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Clinicopathologic Factors and Patient Perceptions Associated with Surgical Breast-Conserving Treatment

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Background: Clinical studies have shown equivalent survival rates between breast-conserving surgery (BCS) and mastectomy in early breast cancer; however, rates for BCS remain low. The purpose of this study was to determine (a) the prevalence of BCS in a regional medical center, (b) clinicopathologic factors associated with BCS, and (c) patient perceptions of the treatment decision-making process.

Methods: We retrospectively reviewed 251 consecutive breast cancer cases during January 1990–December 1991; 77 patients were ineligible for BCS because of unfavorable pathology. We then interviewed 118 of the 160 women available for interview.

Results: BCS was performed in 31 of the eligible patients (18%). Multivariate analysis revealed that tumor size <10 mm ($p = 0.03$) was the only significant predictive variable for BCS. Patient interviews revealed that 93% said their surgeon was the primary source of information regarding treatment options. Among 69% of the women whose surgeons reportedly recommended a particular option, 89% recommended mastectomy with 93% compliance, and 11% recommended BCS with 89% compliance. The BCS group more often obtained a second opinion ($p = 0.04$) and 60% said they made the decision themselves compared with only 37% of the mastectomy group ($p = 0.05$).

Conclusion: Limiting BCS to women whose tumor size is <10 mm is too restrictive; this excludes a large number of women who are clinically eligible for BCS. The surgical decision-making process for early-stage breast cancer is very much surgeon-driven, with a high degree of patient compliance.

Key Words: Breast cancer—Surgery—Segmental mastectomy—Breast-conserving surgery—Patient interview.

Surgery remains the primary treatment for breast cancer, and randomized clinical trials have recently produced firm evidence that breast-conserving surgery (BCS) yields long-term survival equivalent to modified radical mastectomy (1–3). These trials were so convincing that the National Institutes of Health (NIH) Consensus Conference of June 1990 stated "breast conservative treatment is an appropriate method of primary therapy for the majority of women with stage I and II breast cancer and is preferable because it provides survival rates equivalent to those of total mastectomy and axillary dissection while preserving the breast" (4). Despite this recommendation, two recently published large American studies document a wide geographic variation in BCS (5,6) and an overall practice of BCS among Medicare patients of only 12% (6). Because of this surprisingly low rate of use of BCS, we undertook a study at our institution to determine (a) the frequency with which BCS is performed, (b) the de-

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mographic and clinicopathological factors associated with selection of BCS, and (c) patient perceptions of the treatment decision-making process.

METHODS

Our institution is a major regional referral center for southeastern North Carolina. We retrospectively reviewed the medical records of 251 consecutive cases of breast cancer surgery performed at our hospital during a 2-year period from January 1990 to December 1991. Cases were identified through pathology reports and confirmed using the medical center tumor registry. Each hospital chart was reviewed by a surgeon (C.K.), and 77 cases were classified as ineligible for BCS on a clinicopathological basis. Reasons for ineligibility included a tumor size >4 cm (24 cases), locally advanced disease (18 cases), local recurrence (16 cases), unknown tumor size (7 cases), multicentricity (6 cases), extensive ductal cancer in situ (3 cases), and Paget's disease (3 cases). For further study, we thus included 174 patients judged eligible for BCS.

We identified demographic and clinicopathologic factors thought by previous investigators to be associated with the selection of BCS. These variables included age, marital status, race, insurance coverage, residence in the same county as the medical center, family history of breast cancer, noninvasive histology, and tumor size (<10, 10–19, 20–29 mm versus 30–39 mm). We used a multivariate logistic regression model to estimate the relative odds of having BCS in the presence of these factors.

In addition to examining demographic and clinicopathological factors, we conducted focus group interviews and telephone interviews to determine patient-perceived factors associated with the selection of BCS. The focus groups were designed to cover issues that the women perceived to be important in the treatment decision-making process. For the focus groups, we used a nondirective, structured approach, in which the moderator used a prepared topic guide that listed the questions/issues to be addressed. The questions were open-ended and nondirective. We conducted seven focus groups (6 or 7 women in each group) among 44 of the 174 women. The focus groups were stratified by type of surgery — six of the groups were comprised of women who had mastectomies, and one was comprised of women who had BCS. The focus group interviews took place in the spring of 1992, which was 1–2 years after surgery. The groups were formed so that women of similar educational and socioeconomic status were in the same group. The moderator for the focus groups was a woman with a masters degree in health education and extensive experience in women's health issues.

