An Ultrastructural Study of a Juvenile Melanoma

C. ABRAHAMS, R. B. SKUDOWITZ

SUMMARY

An unusual variant of juvenile melanoma, namely a sclerosing juvenile melanoma occurring on the buttock, has been studied by light and electron microscopy. The diagnosis of a pigment tumour was confirmed by the presence of structures common to these lesions, i.e. melanosomes, intracytoplasmic fibrils and microvilli on the cell surface. The tumour consisted of two cell configurations, namely a multinucleated giant cell and a second cell made up of two separate cells lying in close apposition, the cytoplasm of one cell being dark and the other light. This tumour can be differentiated from a benign naevus by the bizarre histological appearance on light microscopy. On electron microscopy the distinction is made by the presence of the very large multinucleated giant cells, the apposition of the light and dark cells, the scanty melanosomes and the presence of intracytoplasmic lumina. The value of electron microscopy in the determination of the nature of unusual skin tumours is discussed.


The identification of the exact nature of tumour cells is not always possible by conventional light microscopy, and the surgical pathologist may have to resort to ultrastructural examination in order to elucidate their histogenesis. An example of the value of this technique presented itself recently in the study of an unusual skin tumour, namely a sclerosing juvenile melanoma. This report deals with these observations.

PATIENTS AND METHODS

The patient was a 16-year-old male with a nodular swelling on the buttock. The swelling had been present for many years and had grown a little over the last 10 years and was completely painless. On examination it was raised and was slightly pigmented and measured 1.5 x 1 cm. The tumour was removed under local anaesthesia, and sections appeared firm and pale.

The histopathological features were studied by viewing sections stained with haematoxylin and eosin. Electron microscopical examination was undertaken after washing the formalin-fixed specimen in Millonig's buffer, fixing in 1% OsO4 for 2 hours, dehydrating in alcohols, embedding in Epon, and cutting and staining with lead citrate and uranyl acetate.

RESULTS

Light Microscopy

The lesion was raised and polypoidal and the overlying epidermis was acanthotic. A cellular tumour extended from the level of the reticular dermis to the subcutaneous tissue (Fig. 1). It was made up of multinucleated or single cells embedded in a dense collagogenous stroma (Fig. 2). The cells had large nuclei with prominent nucleoli and abundant finely granular non-pigmented cytoplasm, and resembled anaplastic tumour giant cells. Some of the tumour cell nests were round, whereas other were irregular. Mitoses were seen infrequently. There was no junctional activity. Large dilated capillaries were present in the upper dermis.

Department of Ophthalmology, University of the Witwatersrand, Johannesburg

C. ABRAHAMS, M.MED. (PATH.), F.F. PATH. (S.A.), F.R.C. PATH.
1609 Lister Building, Jeppe Street, Johannesburg
R. B. SKUDOWITZ, M.D. B.Ch., D.T.M. & H., F.F. PATH. (S.A.)

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Reprint requests to: Professor C. Abrahams, Dept of Ophthalmology, University of the Witwatersrand Medical School, Esselen Street, Hillbrow, Johannesburg, 2091 RSA.

Fig. 1. Low-power view of tumour showing acanthotic epidermis, dilated capillaries in the upper dermis and tumour cells throughout the dermis embedded in collagen (H and E x 44).
Electron Microscopy

