Ultrastructure of a glomus tumour

M. HARRIS

From the Department of Pathology, University of the West Indies, Kingston, Jamaica

SYNOPSIS The ultrastructure of a glomus tumour is described, and the implications of the findings, with regard to the histogenesis of this type of tumour are briefly discussed.

Floël, Hammersen, and Staubesand (1967) gave the first account of the fine structure of a glomus tumour. Their findings indicated that its 'epithelioid' cells were of smooth muscle type, and have been confirmed by other authors (Murad, von Haam, and Murthy, 1968; Rascol, Izard, and Rascol, 1968; Venkatachalam and Hashimoto, 1969; Kuhn and Rosai, 1969). The principal features indicating the relationship between the tumour cells and smooth muscle have been the presence of cytoplasmic myofibrils with characteristic zones of focal condensation, large numbers of pinocytic vesicles, and a conspicuous zone of electron-dense material between adjacent cells. In some of the reported examples mast cells have been a notable feature (Murad et al., 1968; Rascol et al., 1968; Tarnowski and Hashimoto, 1968; Goodman and Abele, 1971).

The ultrastructure of a further example is described here.

Materials and Methods

The patient was a 60-year-old man who complained of a small, painful nodule beneath the skin of the left wrist. The nodule, which was 0-6 cm diameter and brown in colour, was excised and sent for histological examination fixed in 10% formal saline. Half of the nodule was embedded in paraffin wax and 5 μ sections were stained with haematoxylin and eosin and by Gordon and Sweet's method for reticulin fibres.

After two weeks the remainder of the tumour was retrieved from the formal saline, cut into 1 mm cubes, and washed overnight in phosphate-buffered sucrose (pH 7-2) at 4°C. The tissue was then post-fixed in osmium tetroxide at 4°C for two hours and embedded in Epon. Sections were cut on a Reichert ultramicrotome, stained with uranyl acetate and lead citrate and examined in an Hitachi HS7S electron microscope.

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Fig. 1  Light micrograph. Closely packed glomus cells surround small vascular channels. Haematoxylin and eosin × 325.

Fig. 2  Low-power electron micrograph demonstrating the uniformity of the tumour cells and the regular intercellular space filled with electron-dense material. Myofibrils occupy the zones of cytoplasm indicated by asterisks. Uranyl acetate and lead citrate × 9,000. N: nucleus.
similar to those seen in smooth muscle cells. A further striking feature was the presence of abundant pinocytic vesicles bordering all the cells examined.

In the few capillaries included in the sections there was a complete lining of non-fenestrated endothelial cells. Tumour cells extended up to the capillary basement membrane but did not come into contact with the lumen of the vessel as they did in the tumour reported by Toker (1969).

Mast cells were not seen although they have been a feature in some examples (Murad et al, 1968; Rascol et al, 1968; Tarnowski and Hashimoto, 1969).

Discussion

The ultrastructural features described above, notably the presence of cytoplasmic fibrils with associated focal condensations and abundant pinocytic vesicles, indicate that the cells of the glomus tumour are related to smooth muscle. These findings are in general agreement with other reports of the ultrastructure of glomus tumours (Floel et al, 1967; Murad et al, 1968; Rascol et al, 1968; Venkatachalam and Greally, 1969; Tarnowski and Hashimoto, 1969; Kuhn and Rosai, 1969; Goodman and Abele, 1971).

The generally accepted concept of the histogenesis of the glomus tumour is based on the study of Murray and Stout (1942) in which, as a result of tissue culture experiments, they suggested that the epithelioid cells of glomus tumours were derived from vascular pericytes. It was suggested that the latter might be modified smooth muscle cells and, in a separate paper, that the haemangiopericytoma was
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a related tumour (Stout and Murray, 1942). Subsequently, however, it has been shown that normal vascular pericytes resemble fibroblasts and do not have the ultrastructural features of smooth muscle (Fawcett, 1963; Rhodin, 1967) and neither do the cells of those haemangiopericytomas that have been studied by electron microscopy (Ramsey, 1966; Paullada, Lisci-Garmilla, Gonzales-Angulo, Jurado-Mendoza, Quizano-Narezo, Gomez-Peralto, and Doria-Medina, 1968; Murad et al., 1968).

Thus, although ultrastructural studies of glomus tumours support the view that their epithelioid cells are of smooth muscle type, there is no evidence from electron microscopy that they are derived from pericytes and the grounds for regarding glomus tumours and haemangiopericytomas as being histogenetically related therefore appear to be unsound.

References