We used the information obtained from the focus groups to develop an interview instrument to be conducted among all women. This instrument included specific questions that were pretested on a sample of 10 women treated for breast cancer outside the study period. The instrument was validated using information from clinical records and from the focus groups. The interview instrument was designed to elicit information on the woman's knowledge of available surgical treatment options, and the source of that knowledge; whether she thought she had enough information to make her decision; whether she thought she had enough time to make her decision; whether her physician recommended a particular treatment option and why; why she chose the treatment option she chose; what factors influenced her choice; what people influenced her choice, and who was the most influential in that decision; who she thought made the final decision regarding treatment; is she happy with that decision; and would she make the same decision again. All interviews were conducted over the telephone by a trained, female interviewer. The interviews were conducted in the winter of 1993, which was 2–3 years after surgery. We descriptively examined the women's responses to each of these questions, and compared the responses of women who had BCS with those who had mastectomy. In making these comparisons, we used the χ^2 statistic to examine differences in proportions between the two groups and the Student's t test to examine differences in means.

Of the 174 women, 8 had died and 6 had a previous mastectomy before the study period, leaving 160 women available for the in-depth interview. One hundred eighteen (74%) agreed to participate in the interview; 12 refused to participate, 14 were unable to complete the entire interview, and 16 were unable to be reached after at least five attempts. There were no significant differences between those who participated in the interviews and those who did not with regard to type of surgery, tumor size, family history of breast cancer, noninvasive histology, county of residence, age, and race. There were differences between the groups with regard to payment status and marital status. Women who completed the interviews were more likely to be married

($p < 0.03$) and have private insurance ($p < 0.001$) compared with those who did not.

RESULTS

Breast-conserving surgery was performed in only 31 of 174 eligible patients (18%). Of the 143 remaining patients, 133 had a modified radical mastectomy, and 10 had a total mastectomy. For the analysis, the patients who had a modified radical mastectomy and a total mastectomy were grouped together. Of the 143 women who had mastectomies, 28 received breast reconstruction at the time of mastectomy.

During the study period, 12 different private surgeons and 2 academic surgeons supervising surgical residents performed the 174 breast cancer operations. Among these surgeons, there were only four who performed >10 procedures in the 2 years. These four surgeons performed ~70% of the procedures in the 2 years. The remaining surgeons performed an average of only five breast cancer operations during the 2 years. The rates of BCS for the four surgeons who performed most of the procedures were 7.7, 9.1, 13.6, and 26.1%. Thus, one surgeon performed significantly more BCS than the other three. However, this one surgeon still had a relatively low rate of BCS. There was no significant association between surgeon age and type of procedure.

The demographic and clinicopathological factors for the two groups are shown in Table 1. When all variables were considered in the multivariate logistic regression model, tumor size was the only significant variable ($p = 0.03$). Controlling for all other variables in the model, women with a tumor size <10 mm were six times more likely to have BCS than women with tumor sizes ≥30 mm (Table 2). Other variables in the model such as age, marital status, race, distance from medical center (measured by county of residence), insurance type, family history of breast cancer, and invasive cancer were not significant.

When we examined the focus group data, we found two major content areas that the women perceived to be important in the treatment decision-making process. These content areas were physician advice and survival/fear of additional cancer. Women who had mastectomies did so on their surgeon's advice, and often they were not presented with options. The women reported that their surgeons seemed knowledgeable and caring, and supported their advice with scientific evidence, stating the size and location of the tumor as the reason for recommending mastectomy. Women in the BCS group also followed their surgeon's advice, but the surgeons almost always presented the options and gave the women a choice of mastectomy or BCS. These women were more likely to then seek additional advice from other physicians, spouses, family members, and friends.

