

GROSS LESIONS IN FERAL PIGEONS IN SOME CASES OF ORGANOPHOSPHORIC ACUTE POISONING

ANCA LUNGU*, TIZIANA RAMPIN, G. MANAROLLA**, CAMILLA RECORDATI****

*Faculty of Veterinary Medicine Bucharest, Romania

**Dipartimento di Patologia Animale, Igiene e Sanità Pubblica Veterinaria –
Università degli Studi di Milano, Italy

Summary

A synthesis of necrotic investigation conducted on 10 years (1996-2006) on sporadic events of death involving feral pigeons is trying to underline some common features which may define the gross lesions picture in organophosphoric poisoning in birds. The necropsy findings mainly centred round the circulatory changes constantly observed in the subcutaneous tissues of the neck and pre-pectoral zone, particularly along the oesophagus and crop *(permit to) might describe a common picture of injuries, useful for a rapid diagnostic orientation.

Some pathogenesis consideration based on the double toxic effect upon the endothelial structure and the autonomous nervous system try to explain the sudden death and the pattern of the out coming lesions picture.

Although the Italian law forbids killing of feral pigeons (*Columba livia*), sporadic outbreaks of mortality due to illegal poisoning still occur in this species in Italy both in urban areas and in the countryside. Cases of intentional poisoning may be suspected when incidents involve a few to great numbers of birds and take place in areas where feral pigeons are known as a cause of several types of damages. In these cases, dead pigeons, usually in good body condition, are found in a same place where also a certain amount of remaining feed (usually a mix of cereals) can still be detected. Although literature on the matter refers that necropsy findings of the dead pigeons are unremarkable in most cases of poisoning [1; 2; 3; 4; 5], this study describes peculiar gross findings constantly observed in acute organophosphoric poisoning in feral pigeons during 10-year-routine diagnostic activity (1996-2006).

Materials and Methods

Groups of dead or agonic feral pigeons found and collected by the officials of the ASL-Veterinary Service had been submitted to the Section of Veterinary and Avian Pathology of the University of Milan for post-mortem examination to determine the cause of death. In any case of investigation the precise number of dead birds was not reported by the officials but anytime it was estimated about some tens. In a few cases samples of feed found in close proximity to the dead

pigeons was also submitted. When the necropsy findings suggested intentional poisoning cases, samples of feed and digestive content as well as liver samples were forwarded to Istituto Zooprofilattico della Lombardia e dell'Emilia – section of Brescia - for chemical analysis.

As such events may have juridical implication, the anamnestic data and the gross lesions observed at necropsy were in all cases recorded, analysed and photographically documented as phisic evideces.

Results and Discussions

Necropsy findings revealed that most investigated birds were in good body condition. The great majority of submitted pigeons were adult, both males and females, in varying degree of reproductive activity. In all subjects abundant feed was found in the first segments of the digestive tract. These details suggest a sudden death of the pigeons. In all birds severe congestion, oedema and haemorrhages were constantly found in the subcutaneous tissues of the neck and pre-pectoral zone, particularly along the oesophagus and crop (Fig. 1 and 2).



Fig. 1 Organophosphoric poisoning in pigeon. Hemorrhages of the subcutaneous tissues of the neck associated with hyperemia of the regional vessels.

Moreover, the severe damage of the blood vessels can make quicker the onset of the post mortal changes masking the lesions with faster cadaveric imbibition. No other gross lesions were detected. Chemical analysis confirmed

poisoning due to organophosphoric compounds in all cases showing the aforementioned gross findings.

Reports of death of free-ranging wild mammals or birds caused by intentional poisoning are normally rare and generally restricted to single individuals [1]. On the other hand, wildlife die-off due to organophosphoric compounds generally involve a few to hundreds animals. A presumptive diagnosis of organophosphoric/anticholinesterase poisoning should be considered whenever animals are found dead in good body condition [1; 5]. Clinical signs of organophosphoric poisoning (such as severe dyspnea associated with nervous signs preceding death) generally begin few minutes after the exposure to highly toxic doses [1; 3] but usually remain unobserved affecting free ranging subjects. Besides the well known anticholinergic action, some organophosphoric compounds, like 4-alkyl derivatives, have a second, hyperacute effect causing sudden death and based on the inhibition of γ -amino butyric acid (GABA) [3].



Fig. 2 - Organophosphoric poisoning in another case. Severe hemorrhagic lesions affecting all the organs of the neck.

In this study we constantly observed severe circulatory changes in the poisoned birds especially in the subcutis of the neck. These lesions were unusual and difficult to explain considering the sudden death of the birds.

In reason to explain this pathologic process causing the extremely rapid death it must be first underlined that, more than other analogues structures, the mucous membranes of the digestive tract are particularly permeable for some toxic substances [3]. Moreover, the thinness of the oesophagus wall in birds make possible a rapid and massive diffusion in the neighbouring structure, exacerbating the toxic effect of the poisoning.

Further, field literature data indicate that many xenobiotic substances have an action on the vasculature by altering their autonomic nervous system activity [3; 5]. Thus, it is conceivable that the direct action of inhibiting cholinesterase in the intramural myoneural junctions of blood vessels induces vasoplegia. Additionally, this possible explanation for the pathogenesis of the circulatory changes could be sustained by the literature data showing distal axonopathies in blood vessels musculature induced by organophosphoric poisoning [3; 5; 7].

On the other hand, it is well known that endothelial cells of certain arteries and veins are directly involved in the decrease of vascular tone as a result of exposure to naturally occurring vasodilator substances such as acetylcholine. As a general rule, when endothelial cells are damaged, blood vessels lose the ability to relax on the exposure to most of these substances. In addition, the loss of functional endothelial cells seems to transform normal vasodilator responses into potent vasoconstrictor activity. A substance which damages or destroys endothelial cells to the extent that vasodilatory response is altered could conceivably cause significant decreases in the blood flow and subsequent tissue damage in certain organs [3].

This double pathogenetic mechanism allows to explain the circulatory lesions observed at necropsy of feral pigeons poisoned using organophosphoric substances.

Conclusions

- Cases of intentional poisoning of birds with organophosphoric substances may be suspected especially when great numbers of birds in good body conditions show necropsy finding suggesting a sudden death;
- Severe circulatory changes affecting mainly subcutaneous tissues of the neck and pre-pectoral zone - particularly along the oesophagus and crop - may be useful as a rapid diagnostic orientation suggesting an organophosphoric poisoning;
- The aforementioned gross findings could be explained by a double action of organophosphoric compounds which block the blood vessels activity and damage normal endothelial function.

References

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