Thorax (1972), **27**, 472.

Pseudosarcoma of the oesophagus

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Pseudosarcoma of the oesophagus previously has been well documented in only six patients. The present case history illustrates the characteristics originally described by Stout of a polypoid lesion composed of sarcoma-like cells adjacent to squamous cell carcinoma.

Earlier reports have postulated that the sarcomatous cells represent an unusual stromal proliferation in response to the adjacent squamous cell carcinoma. Another theory has been that the two cellular elements represent two separate lesions occurring coincidentally.

Routine microscopic examination of the present lesion revealed it to be composed principally of pleomorphic spindle-shaped cells with areas of larger, more rounded cells resembling squamous carcinoma. However, electron microscopic examination of this tumour revealed that the sarcomatous cells contained tonofibrils and particularly desmosome-associated tonofibrils. These findings, we believe, definitely establish that the sarcoma-like cells originate from squamous epithelium. It is postulated that cells of both the sarcomatous and carcinomatous elements may be derived from the basal elements of the epithelium and this may account for the relatively benign clinical behaviour of this tumour.

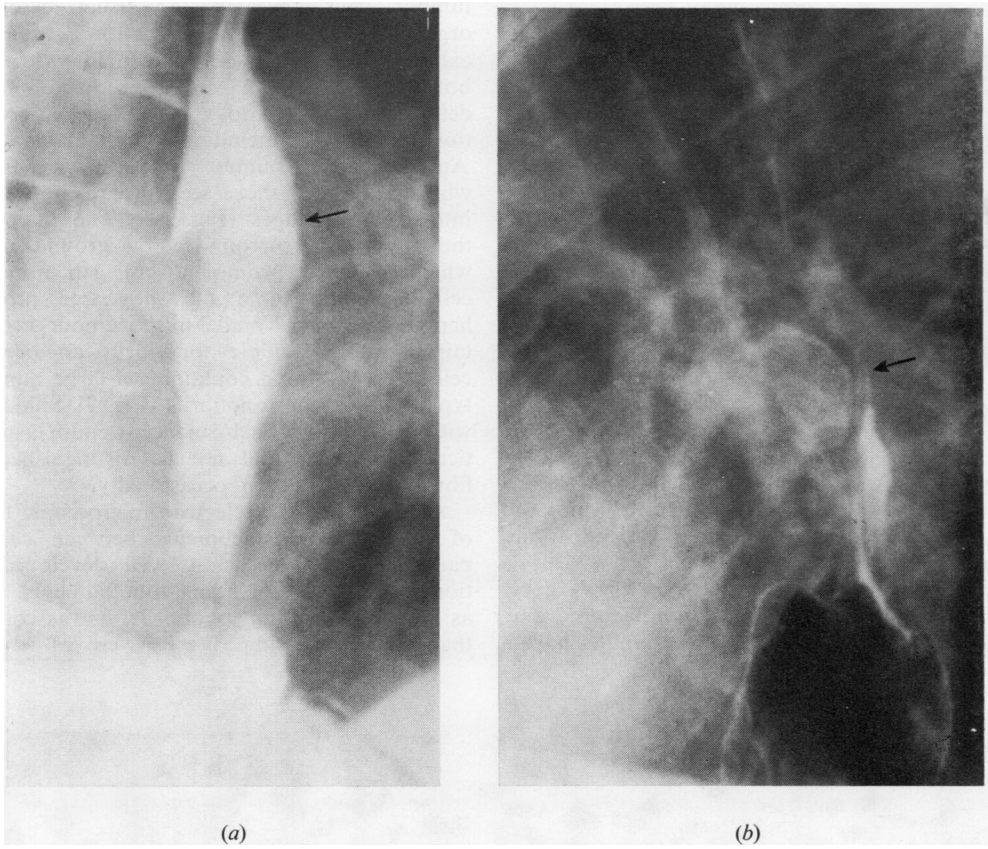
Pseudosarcoma of the oesophagus is a rare tumour of the oesophagus and, unfortunately, its true incidence is difficult, if not impossible, to determine as this lesion has been confused with carcinosarcoma and vice versa. This tumour has been well documented in at least six patients (Stout and Lattes, 1957; Hay-Roe, Hill, and Civin, 1960; DeMarco *et al.*, 1965; Howell Hughes and Cruickshank, 1969; Razzuk *et al.*, 1971). In most instances, the history is one of progressive dysphagia produced by intraluminal growth of the tumour. Characteristically, the polypoid tumour is composed of sarcoma-like cells, and intramucosal carcinoma, or even frankly invasive squamous cell carcinoma, may be identified adjacent to the lesion.