The other content area generated by the focus groups pertained to survival and fear of additional cancer. Women who had mastectomies thought that a mastectomy rather than a lumpectomy would increase their chances of survival and reduce the risk of recurrent cancer. The women also expressed a desire for closure of the decision-making process and possible further treatment. They thought that with a mastectomy, they could get on with their lives and not be continually obsessed with cancer decisions and treatments. Many women thought that when a mastectomy is performed, the cancer cannot return because the breast has been removed. Women expressed a desire for definitive treatment that eradicates the cancer completely. Faced with the choice of mastectomy versus lumpectomy, ra-

TABLE 1. *Descriptive information on demographic and clinicopathological factors by type of surgery for breast cancer*

Demographic factors	Mastectomy (n = 143) (%)	BCS (n = 31) (%)
Age (yrs)		
<50	80.0	20.0
50–69	84.2	15.8
70+	81.0	19.0
Widowed	76.6	23.4
Married	83.3	16.7
Single/divorced	88.0	12.0
Nonwhite	74.2	25.8
White	83.9	16.1
Lives outside county	81.4	18.6
Lives in county	82.7	17.3
Government insurance/self-pay	69.0	31.0
Private insurance	84.8	15.2
Clinicopathological factors	**%**	**%**
No family history	81.0	19.0
Family history	90.5	9.52
Noninvasive cancer	62.5	37.5
Invasive cancer	84.2	15.8
Tumor <10 mm	55.6	44.4
Tumor 10–19 mm	81.2	18.8
Tumor 20–29 mm	89.6	10.4
Tumor 30+ mm	89.3	10.7

BCS, breast-conserving surgery.

TABLE 2. *Relative odds of having breast-conserving surgery with the presence of selected demographic and clinicopathologic factors (multivariate logistic regression model)*

Variable	Odds ratio	95% Confidence interval	p value
Age (yrs)			
<50	1.8	0.47–7.10	0.39
50–69	1.1	0.37–3.13	0.9
70+	1.0	—	—
Widowed	3.3	0.60–17.70	0.17
Married	2.4	0.55–10.30	0.25
Single/divorced	1.0	—	—
Nonwhite	1.2	0.40–3.65	0.74
White	—	—	—
Lives outside county	1.1	0.45–2.63	0.8
Lives in county	1.0	—	—
Government insurance/ self-pay	2.2	0.74–6.80	0.15
Private Insurance	1.0	—	—
No family history	2.8	0.55–13.92	0.22
Family history	1.0	—	—
Noninvasive cancer	2.7	0.78–9.44	0.12
Invasive cancer	1.0	—	—
Tumor (mm)			
<10	6.0	1.22–29.05	0.03[a]
10–19	2.0	0.50–7.82	0.33
20–29	1.1	0.22–5.02	0.95
30+	1.0	—	—

[a] Indicates statistical significance.

diation therapy, and follow-up of the remaining breast, women overwhelmingly chose mastectomy. They expressed fear of side effects from radiation therapy. Several women in the focus groups said that their doctors cautioned them against lumpectomy with radiation and did not present lumpectomy as an equal option. In contrast, women in the BCS group said they decided to try the more conservative procedure first, and then if they needed a mastectomy they could have that later. Information obtained from the patient interviews is presented in Table 3, including patient factors such as patient and spouse education, interval between diagnosis and decision, obtaining a second opinion, and patient satisfaction according to type of surgery. Women in the BCS group were significantly more likely to obtain a second opinion than women in the mastectomy group ($p = 0.04$). Women undergoing BCS took longer to make their decision compared with women undergoing mastectomy, but this was not statistically significant due to insufficient power. In both groups, >90% of the women were happy with their treatment decision, and the vast majority would make the same treatment choice again.

Of 118 women who completed the telephone interviews, 93% said they received information regarding treatment options from their surgeon, and 77% stated their surgeon was the most important source of information. Other sources of information noted were a relative (27%) or friend (26%), pamphlets (27%), magazines (25%), books (21%), and television (19%). Only 3% reported receiving any information from a skilled nonphysician health care provider, such as a nurse, and only 1% from cancer support groups. Thirteen percent of the women said they consulted the American Cancer Society for information on treatment options.

