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دراسات مورفولوجية على مري: الجمعان
أثناء فترات نموه

روبرت لرج، أنور قاسم، عبد السلام حموده، محمد أمين

أجريت بعض الدراسات المورفولوجية على مرء الجمل أثناء فترة ما قبل الولادة وما بعدها، وقد أُستخدم لهذه الدراسة 22 مريحاً أخذت من الجمل بعد الولادة في مراحل النمو المختلفة وقد لوحظ أن وضع المري لم يتأثر خلال مختلف مراحل النمو حيث يقع الثالث العلوي للمري العنقلي على الحنجرة وعلى القصبة الهوائية. بينما يقع الثالث الأيمن من المري العنقلي على السطح العلوي الجانبي من القصبة الهوائية من ناحية اليسار وقع الثالث السفلي للجنب الأيسر من القصبة الهوائية بينما يقع المري على السطح العلوي للقصبة الهوائية، وقد لوحظ زيادة طول وقطر وسط كر جدار المري مع زيادة العمر حيث يصل الطول في الجمل البالغ 165 سم والقطر حوالي 21 سم، ونقص المري في الجمل إلى جزء يمثل الاتصال البلدي العلوي المري وجزء منقتي وجزء صدر، بينما الجزء البطني غير موجود، ويبلغ الجزء العنقلي في الطول ضعف طول الجسم الصدري تقريباً.
SOME MORPHOLOGICAL STUDIES ON THE ESOPHAGUS OF THE CAMEL DURING ITS ONTOGENETIC PERIODS

(With 2 Tables & 4 Figures)

By
R. BERG, A.M. KASSEM, A.K. HEMMODA, and M. AMIN.
(Received at 17/11/1982)

SUMMARY

Twenty two dromedary camels in different stages of development were used. The studies showed, unchanging in the position of the esophagus during all the developmental stages. At the pharyngo-esophageal junction it lies dorsal to the larynx, at the thoracic inlet on the left side of the trachea and its thoracic part lies dorsal to the trachaeal. The length, diameter and thickness of its wall increase with the age. The length of the esophagus in adult camel is about 175 cm, and the diameter is about 2.1 cm. In adult camel the cervical part is nearly equal two times the thoracic part in its length but at the same time the thoracic part has a thicker wall and narrower diameter than the cervical part.

INTRODUCTION

These anatomical studies on the camel's esophagus may be an attempt to give some informations on the esophagus of a long-necked mammal. The length and diameter of the individual parts of the esophagus of the camel are important for the internal medicine and surgery.

MATERIAL and METHODS

Nineteen camel fetuses with CVRL of 20-100 cm, a young camel of 1.5 years of age, and two adult camels 5 and 6 years of age were used for the anatomical studies. The material was collected from the Cairo abattoir and after measuring their CVRL by flexible cloth tape the fetuses were immediately injected with 10% formaline intrathoracically and put, together with esophagi of the young and adult camels into 10% formaline. Here they were kept till the time of dissection. The position, relation and the course of the esophagus were studied by performing lateral, ventral dissection and cross sections. All the measurements of the esophagus were taken from fixed specimens.

RESULTS

The measurements include the length of the esophagus and also the length of its cervical and thoracic parts are shown in Table (1). Furthermore the diameter was taken at the level of the 4th cervical vertebra, at the thoracic inlet, at the base of the heart and the level cranial to the esophageal hiatus and shown in Table (2).

Regarding the position of the esophagus, there are practical no changes during the early and late phases of each pre and postnatal periods. In all developmental stages, the initial part of the esophagus is found over the larynx then after that the trachea and continued in this course caudally to the level of the 5th cervical vertebra, where the esophagus is found dorsolateri to the trachea (Fig. 1 & 2). And lastly towards the thoracic inlet, we found it completely shifted to the left of the median plane and the trachea (Fig. 3). Within the thoracic mediastinum its thoracic part (Fig. 4) passes dorsally and forming by this course a curvature, the convexity of which is directed dorsally, then the esophagus curves ventrally and caudally to reach the the Hiats esophagus at the level of 10th thoracic vertebra.

