J. Comp. Path. 2010, Vol. 142, 218–222

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SHORT PAPER

Epithelial and Pancreatic Choristoma in Bovine Lymph Nodes

O. Quesada, A. Suárez-Bonnet, M. Andrada, A. Fernández and A. Espinosa de los Monteros

Unidad de Histología y Patología Animal, Instituto Universitario de Sanidad Animal, Facultad de Veterinaria, Universidad de Las Palmas de Gran Canaria, 35413 Arucas, Las Palmas, Spain

Summary

Lymph nodes from 186 cows were evaluated as part of a bovine tuberculosis eradication programme. The mediastinal lymph nodes of 13 animals contained atypical structures. In 12 cases (6.45%) these consisted of multiple epithelial structures and, in one case, of pancreatic-like tissue. Immunohistochemistry (IHC) revealed that the epithelial structures were consistent with respiratory epithelium and with ectopic pancreatic tissue, respectively. To the best of our knowledge these are the first histological and immunohistochemical descriptions of epithelial and pancreatic choristomas in bovine lymph nodes.

Keywords: bovine; choristoma; epithelium; lymph node

Choristoma is the presence of histologically normal tissue in an ectopic location. In man, the presence of heterotopic tissue in lymph nodes is rarely reported. Benign glandular inclusions have been documented in 11.4% of lymph nodes (Horn and Bilek, 1995), predominantly in the pelvic and para-aortic nodes (Schnurr *et al*., 1978; Kheir *et al*., 1981; Maassen and Hiller, 1994). Choristoma has also been described in various sites from a range of domestic animal species (Gameel *et al*., 1992; Baker *et al*., 1993; Tanimoto and Ohtsuki, 1993; Patnaik *et al*., 2000; Cullen *et al*., 2002; MacLachlan and Kennedy, 2002), but only three descriptions of inclusions in lymph nodes have been reported (Peters *et al*., 2003; Gómez-Laguna *et al*., 2007; Komine *et al*., 2009). The present report documents 13 cows with choristoma of the mediastinal lymph node.

As part of a bovine tuberculosis eradication programme, 186 cows with positive intradermal tuberculin test were slaughtered. These animals ranged from 1 month to 14 years of age. There were 169 Holstein Friesian and 15 Canary Islands native breed cattle. The retropharyngeal, tracheobronchial, mediastinal, prescapular and hepatic lymph nodes were systematically collected after abattoir post-mortem inspection. The mesenteric and ileocaecal lymph nodes and the ileocaecal valve were also collected for the diagnosis of paratuberculosis. Tissue samples were fixed in 10% neutral buffered formalin, embedded in paraffin wax and stained with haematoxylin and eosin (HE) for microscopical examination. For immunohistochemical analysis, tissue sections (3 μm) were labelled by the biotin–streptavidin (B–SA) method with primary antibodies and antigen retrieval as summarized in Table 1. All primary antisera were specific for human molecules and of known cross-reactivity with bovine tissues. Canine and bovine skin, small intestine, lung and pancreatic tissue samples were included as controls.

Atypical structures were observed in the mediastinal lymph nodes of 13 cattle. These animals were 4–11 years old and no gross lesions had been identified in them at post-mortem examination. No atypical structures were observed in the lymph nodes of the remaining 173 animals. In 12 animals (6.45% of the total population), the affected lymph nodes had multiple epithelial structures with a mainly peritrabecular distribution. These structures were composed of a single layer of cuboidal to columnar epithelioid

Correspondence to: O. Quesada (e-mail: oquesada@becarios.ulpgc.es).

0021-9975/$ - see front matter
doi:10.1016/j.jcpa.2009.07.005

Table 1
Summary of immunohistochemical methodology

Antibody	*Source*	*Host*	*Type*	*Clone*	*Antigen retrieval*	*Dilution*
AE1/AE3 pancytokeratins	Dako*	Mouse	Monoclonal	AE1 and AE3	10% pronase†	1 in 100
CK5 + 8	Euro-Diagnostica‡	Mouse	Monoclonal	RCK-102	10% pronase	1 in 20
CK8 + 18	Euro-Diagnostica	Mouse	Monoclonal	NCL-5D3	Citrate buffer§	1 in 20
CK20	Dako	Mouse	Monoclonal	K_s 20.8	Citrate buffer	1 in 20
CK7	Dako	Mouse	Monoclonal	OV-TL 12/30	10% pronase	1 in 20
CK14	Novocastra¶	Mouse	Monoclonal	LL002	Citrate buffer	1 in 40
Chromogranin A	Dako	Rabbit	Polyclonal	A 0430	Citrate buffer	1 in 500
Synaptophysin	Dako	Mouse	Monoclonal	SY38	Citrate buffer	1 in 80

