

Hepatic Amyloidosis in *Camelus Dromedarius* in Saudi Arabia

(A case report)

Mahmoud M.Hamouda, Fahad A. Al-Hizab

Department of Pathology, College of Veterinary Medicine and Animal Resources,
King Faisal University, Al-Ahsa, Saudi Arabia

Abstract:

Hepatic amyloidosis was diagnosed histologically in a 10-year old female camel. The animal was in a poor physical condition and brought for slaughter in Al-Ahsa slaughterhouse. During post-mortem inspection, the liver was enlarged, and extremely pale and waxy on both its external and cut surfaces. Histologically, the deposits appear first in the space of Disse and then progressively enlarge to encroach on the adjacent hepatic parenchyma. The trapped liver cells were destroyed and eventually replaced by sheets of amyloid. Amyloid was stained positively with or without 5% potassium permanganate pretreatment.

Key Words: *Camelus dromedarius*, liver, amyloid.

Introduction:

Amyloidosis is a disease characterized by extracellular deposition of amyloid, a fibrillar material composed of a major protein (Gruys and Snel 1994).

Typically, amyloidosis have been classified based on their clinical features into categories that include primary amyloidosis, secondary amyloidosis, familial amyloidosis, and isolated amyloidosis.

Primary amyloidosis (AL) is due to overproduction of immunoglobulin light chain and may be neoplastic or genetic in origin. Secondary, or reactive amyloidosis (AA), is due to an accumulation of serum amyloid A (SAA) in acute phase protein associated with inflammation, chronic infectious and malignant disorders (Yakar *et al.*, 1995).

The familial form of amyloidosis is found in patients diagnosed with genetically inherited forms of amyloid whereas an isolated amyloid only tends to involve a single organ system. For example, Type-II diabetic patients have isolated amyloid deposits in islets of Langerhans.

The AL type is the most common form in humans and is frequently associated with multiple myeloma (Picken, 2001). By contrast, AL amyloidosis is very rare in domestic animals. A systemic AL amyloidosis was diagnosed in the horse associated with multiple myeloma

(kim *et al.*,2005) and in the cow associated with bovine leukocyte adhesion deficiency (Taniyama *et al.*,2000).

The AA occurs in different species of domestic animals including canine, equine, bovine, avian, and less frequently porcine and feline (Hukkanen *et al.*,2006, Flatland *et al.*,2007 and Zini *et al.*, 2008).

Although histologic examination is the “gold standard “ for diagnosis of amyloid, both forms (AA and AL) are ultrastructurally similar bind Congo Red and exhibit green birefringence with polarization. Amyloid fibril type may be distinguished through one of two methods that exploit biochemical differences in the fibrils : potassium permanganate oxidation or Shtrasburg method (SH method) (Francis, 1990).

Materials And Methods:

Liver specimens were collected and fixed in 10% buffered formalin, dehydrated, processed and embedded in paraffin wax. Four-microns serial sections were stained with HE, Congo Red and crystal violet stains (Bancroft *et al.*,1994). The slides were treated with potassium permanganate for oxidation to differentiate between Al and AA amyloid.

Results:

Grossly, the liver was enlarged and extremely pale and friable, grayish and waxy on both its external and cut surfaces (fig.1).

Histologically, the deposits seem to appear first in the space of Disse and then progressively enlarge to encroach on the adjacent hepatic parenchyma and sinusoids. The deposits appeared homogeneous, pink, fluffy or smudgy by HE (Fig.2). It appears orange to red by Congo red stain (Fig.3). The trapped liver cells were destroyed and eventually replaced by sheets of amyloid (fig.4). The amyloid might be AL type due to retention of Cong red staining properties post-oxidation by potassium permanganate. No amyloid-related microscopic lesions were observed in organs other than the liver.



