THE BOVINE LINGUAL TONSIL – A SPECIFIED RISK MATERIAL (SRM)

Gasse Hagen
Institute of Anatomy, University of Veterinary Medicine Hannover, Germany
Hagen.Gasse@tiho-hannover.de

ABSTRACT

This paper is supposed to emphasize two issues:
(a) A legal item as expressed in European Community regulations concerning bovine spongiform encephalopathy (BSE).
(b) A histological item aimed to identify follicular dendritic cells (FDC) which are – firstly – typical constituents of lymphatic tissue and – secondly – are the structural components which make a tonsil become a SRM, since they bind prion protein.

The first item fits very well to demonstrate that there is still a great demand for anatomists to contribute to all fields of applied anatomy not only in clinical science, but also in food hygiene.

The second item is focussed on the immunohistochemical detection of FDC, since the routine structural criteria which have so far been applied do not seem sufficient to define precisely enough what a 'tonsil' actually is.

By means of immunohistochemistry, tonsillar lymph nodules (*Noduli lymphatici*, often referred to as lymph follicles) were recognized by the presence of FDC which were found up to 30 mm rostral of the most caudal papilla vallatae, at a depth of approx. 4.6 mm (i.e. within the *Lamina propria mucosae*).
KEY WORDS: Specified risk material (SRM), BSE, lingual tonsil

INTRODUCTION

This study was triggered by the regulation (EC) 999/2001 which demands that the lingual tonsil shall be removed by cutting the tongue in a transversal plane rostral to the lingual process of the hyoid bone. As demonstrated in our previous study (4), this procedure did not guarantee the complete elimination of lingual tonsillar tissue, as tonsillar removal depended very much on the correct position in which the tongue was held when the cut was made in a ventro-dorsal direction. In search of a more appropriate landmark for the cut, we proposed to use the most caudal papillae vallatae, as this orientation mark is on the dorsal surface of the tongue and is far away from the macroscopically visible part of the tonsil. However, such a recommendation appears useful only under the premises that no tonsillar tissue is presented rostral to this landmark.

In order to check for lymphoid tissues, several previous studies (1, 3), included our own (4), relied on routine histological methods (H.E. stain) only, or used immunohistochemistry to detect populations and subpopulations of lymphocytes (2). These methods did not seem to us to be appropriate as they could not distinguish true tonsillar tissue from mere unspecific accumulations of lymphocytes. Considering this, we made the attempt to stain immunohistochemically the follicular dendritic cells (FDC). FDC are a specific structural component of secondary lymph organs known to be involved in the pathogenesis of the bovine spongiform encephalopathy (for references see 5, 6).

MATERIAL AND METHODS

Tissue flaps of the lingual mucosa were taken from the bovine lingual tonsil, and from an area which was between the macroscopically visible part of the lingual tonsil and a transversal plane 30 mm rostral of the most caudal papillae vallatae. After fixation by immersion in either 4 % formalin or in Bouin's solution, and routine embedding in paraffin wax, serial sections were alternatively stained with haemotoxilin-eosin (H.E.), or submitted to

immunohistochemistry (i. e. incubation with the antibodies CNA.42 or D46). These procedures, as well as the positive and negative controls, have been most recently described (5, 6). The samples were taken from 27 male and 3 female cattle which were between 19 and 29 months old.

RESULTS AND DISCUSSION

Positive staining of the follicular dendritic cells (FDC) was achieved with both antibodies, i.e. CNA.42 and D46, demonstrating specifically the presence of lymph nodules, *Noduli lymphatici* (= lymph follicles), in the tissue samples. The lymph nodules were arranged in groups (*Noduli lymphatici aggregati*) or single. They were located in the macroscopically visible part of the lingual tonsil, but were also present in tissue areas rostral of the tonsil, e.g. in locations 30 mm rostral of the caudal-most papillae vallatae. These dispersed lymph nodules were referred to as the *Pars disseminata* of the lingual tonsil. The lymph nodules – grouped or single – of this disseminate part occurred in the lingual mucosa down to a depth of approx. 4.6 mm. Their numbers decreased from caudal to rostral (e.g. maximum n=15 in areas next to the caudal-most papillae versus maximum n=2 in the area 30 mm rostral of the caudal-most papillae vallatae). As the immunohistochemical reactions clearly identified FDC, they detected the presence of presumptive SRM in tissue areas outside the proper lingual tonsil. However, the relatively small quantities of FDC in these areas allow to estimate that the potential risk related to this disseminate part of the tonsil is very small. This statement is based on calculations which point out that one individual of bovine should eat 200 g of lingual tissue to become infected.

CONCLUSIONS

1. Considering the relative small numbers of lymph nodules (lymph follicles) which were found apart from the macroscopically visible part of the lingual tonsil, an amendment of the regulation (EC) 999/2001 does not appear appropriate.
2. Instead, major attention should be paid to the correct application of the existing regulation, i.e. a correct performance of the cut. Above all, care should be taken to peal the mucosa off properly.

REFERENCES

1. Casteleyn, C., Breugelmans, S., Muylle, S., Van den Broeck, W., Simoens, P. Consumptie van rundertong en kalfszwezeriken: een risico voor de volksgesundheid? - Vlaams Diergeneeskundig Tijdschrift. 2007.76: 130-137
2. Cocquyt, G., Simoens, P., Muylle, S., Van den Broeck, W. Anatomical and histological aspects of the bovine lingual tonsil. Res. Vet. Sci. 2008. 84: 155-173
3. Kato, K., Sawada, Y. Distribution of the lingual tonsil of cattle designated as specified risk material. J. Vet. Med. Sci. 2008. 70:251-254
4. Kühne, M., Klein, G., Gasse, H. Shortening of the bovine tongue according to regulation (EC) 999/2001 is not complying with the current legal definition of specified risk material – a macroscopical and histological preliminary study. J. Vet. Med B. 2005. 52: 102-104
5. Rebmann, S. Nachweis lymphatischen Gewebes (insbesondere Tonsillen) in der Schleimhaut der Rinderzunge und Empfehlungen für Maßnahmen zur sicheren und wirtschaftlichen Entfernung des lymphatischen Gewebes der T. lingualis im Schlachtbetrieb. 2008. Hannover, Tierärztliche Hochschule, Dissertation
6. Rebmann, S., Gasse, H. Bovine lingual tonsil: Histomorphological characteristics with special reference to the follicular dendritic cells. Anat. Histol. Embryol. 2008 (in press)