Case reports

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Intracardiac heterotopia—mesenchymal and endodermal

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SUMMARY A case is reported of an intracardiac 'epithelial heterotopia' with a predominant mesenchymal component. This is thought to have resulted from the differentiation of aberrant primitive cell(s) displaced into the heart during its development. Though microscopically resembling a myxoma, this lesion is clearly distinguished by the presence of glandular structures. The myxoid component exhibited a startling invasiveness which resulted in occlusion of the superior vena cava, causing symptoms very early in life and death at the age of 6 months.

Intracardiac heterotopias are uncommon, but in almost all cases reported the principal aberrant tissue is epithelial, with little or no mesenchymal component. Generally morphologically benign in appearance, these heterotopias may cause symptoms and are sometimes lethal, as a result of their location. In a few reports, however, the ectopic tissue had a predominantly myxoid mesenchymal component and the differential diagnosis from myxoma has sometimes been difficult to establish. Our case showed a very unusual form of this latter type of lesion, with remarkable clinical and morphological features.

Case history

The mother of a 2-month-old boy noticed that the upper part of his body had been swollen since he was 3 weeks old. On admission, he appeared undernourished and was breathless, and there was slight cyanosis of the face, with oedema of the face and upper trunk. On auscultation, an inconspicuous systolic murmur was noted.

A chest x-ray film showed an enlarged heart with a prominent right atrium and the electrocardiogram showed a wandering pacemaker. Subsequent cavography showed complete blockage of the superior vena cava at its point of entry into the right atrium, with the passage of radio-opaque dye through extraordinarily varicose azygos and hemiazygos veins (Fig. 1). Cardiac catheterisation showed

normal intracardiac pressures and there was no evidence of any intracardiac shunt. Angiocardiography showed a trabeculated right auricular appendage and right atrial wall deformity; the interventricular septum protruded into the right ventricular cavity and the right ventricle was displaced into the right hemithorax, but other structures appeared normal.

At thoracotomy, a hard tumour was found infiltrating the anterior wall of the right atrium, extending towards and surrounding the entrance of the superior vena cava. A diagnosis of inoperable myxoma was made. Respiratory difficulties and oedema continued until the child died at the age of 6 months.

NECROPSY

The heart was enlarged, weighing 50 g (normal for age and body size 30 to 35 g). The wall of the right atrium was thick (17 mm) and diffusely infiltrated throughout by a firm white tissue which reduced the atrial cavity by 50 per cent. The greatest degree of infiltration and thickening was in the interatrial septum. The lumen of the superior vena cava was reduced to 1 mm but the inferior vena cava and tricuspid valve, as well as the remainder of the heart, were normal. No pedunculated masses or thrombi were found in the right atrium. The body weight of 4500 g and height of 54 cm were both below normal for age. The brain showed moderate oedema. There was recent upper right

Fig 1 Cavography. Note occlusion of the superior vena cava and dilated and tortuous azygos and hemiazygos veins.

lobe pneumonia, with lung haemorrhage and mild pulmonary oedema. No neoplastic growths were found elsewhere in the body.

Microscopical examination of the entire right atrium showed extensive infiltration with myxomatous tissue. In the interatrial septum, there were several tubular or pseudoglandular structures, lined by cuboidal and tall secretory cells and resembling intestinal glands (Fig. 2). There were no histological features of malignancy. No cysts or clefts were discovered. Histological examination of the other organs showed no significant abnormalities.

Discussion

Intracardiac heterotopia was first described by Armstrong (1913). Since that time several other cases have been reported, but under different names (Morris and Johnson, 1964). Willis (1962) suggested the concept of intracardiac epithelial heterotopias which could be subdivided into two groups.

In the first group, the heterotopic inclusions are located within the superficial myocardium. Lanks and Lautsch (1966) reported a 'typical' case where oesophageal remnants were found in the posterior wall of the left atrium near the atrioventricular groove. Characteristically, the aberrant tissue is cystic or tubular, lined with epithelial cells of cuboidal, ciliated, or mucous secreting type. In the second group, the heterotopia occurs principally in the interatrial septum, though it can occur elsewhere in the right atrium, and is frequently asso-

Fig 2 Photomicrograph of right atrial wall showing glandular structures lined by columnar cells. (H and E ×130.)

ciated with heart block and/or other arrhythmias. The lesion also shows cystic or tubular structures, or multiple minute cystic spaces. The lumina are usually lined with cuboidal or columnar cells, but stroma is not apparent and in the majority of the cases not even mentioned by the authors. Several of the heterotopias occurred in young children and were associated with other congenital malformations. In certain instances, the cystic structures were lined by simple flat cuboidal or stratified epithelium and were reported as 'mesotheliomas' (Picoff and Petenyi, 1970; Fine and Morales, 1971). In others, thyroid parenchyma was reported, either alone or with other structures (Hopkinson and Newcombe, 1971). The lesions usually appeared benign and well circumscribed, though pathological as a result of their location.

Unfortunately, some heterotopias do not fit easily into Willis' classification, with respect to location or epithelial cell type. Our case, and the cases of a 53-year-old woman with a discrete right atrial egg-shaped mass (Anderson and Dmytryk, 1946), and a 45-year-old woman with a right atrial pedunculated mass (Honey and Axelrad, 1962), differ substantially from others reported. In these, the stroma was abundant with a predominantly myxoid appearance, while the epithelial component was scanty. Likewise, despite the benign histological appearance, there was evidence of local invasion in Anderson's case and extensive infiltration in ours. Indeed, the widespread and severe invasion of the entire right atrium by the myxoid tissue is its most striking feature. In another exceptional case, a malignant interatrial septal teratoma, composed mainly of small gland-like structures in a myxoid stroma, metastasised and caused the death of a 2-year-old girl (Solomon, 1951).

Several theories have been put forward to explain these heterotopias. Most authors now agree with Willis that a developmental anomaly is the most likely explanation for the presence of different types of ectopic tissue. During early embryonic life, the simple rudimentary tubular heart lies in immediate juxtaposition to the buccopharyngeal membrane and the foregut lined by endodermal epithelium (Langman, 1975). These structures differentiate into pharynx, parenchyma of thyroid gland, respiratory tract, oesophagus and upper gastrointestinal tract. Displacement of any of the embryonic cells destined to develop into these structures into the the developing heart, and sub-

sequent total or partial differentiation would give rise to the interatrial or superficial subepicardial epithelial inclusions. To account for the combination of mesenchymal and epithelial components, and for the occurrence of teratomas in the heart, Anderson and Dmytryk (1946) and Solomon (1951) have suggested that primitive multipotential cells displaced into the developing heart at even earlier stages could then differentiate to form the multi-germinal layer heterotopias.

It may be suggested that the so-called 'mesothelioma' (Picoff and Petenyi, 1970; Fine and Morales, 1971) of the atrioventricular canal is indeed of mesothelial origin, arising from displaced epicardium. This could occur during the time when the bending and torsion of the primitive heart brings the epicardium very close to the atrioventricular region.

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