The information obtained in the interviews paralleled that obtained in the focus groups, in that the two most frequent factors reported by the women in choosing treatment options were the "desire to get rid of the cancer," which applied to 47 mastectomy patients (48%) and 2 BCS patients (10%), and "phy-

TABLE 3. *Patient factors by type of surgery for breast cancer*

	Mastectomy (N = 98)	BCS (N = 20)	p value
Years of completed education (mean ± SD)	13.1 ± 2.4	12.8 ± 3.1	0.53
Years of completed education for spouse (mean ± SD)	12.7 ± 3.6	11.9 ± 3.1	0.35
Living with spouse at time of surgery	66%	60%	0.59
Days from diagnosis to decision (mean ± SD)	3.8 ± 7.3	6.1 ± 6.6	0.20
Days from diagnosis to surgery (mean ± SD)	10.8 ± 10.7	14.4 ± 10.0	0.17
Adequate time to make a decision	94%	95%	0.99
Lack of knowledge of surgical options at time of treatment decision	41%	45%	0.34
Obtained a second opinion	11%	30%	0.04[a]
Two years postsurgery, happy with treatment	92%	100%	0.35
Would make the same treatment choice again	95%	86.7%	0.46

BCS, breast-conserving surgery.
[a] Indicates statistical significance.

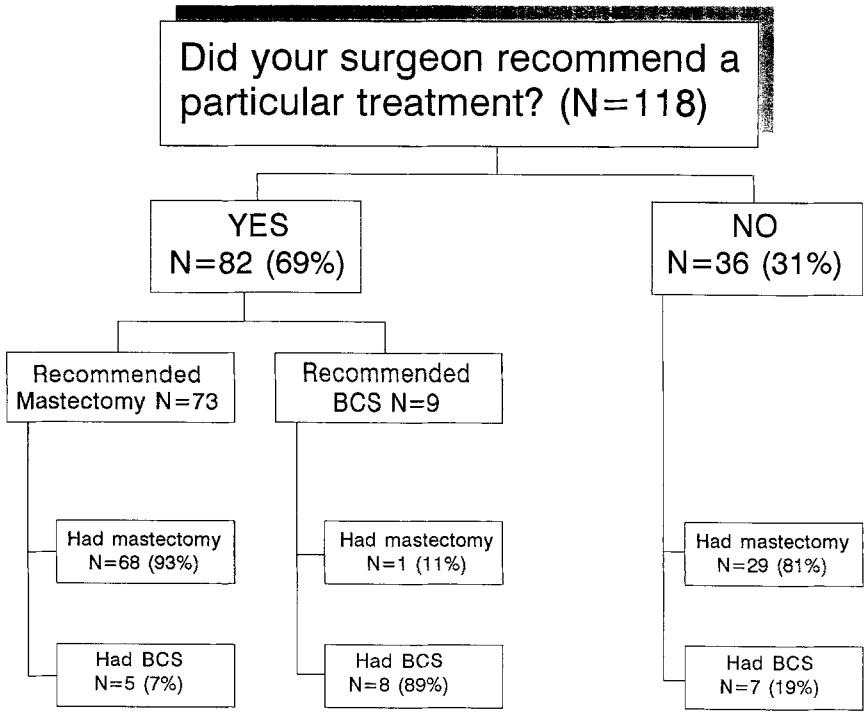

FIG. 1. Comparison of groups of women having a recommendation by their surgeon for a particular surgical treatment versus no recommendation. There was no significant difference in the percentage of mastectomy between women having a recommendation for mastectomy versus no recommendation (p = 0.06).

sician advice," which applied to 36 mastectomy (37%) and 3 BCS patients (15%). Eighty-two women reported that their surgeon recommended a particular procedure (Fig. 1). Seventy-three women reported that their surgeon recommended a mastectomy, and 93% of them had a mastectomy. Nine women reported that their surgeon recommended BCS, and 89% had BCS. Of 36 women who reported that their surgeon made no recommendation, 81% had a mastectomy compared with 19% who had BCS.

When the women were asked who they thought actually made the final treatment decision, 60% of the BCS group said they made the decision themselves compared with only 37% of the mastectomy group (Table 4). The women in the mastectomy group were more likely to say that their surgeon either made the final decision or that they participated equally (p = 0.05).

DISCUSSION

Of the 182,000 new breast cancers diagnosed in the United States in 1993, ~75–80% will present with early-stage disease and should be eligible for BCS (4,7). However, as previous studies have shown, BCS is not often performed. Two large United States studies have reported that rates of BCS vary widely between 3.5 and 41.5% (5,6). In addition, data collected by the National Cancer Data Base document a BCS rate of 27% in the South Atlantic region of the United States (8). In our study, we found that only 18% of women eligible for BCS received it. Unlike these large population-based studies, we were able to examine clinicopathologic factors associated with BCS, and patient perceptions regarding surgical options in early-stage breast cancer. Although our study sample was small enough to allow for extensive medical record review and in-depth patient interviews, the sample size does limit the power to detect differences in some of the variables, and the data are from one institution, which may limit the generalizability of the results. Another caveat to be kept in mind when interpreting the results is that women who completed the interviews were more likely to be married and have private insurance than those who did not complete the interview.

