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Physical, Biochemical, Cytological, Bacteriological Screening of Carpal hygroma Fluid *vis-a-vis* Surgical Management of Carpal hygroma in Cattle and Buffaloes-A report of 15 Cases

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A B S T R A C T

Fifteen animals affected with unilateral 9 and bilateral 6 carpal hygroma were presented with the history of swelling on the anterior aspect of the carpus since 3-18 month. Hygroma fluid samples from all the cases were aseptically collected for physical, biochemical, cytological and bacteriological investigations. The colour of hygroma fluid was pale yellow with slight deposits. Glucose, chloride and total protein levels were 43±4.08 mmol/dL, 107±6.50 mmol/dL and 3.20 g/dL, respectively. Cytological examination revealed cell count of 150 cells/µL, 20% neutrophils and 80% lymphocytes. Moreover, mild (+) cellular degeneration changes were also seen. The hygroma fluid samples from all animals were screened for brucellosis. Two cows were found positive for *Brucella* in tube agglutination test with antibody titres of 160 and 320 IU, respectively. Whereas, the hygroma fluid samples from other animals showed no growth on culture. Surgical excision of carpal hygroma in all cases was done under xylazine sedation (@ 0.02mg/kg body wt) and intravenous regional anaesthesia (IVRA). In *brucella* infected cows (n=2), hygroma sacs were excised *en mass*. Skin sutures were applied and the limb was put in fiber-glass cast for 10 days. In bilateral cases, the hygroma of one limb was treated at first instant followed by counter limb after 15 days. In all cases, the wound healing occurred by first intention without any complication. It was concluded that *brucella* organism may be present in hygroma fluid and due precaution are required while collecting fluid samples. The presence of hygroma may be considered as evidence of brucellosis in the herd. The owners should be advised not to breed such animals in future.

Introduction

Bursa is a small synovial fluid filled pouch of white fibrous tissue lined with synovial membrane whose main function is to provide cushion between bone, tendons and muscles around major joints of body (Honnas *et al.,* 1995 and Kassem *et al.,* 2017).

These bursae are further divided into congenital (Ahmed and Radad, 2006) and acquired (Misk, 2008). Acquired bursitis/hygroma has been reported that of olecronan (Hayat *et al.,* 2009), carpal (Ibrahim, 1987 and Misk, 2008) and sternal (Ahmed and Radad, 2006).

Carpal hygroma is commonly encountered acquired bursitis in bovine. It characterised by localized swelling over the dorsal part of carpal joint involving the skin, subcutaneous precarpal bursa and loose connective tissue (Tyagi and Singh, 2006 and Shukla *et al.,* 2020).

Etiology of carpal hygroma involves direct trauma with rough flooring (Cohen *et al.,* 2005; Ahmed and Radad, 2006; Venugopalan, 2009 and Kenyon, 2011) and brucellosis (Blood *et al.,* 1983; Sathiyabama, 2010 and Kenyon, 2011).

Diagnosis can be done on the basis of history of housing of animal on rough flooring, slow growth of fluctuating mass on the dorsal surface of the carpus and exploratory aspiration of hygroma fluid (Ahmed and Radad, 2006).

Conservative management can be done by repeated aspiration of hygroma fluid at weekly time interval (Arican *et al.,* 2005; Samsar and Akin, 2006) or incision of bursa followed by infiltration of irritant solutions like 4% tincture of iodine or 3-5% carbolic acid, which leads to destruction of the bursal lining followed by granulation, cicatrisation and obliteration of cavity (Arican *et al.,* 2005; Ahmed and Radad, 2006). However, surgical resection of chronic hygroma is preferred than conservative or medical treatments due to rapid and economic healing (Honnas *et al.,* 1995; Ahmed and Radad, 2006 and Shukla *et al.,* 2020).

The present study was aimed to do physical, biochemical, cytological and bacteriological examination of carpal hygroma fluid sample *vis-a-vis* surgical management of carpal hygroma to recommend preventive measure for the veterinary surgeons dealing with carpal hygroma in dairy cows and buffaloes.

Materials and Methods

Carpal hygroma fluid samples from all the affected animals (12 cows and 3 buffaloes) were taken aseptically in a sterile vial for the physical, biochemical, cytological and bacteriological examination. Staining of fluid was done with Auramine stain and Ziehl–Neelsen (Z.N.) stain (Bastian, 2005). A tube agglutination test was done in all animals.