Fig.1: liver display waxy deposition (arrow) with tan-red foci (arrow head)

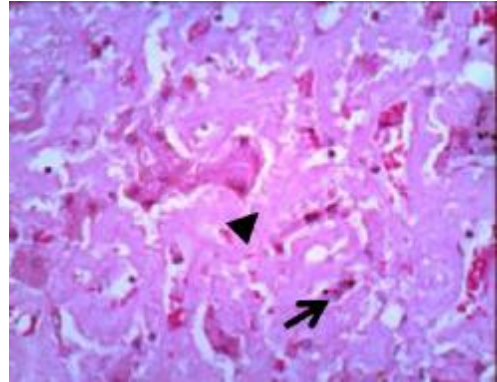


Fig.2: liver display eosinophilic material (arrow head) between squeezed hepatocytes (arrow). HE.X400

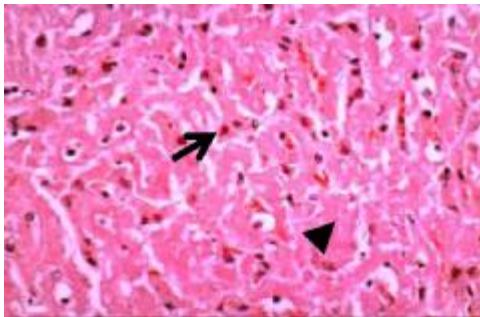


Fig.3: liver display eosinophilic material (arrow head) between squeezed hepatocytes (arrow). Congo red X400

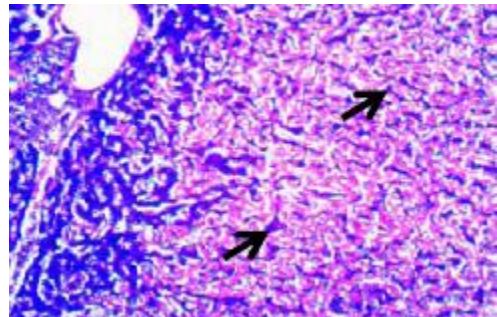


Fig.4: liver display eosinophilic material between squeezed hepatocytes (arrows). Crystal violet X400

Discussion:

A case of hepatic amyloidosis in *Camelus dromedarius* is reported. The amyloid material showed positive Congo red staining, and when that material was treated with potassium permanganate, staining properties were retained. This finding demonstrated that the amyloid deposits in the liver might be of AL-derived protein and were classified as AL amyloid, but this result needs further investigation by using immunohistochemical technique.

AL amyloidosis is the most common type of systemic amyloidosis in humans, and is frequently associated with multiple myeloma (kimura *et al.*, 2007). Conversely, AL amyloidosis is rare in domestic animals. However, Kim *et al.* (2005) reported systemic AL amyloidosis in spleen, stomach, duodenum and jejunum associated with multiple myeloma in horse.

Remarkably, the present animal exhibited no gross amyloid-related amyloidosis abnormalities in organs besides the liver. Hepatic involvement in primary amyloidosis is not rare, but is often clinically silent and a mild elevation of serum alkaline phosphatase level and hepatomegaly are the most common findings (Bandyopadhyay *et al.*,2006).

In the present study, the exact cause of hepatic AL amyloidosis could not be identified. However, in humans and horse, it is usually associated with myeloma. To the best of our knowledge this is the first pathologic study on hepatic amyloidosis in camelus dromedaries in Saudi Arabia.

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داء الشبة النشوى الكبدى فى الجمل وحيد السنم فى المملكة العربية السعودية (تقريب حالة)

محمود عبدالحليم محمود حمودة و فهد عبد الله الحزاب

قسم الأمراض، كلية الطب البيطرى والثروة الحيوانية، جامعة الملك فيصل
الأحساء، المملكة العربية السعودية

الملخص:

تم التشخيص المجهرى لداء الشبة النشوى الكبدى فى ناقة وحيدة السنم عمرها 10 سنوات وقد تم ذبح هذه الناقة بمسلخ الأحساء وكانت تعاني من إعياء شديد. أثناء الكشف على اللحوم تبين أن الكبد كبير الحجم وشاحب اللون وظهر به مادة شمعية على كلا سطحية وعند القطع العرضى. الفحص المجهرى أظهر وجود ترسيبات شمعية بدأت بفرغ دس وامتدت فشملت معظم أجزاء الكبد. الخلايا الكبدية المحصورة ظهرت ضامرة وميتة ومعظمها تم استبدالها بهذه المادة الشمعية. هذه المادة الشمعية استجابت ايجابيا مع الصبغة النوعية المميزة لها وذلك باستخدام أو بدون استخدام 5% من برمنجنات البوتاسيوم. يعتبر هذا أول اكتشاف لهذا النوع من المادة الشمعية (الشبة النشوية) فى الجمل الوحيد السنم.