The origin of the sarcoma-like cells is uncertain, although Lane (1957) has suggested that these cells represent a bizarre stromal proliferation from some undetermined stimulus from the adjacent epidermoid malignancy. Recently, we have had the opportunity to manage a patient with a pseudosarcoma of the oesophagus. The results of electron microscopic examination of the tumour have suggested that these cells are actually derivatives of the squamous cell epithelium, as reported recently by Lichtiger, Mackay, and Tessmer (1970) in the study of 13 similar tumours of the upper respiratory tract, oral cavity, and skin.

CASE REPORT

A 63-year-old white man was admitted to Passavant Memorial Hospital with a two-month history of dull aching pain in the epigastrium which radiated beneath the lower sternum and into the lower abdomen. The patient had been referred from another hospital where an oesophagogram had shown the presence of a $2{\cdot}5 \times 3{\cdot}5$cm polypoid lesion located at the junction of the middle and lower thirds of the oesophagus (Fig. 1a and b). A small sliding oesophageal hiatal hernia was also present. Oesophagoscopy had been performed and microscopical examination of the biopsy specimen of the lesion revealed a tumour composed for the most part of pleomorphic spindle-shaped cells resembling a sarcoma. However, in portions of the specimen the cells were larger, more rounded, and somewhat resembled a squamous cell carcinoma.

At the time of referral the symptoms of the patient were unchanged and at no time did he complain of dysphagia. Physical examination was unremarkable except for evidence of recent weight loss which the patient attributed to a weight reduction diet. Radiographs of the chest and an electrocardiogram were unremarkable. A mild anaemia was evident with a haemoglobin of 11·3 g/100 ml and haematocrit of



(a) (b)

FIG. 1. (a) *Barium-filled oesophagus revealing the presence of a polypoid filling defect at the junction of the middle and lower thirds of the oesophagus. Small hiatal hernia also demonstrated.* (b) *Double contrast study of oesophagus revealing polypoid mass attached to the oesophagus by a broad base.*

38%. Urine analysis was normal. Liver function studies and a liver scan were normal as was the remainder of an extensive laboratory evaluation.

Because of the location of the lesion and its broad attachment to the oesophageal mucosa, a staged total oesophagectomy and colonic interposition were performed. The oesophagectomy was accomplished through a right posterolateral thoracotomy and, at the completion of this stage, a cervical oesophagostomy and gastrostomy were performed. The patient did well postoperatively and one month later a retrosternal right colon interposition was performed. The patient tolerated both procedures well and is healthy without evidence of disease more than two years later.

On gross examination the tumour was soft, pinkish grey, rounded, polypoid, and 2 cm in maximum dimension (Fig. 2). It was attached to the oesophagus by a broad base, and the mucosa was ulcerated over it. On section the tumour did not appear to extend into the wall of the oesophagus.

The lesion as well as several centimetres of oesophagus above and below it were examined by both light and electron microscopy. Several perioesophageal and coeliac lymph nodes were also examined.

MICROSCOPICAL EXAMINATION Sections of the tumour revealed it to be composed of spindle-shaped cells like those seen in the biopsy (Fig. 3). In some areas the squamous epithelium showed marked dysplasia with conversion of the basal layer into spindle-shaped cells (Fig. 4). The demarcation between epidermis and tumour was indistinct, giving the impression of continuity between the two.

