Clinical examination, xeromammography, and fine-needle aspiration cytology in diagnosis of breast tumours

J MEIRION THOMAS, B M FITZHARRIS, W H REDDING, J E WILLIAMS, P A TROTt, T J POWLES, H T FORD, J-C GAZET

Summary and conclusions

The diagnostic accuracy of clinical examination, xeromammography, and fine-needle aspiration cytology was compared with definitive histological findings in 255 breast lumps excised during one year. When suitable aspirates were obtained for cytological examination the diagnostic accuracy of aspiration cytology was higher than clinical examination or xeromammography. A diagnostic accuracy of 99% was achieved when all three screening tests were in agreement. As well as confirming a clinical diagnosis of malignancy, cytology is useful in identifying malignancy when clinical findings suggest that the tumour is benign. The availability of accurate cytology has affected patient management in many ways.

Xeromammography did not enhance the diagnostic accuracy of clinical examination and aspiration cytology in patients presenting with a breast lump and, as a procedure with potential hazard, the benefit of routine xeromammography is questionable when an efficient cytological service is available.

Introduction

A rapid, inexpensive, efficient, and safe method of distinguishing between benign and malignant breast lumps in outpatient clinics would benefit patients and surgeons greatly, while reducing the waiting list for special investigations. We compared the accuracy of clinical examination, xeromammography, and fine-needle aspiration cytology, evaluated individually and in combination, in diagnosing breast tumours in outpatients. We tried to identify methods of improving the diagnostic usefulness of these screening methods, and to evaluate the role of routine xeromammography in the diagnosis of palpable breast tumours when an efficient cytological service is available.

Methods and results

During 1977, 255 breast lumps in 249 patients were excised for biopsy at this unit. Of these, 77 were proved to be malignant, and 178 were benign. The diagnostic accuracy of clinical examination, xeromammography, and fine-needle aspiration cytology was compared with the definitive histological findings (table 1). Because equal numbers of histologically benign and malignant tumours were incorrectly diagnosed by clinical examination (table 1) there were also 77 clinically malignant tumours and 178 clinically benign tumours in this series. In tables II and III the tumours are classified according to clinical diagnosis in an attempt to define the place of aspiration cytology and xeromammography in enhancing diagnostic accuracy. The results of aspiration cytology and xeromammography were reported as either benign, suspicious of malignancy, or malignant. In table I tumours reported as suspicious of malignancy have been tabulated as malignant.

When suitable aspirates were obtained for cytological examination, the diagnostic accuracy of aspiration cytology was higher (95%) than either clinical examination (89-8%) or xeromammography (84-2%). Nevertheless, while all breast lumps were assessed clinically and 240 (94-1%) by xeromammography, aspiration cytology was performed in only 196 breast lumps (76-9%) and, of these, 37 (18-9%) were unsuitable for cytological diagnosis. The effective accuracy of aspiration cytology is therefore reduced to 77% when expressed as a percentage of the breast lumps aspirated. Unfortunately, aspiration cytology tended to be omitted when clinical examination was strongly
suggestive of benign breast lump, and in 57 such cases (table II) five tumours (8.8%) were subsequently proved to be malignant on histology.

All three screening methods were performed in 189 of the tumours with diagnostic agreement of all three in 109 cases (57.7%). A diagnostic accuracy of 99% was achieved in these 109 cases because only one breast lump was incorrectly diagnosed (tables II and III). There were no errors in the 49 cases reported as cytologically malignant, but there were four benign tumours (false-positive) among the 14 reported as suspicious of malignancy. In the 96 cases reported as cytologically benign, four were malignant (false-negative) (tables I, II, and III). In the 47 cases reported as radiologically malignant, 43 proved to be malignant while four were benign. In the 38 cases reported as suspicious of malignancy, 18 were malignant, but 20 were benign (total of 24 false-positives). In the 155 cases reported as radiologically benign, 14 were malignant (tables I, II, and III).

Xeromammography would have been a useful adjunct to cytology in patients with carcinoma if it had detected carcinoma in patients with false-negative cytological findings, or in cases in which the aspirate was unsuitable for cytological diagnosis. Nevertheless, in the four patients with carcinoma in whom cytological results were false-negative (tables I, II, and III) the xerogram was reported as benign in every case, though clinical examination suggested malignancy in three and benign breast lump in one. In the eight patients with carcinoma whose cytological specimens were unsuitable for diagnosis (see tables) the xerogram was reported as malignant in seven and suspicious of malignancy in one, but clinical examination had also suggested malignancy in seven of the eight patients. Nevertheless, in four (clinically benign) cases the xerogram alone diagnosed malignancy in three or was suspicious of malignancy in one, but cytology had not been performed in three of these cases and an unsuitable aspirate was obtained in one.

**Discussion**

At this unit the availability of accurate cytology has affected patient management in many ways. Patients in whom cytological findings are positive undergo exhaustive investigation to detect metastatic disease. They are admitted to hospital as a matter of urgency, and the probably clinical diagnosis and the likely surgical procedure is discussed with the patient. Patients in whom cytological findings are negative are reassured that their breast lump is probably benign, do not undergo full investigation for metastatic disease, and are admitted to hospital at the first convenient opportunity for excision biopsy and frozen section only. In those few patients in whom malignancy is detected on frozen section, full investigation for metastatic disease is performed, and the patients return to theatre on the next operating list for definitive surgery when appropriate. When the aspirate is unsuitable for cytological diagnosis, another specimen is taken and the patient reviewed with special reference to clinical findings and the xeromammography.

