

# Endoscopic needle aspiration cytology: a new method for the diagnosis of upper gastrointestinal cancer

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**SUMMARY** A technique for obtaining needle aspiration cytology specimens from upper gastrointestinal lesions at endoscopy is described. The validity of the technique was initially confirmed by applying it to resected gastric carcinomas. Thirty seven endoscopically visualised lesions were then sampled by forceps biopsy, brush and needle cytology. Ten lesions were subsequently found to be carcinomas. Needle aspiration produced identifiable malignant cells from seven of these lesions. In two it was the only sampling method which provided the correct diagnosis. This technique may be a useful addition to conventional endoscopic sampling methods, particularly where tumours lie deep to normal mucosa, or necrotic slough.

The majority of malignant lesions of the upper gastrointestinal tract can be recognised by their endoscopic appearances. Clinical suspicion can in most instances be readily confirmed by endoscopic biopsy and brush cytology. The use of these two sampling techniques, either alone or combined, can result in the correct identification of approximately 95% of malignant lesions.<sup>1-3</sup> A small proportion of these tumours will remain undetected by conventional techniques, however, because only surface cells or tissues are sampled. Primarily infiltrative lesions such as linitis plastica, recurrent tumours, and less common histological types such as lymphomas and sarcomas are difficult to diagnose by biopsy or brush cytology.<sup>2,4</sup>

Fine needle aspiration cytology is an effective means of diagnosing many malignant tumours. Samples are generally obtained percutaneously from a palpable lesion in organs such as breast, or with ultrasonic guidance from deep structures such as pancreas. The availability of flexible needles for injecting oesophageal varices raises the possibility that needle aspiration cytology could be applied to gastrointestinal lesions visualised endoscopically. This technique may allow samples to be obtained

from lesions lying deep to necrotic debris or to normal mucosa, and which may be hard to diagnose by conventional means.

In this pilot study we have compared the diagnostic accuracy of endoscopic forceps biopsy, brush cytology, and needle aspiration cytology on resected specimens of gastric cancer. The same three sampling techniques have been applied to a variety of upper gastrointestinal lesions seen at routine endoscopic examination.

## Methods

### BIOPSIES

All examinations were done with an Olympus GIF-Q forward-viewing endoscope. A minimum of five biopsies were taken from each lesion with Olympus FB-24E forceps. Cytology brushings were obtained with an Olympus BC-9L brush and smeared onto slides. The slides were immediately fixed and subsequently stained with haematoxylin and eosin. Aspiration cytology specimens were obtained with an Olympus NM-1K needle. The needle was inserted into the target area and suction applied at the proximal end with a 10 ml syringe. The needle was gently moved in the tissue to dislodge cells and the suction released. The needle was then withdrawn from the endoscope and the syringe disconnected, filled with air and used to blow the aspirated material

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onto a slide. After being spread on the slide with the needle point the aspirate was fixed and stained as for the brush specimens. Each lesion was sampled by needle aspiration, brushing and biopsy in that order.

The pathological study was carried out on two stomachs resected for proven gastric carcinoma. The fresh specimen was pinned out and forceps biopsy, brush and needle aspiration cytology samples were obtained from a series of predetermined sites. These were located at increasing distances from the tumour centre along each of four radii. The samples were coded and read by the same pathologist (MKM). The results were compared with full thickness histological blocks taken from exactly the same point on the specimen.

## Results

The results of the pathological study indicated that readable aspirates could be obtained in every case.

### CASE 1

This was a small tumour with a well defined edge. Formal histological blocks showed no submucosal spread beyond the macroscopic edge. Forceps biopsy, brush and needle cytology all indicated carcinoma on the tumour itself and all gave correct results beyond the tumour margin.

### CASE 2

Histological blocks from this large tumour showed extensive submucosal infiltration. Forceps biopsy, brush and needle cytology all showed malignant cells on the tumour itself but only needle cytology was able to demonstrate carcinoma peripheral to the macroscopic edge at two sites.

