Occurrence of proventriculo-ventricular intussusception in chicken - A one-year perspective study

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Abstract

Proventriculo-ventricular intussusception is the telescoping of proventricular portion of the avian stomach into the ventriculus. Even though occurrence of intestinal intussusceptions in chickens commonly observed, the reports on proventriculo-ventricular intussusceptions were very scarce. The study was done as a part of screening the gut lesions in the chicken carcasses for a period of one year and 18078 chicken carcasses of multiple age groups belonging to 15 pure line breeds and two commercial breeds were screened. Proventriculo-ventricular intussusceptions noticed in two female PD2/Vanaraja chicks of 4 days and 3 weeks of age and in a 9 weeks old male Nicobari grower. While the intussuscepted proventriculus of Vanraraja chicks had unremarkable inflammatory lesions, severe congestion of proventriculus along with koilin displacement in the anterior portions of ventriculus were evident in Nicobari grower. The present study, point out the occurrence of proventriculo-ventricular intussusception in young synthetic and native lines of chicken.

Key words: Proventriculo-ventricular intussusception, Vanaraja, Nicobari breed.

Intussusception is the telescoping of one part of the digestive tube into the lumen of adjacent part often resulting in blockage of feed and fluid passage. The inner telescoped part is called the intussusceptum and the outer receiving part intussuscepiens. Even though the intussusception of intestine is rather common in poultry (Crespo *et al*., 2013), intussusception involving proventriculus scarcely been reported (Shrivastava *et al.*, 1989). Because of the scarcity of reports, its incidence and aetiological studies are not available. The present study aimed to throw light on the occurrence of proventriculo-ventricular intussusception in chickens of different breeds and age groups.

The study was based on the necropsy screening of chicken carcasses for gut lesions for a period of one year spanning from December 2015 to November 2016. Necropsy was performed on daily basis on the carcasses from the farms of ICAR- Directorate of Poultry Research, Hyderabad, Telangana, India and on the occasional outbreak based necropsy from the commercial farms. A total of 18078 carcasses belonging to 15 different breeds/lines and multiple age groups were screened during the period. The lines screened included white Leghorn breeder

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lines such as IWA, IWD, IWF IWH, IWI, IWK (n= 2095), synthetic breeder lines like PD1 (n=1712), PD2/Vanaraja (n=3880), PD3 (n=4223), Gramapriya male line (n=1632), broiler lines like Punjab Broilers (n=2783), single gene lines like Dwarf (n=237) and Naked Neck (n=257), and native breeds like Aseel (n=341), Ghagus (n=392) and Nicobari (n=426). Apart from this pure lines, commercial White Leghorns (n=52) and commercial broiler breeders (n=48) were also screened during the period. Tissue samples were collected in 10% neutral buffered formalin processed by paraffin embedding method, sectioned at 5µ thickness and stained with routine Haematoxylin and Eosin (H&E) stain.

The occurrence of Proventriculo-ventricular intussusceptions was 0.017% (3/18078). The condition noticed in two female PD2/Vanaraja (0.052%) birds of age, 4 days and 3 weeks, and in one male Nicobari (0.236%) aged 9 weeks. All the three affected chickens were floor reared and belonged to different flocks reared in different sheds. In these chickens, the proventriculus was telescoped into the lumen of anterior thin walled part of the ventriculus. Closer observation revealed that the point of telescoping originated posterior to the proventriculo- oesophageal junction without the eversion of the oesophagus. The intact oesophagus was drawn posteriorly along with the telescoped proventriculus. In the Vanaraja chicks (Fig. 1), very small part of the inverted proventriculus was protruded into the lumen of ventriculus while moderately protruded in Nicobari grower.

Figure 1 Proventriculo-ventricular intussusception (arrow) in the 4 day old Vanaraja chick

Inflammatory lesions were absent in the proventriculus and ventriculus of both Vanaraja chicks. Pulling of proventriculus with mild force, holding the oesophagus relieved the intussusception in the 3 weeks old Vanaraja chick. Histologically mild degeneration and compression of the submucosal glands were found in the Vanarja chicks (Fig. 2). On the other hand, the intussusception was not relieved with mild pulling of the oesophagus in case of Nicobari grower. Further, the koilin layer of the ventriculus was pealed posterior to the isthmus and pushed into the lumen by the protruding proventriculus (Fig. 3). The intussusceptum was severely congested (Fig. 4). Crop was empty in all the three cases.

