

The Cytology of Benign, Pseudomalignant Reactive Changes in Fibrous Tissue, Adipose Tissue and Striated Muscle in Fine Needle Aspiration Samples

One reason for a false-positive diagnosis of sarcoma in a soft tissue tumour aspirate is the misinterpretation of benign, reactive cellular changes in benign conditions.

Fibrous Tissue

Normal fibroblasts/myofibroblasts appear in FNA samples as spindle-shaped cells with slender cytoplasm, often

with elongated cytoplasmic processes. The nuclei are rounded, ovoid or fusiform with regular chromatin and small nucleoli, if any. The cells are seen either as dissociated or in small clusters or runs of loosely attached cells. Stripped nuclei are not uncommon (fig. 8).

Reactive fibroblasts/myofibroblasts show, irrespective of cause, a wide variation in size and shape. The cells become polyhedral or triangular, often with rather abundant cytoplasm. They may show angulated cytoplasmic extensions or cytoplasmic

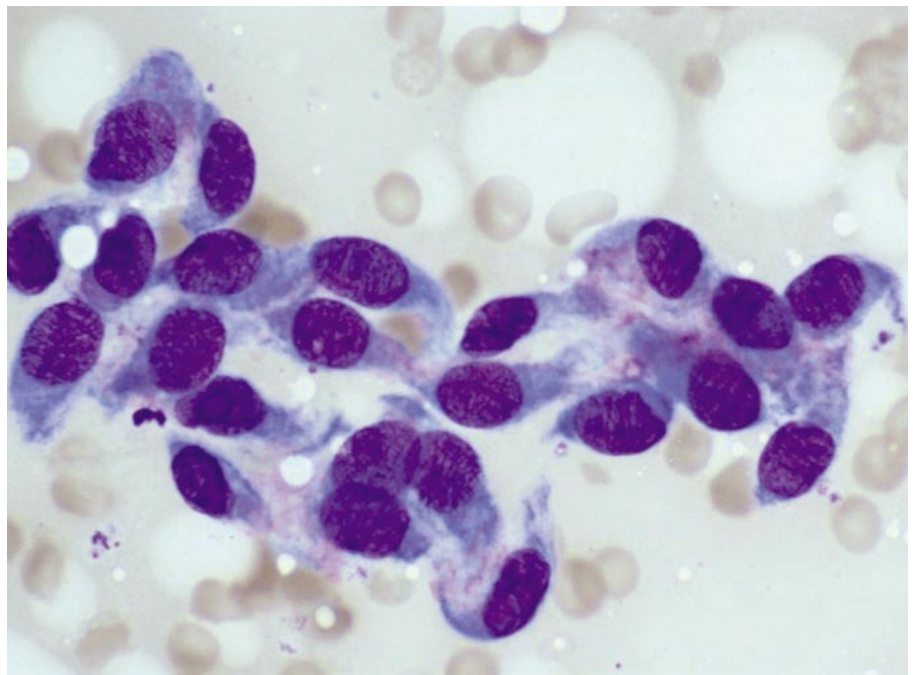
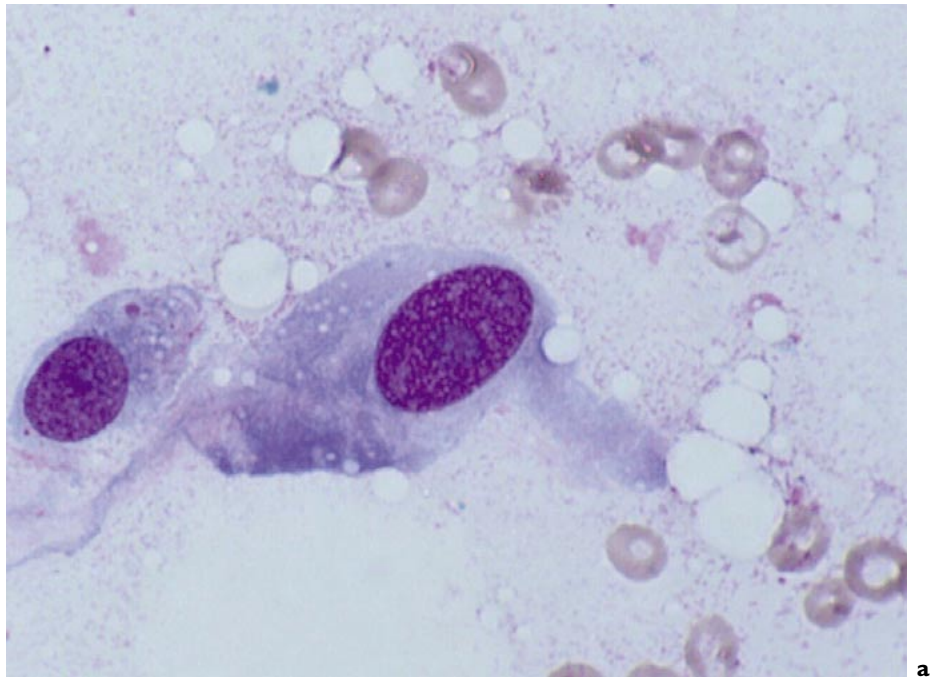
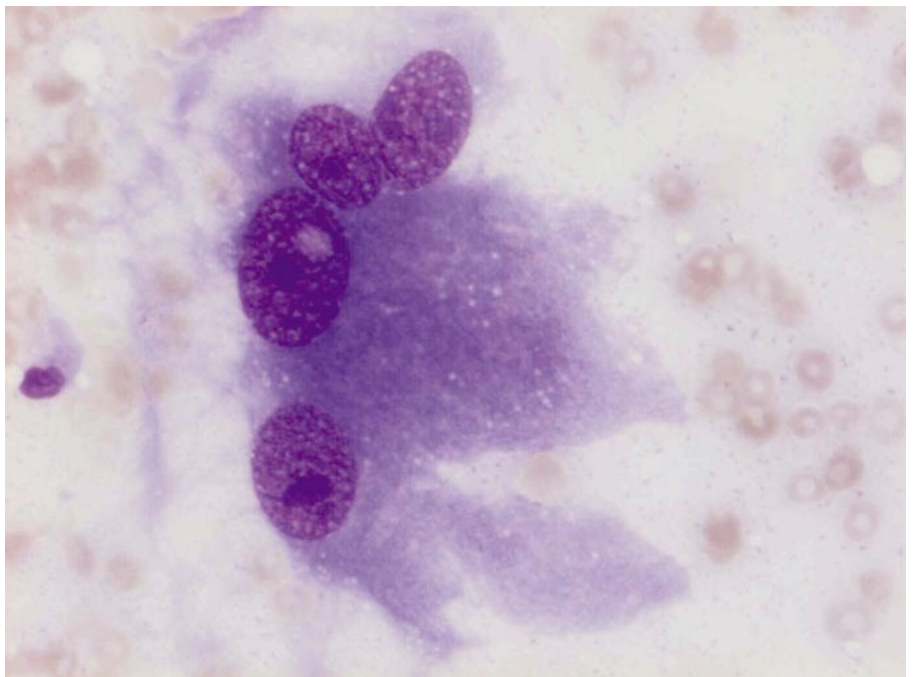