Prior to surgery, all the animals were fasted for 24 hours. All the animals were restrained in the lateral recumbency with affected limb on upper side under xylazine sedation (0.02 mg/kg body wt, I/M) a tourniquet was applied proximal to the carpal joint and distal to the elbow joint for intravenous regional anaesthesia (IVRA). In IVRA 20 ml of injection lignocaine hydrochloride 2% was administered in a prominent vein (Fig. 2, A).

After shaving and scrubbing of the surgical site (Fig. 2, B), an elliptical skin incision on lateral aspect to the swelling was made (Fig. 2, C), and the skin was undermined with the help of scissors and utmost care was taken to avoid the rupture of bursa (Fig. 2, D). The posterior portion of the bursa was detached carefully,

keeping the joint capsule least affected (Fig. 2, E). In all cases intact bursae were resected successfully (Fig. 3, A and B) however in two cows, the sac got ruptured (Fig. 3, E) and the surgical site was flushed with warm saline solution mixed with antibiotic gentamicin.

Horizontal mattress suture pattern was applied on the skin using Nylon suture No. 2 and trimming of extra skin was done to prevent pocket formation during the healing process (Fig. 2, F).

All cases were operated and hygroma sacs were surgically excised as *en mass* which was followed by application of fiberglass cast for 10 days and injection Enrofloxacin hydrochloride @ 2.5 mg per kg body wt. I/M and injection Meloxicam @0.5 mg per kg body wt. I/M were administered for 5 and 3 days, respectively. Sutures were removed on 10^{th} day post-operative (Fig.3 C).

History

All the animals were affected with either unilateral or bilateral carpal hygroma (Fig. 1, A-C) and were presented with the history of swelling on the anterior aspect of the carpus since 3-18 month.

According to the owner initially it was a small swelling over the carpal joint and slowly developed. In some cases it was treated by the local veterinarian, but the animal didn't respond to the treatment and it grows steadily over a period of time.

On clinical examination mucous membrane and rectal temperature were normal. Feed and water intake was normal. However, animals have difficulty in sitting down and standing up due to massive swelling on anterior aspect of carpal joint.

Results and Discussion

The colour of hygroma fluid was pale yellow (Fig. 3, A) with slight deposits. Glucose, chloride and total protein levels were 43±4.08 mmol/dL, 107±6.50 mmol/dL and 3.20 g/dL, respectively. Cytological examination revealed cell count of 150 cells/µL, 20% neutrophils and 80% lymphocytes. Moreover, mild cellular degeneration (+) were seen.

The hygroma fluid samples from all the animals were screened for brucellosis using tube agglutination test. Two cows were found positive for *brucella* with antibody titres of 160 and 320 IU, respectively and no acid bacilli was observed under Z.N. and Auramine stains. *en mass* resection without spilling hygroma fluid was successfully done in n=13 cases whereas, it was not possible in n=2 cows.

In the present study, carpal hygroma affected animals were installed at pucca floor and repeated trauma might has caused the hygroma. Other authors (Ahmed and Radad, 2006; Tyagi and Singh, 2006; Kenyon, 2011; Misk *et al.*, 2013; Kassem *et al.*, 2017 and Shukla *et al.*, 2020) reported in cattle and buffalo and Hayat *et al.*, (2009) reported in horses that due to repeated trauma, the skin gets thickened which surrounds the acquired subcutaneous bursa containing fluids in it.

Routinely, brucellosis in cattle is diagnosed clinically by abortion, infertility and retained fetal membrane however, in the present study two animals which had carpal hygroma were found positive for brucella organism after screening hygroma fluid. Other authors have also reported presence of brucella organisms in hygroma fluids in cattle (Fensterbank, 1978; Musa *et al.*, 1990; Berhe *et al.*, 2007; Sathiyabama, 2010).

