The gross appearances of fine needle aspiration cytology samples

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ABSTRACT

Aims: This study set out to photograph and describe the gross appearances of fine needle aspiration (FNA) cytology samples of commonly encountered lesions.

Methods: During a 2 year period, a cytopathologist photographed the gross appearances of near patient FNA samples, concentrating on commonly encountered lesions.

Results: The gross appearances are described, accompanied by photographic illustrations.

Conclusions: This paper describes and illustrates the gross appearances of FNA cytology samples of some commonly encountered lesions.

Pathologists and other clinicians performing fine needle aspirations (FNAs) are aware that it is often possible to assess the diagnostic utility of the material obtained from its gross appearances. In addition in some cases it is possible to suggest a specific diagnosis from the gross appearances. Some of these specific diagnoses are straightforward to recognise. Others require more experience. There is very little in the literature about the gross appearances FNA samples. This is partly a consequence of the practical difficulties of photographing these samples before they are altered by processing and staining.

In this study we set out to photograph and describe the gross characteristics of FNA samples from some commonly encountered lesions.

METHODS

The study took place in a tertiary hospital in rural New Zealand. Most FNAs were performed by an experienced cytopathologist in a dedicated FNA outpatients' suite. Image-guided FNAs were performed by a radiologist, with an experienced cytopathologist in attendance. It is our practice to give an FNA gross material grade to samples according to their gross appearance: grade 1, probably inadequate diagnostic material; grade 2, possibly contains diagnostic material; grade 3, probably contains diagnostic material; and grade 4, material suggesting a specific diagnosis (eg, "grade 4, suggests a pleomorphic adenoma"). An alternative system for the macroscopic grading of (pulmonary) FNA samples has been described, using five grades, and this has been reported to give a good indication of likely cytological diagnostic yield.[1]

Our study concentrated mainly on "grade 3" and "grade 4" samples. Those considered to be of particular interest were digitally photographed using a Nikon Coolpix 950 in the outpatients' FNA suite or the radiology department prior to staining and preliminary near patient microscopic examination. This camera is able focus on objects as close as 20 mm from its objective lens.

RESULTS

FNA gross material grade 3 (probably contains diagnostic material)

The typical appearance of a cellular smear containing diagnostic material is shown in fig 1A. The sample is often thick and pale with a consistency similar to cream. On smearing it has a glistening granular appearance, the granules being confluent at the thick end of the smear and more dispersed at the thin end of the smear. When necrotic material is obtained the granules are less evident (fig 1B). Cellular material from lymphoid lesions is described below.

Colloid nodule or cyst (thyroid)

Colloid cysts of the thyroid yield material that ranges from being watery straw-coloured fluid to being thick golden fluid. The latter produces "cracked pavement" colloid on microscopic examination. The former gives rise to fine thread-like colloid on microscopic examination. When the thick fluid is dried it has an appearance similar to a film of matt varnish (fig 1C). Often the golden fluid is seen in the hub of the needle at the start of the aspiration but becomes blood stained as the FNA progresses. For reasons that are not clear this blood appears to have a particularly bright "arterial" colour. Colloid cysts often contain historic haemorrhage (the associated sudden enlargement and tenderness being the reason for presentation). The appearance of this haemorrhagic colloid depends on the interval between the haemorrhage and the FNA. Initially the material has an appearance indistinguishable from haemorrhage introduced by the FNA procedure, except that there is haemorrhage evenly throughout the aspirate. As the time interval between haemorrhage and aspirate increases so the haemorrhage discolours, becoming darker and eventually chocolate-like. It is often easier to appreciate the degenerate nature of the blood by gross examination than by microscopic examination. It should be remembered that an encysted papillary carcinoma could yield material with a similar appearance to a haemorrhagic colloid cyst.

Epidermoid cyst

The typical appearances of material from an epidermoid cyst are shown in fig 1D. This has a bright white flaky appearance and a strong distinctive odour akin to old socks. This is perhaps the only occasion in FNA cytology in which smell

