vessel. It descend on the Ventriculus sinister to drain it through 8 to 10 small branches in the rabbit and 4 to 5 ones in the goat. In both animals, this vessel, not arrive the apex, however, its tributaries were anastomosed never reached adjoining ones of the R. interventricularis paraconalis.

2. Rr. proximales ventriculares sinister: In the rabbit (Figs 2/3 & 3/2), were represented by a single slender vessel. In the goat (Fig. 4/5), on the other hand, they were 3 to 4 small tributaries, ramified to vascularize the proximal portion of the Ventriculus sinister.

3. R. proximalis atrii sinister (Figs 2/4 & 4/9): observed as a slender vessel, splitted from the chief

vessel, caudal to the Truncus pulmonalis. It drained the deep aspect of the Atrium sinistrum as well as the septum interatriale.

4. R. Conus arteriosus (Figs, 2/5 & 4/6): In both animals, were represented by a single considerable branch which issued from the main vessel, just before its enterece into the Sulcus interventricularis paraconalis. It proceeded cranially to drain the Conus arteriosus as well as the contiguous portion of the Ventriculus dexter.

5.R. Interventricularis paraconalis (Figs 2/6, 3/4 & 4/7, 5/4): Constituted the direct continuation of the V. cordis magna within the Sulcus interventricularis paraconalis. In the rabbit, it released 10 to 12 fine tributaries, however, in the goat, it detached 6 to 8 small ones to drain the two ventricles. Moreover, in the goat, it also branched off a long slender R. anastomoticus (Fig. 4/8) running caudally to the R. intermedius. As an adjunct to the preceding branches, the chief vessel in both animals, detached 7 to 10 fine Rr. septales from its deep aspect, confined to vascularize the Septum interventriculare and to establish anastomoses with their counterparts of the V. cordis media.

**II. V. Cordis media:** In the rabbit (Fig. 1/3), a relatively short vessel, deriver from the ventral aspect of the Atrium dextrum just distal to



mergence of the V. cava cau-  
In the goat (Figs 5/5 & 6/1),  
ver, it was the first branch,  
g from the Sinus coronarius.  
pend within the Sulcus inter-  
cularis subsinuosus, detach-  
out 4 to 5 small twigs (in the  
) or about 8 to 10 ones (in the  
to vascularize the two ventri-

relevant to point out that the  
of the heart of the goat  
d an evident anastomoses  
en the terminal branches of  
the V. cordis media and V.  
magna. Such and anasto-  
could not be traced in the  
due to shortness of the for-

Vv. Cordis dextrae: In the  
(Fig. 1/1), were represented  
relatively long and slender  
s, emanated from the cranio-  
l aspect of the Atrium dex-  
They descend parallel to  
ther on the Ventriculus dex-  
train it as well as to establish  
moses with the adjoining  
ries of the V. cordis magna.  
essel, released a fine R. atrig.  
ig. 1/2) to supply the contig-  
portion of the Atrium dex-  
In the goat, on the other  
the Vv. cordis dextrae (Fig.  
were represented by 4 to 5  
derable tributaries, which  
rged to constitute a main  
(Fig. 5/1). This trunk depart-  
bstantially from the caudal  
a of the Atrium dextrum and  
two slender offshoots (Fig.

5/2), destined to drain the Atrium  
dextrum.

IV-Vv. Cordis minimae, were  
represented by several minute ves-  
sels being interposed within the  
myocardium and emptied into the  
cavity of the Ventriculus dexter as  
well as the Atrium dextrum.

As a conclusion for the venous  
pattern presented, the Ventriculu-  
sinister was more extensively  
drained (by four considerable  
veins), than the Ventriculus dexte-  
(via only two ones), which may be  
due to a thicker myocardium of the  
former.

## DISCUSSION

In the rabbit, the present study  
revealed that, the origin of the V.  
cordis magna from the ventral as-  
pect of the V. cava cranialis sinis-  
tra, was more diverse than in other  
species. However, in goat, the cur-  
rent study, as well as **Choshal, et**  
**al. (1981)** considered the V. cordis  
magna as the cranial continuation  
of the Sinus coronarius. Similar to  
present findings, **McKibben and**  
**Christensen (1964)** in the cat, con-  
sidered it as a single trunk. In this  
respects, in the dog, however, the  
latter authors as well as **Miller**  
**Christensen and Evans (1964)**.  
regarded it as a paired one. Moreo-  
ver, its pattern of distribution, pre-  
sented in this work, showed a great  
resemblance to the findings of



**Hemmoda and Amin (1989)** in the buffalo. It is worth to mention that the apex of the heart in the goat presented a noticeable anastomoses between the *V. cordis media* and the *V. cordis magna*, which was not observed in the rabbit due to shortness of the former. However, the myocardium of the *Ventriculus sinister* in both animals, showed an obvious anastomoses between the collateral branches of these vessels. Such a result was ascertained by the findings of **Choshal, et al. (1981)** in the dog and **Hemmoda and Amin (1989)** in the buffalo. On the other hand, **Choshal, et al. (1981)** denied such anastomoses in the cat.

