

MACRO - MORPHOLOGICAL STUDIES ON THE PULMONARY TRUNK OF THE DONKEY (*Equus Asinus*)

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INTRODUCTION

The pulmonary vasculature, in domestic animals, has received the attention of many investigators as Guszal (1952), Scherone (1955), Ehksam (1957), Adrian (1959 & 1964), Moorhead and Gross (1965) and Osman (1974). In spite of this, nothing could be traced on the pulmonary vasculature of the donkey.

Therefore, this work was undertaken as an attempt to obtain detailed morphological informations on the pulmonary vasculature and to ascertain an exact nomenclature for the pulmonary trunk of the donkey, in comparison with that of other domestic animals.

MATERIAL AND METHODS

This work was conducted on 15 normal lungs of adult healthy donkeys of different ages.

The bronchial tree was injected by a coloured gelatine mass adopt-

ing the technique of Tompsett and Wakley (1956).

The pulmonary trunk was injected with coloured polyvinyl chloride — PVC — red latex (Fa. Klentze u. Co.). Moreover, the trunk was also injected with a dispersion of barium sulphate (Micropaque) preparatory to radiography and dissection.

RESULTS

The pulmonary trunk divides ventral and somewhat prior to the trachial bifurcation into right and left pulmonary arteries. Each division proceeds caudally in close lateral relation to the corresponding bronchus. Their branches follow exactly the entire course of the lobar, segmental and subsegmental bronchi as well as their subsequent divisions.

I. A. PULMONALIS DEXTER

Fig. 1/2) :

It diverges caudolaterally and proceeds along the ventral aspect of the *Bronchus principalis dexter*. It crosses ventral to the *Bronchus lobaris cranialis dexter*, arches over the dorsal aspect of the *Bronchus lobaris medius* then continues as *Ramus lobi caudalis dextri*. Along its course, the right pulmonary artery gives off the following branches :

1. *R. lobi cranialis dextri*

(Fig. 1/3) :

It leaves the lateral aspect of the parent trunk just cranial to the origin of the corresponding bronchus and dorsal to the homonymous vein. It turns cranially along the medial aspect of the corresponding bronchus and divides into cranial and caudal segmental branches.

a — *R. segmentalis cranialis*

(Fig. 1/4) :

It represents the direct cranial continuation of the parent lobar artery. It crosses the lateral aspect of the corresponding vein and supplies the division of the cranial segment by 3—5 dorsal and 2—4 ventral subsegmental branches.

b.— *R. segmentalis caudalis*

(Fig. 1/5) :

It springs from the caudal aspect of the lobar artery, curves dorsally and backward to the terminal part of the caudal segment. It crosses the cranial aspect of the *Bronchus cranialis dexter* and supplies the caudal segment by 3—5 relatively small branches.

2. *R. lobi accessorii* :

It springs from the medial aspect of the *A. pulmonalis dexter*, 1—2cm. cranial to the origin of the *Bronchus lobaris accessorius*. It passes caudomedially, crosses the latter bronchus and terminates into lateral and medial segmental branches (Figs. 1/6 & 7). Each branch accompanies the corresponding segmental bronchus and its subsequent divisions.

3. *R. lobi medii*

(Fig. 1/8) :

Leaves the lateral aspect of the right pulmonary artery, just cranial to the origin of the *Bronchus lobaris medius*. It proceeds ventrally cranial to the latter bronchus, crosses the medial aspect of the *V. lobaris medii* then divides into cranial and caudal segmental branches. The cranial branch (Fig. 1/9) passes directly to the corresponding bronchus, while the caudal one (Fig. 1/10) crosses the medial aspect of the cranial segmental bronchus to gain the cranial aspect of the *Bronchus segmentalis caudalis lobi medii*. Both branches follow a pattern of distribution similar to that of the corresponding bronchus.