Slices of tumour previously fixed in neutral buffered formalin were minced into 1 mm^2 cubes and post-fixed in Millonig's fixative. Silver and

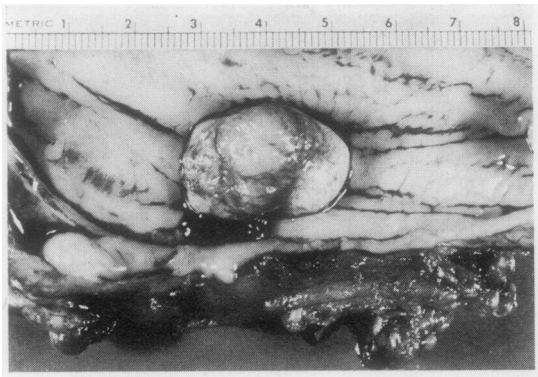


FIG. 2. *Polypoid pseudosarcoma of the oesophagus.*

gold sections from epon embedded blocks were examined in a Philips EM-300 electron microscope and photographed at initial magnifications ranging from ×1,200 to ×15,000.

Despite the formalin fixation there was good preservation of cytoplasmic architecture and detail. A study of many of the spindle-shaped tumour cells revealed the usual cytoplasmic organelles in variable proportions. Many cells exhibited desmosomal attachment with neighbouring cells which varied from a weak, ill-defined desmosome to very well developed junctional complexes including tonofilaments (Fig. 5). An occasional spinous process was identified which resembled those seen in squamous cells at intercellular bridges (Fig. 6). The majority of the cells were surrounded by ground material which included prominent collagen fibres. The cell border at these sites possessed prominent hemidesmosomes. While most tumour cells contained no discernible tonofibrils an occasional cell could be found containing a large number of typical branching tonofibrils (Fig. 7). Spindle cells with abundant rough-surfaced endoplasmic reticulum which could not be distinguished from fibroblasts were seen occasionally.

As a result of the electron microscopic findings of desmosomal attachments between cells and particularly, on occasion, well developed junctional complexes including tonofilaments, as well as typical branching tonofibrils, it was concluded that the spindle-shaped cells were of squamous