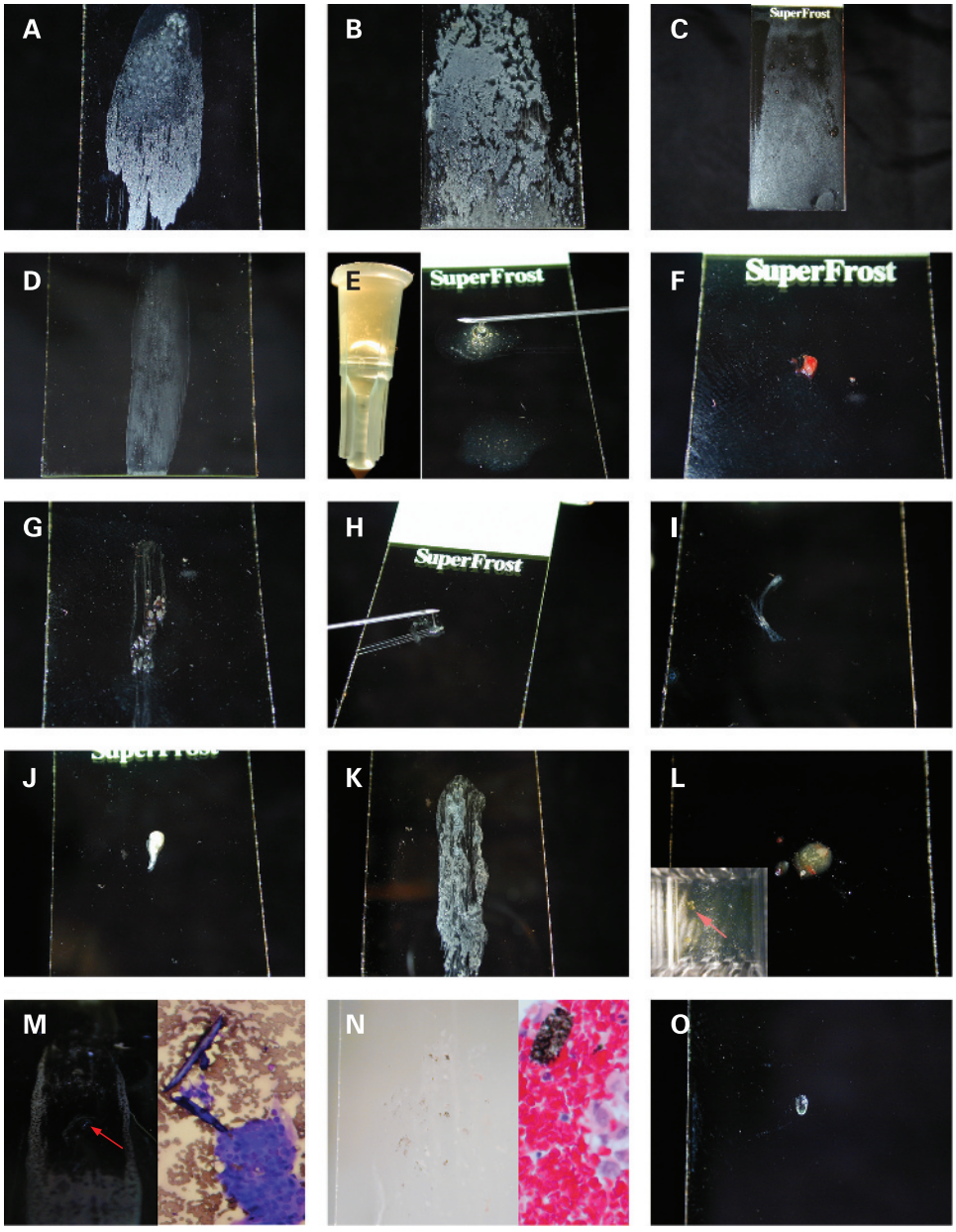

Figure 1 (A) Cellular smear. (B) Necrotic cellular material. (C) Colloid cyst (thyroid). (D) Epidermoid cyst. (E) Squamous carcinoma. (F) Pleomorphic adenoma. (G) Pleomorphic adenoma smeared. (H) Mucinous carcinoma. (I) Mucoepidermoid carcinoma (low grade). (J) Tuberculosis. (K) Tuberculosis smeared. (L) Lipoma with altered fat; the inset shows a residue of fat globules (arrow) at the bottom of a methanol fixative jar. (M) suture debris; there is a tiny fragment of suture material in the gross photograph (arrow); the microscopic photograph shows a different fragment of suture debris with an associated giant cell reaction. (N) Anthracotic pigment from a mediastinal lymph node, also containing non-small cell carcinoma. (O) Ganglion cyst.

contributes to the diagnosis. It is notable that squamous carcinoma does not have this odour.

Squamous carcinoma

The typical appearance of a cystically degenerate keratinising squamous carcinoma is shown in fig 1E. Less well-differentiated squamous carcinoma has a less characteristic appearance. The fluid is clear or straw coloured with a mucoid quality that allows it to cling to the needle as the needle is drawn from it. Often "snow flakes" of white keratin can be seen suspended in the fluid. Novices at performing FNAs tend to misinterpret the mucoid quality of the material being indicative of mucinous lesion.