4. *R. lobi caudalis dextri*

(Fig. 1/11)

It represents the direct caudal continuation of the *A. pulmonalis dexter*, after detaching the *R. lobi medii*. It courses caudally on the lateral aspect of the *Bronchus lobaris caudalis dexter* up to its termination. Along its course, it gives off a

variable number of Rami segmentales dorsales et ventrales.

a — Rr. segmentales dorsales
(Fig. 1/12) :

They are 3 — 5 in number arising just cranial to the commencement of the corresponding bronchi. Each passes caudoventrally, crosses the dorsal aspect of the lobar bronchus to gain the caudal aspect of the corresponding segmental bronchus.

b — Rr. segmentales caudales
(Fig. 1/13) :

They vary from 2 to 3 relatively large branches arising from the ventral aspect of the lobar artery, prior to the origin of the corresponding bronchi. Each slant on the cranial aspect of the corresponding segmental bronchus to the terminal part of the segment.

II. A. PULMONALIS SINISTER
(Fig. 1/14) :

It proceeds caudoventrally along the ventral aspect of the Bronchus principalis sinister. It crosses the ventral aspect of the Bronchus lobaris medius and then continues as the R. lobi caudalis sinistri. Along its course, the A. pulmonalis sinister gives off the R. lobi cranialis sinistri, the R. lobi medii and the R. lobi caudalis sinistri.

1. R. lobi cranialis sinistri
(Fig. 1/15) :

It leaves the lateral aspect of the

parent trunk, just prior to the origin of the corresponding bronchus, passes laterally for about 1cm. then terminates into a cranial and a caudal segmental branches.

a — R. segmentalis cranialis
(Fig. 1/16) :

It is the larger of the two terminal branches of the lobar artery. It curves cranially on the dorsal aspect of the corresponding bronchus and gives 3 — 5 relatively large branches that supply the different divisions of the segments.

b — R. segmentalis caudalis
(Fig. 1/17) :

It curves caudodorsally, crosses the dorsal aspect of the Bronchus segmentalis cranialis and reaches the dorsal aspect of the Bronchus segmentalis caudalis to terminate in the caudal segment.

2. R. lobi medii
(Fig. 1/18) :

It springs from the ventral aspect of the A. pulmonalis sinister, just cranial to the origin of the corresponding bronchus. It divides into two unequal segmental branches, cranial and caudal.

a — R. segmentalis cranialis
(Fig. 1/19) :

It is the smaller of the two segmental branches. It leaves the lateral aspect of the lobar artery and slants on the cranial aspect of the corresponding bronchus to the peripheral part of the segment.

b — R. segmentalis caudalis
(Fig. 1/20) :

It craves caudoventrally, crosses the dorsal aspect of the Bronchus segmentalis cranialis lobi medii sinistri to gain the cranial aspect of the Bronchus segmentalis caudalis of the same lobe.

3. R. lobi caudalis sinistri
(Fig. 1/21) :

It follows a course and pattern of distribution similar to those of the corresponding artery of the right lung.

Tr. pulmonalis

I. A. PULMONALIS DEXTER

1. R. lobi cranialis dextri
R. segmentalis cranialis
R. segmentalis caudalis
2. R. lobi accessorii
R. segmentalis lateralis
R. segmentalis medialis
3. R. lobi medii
R. segmentalis cranialis
R. segmentalis caudalis
4. R. lobi caudalis dextri
Rr. segmentales dorsales
Rr. segmentales ventrales

II. A. PULMONALIS SINISTER

1. R. lobi cranialis sinistri
R. segmentalis cranialis.
R. segmentalis caudalis

2. R. lobi medii
R. segmentalis cranialis
R. segmentalis caudalis

3. R. lobi caudalis sinistri
Rr. segmentales dorsales.
Rr. segmentales ventrales

DISCUSSION

The present findings reveal that, the Tr. pulmonalis of the donkey, like that of the horse (Ehrsman, 1957; Wilkens and Munster, 1975), divides ventral and somewhat cranial to the bifurcation of trachea. In this connection, Guzsal (1952), Schorone (1955), Hare (1955) and Osman (1974) gave a similar result in domestic animals, cattle, sheep and camel, respectively.

The initial part of the A. pulmonalis dexter and the A. pulmonalis sinister lies ventral to the corresponding Bronchus lobaris cranialis thus giving these bronchi an eparterial position, similar to those of the horse (Ehrsman, 1957) and camel (Osman, 1974).