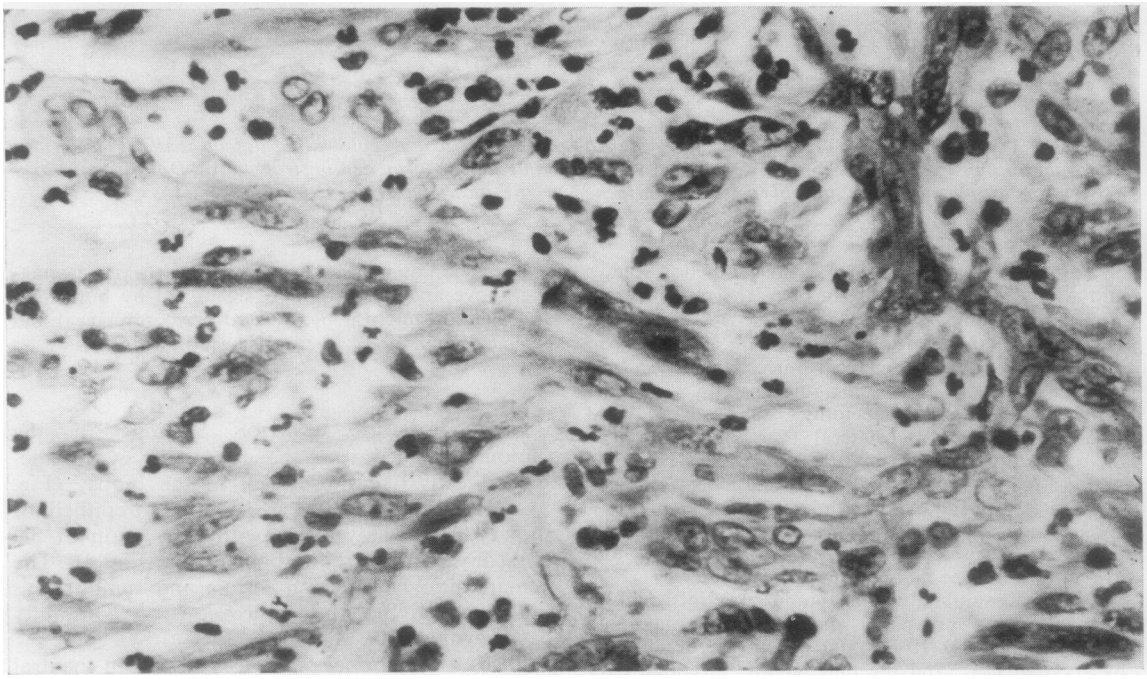


FIG. 3. *Photomicrograph of tumour showing pleomorphic spindle-shaped cells. H and E* ×250.

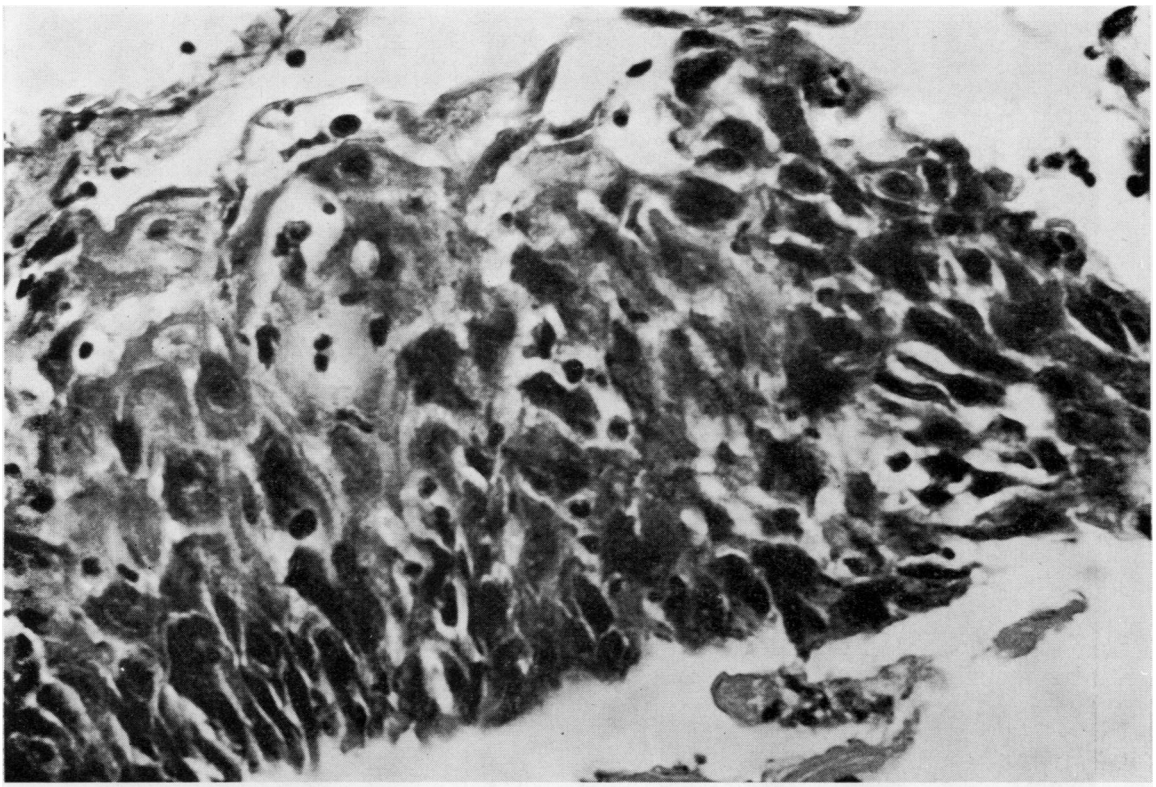


FIG. 4. *Photomicrograph of surface showing squamous epithelium with marked dysplasia and spindle-shaped cells at the base. H and E* ×250.

