Histopathological study of splenitis in cattle induced by traumatic foreign body penetration

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Abstract

Aim: A detailed post mortem examination was conducted on the animal to know the cause of the death.
Materials and Methods: Detailed post-mortem examination was carried out. The Impression smears from the affected organs was taken and subjected to Gram's staining technique for preliminary identification of the micro-organism. The suspected tissues were processed for histological investigation by formalin fixation and paraffin embedding technique as explained by Luna
Results: Hardware diseases in cattle are a common feature in developing countries where organized farming is still not an adopted practice of management. During post mortem examination, a case of foreign body penetration induced splenitis was encountered. A large irregular abscess cavity was found with greenish liquefactive material found wherever the foreign body had penetrated. Multiple focal abscesses were found in the parenchyma along with congestion and edema. The histopathological investigation revealed inflammation with neutrophilic liquefactive debris, mild fibrosis, vascular sclerosis, focal lymphocytolysis and numerous chains of regular sized bacilli in the parenchyma, determined to be *Bacillus* spp. Trauma due to foreign body is rare in spleen due to its anatomical location.
Conclusion: Foreign body penetration induced splenitis was encountered. The histopathological investigation revealed inflammation with neutrophilic liquefactive debris, mild fibrosis, vascular sclerosis, focal lymphocytolysis and numerous chains of regular sized bacilli in the parenchyma, determined to be *Bacillus* spp.
Keywords: Cattle, Foreign body, Histo-pathology, Penetration, Splenitis, Traumatic.

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Introduction

Indiscriminate feeding practices have been the major factors causing foreign body traumatic pathological manifestations which have proven often fatal among cattle. It is still a common practice in rural/ semi-urban areas to allow the cattle to graze randomly on food leftovers etc., in the garbage dumps. Hence, the incidence of hardware diseases is commonly encountered. These affections can also be termed as Foreign body syndromes in modern veterinary terminology.

Case History

One such case was brought to the Dept of Pathology, Veterinary College, Shimoga., for post mortem examination. The animal had died exhibiting clinical signs of pyrexia, hurried respiration, dishing gait, tense abdomen, anorexia and dullness. It was aged 8 years and had a previous history of mastitis, due to which its productivity was reduced. As there was no productivity from the animal, it was left to graze at random in the vicinity without supervision.

A detailed post mortem examination of a cattle was conducted to know the cause of the death.

Materials and methods

The animal was subjected to a detailed post mortem examination and the organs showing macroscopic lesions were systematically recorded. The affected organs showing lesions were collected for histopathological examination. Impression smears from the affected organ was taken and subjected to Gram's staining technique for preliminary identification of the micro-organism. The suspected tissues were processed for histological investigation by formalin fixation and

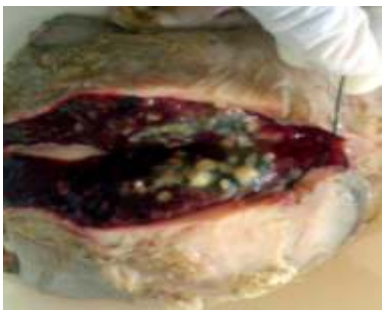

Fig 1. Ventro-lateral surface of the spleen showing a lodged iron wire and multifocal abscesses surrounded by green necrotic areas in the parenchyma of the spleen dissected through the point of entry of the foreign body. Also note the focal induration of the wound lips with extensive fibrosis of the lip surface.

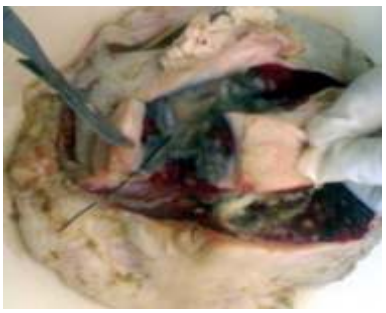

Fig 2. The suppuration tract in the splenic parenchyma traced from the point of entry of the iron wire. The tip of the wire is lodged in the parenchyma showing abscess cavitation with thick fibrotic reaction. Note the semi-solid dull greenish-creamy pus in the abscess.

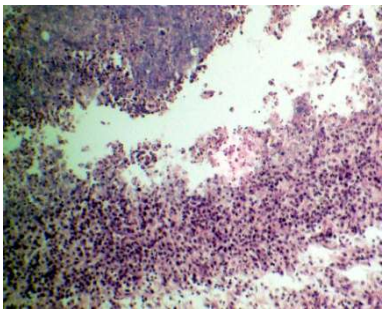

Fig 3. Section of spleen showing liquefactive necrosis (Top left corner) and suppurative inflammation within the parenchyma. H&E, 30X.

paraffin embedding technique as explained by Luna [1].

Results and Discussion

The spleen was enlarged and had a thickened capsule on the ventro-lateral surface adjacent to the rumen. The foreign body had already penetrated and was embedded inside the parenchyma of the spleen. Upon removal, a small wound was noticed which was indurated. Surrounding the wound lips, a wide area was also thickened and fibrotic. The reticulum at the rumeno-reticular junction, showed similar indurated wound, partially healed. Upon incision at the site of the wound, the spleen showed a thick greenish-creamy suppurative foci of lesion (Fig-1). Few areas were found containing semi-solid greenish-creamy pus forming small abscess cavities.