TABLE 4. *Who made the final decision regarding type of surgery?*

	BCS (N = 20)	Mastectomy (N = 98)
Surgeon[a]	3 (15%)	27 (28%)
Surgeon and woman equally[b]	5 (25%)	35 (36%)
Woman[c]	12 (60%)	36 (37%)

BCS, Breast-conserving surgery.
[c] versus [a/b]: p = 0.05.

In our study, we sought to identify variables that might be predictive for the selection of BCS. In the multivariate model, tumor size <10 mm was the only significant variable. Limiting BCS to only women whose tumor size is <10 mm is far too restrictive. This excludes a significant number of women with early-stage breast cancer (stage I and II) who are eligible for BCS according to the recent NIH Consensus Conference recommendations (4).

The focus groups and patient interviews revealed that the treatment decision was mainly surgeon driven. There was very little input from other experienced health care providers, and the vast majority of women complied with their surgeon's advice. The women who had BCS obtained a second medical opinion more frequently than those who had mastectomy; presumably, these women would be perceived by their surgeons and friends as making a choice that is different from conventional treatment in this area of the country.

Another important factor considered by women in deciding their treatment options was the "desire to get rid of the cancer." These data would imply that a significant number of the women and their surgeons thought that a mastectomy would offer a better chance of survival, and that BCS may well jeopardize their survival. Of those surgeons making a recommendation for a surgical option, almost 90% made a recommendation for mastectomy. The vast majority of the women complied with their surgeon's recommendation for a particular type of surgery, but if the woman reported that their surgeon made no recommendation, >80% still chose mastectomy. There was no significant difference in the percentage of women having a recommendation by their surgeon for mastectomy versus the group of women having no recommendation by their surgeon.

When the women were asked to recall who they thought made the final decision regarding mastectomy versus BCS, there was a significant difference between the two groups. The women in the BCS group reportedly were more likely to have made the decision themselves in comparison to the mastectomy group. These findings are analogous to Schain's model of physician–patient interaction (9). In this model, the activity–passivity interaction, in which the physician is active and the patient is passive, is similar to the surgeon making the decision and the woman freely accepting. This role was adopted by 28% of the mastectomy group and only 15% of the BCS group. At the other end of the spectrum is the mutual participation or shared-responsibility interaction, in which the patient makes the decision after being imparted specialized knowledge from the physician. This type of interaction, in which the woman plays a significant role in the decision-making process, applied to 60% of the BCS but only 37% of the mastectomy group.

When one makes a global assessment of the focus group data and the entire patient interview, it becomes apparent that the surgeon drives the decision-making process. The vast majority of women went along with their surgeon's recommendations and the surgeon was viewed as the primary and most important source of information that enabled the women to make a decision. Only 20% of the women had BCS, implying that the majority of surgeons during the years 1990 and 1991 believed that mastectomy was the most appropriate treatment for early-stage breast cancer.

In the literature, surgeons are less likely to recommend BCS than are other specialists, and physicians who are less willing to involve patients in the decision-making process are also less likely to recommend BCS (10–12). Even more significant is the recent finding by Tarbox et al., who found that only 44% of general surgeons believed that BCS yields survival rates equivalent to mastectomy in appropriate patients (13). The studies support the fact that a significant number of surgeons routinely recommend mastectomy as their preferred option for early-stage breast cancer. It should be noted that Tarbox's study applied to only T1 breast cancer, which is 2 cm or less in greatest dimension.

There are very little data closely examining patient determinants in the selection of mastectomy over BCS. A review by Palmer states that a negative cosmetic result, fear of cancer recurrence, and radiation issues such as cost, transportation, radiation mastitis, and fibrosis may have had a negative impact on the selection of BCS (14). In our study, 40% of the women who were eligible for BCS said they chose a mastectomy because of fear of cancer recurrence. Women in the focus groups clearly thought that their surgeons did not present lumpectomy and radiation therapy on an equal footing with mastectomy.