cell origin. These organelles are common to squamous cells and their presence was a strong point against the cells being sarcomatous in origin. Also the spinous processes noted lent further support to the conclusion that the spindle cells in this lesion were derived from squamous cells. Thus, the tumour was considered to represent a so-called pseudosarcoma which can now be more appropriately termed a spindle-cell variant of squamous cell carcinoma.

DISCUSSION

Differentiation of pseudosarcoma from other polypoid lesions of the oesophagus requires microscopical examination. The location of the lesion and its gross appearance are not unique. Microscopically pseudosarcoma most closely resembles carcinosarcoma. Both lesions have elements of carcinoma and sarcoma but can be differentiated by the relationship between the two components. In the carcinosarcoma, the sarcomatous and carcinomatous elements intermingle, whereas in the pseudosarcoma these cell types appear separately, although adjacent to each other (Pearlman, 1940; Elton and Joannides, 1962; Moore *et al.*, 1963; Sherwin *et al.*, 1963; Talbert *et al.*, 1963; DeMarco *et al.*, 1965; Razzuk *et al.*, 1971).

The nature of the sarcomatous elements in the pseudosarcoma has been debated. Lane (1957) originally suggested that these sarcomatous cells represented a bizarre stromal proliferation resulting from some undetermined stimulus from the adjacent epidermoid carcinoma. In support of such a theory, it has been noted that similar connective tissue reaction may result from various stimuli, such as trauma or irradiation (Hay-Roe *et al.*, 1960). However, electron microscopic studies of so-called pseudosarcomas by Lichtiger