Fig.1 A. Unilateral carpal hygroma in a 7 year old Murrah buffalo
B. Bilateral carpal hygroma in a 4year old H.F. cattle
C. Unilateral carpal hygroma in a 6.4 year old Nili-Ravi buffalo
D. Bilateral carpal hygroma and fluid collection in a 1.5 year old H.F. heifer

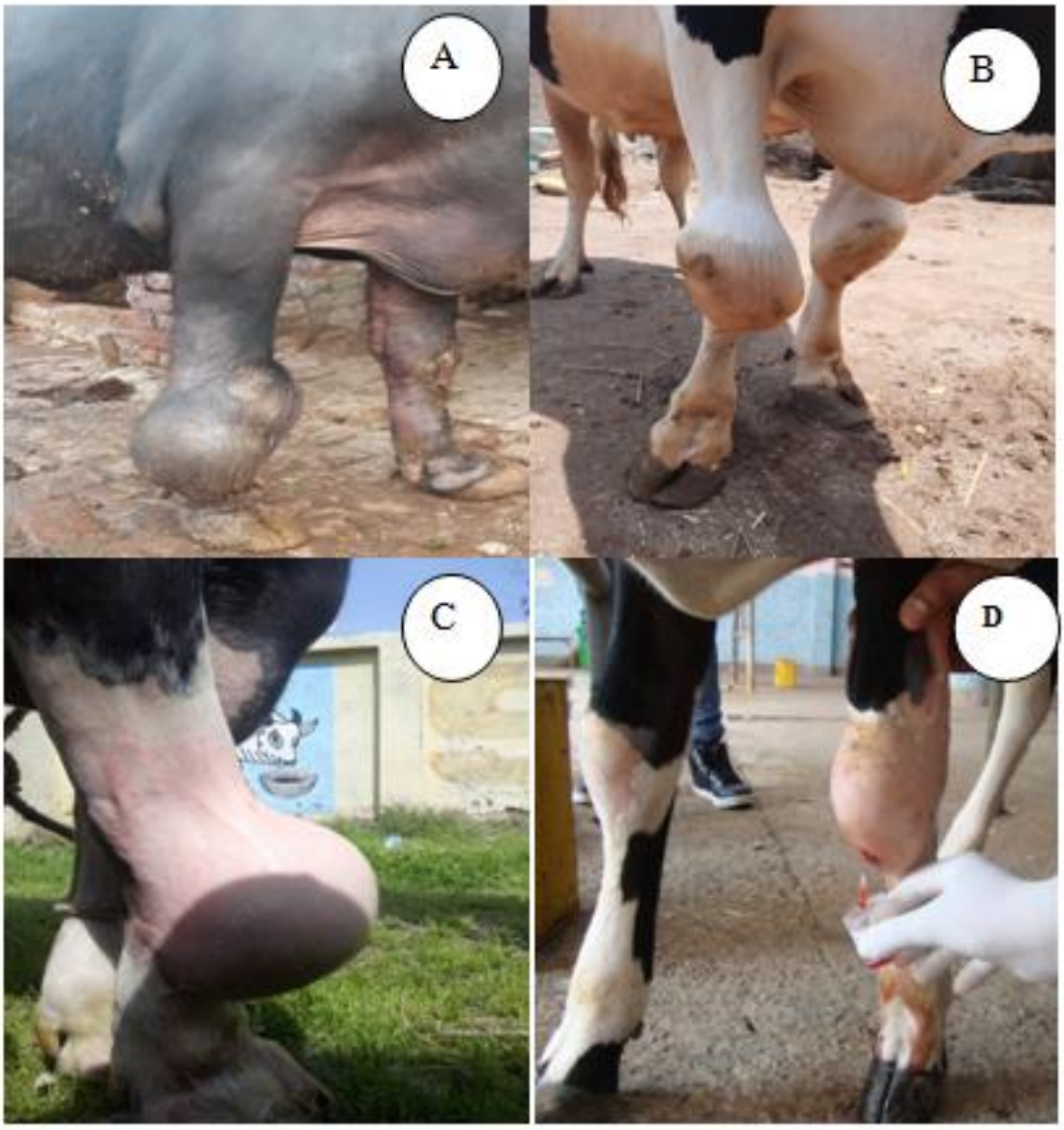


Fig.2 A- Application of tourniquet and IVRA with of 20 ml 2% lignocaine hydrochloride
B- Aseptic preparation of surgical site
C- Elliptical skin incision on lateral aspect of carpal hygroma
D- Undermining of skin for separation of sac
E- Undermining of ventral attachment of en mass resection of bursa
F- Skin suturing

