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Effect of Acanthocephalan Infection on the Intestinal Wall of Snake (*Naja naja*): a Histopathological Parameter

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Abstract: During a routine collection of helminth parasites from vertebrates acanthocephalan were recovered from the intestine of *Naja naja*. As the acanthocephalan were attached to intestinal wall it was desirable to study its histopathology severe host tissue reaction has occurred and whole thickness of the intestinal wall was involved. Intestinal mucosa was badly affected. Atrophy, necrosis, degeneration, shrinkage and erosion of the surface layers was seen in several sections. Most of the sub-mucoid region replaced by homogeneous pink staining material and fibrinous exudate. Dense fibrous mass was observed at the surrounding area of acanthocephalan. In most of the sections mucosa and sub-mucosa were eroded and villi were degenerated and dislocated. Several sections of acanthocephalan were observed in the serosal layers. It is suggested that similar host tissue reaction probably can occur in human because snake meat serve as a food item in some parts of the world.

Key words: Snake, intestine, acanthocephala, histopathology, *Naja naja*, atrophy

Introduction

There are six species of cobra distributed over nearly all of Africa, the mainland of Asia from Southern China to Baluchistan and major islands from Taiwan to Java. One species occurs in Pakistan where it is represented by two subspecies i.e. *Naja naja naja* and *Naja naja karachiensis*.

In most of the non-Muslim countries the flesh of the snakes are very expensive meal. Some countries like Philippines, Hong Kong, China, Japan etc., the snake raw flesh taken as a meal or they make their soups or barbecue. Snakes are also scientifically very important. Proteins in snake venoms include a factor that promotes growth of nerve fibers and a substance that inactivates complement, an important component of immune system (Kostiza *et al.*, 1995; Chen *et al.*, 1996; Thwin *et al.*, 1998; Yong, 1999). Snakes venom components are used by biochemists, pharmacologists, immunologists and molecular biologists in their research. They have a very limited role in clinical medicine, although antibodies were produced by *Naja kaouthia* venom (Masathien *et al.*, 1994).

There is no report so far on major diseases or histopathological changes in *Naja naja* except about some parasitic infections.

Materials and Methods

During a routine examination of helminth parasite of vertebrates eight specimen of snake *Naja naja* were collected from Karachi, Sindh, among which 5 specimens were heavily infected by acanthocephalan parasites which were identified as *Centrorhynchus* spp.

For histopathological studies portions of obviously infected intestine were fixed in buffer formalin for 24 h. To remove the fixative washed several times in 70% alcohol and dehydrated in graded series of alcohols. Wax embedded blocks were made by routine procedure. Eight micron thick sections were cut and stretched on a slide with little albumin on it. After 24 h, deparaffinized, stained in hematoxylin and eosin and mounted permanently in Canada balsam by usual method. Photographs were taken by a Nikkon (Optiphot-2) photomicrographic camera. Agfa colour film was used. Selected photographs are presented here and described.

Results and Discussion

Histopathological observations revealed that the intestinal villi were badly affected, fuse together and have lost their upright position in the lumen. At several places the villi and whole thickness of the muscular layers were atrophied and appeared as pink staining homogeneous material (Figs. 1-3).

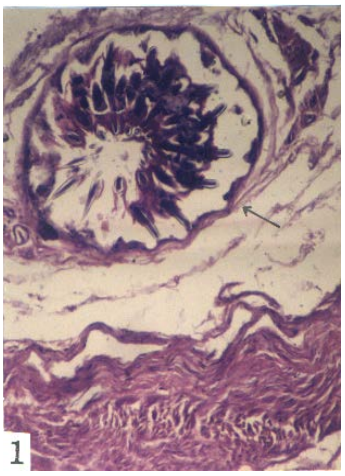

Fig. 1: Section of intestine showing perforation of the wall and section of proboscis is obvious on the surface of serosa (arrow). Slight tissue reaction is obvious around the proboscis (x 50).

Perforation with acanthocephalan appeared as sections in the muscular and on serosal surface (Figs. 1-3). Many sections indicated severe host-tissue reaction and total destruction of the intestinal tissue (Fig. 2). In some of this type of lesions the proboscis hooks of parasite were present in the center surrounded by dense fibrinous mass (Fig. 4). Surrounding tissue was atrophied and homogeneous. Destruction and degeneration was obvious in the muscular and serosal layer (Fig. 4). Study of a series of sections has confirmed that the whole thickness of the intestinal wall and serous membrane was affected, at the site of penetration and perforation.

Fusion of villi and degeneration of epithelial cells was prominent (Figs. 2 and 5). The dark patches in between the muscle bundles represent the inflammatory cells. No parasite tissue was obvious in this region (Fig. 6). Here at the serosal layer homogeneous fibrous mass was prominent. Several sections showed that muscularis mucosa or the muscles layers lost their structure and indicated hyaline degeneration leaving a layer of pink stained

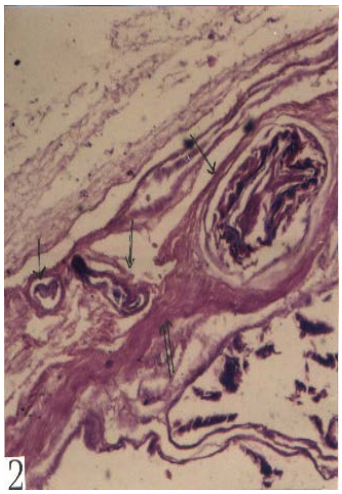

Fig. 2: Section of acanthocephalan penetrated in the muscles of intestinal wall (arrow). Here orientation of muscle fibers is disturbed, these appear to be in the process of atrophy (double arrow). Note the dense fibral mass at the surrounding area of parasites. Sub-mucosa and mucosa eroded. Villi become degenerated and dislocated (small arrow) (x 10).

