

Papillary-Polypous Mesothelioma of the Pericardium of a Dog (at the Same Time a Contribution to the Question as to Primary Tumours Arising from Serous Cover Cells)

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Summary. A report is given on a dog in which, on the occasion of the post-mortem examination, a papillary-polypous mesothelioma of the pericardium with epitheloid determination was discovered as an "accidental" finding.

Primary tumours of the serous membranes, mesotheliomas, have only a subordinate importance in tumour statistics in human and in veterinary medicine. In the past decade, however, this group of tumours had provided food for extensive discussion with respect to histogenesis, morphological diversification and questionable value¹. Individual authors (Willis, 1953) have even questioned the existence of this group of tumours.

In consequence of their ability to initiate proliferation of vascular endothelia, mesotheliomas were long considered as belonging to the endotheliomas (von Albertini, 1955). In this connection, the endothelia of the serous lymphatic channels were considered as the mother tissue, while other authors were of the opinion that the mesotheliomas derived from the serous cover cells, or else left open the two possibilities of tumour derivation (Borst, 1936). The tumourous metamorphosis of scattered "buds" of epithelium in the serous membranes has been discussed (Bolk, 1952). Macroscopically, diffusely growing forms (Borst, 1936; Bolk, 1952; von Albertini, 1955; Saphir, 1961; Stout, 1965) are distinguished from the rarer localized and usually papillary tumours (Kirch, 1931; Wells, 1935; Jackson, 1936; Yoshida, 1937; Stout, 1942, 1950, 1951; Gusek, 1964).

Histologically, mesotheliomas are characterized by an unusual variety of forms. The appearance of epitheloid and mesenchymal structures—in part within a tumour—frequently enough leads to diagnostic confusion and to mix-ups with other, for example metastasizing, neoplasms (Willis, 1938). Leinati (1970) was of a similar opinion and, after critical examination of mesotheliomas described in domestic animals, gained the impression "that there were secondary metastatic seedlings from non-established or non-recognized malignant primary tumours (namely carcinomas) among the cases described". Taking this situation to its

¹ An extensive discussion on the question of the histogenesis and a comprehensive historical survey can be found in work by Bolk (1952).

logical conclusion, Saphir (1961) thus demanded that mesotheliomas in the serous cavities should be diagnosed as such only when a complete sectioning has revealed no other primary tumour.

Von Albertini (1955) takes as the histological characteristic of mesotheliomas "the appearance of cleft-like interspaces, which, analogous to the serous cavities, are lined with a flat layer of cells similar to the serous epithelium". Tubular structures have also frequently been described (Benoit, 1953). The histological picture of circumscribed serous tumours deviates from this definition since, here, as a rule, a ramifying connecting tissue stroma of varying extent is present, which is covered with cells varying from cuboid to cylindrical in shape (Yoshida, 1937; Bartok, 1962; Gusek, 1964). Hyalinised tissue areas are sometimes also to be seen (Kirch, 1931; Bartok, 1962).

An intra- and extracellular deposition of mucus in mesotheliomas has been variously reported (Borst, 1936; McCaughey, 1965; Lüders, 1969). Blix (1951), Dawe (1953) and Sarrell (1955) have drawn attention to the high content of hyaluronic acid in the exudates of the pleural cavities containing mesotheliomas.

The difference in the importance assigned to serous tumours may be due to the "ambiguous morphological situation" of the serous cover cells (Bargmann, 1964) which are possibly related to the fibrocytes (Stout, 1951; Bolck, 1952; Churg, 1965).

The importance of mesothelial tumours is in dispute. While von Albertini (1955) does not recognize any benign variations, Stout (1950) classified mesotheliomas into diffusely-growing malignant tumours, into benign and malignant solitary mesotheliomas of a fibrous structure and into benign mesotheliomas of the male and female genital tracts. Saphir (1961) differentiates diffuse mesotheliomas from solitary tumours which are "much more frequently benign". In his view, however, mesotheliomas of the pericardium are malignant tumours.

Mesothelial blastomas have been described in all serous regions. In the case of man and domestic animals, mesotheliomas of the pleura and of the peritoneum predominate, while primary mesotheliomas of the pericardium must be considered a rarity. Bodenheimer (1865) was possibly the first person to describe such a tumour which he classified histologically as a "cellular sarcoma". Up until 1953, Dawe had recorded 25 cases of primary mesothelioma of the pericardium, which were followed by a further 8 cases between 1953 and 1958 (Thomas, 1957; Bergmann, 1958). In addition, Kaufmann and Stout (1964) reported on 8 tumours described as mesotheliomas of the pericardium that they found among the examination material of the University of Columbia covering the years 1919 to 1961. I have also found a further 5 cases in the literature (Michi, 1967; Kobylinsky, 1968; Roitsch, 1966; Wiederkehr, 1970). In accordance with tentative estimates, therefore, about 50 primary mesotheliomas of the pericardium in humans are known.