CK, cytokeratin.
*Dako, Glostrup, Denmark.
†10% pronase, 10 min at room temperature.
‡Euro-Diagnostica, Arnhem, The Netherlands.
§Citrate buffer, pH 6.0, 20 min at 95 °C.
¶Novocastra Laboratories, Newcastle, UK.

cells, with cilia along their apical surface (Fig. 1). No mitotic activity or atypia were evident. All of these cells showed positivity for AE1—AE3 (Fig. 2) and CK20 (Fig. 3). Strong immunolabelling for AE1—AE3 was observed in the cytoplasm and associated with the cell membrane. Immunolabelling for CK20 was less intense and mainly cytoplasmic, but in some cases there was also membrane expression. There was no labelling for CK7, RCK-102 and NCL-5D3. Normal bovine respiratory epithelium was positive for CK20 and negative for CK7.

In the remaining case, a circumscribed nodule was observed in a mediastinal lymph node. This consisted of multiple acini formed of columnar cells with basophilic cytoplasm and a basal nucleus. Centroacinar cells were also present. Some groups of pale-staining cells, resembling endocrine pancreas and associated with capillaries, were found scattered throughout the acinar tissue (Fig. 4). The cytoplasm of these cells expressed synaptophysin and chromogranin A, with the former marker having the most intense labelling (Fig. 5). Strong cytoplasmic labelling for AE1—AE3 was observed in the intercalated and intralobular ducts and in the centroacinar cells. Normal bovine pancreatic tissue had the same immunohistochemical labelling pattern. The histological and immunohistochemical characteristics were consistent with a diagnosis of pancreatic choristoma or ectopic pancreatic tissue in the lymph node.

Choristoma has been described in all domestic animal species. In dogs, documented choristoma include exocrine pancreatic tissue in the intestinal submucosa (Cullen *et al*., 2002), skin with hair on the surface of

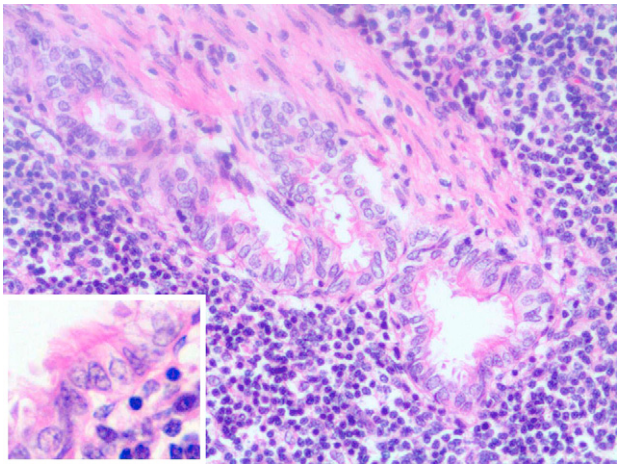

Fig. 1. Epithelial structures adjacent to lymph node trabeculae. HE. ×200. Inset: detail of inclusions composed of cuboidal to columnar epithelioid cells with apical cilia. HE. ×400.

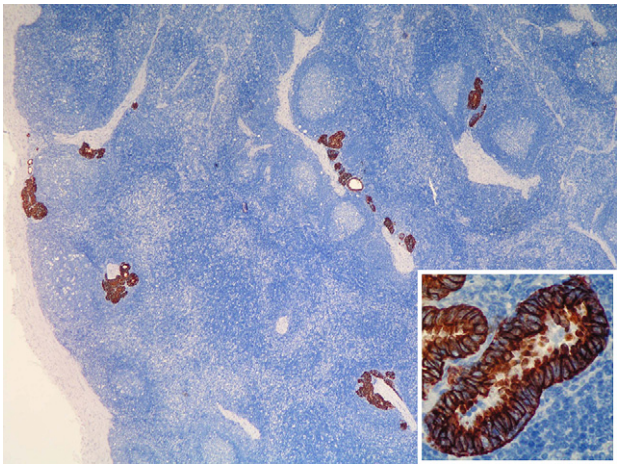

Fig. 2. Multiple epithelial structures with a predominantly peritrabecular distribution immunolabelled for expression of AE1—AE3. IHC. ×100. Inset: cytoplasmic and membrane expression of AE1—AE3. IHC. ×400.