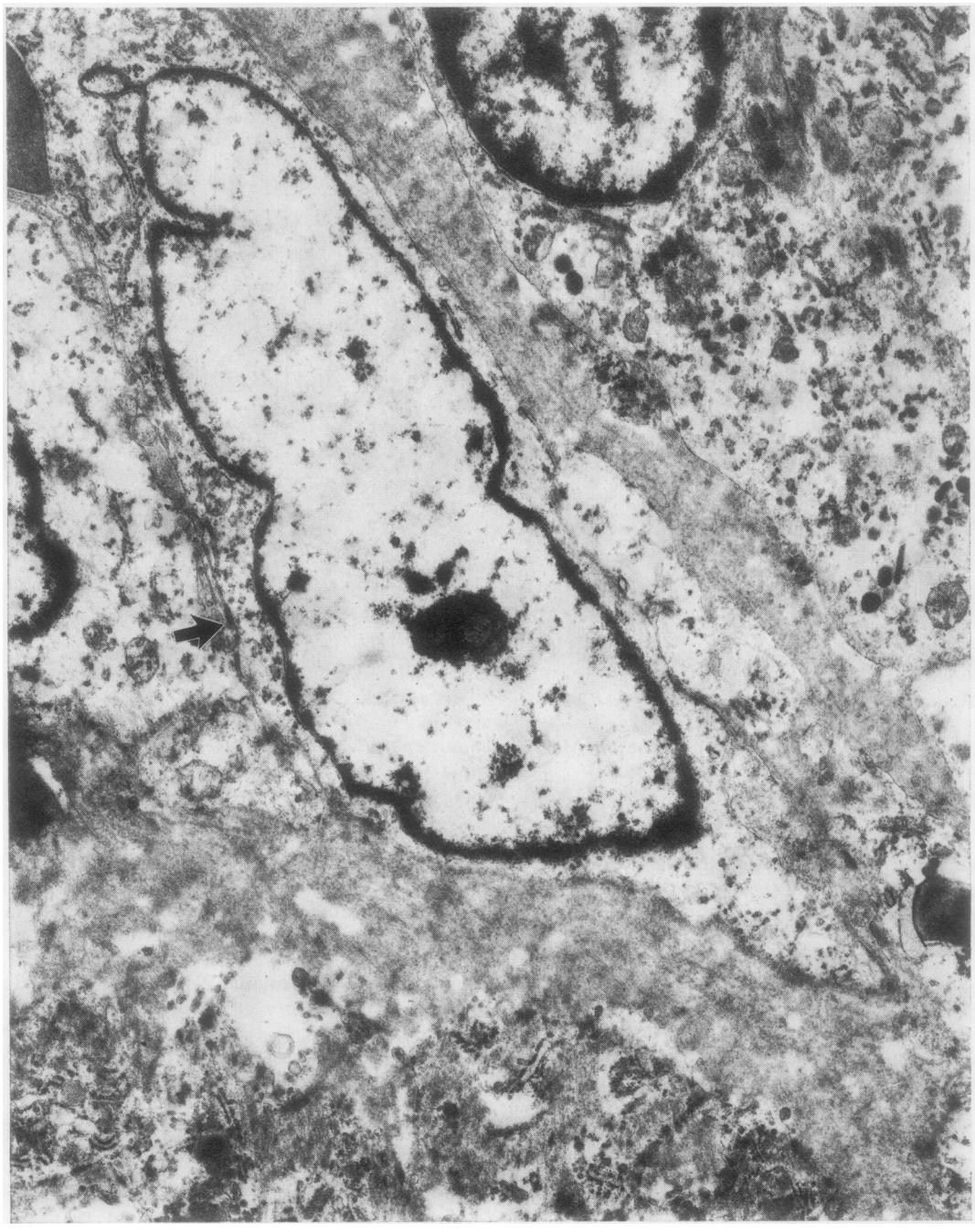


FIG. 5. *Electron micrograph showing most of a spindle-shaped tumour cell and portions of surrounding cells. Interdigitations of the cell membrane and desmosomes (arrow) are present at the sites of contact between tumour cells* (×7,885 *stained with uranyl acetate and lead nitrate*).