The separate segmental branches, given by the pulmonary artery to both the lobus cranialis and medius as well as the single lobar artery to the lobus accessorius reported by Adrian (1959, 1964) could not be ascertained in the donkey. However, Felder (1962) reported the possibility of eruption of such segmental branches to the different pulmonary lobes in the dog. On the

contrary Hare (1955), in sheep, Ehrsmann (1957) in the horse and Osman (1974) in the camel, reported that all the pulmonary lobes receive lobar arteries.

SUMMARY

This work was conducted on 15 normal lungs of adult donkeys of different ages. The bronchial tree as well as the pulmonary trunk were injected by coloured injection masses.

The origin, course and distribution of the right and left pulmonary arteries, with special reference to their relation to the corresponding bronchi, were thoroughly investigated.

The results were illustrated in 4 figures and the findings obtained were discussed with the available publications dealing with the pulmonary trunk of other domestic animals.

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Fig. (1) : Diagrammatic representation of the bronchial tree and the Tr. pulmonalis of the donkey.

1. Tr. pulmonalis.
2. A. pulmonalis dexter
3. R. lobi cranialis dextri
4. R. segmentalis cranialis
5. R. segmentalis caudalis r. lobi cranialis dextri.
6. R. segmentalis lateralis r. lobi accessorii
7. R. segmentalis medialis r. lobi accessorii
8. R. lobi medii.
9. R. segmentalis cranialis &
10. R. segmentalis caudalis r. lobi medii
11. R. lobi caudalis dextri
12. Rr. segmentales dorsales &
13. Rr. segmentales ventrales r. lobi caudalis dextri.
14. A. pulmonalis sinister
15. R. lobi cranialis sinistri.
16. R. segmentalis cranialis &
17. R. segmentalis caudalis r. lobi cranialis sinistri
18. R. lobi medii
19. R. segmentalis cranialis &
20. R. segmentalis caudalis r. lobi medii
21. R. lobi caudalis sinistri
22. Rr. segmentales dorsales.
23. Rr. segmentales ventrales r. lobi caudalis sinistri

Fig. (2): Radiograph of left pulmonary artery, ventrodorsal view.

Fig. (3) : Radiograph of the right pulmonary artery, ventrodorsal view.

Fig. (4) : Photograph of the lung of the donkey showing the right and left pulmonary arteries, dorsal view.

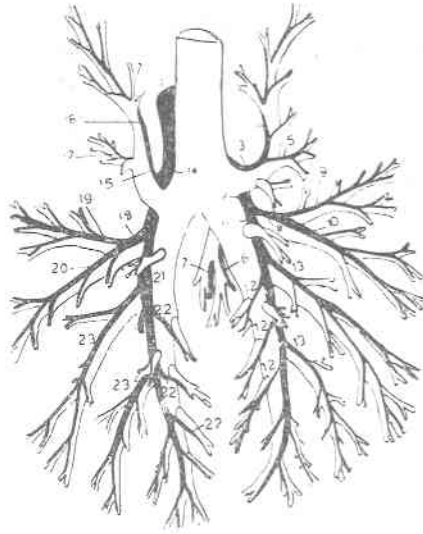


Fig. 1



Fig. 2



Fig. 3

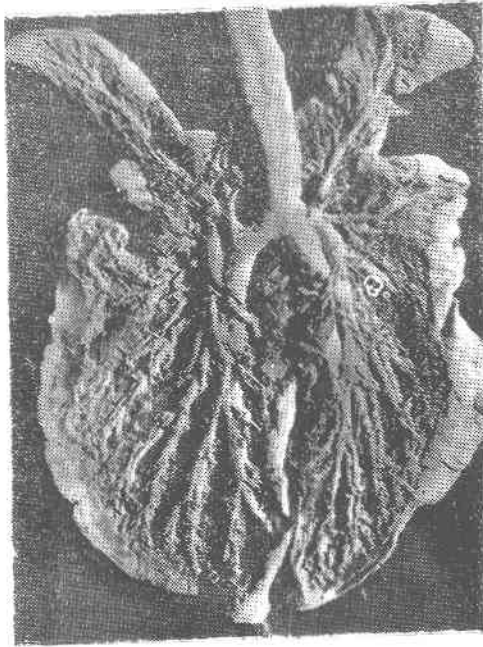


Fig. 4