Fig. 8. Normal fibroblasts in an FNA biopsy. A run of loosely cohesive cells with ovoid, uniform nuclei, regular chromatin and bipolar cytoplasm. MGG. Medium magnification.



a



b

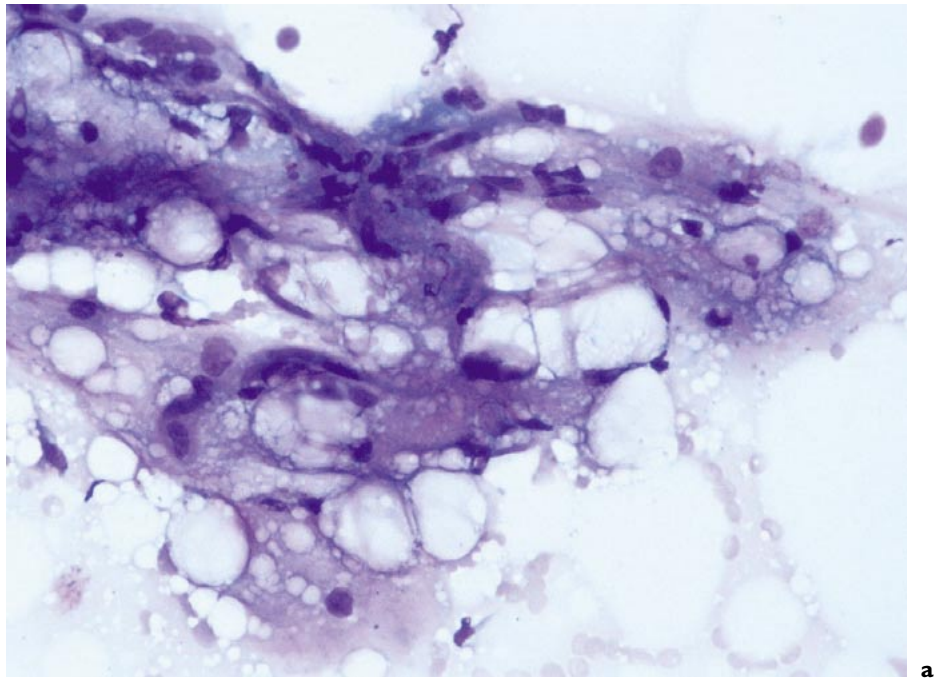
Fig. 9. Example of reactive fibroblast/myofibroblast. **a** Larger than normal fibroblasts with more abundant cytoplasm with angulated extensions and large nuclei with prominent nucleoli. **b** A multinucleated, ganglioncell-like reactive fibroblast. MGG. High magnification.