It was established that, the *V. cordis media* in the rabbit, arose from the ventral aspect of the *Atrium dextrum*. Such a result was simulated to the findings of **Smuts and Bezuidenhout (1978)** in the camel. However, the current study in the goat, as well as **Ghoshal, et al. (1981)** in domestic animals gave an origin from the *Sinus coronarius*. The drainage of the two ventricles as well as the *Atrium dextrum* by the *V. cordis media* and the *Vv. cordis dextrae*, presented in this work, was convenient to the findings of **Christensen and Campeti (1959)** in the dog and pig and **Ghoshal, et al. (1981)** in domestic animals.

### SUMMARY

The venae cordis in both the rabbit and

goat were represented by 1-*V. cordis magna*, 2-*V. cordis media*, 3-*Vv. cordis dextrae* and 4-*Vv. cordis minimae*. In the rabbit, the origin of the *V. cordis magna* from the ventral aspect of the *V. cava cranialis sinistra* was more diverse than in the goat, in which it constituted the cranial continuation of the *Sinus coronarius*. In both animals, the *V. cordis magna* vascularized the *Ventriculus sinister* through, *R. intermedius* and *Rr. proximales ventriculares sinister*. Moreover, it drained the two ventricles by *R. interventricularis paraconalis*. It also branched off the *R. Proximalis atrii sinister* to vascularize the *Atrium sinisterum*. In the rabbit, the *V. cordis media* was derived directly from the *Atrium dextrum*, however, in the goat it split from the *Sinus coronarius*. It drained the two ventricles, moreover, it participated the preceding vessel to vascularize the *Septum interventriculare* via several small *Rr. septales*. In the rabbit, the *Vv. cordis dextrae* were demonstrated as two slender vessels, however, in the goat, they were 4-5 considerable ones, which converged to constitute a main trunk. They diverged from the *Atrium dextrum* to drain it as well as the *Ventriculus dexter*. As an adjunct to the preceding vessels, several minute ones (*Vv. cordis minimae* being intervened within the myocardium of the four chambers and emptied into the cavity of the *ventriculus dexter* as well as the *Atrium dextrum*.

### LEGENDS

Fig. 1: Diagramatic representation showing the origin and pattern of distribution of the *Vv. cordis dextrae* and *V. cordis media* in the heart of rabbit, right side, lateral view: 1- *Vv. cordis dextrae*. 2- Atrial branch of (1). 3- *V. cordis media*. A- *Atrium dextrum*. B- *Ventriculus dexter*. C- *Ventriculus*



sinister. D-V. cava cranialis extra. E-V. azygos dextra. F-V. cava cranialis sinistra. G-V. cava caudalis.

Fig. 2: Diagramatic representation showing the origin and pattern of distribution of the V. cordis magna in the heart of rabbit, left side, lateral view: 1-V. cordis magna. 2-R. intermedius. 3-R. proximalis ventricularis sinister. 4-R. proximalis atrii sinister. 5-R. conus arteriosus. 6-R. interventricularis paraconalis. A- Atrium sinistrum. B-Auricular dextra. C-conus arteriosus. D-Truncus pulmonalis. E-V. cava cranialis sinistra. F-V. cava cranialis dextra. G-V. azygos dextra. H-V. cava caudalis. I-Ventriculus sinister. J- Ventriculus dexter.

Fig. 3: Photographic representation showing the pattern of distribution of the V. cordis magna in the heart of the rabbit, left side, lateral view: 1-R. intermedius. 2-R. proximalis ventricularis sinister. 3-R. conus arteriosus. 4-R. interventricularis. A-Atrium sinistrum. B- Ventriculus sinister. C- Ventriculus dexter. D-Conus arteriosus. E-V. cava caudalis. F-V. cava cranialis sinistra. G-V. cava cranialis dextra. H-V. azygos dextra. I- Auricula dextra.

Fig. 4: Diagramatic representation showing the pattern of distribution of the V. cordis magna in the goat, left side, lateral view: 1- Sinus coronarius. 2-V. azygos si-

nistra. 3-V. cordis magna. 4-R. intermedius of (3). 5- Rr. proximales ventriculares sinister. 6-R. conus arteriosus. 7-R. interventricularis paraconalis. 8-R. anastomoticus. 9-R. proximalis atrii sinister. A- Atrium sinistrum. B- Atrium dextrum. C-Ventriculus sinister. D- Conus arteriosus.

Fig. 5: Diagramatic representation showing the pattern of distribution of the Vv. cordis dextrae in the goat, right side, lateral view: 1- The common trunk of the Vv. cordis dextrae. 2- Rr. atriales of (1). 3- V.v. cordis dextrae. 4-R. interventricularis paraconalis of V. cordis magna. 5-V. cordis media. A- Conus arteriosus B-Atrium dextrum. C-Ventriculus dexter. D- Ventriculus sinister.