Pleomorphic adenoma

The typical appearance of material from a pleomorphic adenoma is shown in fig 1F. This material has a grey or slightly purple mucoid appearance that does not cling to the needle to form "strings" and produces a coarsely granular smear shown in fig 1G. Often the differential diagnosis is an enlarged lymph node and it is usually easy to distinguish between the gross appearances of these two types of tissue.

Lymphoid tissue

FNA material from a cellular lymphoid lesion is similar to cellular material from a carcinoma except that when the material is spread on the slide it yields a smooth film rather than a granular film, perhaps a manifestation of the lack of cohesion between the cells. However, this is a subtle distinction. There is no consistent difference between a benign node and a lymphoma, except that an overtly enlarged suspicious node that yields no material despite a determined FNA attempt is suggestive of nodular sclerosing Hodgkin lymphoma or some other fibrotic process such as a mediastinal large B cell lymphoma,[2] and a reactive node often gives rise to rather watery material. The latter may be a result of oedema.

Pus
Pus hardly needs describing, as its appearances are well known. It is may be watery or thick and creamy, with a yellow or greenish colour. Sometimes it is haemorrhagic.

Mucinous carcinoma and low-grade mucoepidermoid carcinoma
The typical appearance of mucinous carcinoma is shown in fig 1H, and fig 1I shows low-grade mucoepidermoid carcinoma. The material may range from thin "stringy" mucus to thicker more solid material that may have a "lumpy" appearance and may crumble into granular material on smearing. The authors' experience of mucoepidermoid carcinoma is limited. One assumes that high-grade mucoepidermoid carcinoma yields less overtly mucinous material.

Tuberculosis
Typical caseous material from a tuberculous lymph node is shown in fig 1J. Usually the amount of material obtained is small. The material is snow white and thick. When smeared it is granular as shown in fig 1K.

Lipoma
Lipomas give rise to a sample of fatty globules, sometimes mixed with a small amount of blood. The typical appearance of a lipoma with altered fat due to traumatic fat necrosis is shown in fig 1L. The latter has a creamy, rather than clear appearance, as the degenerate fat becomes emulsified into minute droplets. With FNA samples from lipomas and other fatty specimens, the globules of fat are often best seen in the fresh specimen, and may float away during fixation and staining of the slide. The inset of fig 1L shows residue from an FNA sample of a lipoma after fixation. The fat is denser than methanol and sinks to the bottom of the jar. In aqueous stains the fat residue floats on the surface. Novice FNA practitioners frequently become confused by fatty specimens as they are impossible to "dry" with a hairdryer for Diff Quik staining despite the most determined effort.

Suture debris
Experienced FNA practitioners will appreciate that it is often possible to recognise a suture granuloma by tactile sensation during the FNA procedure. The needle is felt to catch on the suture material and there may even be an associated "clicking" sound. In addition suture debris may be seen microscopically. It may also be seen macroscopically on rare occasions as shown in fig 1M (a tiny fragment of suture debris is marked by the arrow).

Pigmented material
Novice FNA practitioners may be eager to attribute significance to dark pigment when it is seen grossly in samples. In particular there is a temptation to make a link with melanoma. In the experience of the authors most (more than two thirds) FNA samples of metastatic melanoma are not obviously pigmented on gross examination. It should be remembered that dark pigment, when seen, is usually from another source, particularly haemosiderin. Anthracotic pigment in material from a CT-guided FNA of a hilar lymph node, also containing non-small cell carcinoma, is shown in fig 1N.

Warthin's tumour
The authors' experience of this lesion is rather limited, but the lesion typically yields watery fluid that is discoloured brown due to degenerate haemorrhage. These appearances are not typical of other salivary tumours and so suggest the diagnosis, particularly in an elderly patient.

Ganglion cyst
The typical appearance of a ganglion cyst is shown in fig 1O. These lesions usually yield a scanty amount of thick crystal clear mucinous material. Although mucoid material is obtained from other types of lesion (as above) the crystal clear appearances together with clinical context, particularly its position on a limb or digit, gives away the diagnosis.

DISCUSSION
Previous photographic illustrations of the gross appearances of FNA samples are hard to find. However, in the authors' experience, FNA practitioners are already aware of the significance of many of the features described in this paper. It is often possible to assess the likely cellularity of a sample without examining it microscopically and sometimes to suggest a likely diagnosis. We plan to photograph the gross appearances of FNA samples of other lesions and to publish these, as they may be valuable to pathologists and other clinicians that perform FNAs.

Take-home messages
- It is often possible to determine the cellularity of a fine needle aspiration (FNA) specimen from its gross appearance.
- Some lesions yield FNA samples with a characteristic gross appearance that can be recognised by experienced FNA practitioners.

Competing interests: None.

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