The path of entry of the foreign body was traced by carefully following the embedded wire. The piece of iron was approximately 5-6 cm long and 2-3 mm thick and had a jagged but sharp edge at the point of penetration. The iron piece was lodged in the parenchyma, along the course of which there was an encapsulated zone of inflammatory reaction. At the point of the lodgement of the tip of the iron piece, there was an irregular cavity of approximately 4-5 cm diameter filled with greenish-creamy suppurative exudate (Fig-2). Several greenish yellow various sized focal lesions were evident discharging purulent material from the cut surface.

The introduction of the iron piece into the spleen had occurred from the reticulum, which is usually rare. Due to peristaltic movements/contraction, the iron piece had either broken or was dislodged from the reticulum tracing its path towards the spleen. To this effect, a small tract of indurated healed wound of 0.5-1 cm size was found on the serosal surfaces of the reticulum and the rumen. Retention of the broken iron wire within the splenic parenchyma was responsible for initiation of a suppurative reaction in the organ. The lesion suggests a chronic yet persistent irritation expended by the foreign body causing multifocal abscess cavitations spread out in the Splenic parenchyma.

It is recorded that Splenic abscesses may be miliary or large and focal, but both types being uncommon [2]. In one of the studies in horses having perforation of gastro-intestinal tract by metallic wires, the wires were found contained within an abscess with multiple adhesions with liver, spleen and mesentery, and a few were encapsulated with adhesions in the small intestines [3]. It can be deduced that foreign body penetration is most likely to cause abscessation.

The impression smear from the edge of the abscess cavity, stained with Gram's stain showed numerous G+ve bacilli, a few G+ve cocci and few yeasts. It is stated that inflammatory or gangrenous conditions elicited by traumatic foreign bodies is usually caused by *Corynebacterium spp*, and *Fusobacterium necrophorum* respectively [4]. In the abscess smear, the bacteria showed pleomorphy, straight or slightly bent rods, sometimes joined at an angle resembling Chinese letters, sometimes stout or dumb-bell shaped and some organisms were long rods of irregular size. These morphology closely resemble the features of *Bacillus* spp. like the *Corynebacterium (Arcanobacterium*) [5] and *Clostridium* spp. [2] has recorded that abscessation in spleen can be due to various organisms including *Arcanobacterium pyogenes*, but some commonly localize preferentially in the spleen and

that purulent splenitis may develop by local extension in cattle from penetrating wounds of the reticulum. Or the infection with the *Corynebacteria* would have occurred from the sub-clinical mastitis, as per the history of the animal.

The histological findings were suggestive of sub-chronic inflammation with extensive areas of liquefactive necrosis with polymorphonuclear cellular infiltration, surrounded by mono-nuclear cells and fibrous encapsulation (Fig-3). The parenchyma showed several areas of suppuration, focal lymphocytolysis, haemorrhages, haemosiderosis, fibrosis and reticular cell proliferation. Few blood vessels showed thickening of the muscular layer of the arteries indicative of vascular sclerosis. Several non-specific G+ve bacilli were also seen in the parenchyma.

Traumatic splenitis is usually uncommon, since the chance of trauma to the spleen from a penetrating foreign body from reticulum occurs very rarely when compared to the incidence of traumatic reticulitis or traumatic reticulopericarditis. This can be attributed to the anatomical configuration and location of the spleen which is not prone frequently for trauma by foreign body penetration. Penetration is possible only when the foreign body is present at a sufficiently higher location when the reticular / ruminal mixing of the contents occur. It is documented that abscesses or encapsulated areas of necrosis or liquefaction occasionally result from the infection brought in on penetrating foreign bodies which chance to wander into spleen from the reticulum instead of pursuing its usual course towards the heart in which case, there will be extensive fibrous adhesions along the path taken by the nail, wire or other body [6]. It is also stated that the penetrating foreign body usually induces reticulitis or reticulo-pericarditis, and occasionally may penetrate either the liver or the spleen [4, 7] from the reticulum.

It can be deduced that foreign body penetration of the lymphoid organ could cause necrotic, suppurative inflammatory changes, which may cause immuno-suppression and gradual loss of body condition. If left untreated, the case might progress to chronic splenitis and discharge the purulent material into the peritoneal cavity. The animal might suffer from opportunistic infections due to immuno-suppression, spread the infection to adjacent or further locations or succumb to peritonitis and fatal endotoxic shock, or gangrene may supervene. In one of the clinical reports by Nuss *et al.* [8], splenectomy was performed on a 30 month heifer, which had an uneventful recovery, but was culled as it developed complicated septic tarsitis 3 months later. Further he states that eventhough splenectomy is an useful treatment, partial splenectomey could have prevented the late complications of septic tarsitis. In the end, summarises that Suppurative splenitis is usually a complication of hardware disease and has a grave prognosis unless splenectomy is carried out [8]. Diagnosis of foreign body penetration is possible by X-radiation technique, exploratory laparotomy and surgical correction can be adopted, if diagnosed early [4,8].

Conclusion

Trauma due to foreign body penetration is rare in spleen in cattle due to its anatomical location. A case of foreign body penetration induced splenitis was encountered in which the hardware was lodged in the splenic parenchyma and the angle of penetration was peculiar and had occurred from rumen causing a multiple suppurative infection with greenish liquefactive material found wherever the foreign body had penetrated. The histopathological investigation revealed inflammation with neutrophilic liquefactive debris, mild fibrosis, vascular sclerosis, focal lympho-cytolysis and numerous chains of regular sized bacilli in the parenchyma, determined to be *Bacillus* spp.

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