Two types of tumour cells were observed. The first was a multinucleated giant cell with approximately 3-5 nuclei per cell (Fig. 3). There was abundant cytoplasm containing endoplasmic reticulum, mitochondria and occasional melanosomes that were round and measured approximately 0.34 μm. The cell surface showed numerous microvilli and pseudopodia-like processes (Fig. 4). Some of these were incorporated into the cell cytoplasm, and intracellular lumina with processes were also noted at times (Fig. 5). Fibrils were seen in the cytoplasm, particularly towards the cell surface. The nuclei, which were large, had frequent indentations in the margins, nucleoli were prominent and some intranuclear growth was present. The entire giant cell was surrounded by basement membrane-like material that was separated from the plasma membrane. The second type of cell consisted of a cluster of two cells that lay in close apposition, but were separated by distinct plasma membranes (Fig. 6). The cluster was made up of a light and a dark cell. The dark cell had a cytoplasm that was dominated by microfibrils which were uniform, straight or slightly wavy. There was a very rich, rough, surface endoplasmic reticulum and much glycogen. The surface of this cell showed occasional pseudopodia. The light cell contained fewer fibrils in the cytoplasm and showed less endoplasmic reticulum, but had numerous mitochondria. The cell surface was thrown up into polypoidal processes and pseudopodia. Melanosomes were seen infrequently in these two cells. Minimal amounts of basement membrane-like material were present around them. Single cells, resembling the light cells, were noted occasionally.

DISCUSSION

Juvenile melanoma (Spitz naevus or spindle cell naevus) has a classic histological pattern. The tumour, which usually shows junctional activity, consists of epithelial and spindle cells. A. C. Allen (personal communication) regards the present tumour as a sclerosing type of juvenile melanoma. There have been few reports in the literature of the structure of juvenile melanomas and no reports on
Fig. 6. Ultrastructural view of second type of giant cell showing two tumour cells in close apposition. Note the separate cell cytoplasmic membranes (arrows). The dark cell is on the right and shows masses of fibrils (F), endoplasmic reticulum (ER) and glycogen (G). The lighter cell on the left shows numerous mitochondria (M) (x 6261).

this particular type of tumour. Mishima described the subcellular organization of juvenile melanoma cells. This included Golgi apparatus, mitochondria, endoplasmic reticulum, ribosomes and a general configuration which appears to be similar to if not identical with that found in the intradermal naevus cells, although the latter show more melanized premelanosomes. In the juvenile melanoma active melanosome synthesis was exhibited by the presence of various developmental stages, from small vesicles to mature melanosomes, in the vicinity of the Golgi apparatus. The melanosomes seen in the junctional layer appear as short, football-shaped bodies with an average maximum size of 450 × 150 μm, while those in the cells of the dermis are generally ovoid bodies 190 × 180 μm in size. The melanosomes in junctional naevi are smaller (approximately 0.4 μm) in diameter, similar to those in the present case. Unfortunately it was not possible to assess the exact origin of the pigment granules in our case, as they were too scanty. Cytoplasmic filaments, which were so well seen in the light cells in this sclerosing juvenile melanoma, are common to most naevi and can give rise to the appearance of a pale cell on a low-power view. These types of filaments are not specific for naevus cells, but may be found in numerous connective tissue cells where their function is not known. In naevus cells they may be responsible for the transport of pigment granules to peripheral cytoplasm or pseudopodia. Small, non-pigmented granules, believed to be glycogen, occur in the cytoplasm of naevus cells. A similar observation was made in our case (Fig. 6). Intracytoplasmic lumina have been noted in a number of different tumour cells, mainly of glandular, ductal or mesothelial origin. These have not previously been described in pigment lesions. These ducts are lined by large numbers of short microvilli which project into the lumen. The exact nature of these ducts and their significance is not clear. Pseudo-inclusions of cytoplasm within the nuclei were infrequently noted in benign naevi. Such pseudo-inclusions were occasionally observed in our case. It is of interest that clusters of naevus cells, although lying in close apposition, do not have desmosomes or attachment areas. This was also noted in our patient where the second type of tumour cell configuration, consisting of two cells lying in close apposition, did not have any junctions.

On light microscopy the present tumour had features resembling those of a pleomorphic malignant tumour. Although the differential diagnosis included juvenile melanoma, it was not possible to exclude a metastatic malignant tumour or even a pleomorphic-appearing reticulohistiocytoma by light microscopy. The diagnosis of a pigmented tumour was settled when the electron microscopical examination revealed the presence of melanosomes and features of cytoplasmic membrane changes, cytoplasmic organelles and pseudo-inclusions similar to those seen in naevus cells.

REFERENCES