The diagnostic inaccuracy of aspiration cytology in this series was 5% (table I), so frozen section remains mandatory before any ablative breast surgery is performed. Nevertheless, in the 49 cases reported as cytologically malignant, rather than suspicious of malignancy, no errors occurred. The incidence of technically unsuitable cytology specimens was 18.9%, and was twice as high in benign tumours compared with malignant tumours. This is probably related to the lower ratio of ductal cells to stromal cells in benign tumours. The incidence of technically unsuitable specimens can be reduced from 24.8%.

**Table II—Analysis of results of xerography and cytology in diagnosing clinically benign tumours (n=178)**

<table>
<thead>
<tr>
<th>Xerography</th>
<th>No of cases</th>
<th>Cytology</th>
<th>Histology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not done</td>
<td>No cells</td>
<td>Malignant</td>
</tr>
<tr>
<td>Not done</td>
<td>14</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Malignant</td>
<td>10</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Benign</td>
<td>133</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Suspicious</td>
<td>21</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>178</td>
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<td>57</td>
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</table>

**Table III—Analysis of results of xerography and cytology in diagnosing clinically malignant tumours (n=77)**

<table>
<thead>
<tr>
<th>Xerography</th>
<th>No of cases</th>
<th>Cytology</th>
<th>Histology</th>
</tr>
</thead>
<tbody>
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<td>No cells</td>
<td>Malignant</td>
</tr>
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<td></td>
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<tr>
<td>Malignant</td>
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<tr>
<td>Benign</td>
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<tr>
<td>Suspicious</td>
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<tr>
<td>Total</td>
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<td>2</td>
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</table>
Can constriction of the abdomen by a belt or corset cause angina, hypertension, or tachycardia?

My only knowledge of constriction of the abdomen by a belt or corset causing cardiovascular symptoms is with phaeochromocytoma. There the pressure can cause release of catecholamines with tachycardia, hypertension, and angina. This is obviously rare, however. Sometimes patients feel that gastric distension by gas aggravates their cardiac symptoms, but my own experience covering several decades of taking cardiac histories does not lead me to associate constriction of the abdomen with the production of angina. I have discussed this with several colleagues and their comment is the same.

What precautions should be taken by operators using Cymag powder to kill rabbits?

Gassing powders such as Cymag, which give off hydrogen cyanide when exposed to air and moisture, are extremely poisonous when taken by mouth or inhaled. Everyone using them should follow the manufacturers' instructions to be found in a leaflet inside each Cymag container. Similar instructions and details of legislation are given in a leaflet published by the Health and Safety Executive.1 Precautions include working in pairs, avoiding wet or windy days, no smoking, standing to windward, and the provision of amyl nitrite capsules. Instructions are also given on storage, transport, disposal, and the maintenance of equipment. Hydrogen cyanide inhalation is not necessarily instantly fatal. Operators should be instructed to recognise symptoms of poisoning (including the three Bs—blurriness, nausea, and weakness, headache, feelings of suffocation, and collapse). First-aid measures include rapid removal from exposure and inhalation of amyl nitrite. If a doctor is available an intravenous antidote can be given. Cobalt EDTA is held by many to be the treatment of choice,2 but reported unpleasant side effects include vomiting and cardiac arrhythmias,3 and it probably should be given only if the patient is seriously poisoned (that is, unconscious). The debate continues.

The manufacturers of Cobalt EDTA (Kelocyanor) provide a cyanide emergency kit that should be available where people are regularly using Cymag. It contains amyl nitrite, Kelocyanor syringes, indwelling intravenous needles, and dextrose injection (the value of which is not known). It can be sent with the patient to hospital if necessary. The pharmacological basis of treatment has been described.4 Cyanide poisons cellular respiration by combining with the ferric iron of the cytochrome oxidase system. Haemoglobin does not compete with this reaction, but methaemoglobin does by forming cyanmethaemoglobin. The role of amyl nitrite is to convert some haemoglobin to methaemoglobin. Cobalt salts combine with cyanide to form the harmless stable cobaltocyanide ion Co(CN)g. Cobalt EDTA is safer and retains the ability to fix the cyanide ion.

References

5 Holaday, W J, American Journal of Clinical Pathology, 1974, 61, 769.
6 Coleman, D, et al, Clinical Oncology, 1975, 1, 27.
11 Kline, T S, and Neal, H S, Obstetrics and Gynecology, 1975, 46, 89.
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The view has been expressed already. Rimster et al4 correctly diagnosed 91% of carcinomas of the breast by clinical examination and aspiration cytology, while the remaining 9% were clinically or cytologically suspicious. Kline and Neal11 recommended aspiration cytology of all breast lumps and reserved mammography for benign aspirates.

Xeromammography is not without potential hazard and should be reserved for screening high-risk patients when no breast lump is palpable. Routine xeromammography may be useful in detecting a synchronous occult carcinoma in the ipsilateral or contralateral breast, but no such coincidence was seen in this series.

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