Occurrence and pathomorphological changes of pericardial pathology in camel (*Camelus dromedarius*)

Naresh Kumar Sharma, H Dadhich and S Rani

Abstract

The present study was undertaken to elucidate the different pathological changes of pericardium in camel in North-Western, Rajasthan. Majority of the camels included in this study had died of natural causes. The pathological conditions of pericardium were comprised of inflammatory conditions 23.68%, non-inflammatory conditions 34.31% and circulatory disturbances 42.10%. The inflammatory changes were included hemorrhagic pericarditis 13.15% suppurative pericarditis 7.89% and fibrinous pericarditis 2.63%. The non-inflammatory changes were hydropericardium 15.78%, haemopericardium 2.63% and serous atrophy of fat 42.10%. Epicardial hemorrhages 42.10% reported as circulatory disturbance in present study.

Keywords: Camel, pericardium, gross pathology, histopathology

1. Introduction

The dromedary camel (*Camelus dromedarius*) is an important multipurpose livestock species and uniquely adapted to harsh environment. It is generally kept by nomadic pastoralists and essential for subsistence economy [1] and baggage carry for ancillary military purposes [2]. The pericardial sacs surround the heart. The mesothelial lining of inside the sac is the parietal pericardium and outside lining is epicardium. The space between them normally lubricated by small quantity of fluid produced by these cells. Localization of blood born infections to pericardium occurs sporadically in many diseases such as pasteurellosis, colibacillosis, *Pseudomonas aerogenosa*, streptococcus and clostridia infection. Circulatory disturbances cause decrease vascular integrity due to toxicity and septicemia, which is generally associated with toxins that damage the blood vessels [3]. The Rajasthan government on June 30, 2014 declared the camel as the state animal. The aim of this study to identify the different pathological conditions associated with pericardial pathology in camel, living under arid and semi-arid zone.

2. Materials and Methods

In present study, a total (n=62) samples of pericardial tissue were examined, out of them 38 tissues showing frank gross lesions were collected in 10 per cent formal saline for further gross and histopathological examination. The tissues were processed for paraffin embedding by acetone and benzene technique [4]. The tissue sections of 4-5 µm thickness were cut by the help of manual microtome and stained with haematoxylin and eosin staining method [5]. The possible results were recorded by both grossly and histopathologically.

3. Results

Table 1: The occurrence of different pathomorphological conditions of pericardium are described

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Pericardium</th>
<th>No. of samples</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inflammatory conditions</td>
<td>9</td>
<td>23.68</td>
</tr>
<tr>
<td>1.1</td>
<td>Hemorrhagic pericarditis</td>
<td>5</td>
<td>13.15</td>
</tr>
<tr>
<td>1.2</td>
<td>Suppurative pericarditis</td>
<td>3</td>
<td>7.89</td>
</tr>
<tr>
<td>1.3</td>
<td>Fibrinous pericarditis</td>
<td>1</td>
<td>2.63</td>
</tr>
<tr>
<td>2</td>
<td>Non-inflammatory conditions</td>
<td>13</td>
<td>34.21</td>
</tr>
<tr>
<td>2.1</td>
<td>Hydropericardium</td>
<td>6</td>
<td>15.78</td>
</tr>
<tr>
<td>2.2</td>
<td>Haemopericardium</td>
<td>1</td>
<td>2.63</td>
</tr>
<tr>
<td>2.3</td>
<td>Serous atrophy of fat</td>
<td>6</td>
<td>15.78</td>
</tr>
<tr>
<td>3</td>
<td>Circulatory disturbances</td>
<td>16</td>
<td>42.10</td>
</tr>
<tr>
<td>3.1</td>
<td>Epicardial hemorrhages</td>
<td>16</td>
<td>42.10</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>38</td>
<td>100</td>
</tr>
</tbody>
</table>
4. Inflammatory conditions

4.1 Hemorrhagic pericarditis
This condition was reported in (13.15 per cent) cases among camels.

4.1.1 Grossly: The pericardium sac was distended, thick and opaque; showed multiple red hemorrhagic patches on their parietal surface (Figure. 1).

4.1.2 Microscopically: Multiple petechiae to ecchymotic red streaks observed along with focal to diffuse heavy cellular infiltration of mononuclear and polymorphonuclear cells in the pericardial surface (Figure. 2).