processes. The nuclei vary in size and shape (rounded, ovoid, spindle-shaped) and nucleoli may be large and prominent. Binucleated cells are not uncommon (fig. 9a, b).

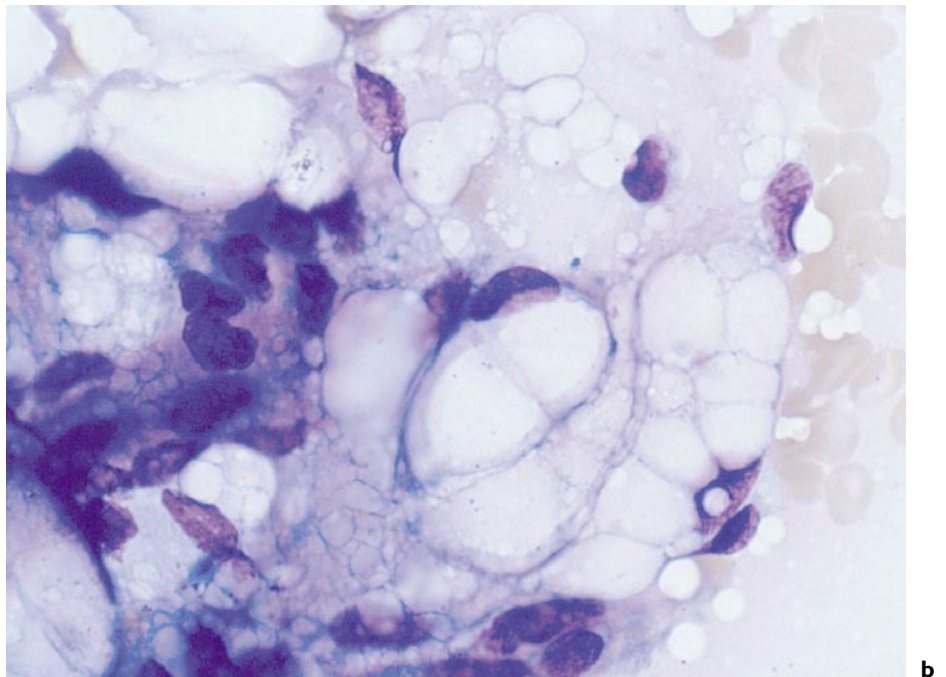
Typical examples of the pleomorphic appearance of reactive fibroblasts/myofibroblasts are seen in the pseudomalignant, benign soft tissue lesions, especially in nodular fasciitis and proliferative myositis.

Adipose Tissue

Normal adipose tissue is seen as small fragments or clusters of large cells with abundant univacuolated cytoplasm and small, dark, regular nuclei. A discrete network of thin capillaries is often observed. Dissociated adipocytes are uncommon.



a



b

Fig. 10. Cellular changes in adipose tissue. **a** Partly myxoid background and different-sized adipocytes. **b** Increased cellularity due to the presence of fibroblasts and histiocytes. **a, b** MGG. Medium magnification.

In reactive states, posttraumatic, inflammatory or in adipose tissue bordering various tumours, the adipose tissue may exhibit a myxoid-like background, the capillary network is more pronounced, the adipocytes vary in size and the fat fragments appear more cellular than normal due to the presence of fibroblasts and histiocytes (fig. 10a, b). Histiocytes with foamy or vacuolated cytoplasm appear between the fat fragments.