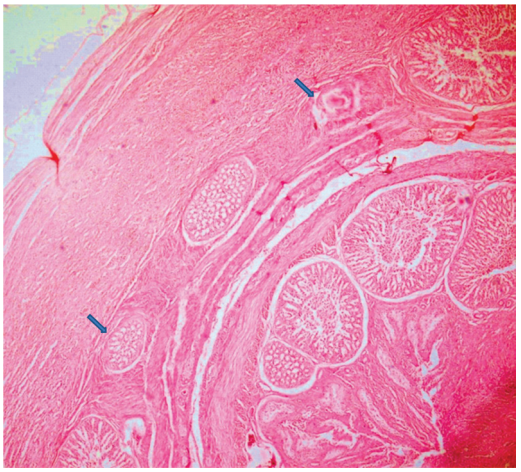

Figure 2 Degeneration and compression of proventricular glands (arrow) in the proventriculo-ventricular intussusception. H&E 40x

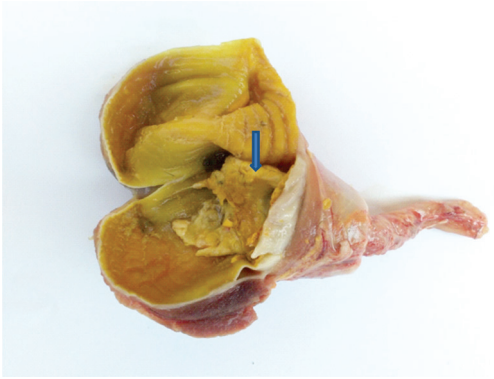

Figure 3 Proventriculo-ventricular intussusception in the Nicobari grower. Koilin layer can be seen pushed into the lumen of the ventriculus (arrow)

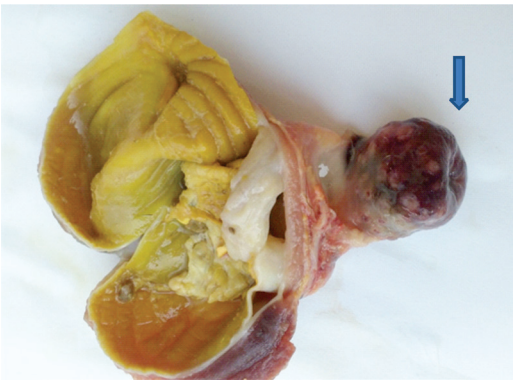

Figure 4 Severe congestion of the intussusceptum proventriculus (arrow) of Nicobari grower

Gross lesions were not observed in the intestines of any of the cases. Coccidial oocysts were randomly noted in the caecal contents of 3 weeks old Vanaraja chicks but not in other birds.

The present study showed that proventriculo-ventricular intussusception even though rare, occurred in young chicken. PD2/Vanaraja is a dual purpose breed developed for backyard rearing with medium growth rate while Nicobari is a native breed with its origin in Andaman and Nicobar islands of India with smaller size and slow growth rate. This indicates that the growth rate may not have significant contribution in the development of the condition. Further, broiler breeds with high growth rate has not affected in the study.

Inflammatory reactions were absent in the telescoped proventriculus in the previous report (Shrivastava *et al*., 1989) and in both Vanaraja chicks of the present study. This may be due to the acute development of the condition. However, the lesions in the Nicobari were different from the early report with severe vascular changes in the telescoped proventriculus along with pealing of koilin layer of ventriculus. Absence of fibrous tissue adhesions indicates a subacute nature of the condition.

Studies on aetio- pathogenesis of proventriculo-ventricular intussusception are not available in the literatures. The aetiology of commonly occurring intestinal intussusceptions are also obscure. In human, intestinal intussusceptions are very common in infants (WHO, 2002) and probable aetiology like adenovirus and enterovirus (O'Ryan *et al*., 2003) and some other infectious, neoplastic and functional disturbances were hypothesized (Cera, 2008), actual aetiology could not be ascertained so far. On the animal side, intestinal intussusception had been found along with parasitism (Wilson and Burt, 1974), foreign bodies, viral enteritis, intestinal surgeries and neoplasia (Levien and Baines, 2011). In fowls, multiple predisposing conditions like coccidiosis, mucosal injury and intestinal hyper motility were considered as the possible causes of the intestinal intussusception (Williams,

1986). In the present study, coccidial oocysts found only in one case but that too was very insignificant in severity. Hence, coccidiosis and resultant hypermotility will not be the cause of provntriculo-ventricular intussusception. A close follow up with other chicken of the same flocks showed no recurrence of the condition, that excludes possibility of any infectious cause. Chronic dyspepsia, chronic inspiratory difficulty due to upper airway obstruction and increased abdominal pressure were attributed for the development of gastro-oesophageal intussusception in dogs (McGill *et al*., 2009). Starvation considered as a probable cause of intestinal intussusception in fowls by some workers (Okoye, 1985) but ruled out by others (Williams, 1986). Although, empty crops observed in all the three birds, role of hunger in the development of provntriculo-ventricular intussusception require further study.

The present study revealed rare occurrence of proventriculo-ventricular intussusception in young chickens of dual purpose lines as well as native breeds. Unlike the earlier reports, proventriculus with severe congestion observed in the present study. Actual cause for the development of the proventriculo-ventricular intussusception is unclear. The possibility of occurrence of proventriculo-ventricular intussusception need to be considered while making clinical diagnosis especially in well-priced birds.

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