The reports on this group of tumours are particularly sparse in the field of veterinary medicine. Observations have included the horse (Salomon, 1934; Jackson, 1936; Pigoury *et al.*, 1958), cattle (Klage quoted by Magnusson, 1961; Pallaske, 1939), sheep (Joest, 1909) and the dog (Schlegel quoted by Jackson, 1936).

Case Report

On the occasion of the autopsy of an eleven-year-old male poodle which had been put to sleep at the request of the owner, a papillary-polypous tumour having the size of a peppercorn was found on the pericardium. Apart from a nodular hyperplastic spleen (Cohrs, 1970), no other pathological organic changes were observed.

The blastomatous pericardial excrescence, which was located on the section near the base of the heart, projected into the pericardial cavity and was in contact with the epicardium of the left anterior wall of the heart (Fig. 1). The serous membranes of the pericardium were slightly reddish-brown in colour but were otherwise smooth and shiny all over. In the pericardial cavity, a few millilitres of a somewhat yellowy-reddish coloured liquid of a serous nature were found. After fixing in formalin, the pericardial tumour was embedded in paraffin. Staining was then effected with haematoxylin and eosin, Turnbull's blue and nuclear fast red, PAS, alzian blue and van Gieson's stain.

Histologically, a dense-celled tumour tissue with alternating fibrous stroma component was found. Papillary tumour formations were covered by a predominantly single-layered epitheloid cell coat, the elements of which were, in the main, cuboid or cylindrical (Fig. 2).

Smaller groups of cells also acquired pavement-cell-like structures and were, in part, somewhat polymorphous in form. Mitotic configurations were nowhere to be seen. The cell nuclei appeared round to oval, often with an eccentric shift and with varying chromatin content.

The base of the tumour was sharply delineated from the sub-serous connective tissue layer; an infiltrative growth did not obtain. At the margins of the base of the tumour, in part also within the tumour itself, small, cell-free, hyaline spheres could be seen, in the vicinity of which ample haemosiderin was present (Fig. 3).

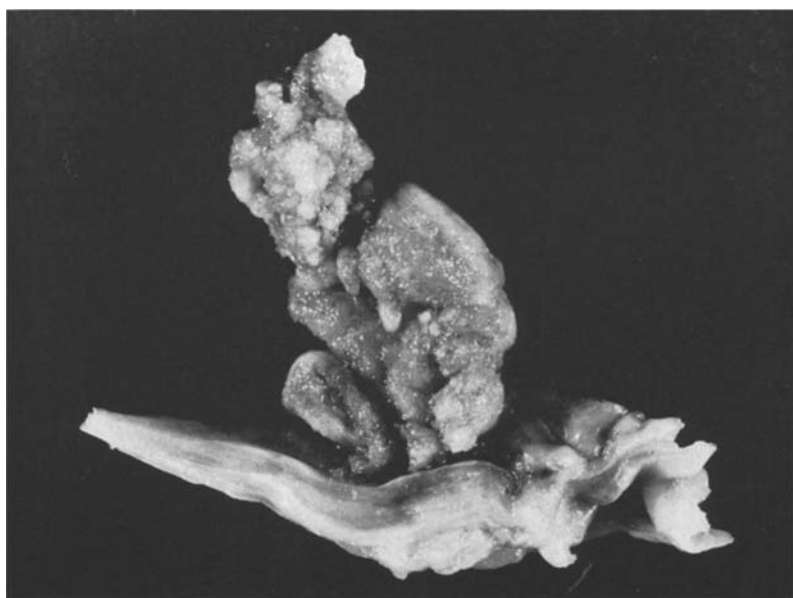


Fig. 1. Papillary-polypous tumour of the pericardium with origin in the pericardium in the vicinity of the base of the heart. The tumour measured 9 mm along its longitudinal axis (low magnification)

