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

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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

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

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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).

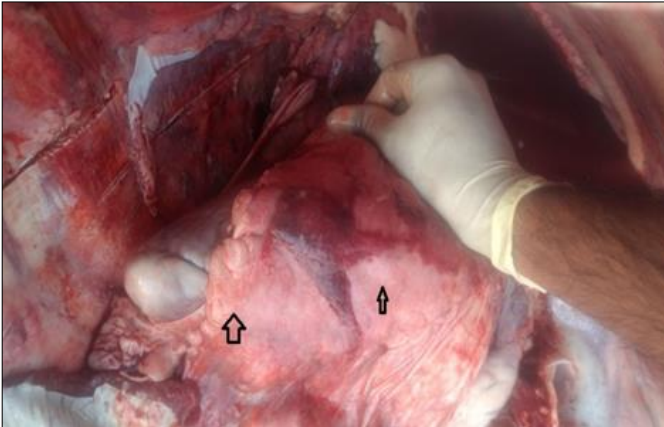


Fig 1: Gross photograph of heart showing thick and opacity of pericardium with diffuse hemorrhagic patches on parietal surface.

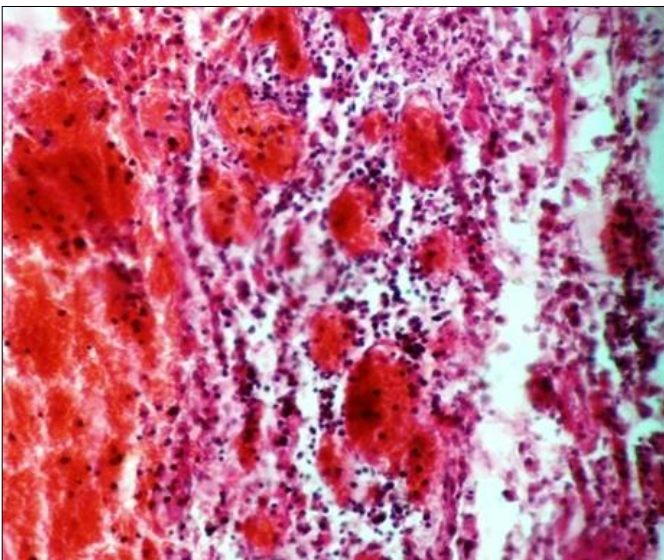


Fig 2: Microphotograph of hemorrhagic pericarditis showing petechiae to ecchymotic hemorrhages with diffuse infiltration of mononuclear and polymorphonuclear cells in the pericardium. H&E 200x

4.2 Suppurative pericarditis

This condition was reported in (7.89per 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

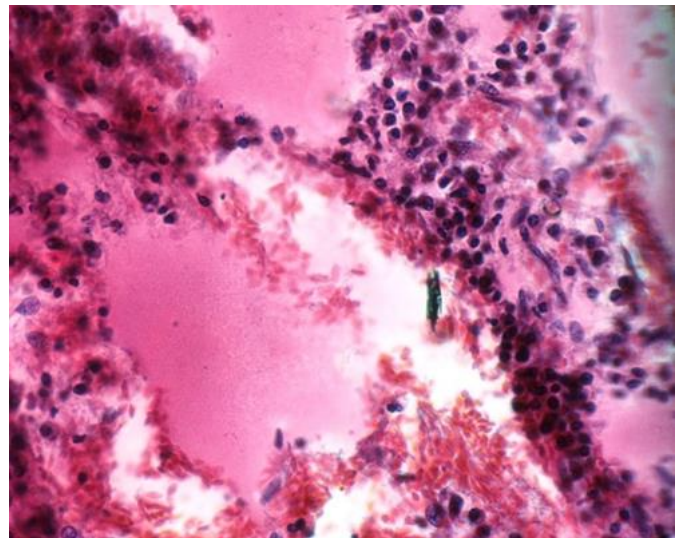


Fig 4: Microphotograph of suppurative pericarditis showing homogeneous eosinophilic fluids in pericardium, surrounded by dense infiltration of neutrophils and lymphocytes. H&E 400x

4.3 Fibrinous pericarditis

This condition was reported in (2.63per 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).



Fig 5: Gross photograph of heart showing foul-smelling grayish serofibrinous fluid in pericardial sac.