Striated Muscle

Normal striated muscle in FNA samples is seen as fragments of muscle fibres with small dark nuclei and a more or less evident striation. The fibres are densely eosinophilic in HE and dark blue in MGG. Regenerating muscle fibres appear in FNA samples as multinucleated cells of varying



11a



11b

Fig. 11. Examples of regenerating striated muscle fibres. **a** Typical ‘muscle giant cells’ with rows of nuclei and dark blue cytoplasm. MGG. High magnification. **b** The cytoplasm is eosinophilic in HE. High magnification.

size and shape. They are rounded, polyhedral, strap-shaped or tadpole-like. The cytoplasm is densely eosinophilic in HE and dark blue in MGG. The multiple nuclei are moderately large,

uniform in size and often harbour a prominent nucleolus. The nuclei are typically arranged in rows, eccentrically located (fig. 11a–c).

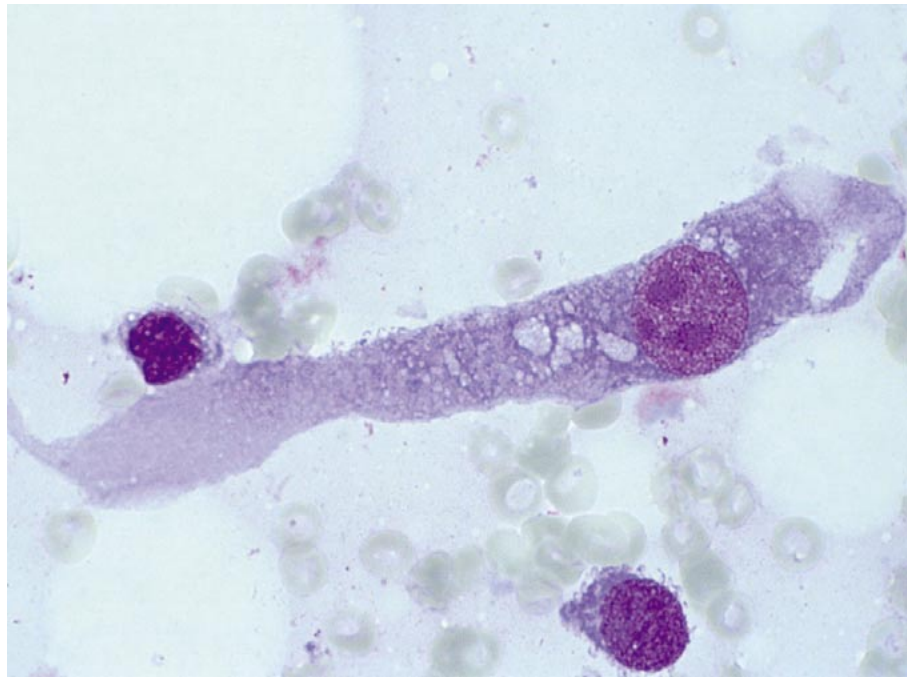


Fig. 11c. A uninuclear, tadpole-like regenerating striated muscle fibre. MGG. High magnification.

11c

Table 4. A summary of benign ‘pseudomalignant changes’ in aspirated material from fibrous and adipose tissue and striated muscle

Tissue	Cellular changes	Lesions
Fibroblasts/myofibroblasts	Variation in size, variation in shape; elongated, triangular, polygonal, plump with cytoplasmic extensions; variable nuclear shape and size; binucleation; prominent nucleoli	Benign pseudosarcomatous soft tissue lesions Posttraumatic states
Adipose tissue	Increased vascularity; increased cellularity (fibroblasts, endothelial cells, histiocytes); multivacuolated cytoplasm in adipocytes; uni- or multinucleated histiocytes between fat fragments (lipophages)	Status after fat necrosis Posttraumatic states Adipose tissue surrounding various non-adipose tumours
Striated muscle	Multi- or uninucleated regenerating muscle fibres (‘muscle giant cells’); occasionally presence of tadpole-like regenerating muscle fibres; prominent nucleoli; dense eosinophilic (HE) or dark blue (MGG) cytoplasm	Aspirates from tumours/lesions infiltrating striated muscle Examples: intramuscular lipoma, intramuscular myxoma, desmoid, fibromatosis colli

Regenerating muscle fibres are mainly found within FNA samples from tumours infiltrating striated muscle. Typical examples are infantile fibromatosis colli and desmoid fibromatosis.

A summary of the reactive cytological changes in fibrous tissue, adipose tissue and striated muscle is presented in table 4.