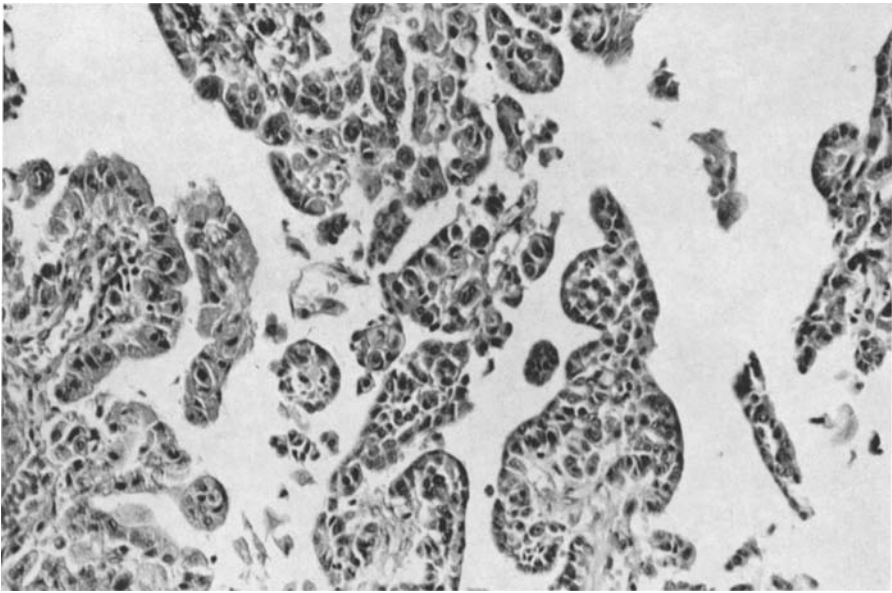


Fig. 2. Fine papillary tumour formations with little stroma. The epitheloid cell character is particularly well recognizable in the villi at the left-hand edge of the picture (H & E)

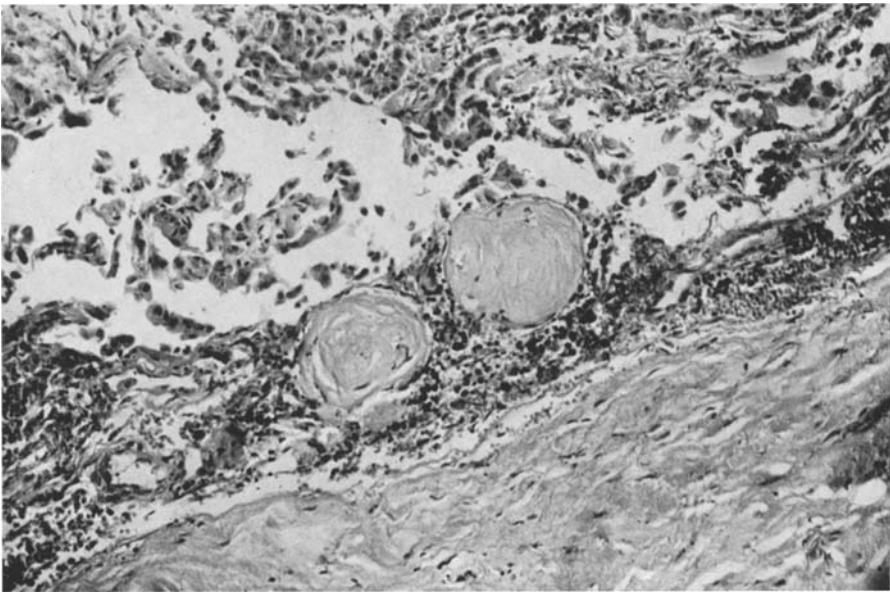


Fig. 3. Base of the tumour. Two small hyaline spheres surrounded by haemosiderotic pigment—recognizable in the picture as black granules. Tumour tissue at the upper edge of the picture, connective tissue of the serous membrane at the lower edge of the picture (H & E)

Diagnosis: Papillary-polypous mesothelioma of the pericardium with no indication of malignancy.

If we *discuss* the histogenesis of this tumour of the pericardium, then we can at once exclude a metastatic tumour formation since, at autopsy, no indication of any other primary tumour was found. Thus, the tumour must have originated in the serous cover cells or in the sub-mesothelial connective tissue, which means, therefore, that we are again confronted with the problems mentioned at the beginning of this article with respect to the tumour matrix. It can, however, be said that the fibromesothelial structure of the tumour, which evidenced a similarity with the fibro-epithelial papillomas, points to the cover cells as the matrix. Glandular-tubular structures or tissue sections with inner cavity formation (Bolck, 1952), that are lined with endothelial-like cells, that is formations, then, which would seem to indicate a degeneration of the vascular endothelia, were not observed. The relationship between the tumour and the sub-serous connective tissue, which was only tangentially affected by the tumour, was also against such a genesis. The only peculiarity was a little haemosiderotic pigment located between the bundles of collagenous fibres—probably the remains of previous haemorrhages which at the site of particular mechanical stressing ("polyp" peduncle) need occasion no surprise. Neither macroscopically, nor histologically could the formation of mucus be demonstrated.

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