The esophagus in the cranial third of the neck is related dorsally to the retropharyngeal space and longus colli muscle and laterally to the carotic vagina and the thymus. In the middle third of the neck it is related dorsally to the retropharyngeal space and longus colli muscle, laterally to the carotic vagina and thymus ventro-laterally to the trachea (Fig. 1-2).

At the thoracic inlet the esophagus is dorsally related to the left longus colli muscle; medially to the trachea, laterally to the left carotic vagina and ventrally to the thymus.

The thoracic part of the esophagus coursing in the mediastinum, and passes dorsally over the base of the heart and the bifurcation of the trachea, forming the thoracic curvature which is convex it crosses the right face of the aortic arch then passes straight back in the caudal mediastinum, ventral to the aortic, and accompanied by the dorsal and ventral esophageal vagal nerve trunks and is related dorsally to the caudal mediastinal lymph nodes.

The abdominal part of the esophagus is absent in the camel fetus and adult camel.

The present study reveals the esophagus of the camel has three curvatures. The first one is the ephalo-cervical curvature, which is slightly dorsally convex, the second one is the cervicothoracic curvature, which extends form the 5th cervical vertebra to the 2nd thoracic vertebra, it is concave dorsally. The third one is at the base of the heart (Thoracic curvature) and is dorsally convex.

DISCUSSION

The present study gives us a comprehensive survey and also some idea on the morphology of the esophagus in the camel embryologically and gross anatomically, it can be confirmed that also the growth of the esophagus follows the known principles of development. With increasing age, the esophagus is increasing in length, (Table 1). This importance for the applied anatomy, because we can conclude from this the length of the stomach tube to be applied by the practitioners for the treatment of the gastro-intestinal disorders in young and adult camel.

There is lack of comparable measurements in the available literature, but individual data were given by LEBRE (1903). He described the absolute length of the esophagus of the two-humped camel (Camelus bactrianus) as to be 200 cm while the present result was 175 cm. In comparison to the buffalo, one can observed the esophagus of the camel as nearly two times the esophagus of the buffalo in length. The length of the esophagus in the Egyptian water buffalo equal 96 cm (ENANY, 1980), in Indian buffalo 98.72 ± 0.92 cm (SINGER and SINGH, 1971) and in ox 90-100% cm (HABEL, 1975).

ESOPHAGUS OF CAMEL

The present result revealed that (Table 1) the relation between the cervical part to the thoracic part in all developmental stages nearly takes ratio of 2:1.

Concerning the diameter of the esophagus, (Table 2) over the larynx proved to be the widest part of the esophagus during the pre and postnatal development (1.2 mm in the CVRL 22 cm stage to 28.34 mm in the adult camel) after this the esophagus narrows in diameter gradually in caudal direction. These data may be beneficial for the guesing of the diameter of instrument being applied in the esophagus by clinicians. The diameter of the adult camel's esophagus has nearly the same results in Egyptian water buffalo in which it is about 20.4–28.3 (ENANY 1980).

In agreement with OMAR (1980) the esophagus is completely found on the left side of the trachea at the thoracic inlet.

However HEGAZI (1945) reported that the esophagus becomes completely on the side of the trachea at the junction of the upper and middle thirds of the neck.


The abdominal part of the esophagus is absent in the camel fetus and camel. Similar results recorded in the late prenatal and postnatal periods of the bovine esophagus (MULLERBOTH, 1962, HABEL, 1975, and ENANY, 1980).

The esophagus of camel has cephalocervical, cervicothoracic and thoracic curvatures as in other Ruminants (NICKEL et al. 1973, and ENANY, 1980).

REFERENCES


Omar, A.M. (1980): On the topographic anatomy of the neck region of one humped camel

Raghavan, D. and Kachroo (1964): Anatomy of the ox. Indian council of Agricultural Research
New Delhi.