A total of 37 lesions were sampled at endoscopy. The indications for endoscopy are shown in Table 1. Ten lesions have subsequently been proved to be malignant by conventional histological examination of the resected stomach. The results of sampling these at the initial diagnostic endoscopy are shown in Table 2. All were adenocarcinomas. There were no patients with lymphoma or linitis plastica. All three sampling methods gave positive results in five, brush

Table 1 Indications for endoscopy in 37 upper gastrointestinal lesions

Provisional diagnosis	n
Gastric ulcer	12
Suspected gastric carcinoma	7
Gastric polyps	3
Gastric dysplasia/metaplasia	5
Oesophageal stricture	5
Gastritis	5

Table 2 Diagnostic accuracy of each sampling technique at initial endoscopy of 10 carcinomas

Carcinomas (n)	Biopsy	Brush cytol	Needle cytol
5	+	+	+
1	+	-	-
1	-	+	-
2	-	-	+
1	-	-	-

cytology or biopsy alone was positive in two, needle cytology alone was positive in two and no sampling technique produced positive results in one. No false positive results were obtained and no adverse effects were observed as a result of any of the three sampling techniques. Those patients who did not undergo surgery have all continued to have regular endoscopic surveillance.

## Discussion

Needle aspiration cytology was safe, very simple to do and added little time to the endoscopic procedure. Almost every lesion which could be approached with the endoscope was easily sampled except for very sessile lesions in the oesophagus and those situated high in the fundus. Even these were easier to sample with the needle than with conventional biopsy forceps. On a few occasions the needle was inserted into the lesion more than once because excessive aspiration of blood or tissue fluid appeared to prevent a satisfactory sample being obtained. This problem was minimised by using only moderate suction on the syringe and taking the needle aspirate before the biopsies. The use of needle aspiration did not appear to make subsequent brushing or biopsy more difficult.

The results indicate that conventional sampling techniques identified only 7 of 10 proven gastric carcinomas on the first occasion. Two of the three biopsy and brush cytology negative lesions both showed dysplasia on biopsy but one was correctly identified as a carcinoma by needle cytology. This patient underwent repeat endoscopy and biopsy with the same result. The needle cytology result was confirmed at operation. The third patient had endoscopically obvious carcinoma with extensive necrosis and ulceration. Five biopsies were taken and these showed only slough, as did brush cytology. Needle cytology showed highly atypical cells. No cases of carcinoma have emerged at regular endoscopic follow up of those patients who have not undergone surgery.

The diagnostic rate for conventional sampling in this series is poorer than that in some others,<sup>2</sup> despite apparently adequate biopsies being taken with

largest forceps usable with the Olympus-Q endoscope. The use of brush cytology is known to improve diagnostic accuracy<sup>6</sup> but only identified one biopsy negative carcinoma in our patients. The majority of the tumours in this series were exophytic rather than infiltrative and several were associated with severe ulceration. The reparative and inflammatory changes resulting from this may have contributed to the failure of conventional techniques to obtain unequivocally malignant cells. Any advantage of needle cytology may lie in its ability to penetrate the surface and sample the deep layers. Although repeated biopsy and brush cytology will eventually identify the majority of upper gastrointestinal carcinomas there is a small proportion in whom the diagnosis remains elusive.<sup>1,2</sup> This is particularly likely to occur with infiltrative lesions, those located in the antrum or cardia,<sup>4,5</sup> and where extensive ulceration has taken place. Needle aspiration cytology was shown in this study to be capable of diagnosing tumours deep to mucosa or slough when conventional methods failed. Clinical application of the technique may help to identify these tumours. The potential implications of this are illustrated by one of the tumours in this study which was identified by needle cytology alone. The endoscopic appearance of this lesion was that of an antral ulcer but it was confirmed at resection to be an early gastric carcinoma.

Our results support the further evaluation of needle aspiration cytology in routine diagnostic endoscopy. When biopsies and brushings are equivocal or negative, its use may result in earlier diagnosis of upper gastrointestinal cancer.

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