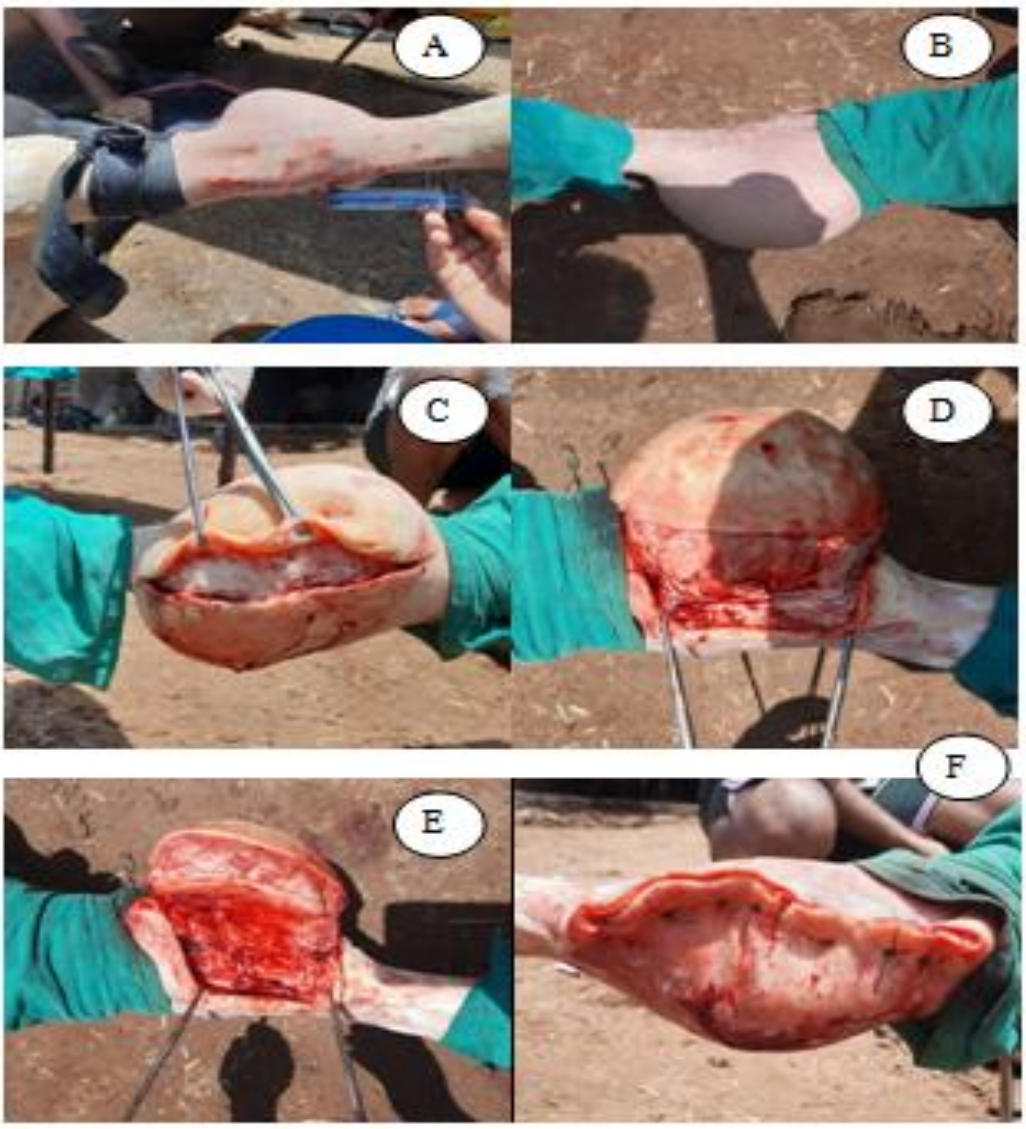
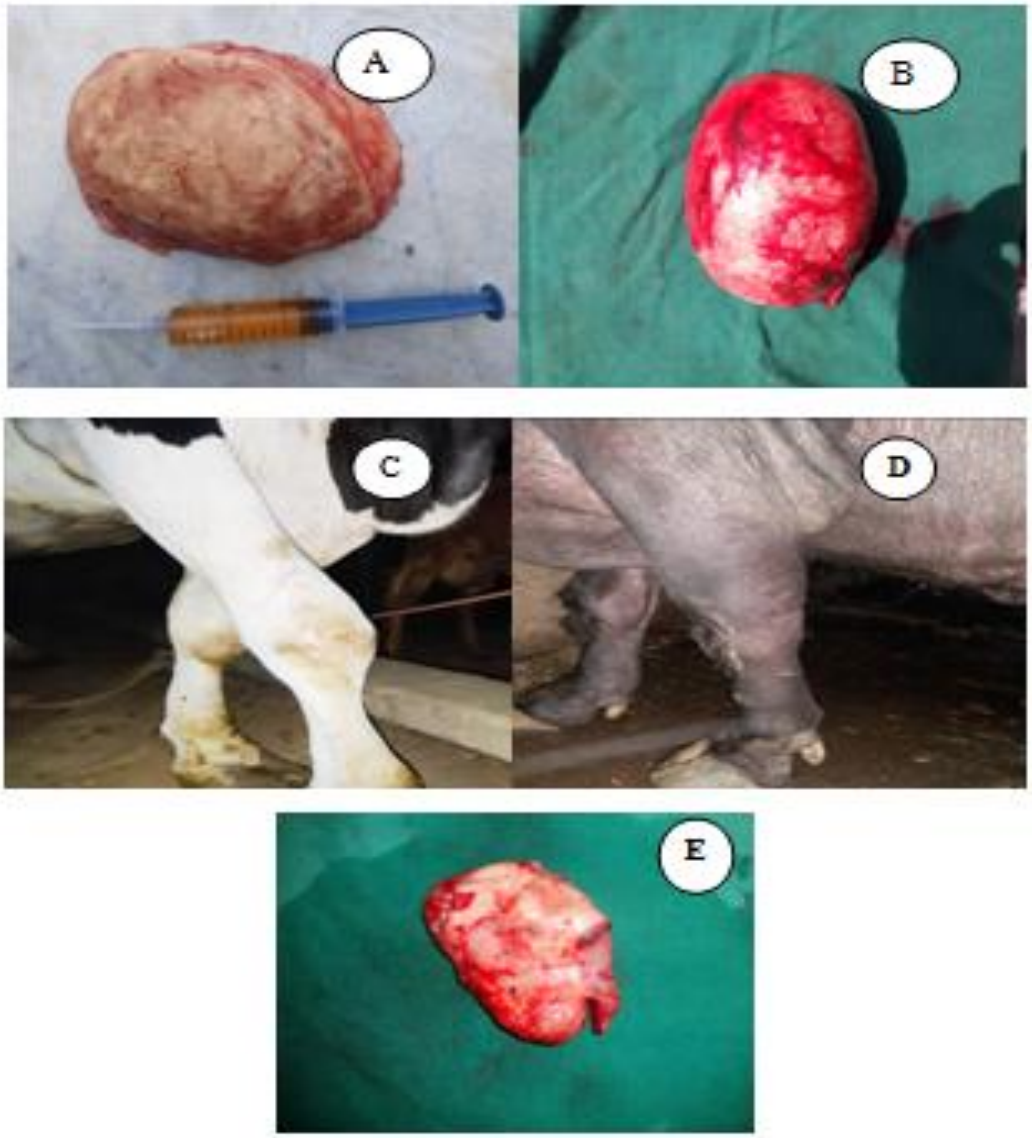