Fig. 6: Photographic representation showing the pattern of distribution of some venae cordis in the heart of the goat, caudolateral view, left side: 1-V. cordis media. 2- R. intermedius of V. cordis magna. A-Atrium sinistrum. B-Ventriculus sinister. C- Ventriculus dexter.

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Venae cordis

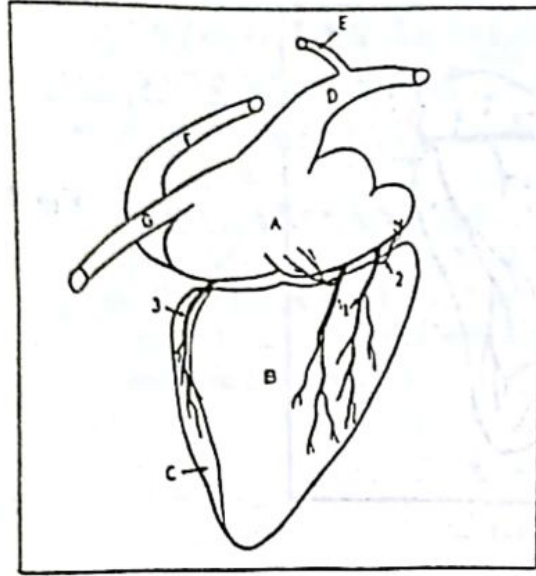


Fig.1

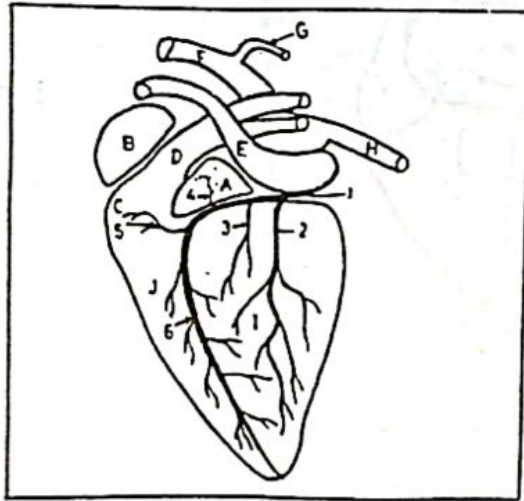


Fig.2



Fig.3



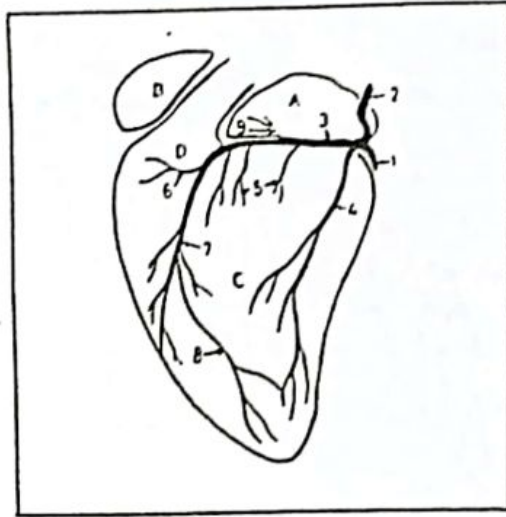


Fig.4

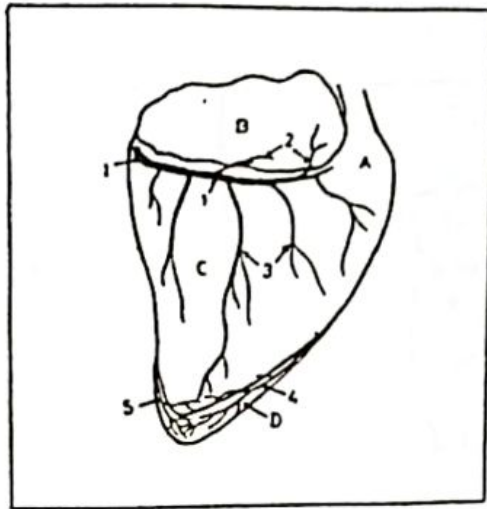


Fig.5

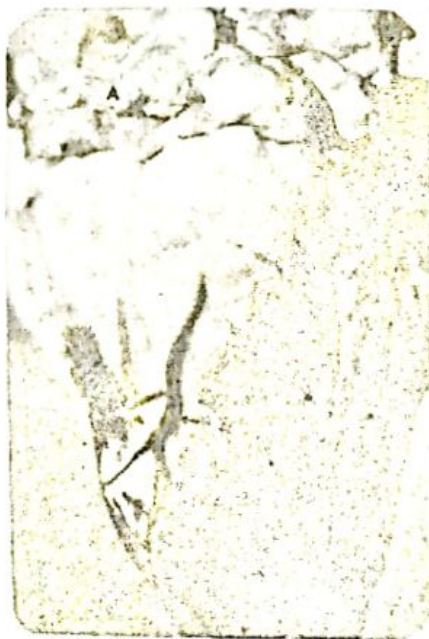


Fig.6