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ASPECTS OF DIAGNOSIS*

Assessment of a scoring scheme for the preoperative diagnosis of breast lumps

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Summary

The value and accuracy of a scoring system applied to clinical examination, aspiration cytology and mammography has been assessed in the diagnosis of 224 consecutive 'new' patients attending a breast clinic with a breast lump.

In 72 of 99 patients with breast cancer (80%) the scores were high enough to allow definitive surgery without formal histology; all were subsequently confirmed as breast carcinomas. Cytology proved the most accurate investigation with no false positives and a correct diagnosis in 146 of 148 adequate specimens (98.6%).

This system reduced the frozen section rate by 74% and allowed for a more appropriate counselling of patients prior to mastectomy.

Introduction

The triple assessment of breast disease by fine needle aspiration cytology, mammography and clinical examination has been reported as being 99% accurate in the diagnosis of breast disease *(1–3)*. Adequate cytology alone with strict criteria applied has been shown to be as reliable as a histological biopsy in the diagnosis of breast cancer (*4*) but occasional false positives have been reported in a number of series (5–7).

In order to reduce the number of diagnostic excision biopsies prior to mastectomy and to improve patient counselling a cytopathology service was established in the Southampton Breast Clinic in 1981. The results of cytology, mammography and clinical examination were then incorporated into a diagnostic scoring scheme on which definitive treatment could be based with greater safety. We report our experience to date using this system and its effect on surgical work-load.

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Patients and methods

Two hundred and twenty-four patients with discrete breast lumps were examined clinically and then subjected to fine needle aspiration at their first attendance at the Breast Clinic. Mammography was then performed on all patients except those under 30 years who were thought clinically to have a benign lesion.

The findings for clinical examination, needle biopsy and mammography were each assigned a score of −2 for a definitely benign tumour, −1 for a possibly benign tumour, 0 for equivocal or inadequate assessment, +1 for a probably malignant tumour and +2 for a definitive malignant tumour. Accordingly, score range of −6 to +6 was obtained for each patient.

Fine needle aspiration was performed using a 21 gauge (green hub) 40 mm needle attached to a 20 ml disposable syringe mounted on a Cameco syringe pistol holder. After disinfection of the skin, the lump was steadied with one hand and the needle advanced through the skin into the tumour. No local anaesthetic was used. Suction was applied to the syringe whilst the needle was introduced several times into the tumour with a twisting action. Suction was released before withdrawal of the needle from the breast. The contents of the needle were expelled onto four microscopic slides and smears made in a similar manner to that used for blood films. Two of the smears were air-dried and stained by the Diff-quik (Harleco) technique. The other two slides were fixed in alcohol and stained using the Papanicolaou technique. Each slide was then examined by a single cytologist; the final report was assigned on a five-point scale similar to that for clinical examination, with 0 for those in which inadequate cells were aspirated or were poorly fixed. A

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diagnosis of carcinoma was made only where numerous unequivocal malignant cells were present. The category 'suspicious of carcinoma' (+1) included aspirates in which malignant cells were scanty, in which there was an admixture of benign cells and also certain cases with very well differentiated malignant cells. Although the presence of significant numbers of benign cells usually indicated a benign lesion, this was not regarded in any way as excluding malignancy.

Mammography was performed with standard superior–inferior and lateral views on a Senograph X-ray set using min-R film, and the appearances similarly reported on a five-point scale. One lesion which was not visualised because of its medial position was assigned a zero score.

The incidence of frozen section or preoperative biopsy prior to mastectomy for the period of January to June 1981 when fine needle aspiration cytology was not available was compared with the period January to June 1982 when it was. Statistical analysis using χ^2 analysis was applied to assess the effect using the scoring scheme.

Results

Two hundred and twenty-four patients over the age of 30 presenting to the breast clinic with a discrete lump were included in the study.

ASPIRATION CYTOLOGY

There were no false positive results and only 2 false negative results. Although cytology was inadequate in 76 cases it confirmed the diagnosis in 76 of 99 (77%) breast carcinomas; in 50 cases the score was +2, in 26 cases +1. The diagnosis of a benign lesion was correct in 70 of 72 (97%) evaluable aspirates. The overall accuracy of cytology with adequate smears was 98.6%.

TABLE I *Results of aspiration cytology and mammography indicating their overall accuracy*

	Mammography		
	Benign	*Inadequate or scored zero*	*Malignant*
Correct	119	9	87
Incorrect	6		3
		Overall accuracy = 95.8%	
		Cytology	
Correct	70	76	76
Incorrect	2		0
		Overall accuracy = 98.6%	

MAMMOGRAPHY (Table I)

Eighty-seven patients were correctly diagnosed as having carcinoma; there were in addition 3 false positive diagnoses. Of 125 patients considered to have mammographically benign breast disease, 6 were later shown to have carcinomas; 2 of these tumours could, on review, have been correctly diagnosed, 2 tumours were easily visible but even on review were considered benign, and in 2 patients the tumour could not be seen even in retrospect. Of 9 patients with zero scores mammographically there were 6 with carcinoma shown only as aysmmetrical breast density. The overall accuracy for mammography was 95.8% (93.8% for carcinoma alone, if those with asymmetrical breast density are included with the positives).