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Oesophagus hinsichtlich der Schunderstoaung des Rindes. DTW 64, 393-396.
### TABLE (1)

Length of the esophagus and its individual parts

<table>
<thead>
<tr>
<th>CVRL/year</th>
<th>Total length cm</th>
<th>Cervical part cm</th>
<th>Thoracic part cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camel fetus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 cm</td>
<td>12 cm</td>
<td>7.0 cm</td>
<td>5.0 cm</td>
</tr>
<tr>
<td>&quot; 30 cm</td>
<td>15 cm</td>
<td>9.0 cm</td>
<td>6.0 cm</td>
</tr>
<tr>
<td>&quot; 40 cm</td>
<td>23 cm</td>
<td>14.5 cm</td>
<td>8.5 cm</td>
</tr>
<tr>
<td>&quot; 55 cm</td>
<td>26 cm</td>
<td>16.6 cm</td>
<td>9.4 cm</td>
</tr>
<tr>
<td>&quot; 62 cm</td>
<td>33 cm</td>
<td>21.2 cm</td>
<td>11.8 cm</td>
</tr>
<tr>
<td>&quot; 70 cm</td>
<td>36 cm</td>
<td>22.5 cm</td>
<td>13.5 cm</td>
</tr>
<tr>
<td>&quot; 80 cm</td>
<td>41 cm</td>
<td>23.6 cm</td>
<td>17.4 cm</td>
</tr>
<tr>
<td>&quot; 100 cm</td>
<td>52 cm</td>
<td>32.3 cm</td>
<td>19.7 cm</td>
</tr>
<tr>
<td>Young camel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5 year</td>
<td>127 cm</td>
<td>83.5 cm</td>
<td>93.5 cm</td>
</tr>
<tr>
<td>Adult</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 year</td>
<td>155 cm</td>
<td>99.5 cm</td>
<td>55.5 cm</td>
</tr>
<tr>
<td>&quot; 6 year</td>
<td>175 cm</td>
<td>115.0 cm</td>
<td>60.0 cm</td>
</tr>
</tbody>
</table>

### TABLE (2)

Diameter of the esophagus in its individual portions

(Completely isolated, relaxed and not extended esophagus)

<table>
<thead>
<tr>
<th>CVRL/years</th>
<th>Over the larynx cm</th>
<th>At the middle of the neck mm</th>
<th>At the thoracic inlet mm</th>
<th>Over the base of the heart mm</th>
<th>Just cranial to the Hiatus esophagus mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camel fetus</td>
<td>22 cm</td>
<td>1.20 cm</td>
<td>0.64 mm</td>
<td>0.48 mm</td>
<td>0.48 mm</td>
</tr>
<tr>
<td>&quot; 30 cm</td>
<td>2.20 mm</td>
<td>1.60 mm</td>
<td>0.95 mm</td>
<td>0.95 mm</td>
<td>0.95 mm</td>
</tr>
<tr>
<td>&quot; 40 cm</td>
<td>3.18 mm</td>
<td>2.20 mm</td>
<td>1.60 mm</td>
<td>1.60 mm</td>
<td>1.60 mm</td>
</tr>
<tr>
<td>&quot; 55 cm</td>
<td>4.14 mm</td>
<td>2.80 mm</td>
<td>2.20 mm</td>
<td>2.20 mm</td>
<td>2.20 mm</td>
</tr>
<tr>
<td>&quot; 62 cm</td>
<td>5.09 mm</td>
<td>3.50 mm</td>
<td>2.80 mm</td>
<td>2.70 mm</td>
<td>2.80 mm</td>
</tr>
<tr>
<td>&quot; 70 cm</td>
<td>5.70 mm</td>
<td>3.82 mm</td>
<td>3.18 mm</td>
<td>2.80 mm</td>
<td>3.18 mm</td>
</tr>
<tr>
<td>&quot; 80 cm</td>
<td>7.30 mm</td>
<td>4.70 mm</td>
<td>4.14 mm</td>
<td>3.82 mm</td>
<td>3.82 mm</td>
</tr>
<tr>
<td>&quot; 100 cm</td>
<td>9.23 mm</td>
<td>7.00 mm</td>
<td>6.36 mm</td>
<td>5.70 mm</td>
<td>6.05 mm</td>
</tr>
<tr>
<td>Young camel</td>
<td>1.5 year</td>
<td>20.70 mm</td>
<td>16.87 mm</td>
<td>13.37 mm</td>
<td>13.69 mm</td>
</tr>
<tr>
<td>Adult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 years</td>
<td>26.40 mm</td>
<td>19.30 mm</td>
<td>15.65 mm</td>
<td>15.30 mm</td>
<td>15.42 mm</td>
</tr>
<tr>
<td>&quot; 6 years</td>
<td>28.34 mm</td>
<td>22.60 mm</td>
<td>20.70 mm</td>
<td>20.38 mm</td>
<td>21.00 mm</td>
</tr>
</tbody>
</table>