Fig.3 A&B- En mass resected hygroma sacs in *brucella* positive cows
C-Three month post-operative in 4year old H.F. cattle
D-5 month post-operative in 7 year old Murrah buffalo
E-Rupture bursa in 2.5 year old cattle



In present study pale yellow hygroma fluid with slight deposits, glucose 43±4.08 mmol/dL, chloride 107±6.50 mmol/dL and total protein 3.20g/dL were the biochemical findings. Cytological examination revealed cell count of 150 cells/ µL, 20% neutrophils and 80% lymphocytes. On screening the available literature no reports has been found.

In the present study all the animals were treated surgically and sac was removed as *en mass* without spillage of hygroma fluid whereas, in two cows hygroma fluid spillage occurred which might be due to repeated attempts of aspiration of hygroma fluid as conservative treatment resulting in infection and adhesion formation.

In present study post operatively the immobilization of the carpal joint with caudal splint and fiber glass cast is very beneficial for the stability of suture line and had better outcomes. However, Shukla *et al.*, 2020 used pressure bandage and caudal splint.

The *brucella* organism may be present in hygroma fluid and due precaution are required while collecting fluid samples. It is recommended that surgery of carpal hygroma should be done as *en mass* resection taking utmost care of any spillage during surgery, especially brucella positive cases, as *brucella* organism may act as public health accident for the veterinary surgeons. However, repeated attempts of aspiration of hygroma fluid as a conservative method of treatment are not recommended. The presence of hygroma may be considered as an evidence of brucellosis in the herd. The owners should be advised not to breed such animals in future.

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