Gross Study on the Valves of the Jugular Veins and its Tributries in the Camel (Camelus dromedarius)

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Blood circulation, particularly of head and neck, plays a vital role in survivability of the animals especially more so in camel. The camel traverses long distances and has a great capability of tolerating adverse environmental conditions such as high temperature, non-availability of water and starvation for long period. This is being probably made possible by adaptations exhibited by camel like its size and shape, colour, tolerance of high temperature and tissue dehydration, specialized respiratory patterns, reduction in metabolic rate etc. (Wilson, 1989). The blood vessels of the head and neck provide blood supply i.e. nutrition to the most vital organ of the body, the brain. The blood supply of the brain is also responsible for the thermo-regulation of the brain. According to Baker & Hayward (1968) “The venous blood returning from the nasal mucosa and the skin of the head to the cavernous, cools the central arterial blood in the carotid rete”.

To understand the thermoregulatory mechanism of a region, the normal topographic anatomy of the blood vessels of that region is a pre-requisite. It is also essential for surgeons, clinicians, pathologists, and radiologists to locate the occlusions of the blood vessels due to traumatic injuries and any diseas conditions like tumors, blood clot or embolism.
MATERIALS AND METHODS

The present study was conducted on eight apparently healthy adult camels of both the sexes. The animals were completely bled through their own heart action and then embalmed with 10 per cent formalin solution according to the Grossman’s technique (1959).

The superior and inferior labial veins of both sides were exposed and cannulated. The venous system was flushed off through the cannula with luke-warm heparinized saline solution. After thorough flushing, the radio-opaque suspension (20% w/v red lead oxide in liquid soap solution) was injected with steady digital pressure. The head and neck regions were radiographed in different profiles (lateral and dorso-ventral and antero-posterior) to obtain the venograms depicting the course and distribution of different veins. The head and neck regions were then dissected to confirm the radiographic findings and photographs were taken. The veins were highlighted with blue enamel paint for photographic purpose.

RESULTS AND DISCUSSION

During the present investigation, it was seen that the venous drainage of the head and neck region was carried out by the external jugular veins and the internal jugular vein was absent which was in accordance with Tayeb (1951), and Moustafa (1981), but it was contrary to the report of Smuts and Bezuidenhout (1987). The internal jugular vein was present in ox, carnivores and pigs as reported by Sisson and Grossman (1953) and Nickel et al. (1981) in ox, by McLeod (1958) and Raghavan (1964), and by Miller et al. (1964) in dog.

The external jugular veins of left and right sides contained 10 and 11 valves, respectively, in their entire course. The distances between each adjacent valve have been shown in Table 1. According to Sisson and Grossman (1953) Jugular veins contains valves at the mouths of its tributaries, and has several pairs of semilunar valves variably disposed along its course in ruminants.
The facial vein contained one or two valves near its origin only and the rest of the course was not containing any valve. There were four valves in Inferior labial vein. Out of which one was present near its union with the facial vein, one each before the union with the facial vein, buccal vein, and its anastomosis with its fellow vessel.

Inferior glandular vein was having 5-6 valves. The valves were located before it received tributaries from ventral buccal gland and anastomotic vein from inferior labial vein.

Superior labial vein contained five valves in its course which were located just before it joined the facial vein. The superior labial vein drains the upper lip (Smuts and Bezuidenhout, 1987) and anastomoses with its fellow of opposite side and has five valves in camel (Zguigal and Ghoshal, 1990b).

Superficial buccal vein was valve less.

No valve was found in Medial inferior palpebral vein, Medial superior palpebral vein, Lateral nasal vein,

The dorsal nasal vein was having only one valve just before it joined the facial vein. The deep facial vein was also a valve less vein. No valves could be seen during the study of Lateral nasal vein. The lateral nasal vein drains the lateral nasal region (Smuts and Bezuidenhout, 1987) including the nostrils and the muscles of that region and this valveless vein anastomoses

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**Table 1: Distances between the valves of E.J.V.**

<table>
<thead>
<tr>
<th>No. of valves</th>
<th>Left E.J.V. (cm)</th>
<th>Right E.J.V. (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin – V₁</td>
<td>27.1</td>
<td>22.7</td>
</tr>
<tr>
<td>V₁ – V₂</td>
<td>26.6</td>
<td>20.0</td>
</tr>
<tr>
<td>V₂ – V₃</td>
<td>5.6</td>
<td>3.0</td>
</tr>
<tr>
<td>V₃ – V₄</td>
<td>13.5</td>
<td>5.0</td>
</tr>
<tr>
<td>V₄ – V₅</td>
<td>14.3</td>
<td>16.5</td>
</tr>
<tr>
<td>V₅ – V₆</td>
<td>12.7</td>
<td>16.5</td>
</tr>
<tr>
<td>V₆ – V₇</td>
<td>6.9</td>
<td>8.2</td>
</tr>
<tr>
<td>V₇ – V₈</td>
<td>13.4</td>
<td>7.3</td>
</tr>
<tr>
<td>V₈ – V₉</td>
<td>3.2</td>
<td>9.0</td>
</tr>
<tr>
<td>V₉ – V₁₀</td>
<td>15.5</td>
<td>14.0</td>
</tr>
<tr>
<td>V₁₀ – V₁₁</td>
<td>--</td>
<td>7.0</td>
</tr>
</tbody>
</table>

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*Zguigal and Ghoshal, 1990b.*
with dorsal nasal and superior labial veins in camel (Zguigal and Ghoshal, 1990b).

The dorsal nasal vein drains the dorsum of the nose (Smuts and Bezuidenhout, 1987) and also rostral part of the nasal cavity and skin having only one valve and anastomose with dorsal impar nasal vein (Zguigal and Ghoshal, 1990b) in camel.

There were four valves in linguo-facial vein. The inferior glandular veins emptied into the rostral border of the masseter muscle and ran towards the lower lip and the ventral buccal glands. It was having 5-6 valves. The superior glandular vein ran towards the angle of the jaw and drained the dorsal buccal gland and malaris and buccinator muscles. The superior labial vein divided into dorsal and ventral branches. It contained five valves. The superficial buccal vein drained the dorsal and the intermediate buccal gland and it was valveless. The medial inferior palpebral vein drained the inferior eyelid. It was also valveless. The medial superior palpebral vein drained the upper eyelid and was valveless. The lateral nasal vein drained the levator nasolabialis and caninus muscles and the nostrils. No valves were seen in it.

REFERENCES