Fig. (1): Cross-section of the level of the 3rd cervical vertebra. Diagramatic, Cranial view.
CVRL 80 cm.
a-- Cutis, b-- superficial cervical fascia.
c-- Funiculus nuchae, d-- M. complexus,
e-- M. multifidus cervicis, f-- M. longissimus cervicis,
g-- M. longissimus atlantis,
h and i-- MM. intertransversarii, j-- M. omohyoideus,
k-- M. sternomastoideus, l-- M. longus colli, m-- M. sternothyroideus,
n-- M. sternohyoideus.
1- Truncus vago sympatheticus. 2- A. carotis communis. 3- V. jugularis externa.
4- Esophagus. 5- Recurrent laryngeal nerve. 6- Trachea. 7- Thymus.
8- extension of the retropharyngeal space. 9- Body of the 3rd cervical vertebra.
10- Spinal cord. 11- V. jugularis interna.

Fig. (2): Cross-section at the level of 5th cervical vertebra, Diagramatic, cranial view.
a-- Skin, b-- Superficial cervical fascia. c-- Funiculus nuchae, d-- Lamina nuchae,
e-- M. complexus, f-- M. multifidus cervicis, g-- M. longissimus cervicis, h-- M.
Serratus ventralis cervicis, i-- M. scalenus dersalis, j-- Mm. intertransversus,
k-- M. longus colli, l-- M. sternomastoideus, m-- M. sternothyroideus.
1- T. vagosympathicus. 2- A. carotis communis. 3- V. jugularis externa.
4- esophagus. 5- recurrent laryngeal n. 6- Trachea. 7- Thymus.
8- body of the vertebra. 9- spinal cord. 10- V. jugularis interna.

Fig. (3): Cross-section at the level of the Thoracic inlet, diagramatic cranial view.
a-- cutis, b-- Superficial cervical fascia, c-- Funiculus nuchae, d-- lamina nuchae,
e-- M. Trapezius, f-- M. serratus ventralis cervicis, h-- M. multifidus, i-- Mm.
scapulo humeralis, j-- M. longissimus cervicis, k-- M. scalenus, l-- Mm. intertransversarii, m-- M. longus colli, n-- M. sternothyroideus, o-- M. sternocostoideus.
1- T. vagosympathicus. 2- A. Carotis communis. 3- V. jugularis externa.
4- esophagus.
5- Recurrent laryngeal n. 6- Trachea. 7- Thymus.
8- spinal cord. 9- V. jugularis interna.

Fig. (4): Cross-section at the level of the 5th rib. Diagramatic, cranial view CVRL 80 cm.
a-- Cutis, b-- Fascia Trunci superficialis, c-- M. Trapezius,
d-- M. supraspinatus, e-- M. infraspinatus, f-- Scapula, g-- M.
Serratus ventralis Thoracis, h-- Funiculus nuchae, i-- Lamina nuchae, j-- M. complexus,
K-M. multifidus, 1- 5th rib, m-- Mm. intercostalis, n-- M. latissimus dorsi,
o-- M. pectoralis transversus, p-- M. Transversus thoracis.
1- Aorta thoracica. 2- esophagus. 3- Root of the lung. 4- Lung. 5- Heart.
6- pleura parietalis. 7- spinal cord. 8- sternum. 9- Dorsal branch of the vagus.
10- Ventral branch of the vagus.