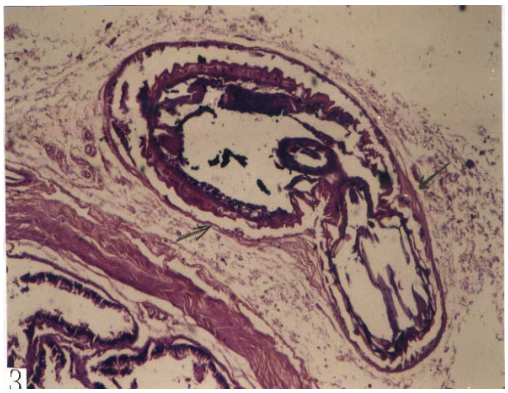

Fig. 3: Longitudinal section of acanthocephalan on the surface of intestinal wall (arrow) (x 20).

material (Fig. 5). The whole intestinal wall was exhibiting atrophy and degeneration. In most of the sections where parasite is physically present it is observed that surrounding region of the parasite is meshy, light stained and without any fibrous structure (Fig. 3).

Histopathology of intestine of snake *Naja naja* has revealed tissue damage of all layers of intestine due to penetration and perforation by the acanthocephalan parasite. The spiny proboscis and spines on the intestinal wall have caused severe host tissue reaction. At sites where parasite physically was not present also showed large number of inflammatory cells and fibrous elements indicating chronic inflammatory reaction. It is likely to suggest that due to full thickness enteritis the snake might have faced nutritional problems due to lack of absorption of the nutrients from the lumen of the host's intestine. As the villi are totally damaged and where they remain attached (Figs. 2 and 4) are fused together and the underlying tissues have became homogeneous which indicates functional disturbance of the organ.

Present observations are basically similar to those reported by Bullock (1963), Bilqees and Fatima (1992a,b) and Bilqees and Khatoon (1998) for nematode and acanthocephalan infections in

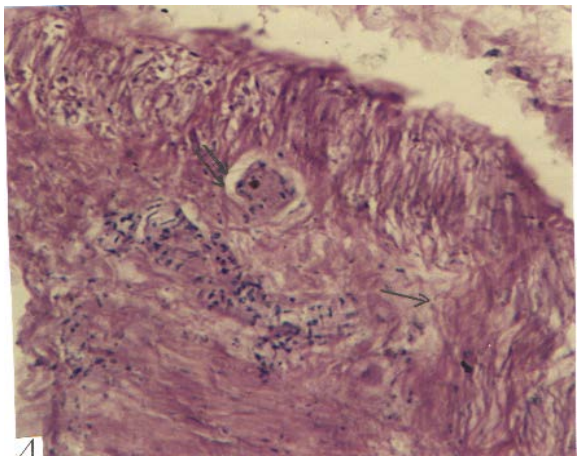

Fig. 4: Micrograph shows loss of epithelial morphology, atrophy of intestinal mucosa and lamina propria. Sections of acanthocephalan are obvious on the muscles of intestinal wall (double arrow). Here orientation of muscle fibers is disturbed, these appears to be in the process of atrophy and degeneration (arrow) (x 20).

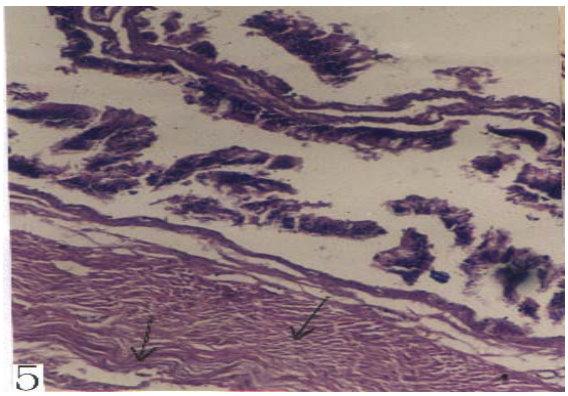

Fig. 5: Section of intestinal portion shows total deformity of surface epithelial layer. Epithelial cells are shrunken and lost their proper structure. Erosion of mucosa and shrinkage and degeneration of muscular layer (arrow) (x 10).

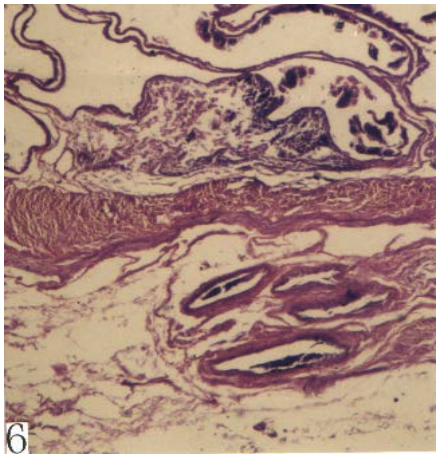

Fig. 6: Section of affected intestinal wall showing necrosis and degeneration of all layers. The epithelial architecture is totally lost. Epithelial and gland cells are not obvious (x 100).

fishes. But greater damage and total destruction of mucosal and serosal layers were noted during present investigation. This could be due to the strong proboscis penetration (Figs. 1 and 2). This might have provoked traumatic severe tissue reaction which resulted into destruction of mucosal layers and underlying tissues. Snake has great economic importance and is an important food article in parts of the world, therefore heavily infected snakes are not desirable for human consumption as the secretary and excretory products from the parasite have antigenic effect, may produce digestive symptoms and allergic reactions as do the other parasites and larval nematodes (Moreno-Ancillo *et al.*, 1997).

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