![Fig 1: Gross photograph of heart showing thick and opacity of pericardium with diffuse hemorrhagic patches on parietal surface.](image1)

![Fig 2: Microphotograph of hemorrhagic pericarditis showing petechiae to ecchymotic hemorrhages with diffuse infiltration of mononuclear and polymorphonuclear cells in the pericardium. H&E 200x](image2)

4.2 Suppurative pericarditis
This condition was reported in (7.89 per cent) cases among camels.

4.2.1 Grossly: Parietal surface of pericardium appeared as thicker, opaque, rough and contained yellow–creamy suppurative exudates (multiple small to large size abscess) with mass of fibrin on surface (Figure. 3).

4.2.3 Microscopically: The pus appeared as homogeneous eosinophilic fluid and surrounded by dense infiltration of neutrophils and lymphocytes (figure.4).

![Fig 3: Gross photograph of heart showing thick and opaque pericardial sac with large size suppurative exudates on parietal surface of pericardium](image3)

![Fig 4: Microphotograph of suppurative pericarditis showing homogeneous eosinophilic fluids in pericardium, surrounded by densely infiltration of neutrophils and lymphocytes. H&E 400x](image4)

4.3 Fibrinous pericarditis
This condition was reported in (2.63 per cent) cases.

4.3.1 Grossly: Heart was greatly hypertrophied, distention of pericardial sac with thick pericardium. The pericardial sac was stuffed with large amount of foul-smelling grayish serofibrinous fluid contain flakes of fibrin network (figure.5). The epicardial surface was covered with heavy deposit of fibrinous exudates, appeared as bread and butter like appearance (figure.6).

4.3.2 Microscopically: There were inflammatory exudates between the pericardium and myocardium. The fibrinous network trapping inflammatory cells, mostly lymphocytes and neutrophils were reported (figure.7).
5 Non inflammatory conditions

5.1 Hydropericardium
This condition was reported in (15.78 per cent) cases.

5.1.1 Grossly: Pericardial sac was contained excess amount of clear to light yellow or straw color, watery serous fluid, (e.g. transudate) with low protein content, without flecks of fibrin and does clot upon exposure to air.

5.2 Hemopericardium
This condition was reported in (2.63 per cent) cases.

5.2.1 Grossly: Pericardial sac contained large amount of serosanguineous fluid.

5.3 Serous atrophy of fat
This condition was reported in (15.78 per cent) cases among camels.

5.3.1 Grossly: The progressive mobilization of fat from atrioventricular junction and lipid mass was reduced in size and replaced by proteinaceous fluid with white foci of fat necrosis (figure.8).

5.3.2 Microscopically: Lipocytes became atrophic and showed necrotic changes. The edematous fluid was present in interstitial space.

6. Circulatory disturbances

6.1 Epicardial hemorrhages
This condition was reported in (42.10 per cent) cases among camels.

6.1.1 Grossly: Small and lentil size foci of petechiae to ecchymotic hemorrhages were present on coronary vessels and atrioventricular groove in epicardial surface (figure.9).

6.1.2 Microscopically: Diffuse massive red streaks of hemorrhages present on the epicardial surface without cellular infiltration (figure.10).
opportunists in traumatic injury. Fibrous adhesions between
the external and internal surfaces of viscera and pericardium
can be observed in chronic inflammatory lesions. Gross and
microscopic changes of fibrinous pericarditis were previously
described by Hegazy et al. [9] in male camel. This condition
is generally associated with foreign bodies’ penetration in heart
due to increased intra-abdominal pressure during pregnancy,
bleed and alimentary tract obstruction by the phytobezoars and
undigested desert fruits, agreement with Purohit et al. [9].
The gross and microscopic findings of hydropericardium were
similar and corroborated with previous observations by
Bekele [8] in camel. In the present study, this condition might
arise due to chronic parasitism, prolonged malnutrition,
severe hypoproteinemia, chronic debility; systemic diseases
cause acute heart failure, chronic cachectic illness and
idiopathic origin. The above causes were previously noticed
by Jubb et al. [3].
Gross and microscopic findings of serous atrophy of
epicardial fat were in accordance with the description reported
in previous study by Jubb et al. [3] and McGavin et al. [11] in
domestic animals. It might be occurred due to chronic
anorexia, starvation or cachexia in agreement with Jubb et al
Epicardial hemorrhages associated with septicemia, anoxia
and electrocution. Similar cause previously described by Jubb
bacterial diseases such as colibacillosis endotoxaemia,
pasturellosis and fungal toxicities might be cause of this
condition in dromedary camel. It is agreement with previous

8. Conclusion
In the present study, 38 pericardial tissue processed gross and
histopathologically. The circulatory disturbances were
predominantly reported followed by non inflammatory and
histopathological condition.

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