Fig 6: Gross photograph of heart showing bread-butter like appearance

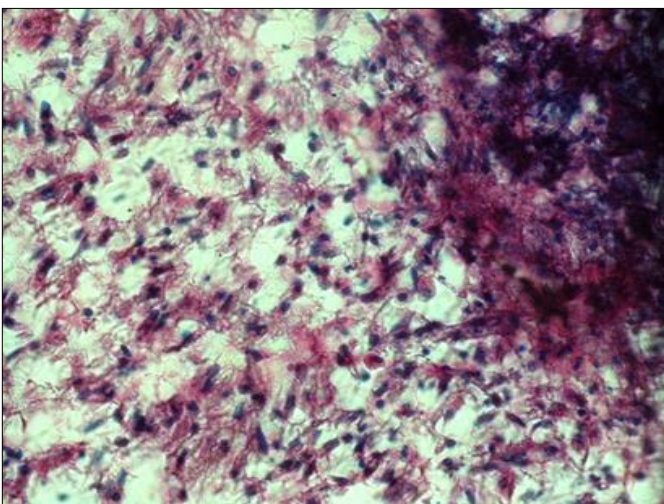


Fig 7: Microphotograph of fibrinous pericarditis showing trapping of lymphocytes in fibrin network between pericardium and myocardium. H&E 400x

5 Non inflammatory conditions

5.1 Hydropericardium

This condition was reported in (15.78per 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.



Fig 8: Gross photograph of heart showing adipose tissue mobilization from Atrio-ventricular junction and replaced by proteinaceous fluid

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).



Fig 9: Gross photograph of heart showing petechiae to ecchymotic hemorrhagic foci on epicardial surface near to coronary vessels and Atrio-ventricular groove

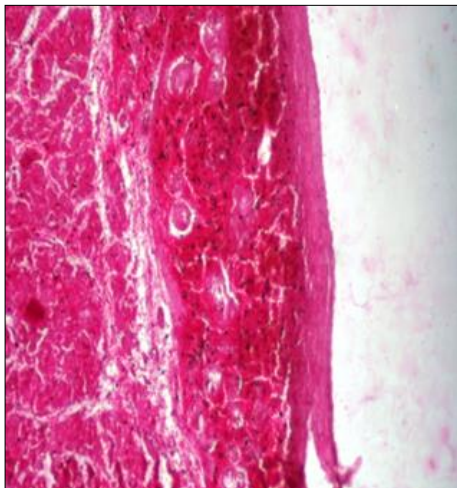


Fig 10: Microphotograph of heart showing diffuse hemorrhagic lesions on Epicardial surface. H&E 100x

7. Discussion

The pathological conditions of pericardium in abundances order were circulatory disturbances (42.10%) followed by non inflammatory (34.21%) and inflammatory condition (23.68%) reported in present study.

The inflammatory condition comprised of hemorrhagic pericarditis 13.15% followed by suppurative pericarditis 7.89% and fibrinous pericarditis 2.63% in present investigation. Gross and microscopic changes of hemorrhagic pericarditis were agreement with earlier report by Athar *et al.* [6] in cattle. It is hypothesized that hemorrhagic pericarditis might be associated with localization of blood born infection the pericardium, occurred sporadically in many bacterial diseases such as streptococcus infection, colibacillosis and pasteurellosis, were previously reported by Bornstein [7] in camel calf and Jubb *et al.* [3] in domestic animals.

The Gross and microscopic changes of suppurative pericarditis were agreement with Jubb *et al.* [3] in domestic animals. Although, bacterial infections of pericardium are relatively uncommon but more likely to produce purulent effusions in secondary diseases, reported by Jubb *et al.* [3] in domestic animals. It might be associated with pyogenic bacterial infection either as primary pathogen or as

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.* [8] in male camel. This condition is generally associated with foreign bodies' penetration in heart due to increased intra-abdominal pressure during pregnancy, bloat 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 [10] 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.* [3] in domestic animals.

Epicardial hemorrhages associated with septicemia, anoxia and electrocution. Similar cause previously described by Jubb *et al.* [3] and McGavin *et al.* [11] in domestic animals. Several bacterial diseases such as colibacillosis endotoxaemia, pasteurellosis and fungal toxicities might be cause of this condition in dromedary camel. It is agreement with previous report by Londhe *et al.* [12] and Al- Hizab, [13] in camel.

8. Conclusion

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

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