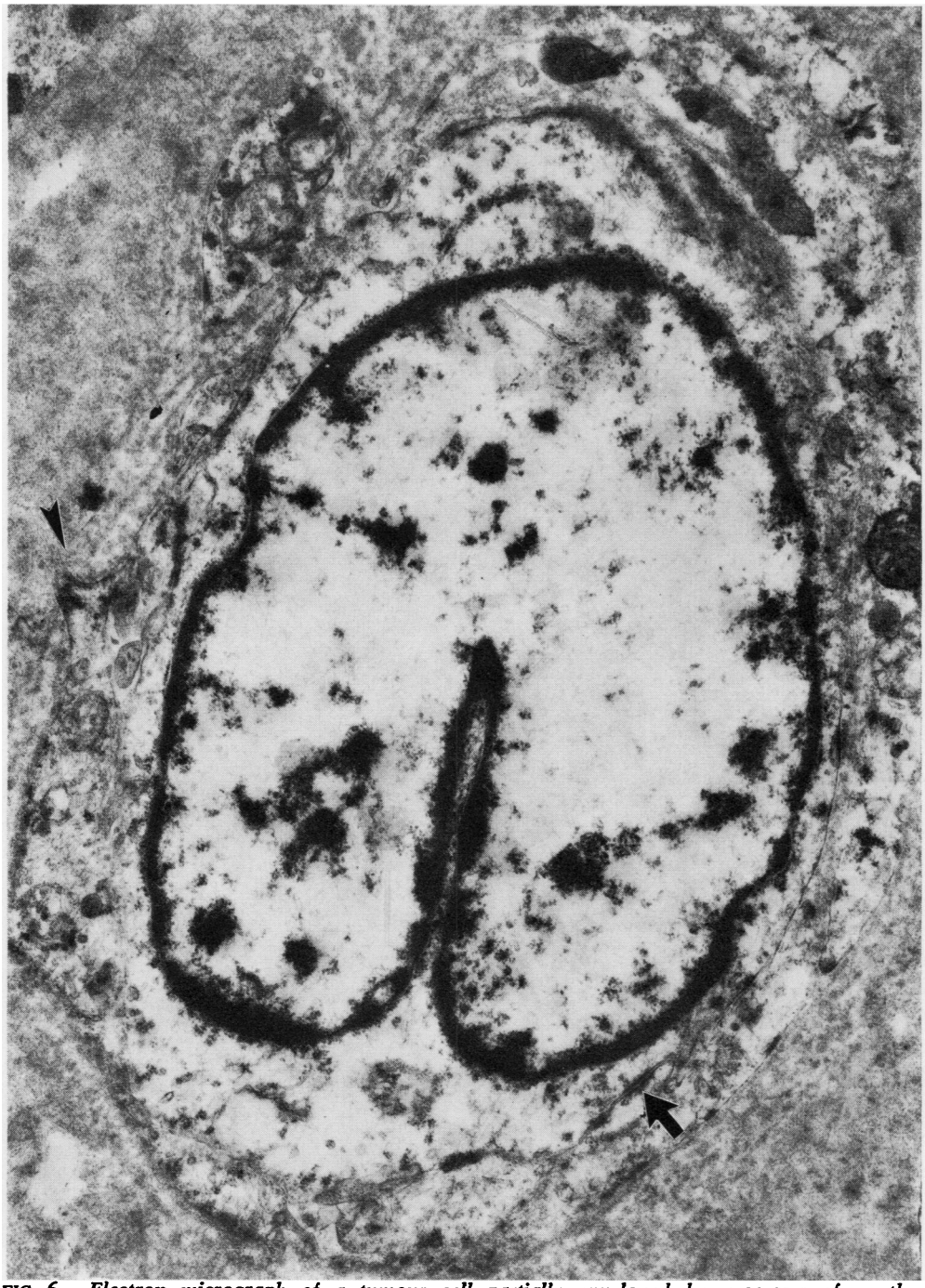


FIG. 6. *Electron micrograph of a tumour cell partially enveloped by processes of another tumour cell. Desmosomes (arrow) are prominent. A spinous process (arrowhead) reminiscent of those seen in squamous cells at intercellular bridges is seen* (×15,100 *stained with uranyl acetate and lead nitrate*).