SCORING SCHEME (Table II)

Each parameter had a score ranging from −2 to +2, with a total score ranging from −6 to +6. The scores were divided into 4 groups. All patients with scores between +4 to +6 were proven to have malignant lesions ($n=72$). Eighteen of 21 patients with scores between +1 and +3 also had carcinomas but 3 had benign lesions. Ninety of 91 patients who scored −3 to −6 had benign disease and only one had a carcinoma. In the 40 patients with scores between 0 and −2, 8 were found to have carcinomas and the rest benign disease.

The 3 patients with positive scores but benign disease all underwent frozen section; one was +1 on mammography alone and two +2 as a result of +1 scores for both mammography and physical examination.

TABLE II *Scores of breast lumps ($n=224$)*

Benign ($n=125$)	Score		Malignant ($n=99$)
20	−6		0
3	−5		0
42	−4	Excision	0
25	−3	biopsy	1
22	−2		3
9	−1		2
1	0		3
1	+1	Frozen	5
2	+2	section	8
	+3		5
	+4		18
	+5	Mastectomy	33
	+6		21

FROZEN SECTION/BIOPSY RATE

During the period between January and June 1981 before cytology became available 58 mastectomies were performed and in 45 of these cases a preceding biopsy or frozen-section was required. In the second period (January to June 1982) where treatment was planned on the scoring system, 63 mastectomies were performed and in only 14 was preceding biopsy required ($\chi^2 = 52.5$, $P < 0.001$). In total only 18 frozen sections or open biopsies have been required prior to 92 mastectomies, a 74% reduction in two-stage procedures.

SIZE OF TUMOUR

Thirty-five of the breast tumours were measured after removal as being 2 cm or less in diameter. Of these aspiration cytology was adequate in 30 and positive in 28 (93%); 80% overall were therefore positive on cytology.

Discussion

One of the objects of this study was to evaluate a scoring system in the management of breast lumps to enable more efficient planning of operative time; this had become particularly important since the inception and considerable expansion of an 'open' specialized breast clinic under the care of one surgical unit. Although cytology alone has been found reliable for decision making this usually evolved from a period of learning and assessment and false positives have been reported from various series. With a new cytology service, both mammography and examination were added to formulate a scoring system which prejudiced against unnecessary ablative surgery.

Adequate cytology proved 99% reliable in diagnosing carcinomas and was positive in 70 of the 74 mastectomies perfomed without prior histological confirmation. The majority of inadequate specimens occurred in benign disease and the rate although higher than in most series (*8–10*) has improved with experience. There were no false positives and only 2 cases (1.4%) of false negative cytology which compares favourably with reported rates of between 3.3% and 10% (*1,9–11*). Both of these patients, as did 4 others with negative scores, underwent excision biopsy dictated by the scoring system. This was a mandatory plan in the scheme for

all solid lumps because of false negative rates reported for each method of assessment.

Mammography was also accurate in diagnosis (96%), comparing favourably with other series *(8–12)*, although there were 3 false positive diagnoses. One of the latter was simply an error in assessment recording, the report indicating a benign process. The other 2, even in retrospect, had possible mammographic signs of malignancy, although the lesions were subsequently histologically benign. One of these later showed no evidence of malignancy on repeat mammography after surgery, and the other is scheduled to be checked mammographically 3 months after surgery. Six of 9 patients given zero scores had tumours hidden in asymmetrically dense breasts, and 4 of the 6 false negatives had no evidence of malignancy on review; these results are in keeping with those of Cahill *(12)*.

The practical effect of this system has been a 74% reduction in two-stage procedures and obvious benefits in planning operating schedules; it has also revolutionised our ability to counsel patients efficiently as in 72 of the 94 mastectomies the diagnosis and proposed treatment could be explained in detail prior to operation.

It is possible that this benefit could also have accrued from the use of Trucut or drill biopsy; these techniques have been found less reliable (36%) in lesions under 2 cm *(13)* in diameter whereas cytology was correct in 80% of such cases. Needle biopsy is certainly less traumatic and in our experience easier to use. With either method, mammography would still have been used to exclude sub-clinical synchronous tumours in either breast.

Our experience with this system has shown it to be safe and beneficial both to patients who are better counselled and to surgeons who are more able to cope with an expanding workload. this system may appear attractive to other units who have to contend with similar problems.

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