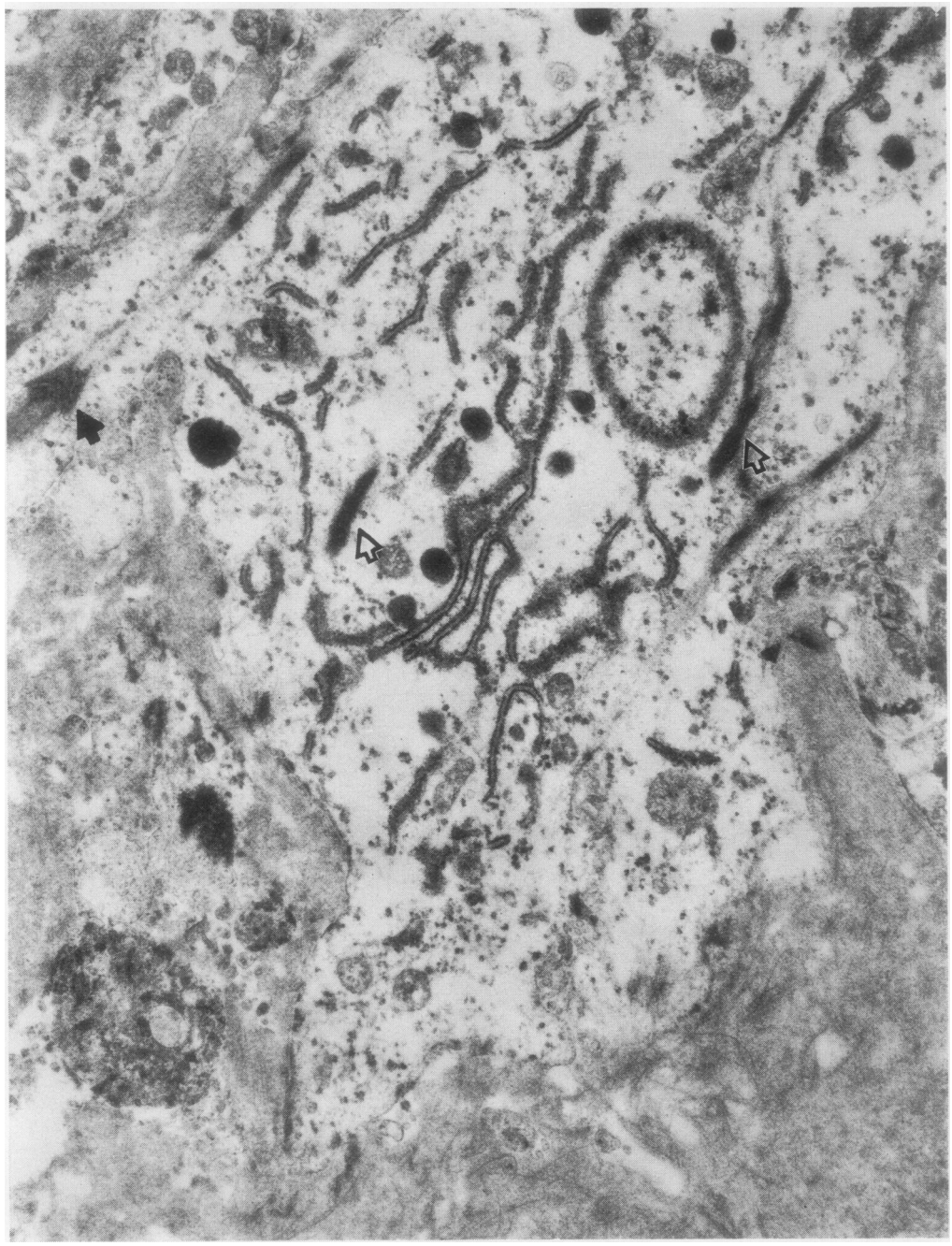


FIG. 7. *Electron micrograph of portion of a tumour cell illustrating abundant rough-surfaced endoplasmic reticulum, abundant tonofibrils (open arrows), and a desmosome with associated tonofibrils (solid arrow). Abundant collagen fibres are seen about the cell* (×10,550 *stained with uranyl acetate and lead nitrate*).

and his associates (1970), and by ourselves in the present report, support the concept that these sarcomatous-like cells are in fact derived from squamous epithelial cells. The presence of tonofibrils and particularly desmosome associated tonofibrils in some of the spindle-shaped tumour cells clearly establishes their squamous origin. It is not clear from electron microscopy of this tumour what the origin of the abundant collagenous stroma might be. The presence of cells indistinguishable from fibroblasts amidst the tumour cells was disclosed, but their true nature is obscure.

The reasons for the tendency of the squamous cells to adopt spindle shape are not apparent, although Lichtiger and his colleagues speculated on the possible role of loss of support of the cell structure caused by a reduction in the number of tonofibrils, leading to increased compressibility of the cells by the surrounding stroma.

A striking feature common to this variant of squamous carcinoma is the apparent origin of the tumour cells from basal cells which are often seen 'dropping off' into the stroma and imperceptibly blending with the underlying tumour. Tonofilaments are scarce in normal basal cells and become more abundant as the cells mature. One could hypothesize that this variant of squamous carcinoma is made up predominantly of basal cells. For unknown reasons these basal cells have less cohesiveness. The desmoplastic reaction elicited by the tumour cells—a common accompaniment of basal cell carcinoma—would complete the picture by compressing the tumour cells. Finally, an origin in basal cells would correlate well with the relatively benign behaviour of this type of tumour.

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