Not all women with early-stage breast cancer and favorable pathologic criteria for BCS should receive BCS. Factors such as the patient's lifestyle, values, beliefs, and coping strategies must be considered (9). When one considers the size and location of the tumor in relation to the size of the breast, the issue

of cosmesis is subjective, both for the woman and her surgeon. Radiation factors, follow-up mammograms, and breast self-examination of the preserved breast are areas that require considerable preoperative dialogue between the patient and her surgeon.

However, ample evidence exists in the literature that women who receive BCS fare better in terms of self-image, emotional adjustment, and overall psychological well-being (15–17). Additionally, studies have found that women want to participate in the decision-making process regarding cancer treatment and prefer to have detailed information on the various options to make informed decisions (18–20).

In summary, BCS appears to be underused at our institution, with the only significant clinicopathologic variable being a tumor size <10 mm. Data from focus groups and patient interviews have revealed that the surgeon plays a dominant role in the decision-making process and very few surgeons recommend BCS. Additionally, those women that did have BCS more frequently obtained a second opinion and also reported a more independent decision-making process. If we are to increase rates of BCS for early-stage breast cancer, it would appear that the intervention should be directed toward surgeons.

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REFERENCES

1. Fisher B, Redmond C, Poisson R, et al. Eight-year results of a randomized clinical trial comparing total mastectomy and lumpectomy with or without irradiation in the treatment of breast cancer. *N Engl J Med* 1989;320:822–8.
2. Veronesi U, Banfi A, Del Vecchio M, et al. Comparison of Halstead mastectomy with quadrantectomy, axillary dissection and radiotherapy in early breast cancer: long-term results. *Eur J Cancer Clin Oncol* 1986;22:1085.
3. Sarrazin D, Le MG, Arriagada R, et al. Ten-year results of a randomized trial comparing a conservative treatment to mastectomy in early breast cancer. *Radiother Oncol* 1989; 14:177–84.
4. NIH Consensus Conference. Treatment of early-stage breast cancer. *JAMA* 1991;265:391–5.
5. Farrow DC, Hunt WC, Samet JM. Geographic variation in the treatment of localized breast cancer. *N Engl J Med* 1992; 326:1097–101.
6. Nattinger AB, Gottlieb MS, Veum J, Yahnke D, Goodwin JS. Geographic variation in the use of breast-conserving treatment for breast cancer. *N Engl J Med* 1992;326:1102–7.
7. Boring CC, Squires TS, Tong T. Cancer statistics, 1993. *CA* 1993;43:7–26.
8. Osteen RT. Breast cancer. In: Steele GD, Osteen RT, Winchester DP, Menck HR, Murphy GP, ed. *National cancer data base annual review of patient care — 1994.* Atlanta: American Cancer Society, 1994:56–71.
9. Schain WS. Physician-patient communication about breast cancer: a challenge for the 1990's. *Surg Clin North Am* 1990; 70:917–36.
10. Liberati A, Patterson WB, Biener L, McNeil BJ. Determinants of physicians' preferences for alternative treatments in women with early breast cancer. *Tumori* 1987;73:601–9.
11. Liberati A, Apolune G, Nicolucci A, et al. The role of attitudes, beliefs, and personal characteristics of Italian physicians in the surgical treatment of early breast cancer. *Am J Public Health* 1991;81:38–42.
12. Deber RB, Thompson GG. Who still prefers aggressive surgery for breast cancer? Implications for the clinical applications of clinical trials. *Arch Intern Med* 1987;147:1543–7.
13. Tarbox BB, Rockwood JK, Abernathy CM. Are modified radical mastectomies done for T1 breast cancers because of surgeon's advice or patient's choice? *Am J Surg* 1992;164: 417–22.
14. Palmer ML. Reluctance for conservative surgery and radiation for early breast cancer. *Surg Rounds* 1994;17:51–4.
15. Mock V. Body image in women treated for breast cancer. *Nurs Res* 1993;42:153–7.
16. Ashcroft JJ, Leinster SJ, Slade PD. Breast cancer — patient choice of treatment: preliminary communication. *J R Soc Med* 1985;78:43–6.
17. Margolis GJ, Goodman RL, Rubin A, Pajac TF. Psychological factors in the choice of treatment for breast cancer. *Psychosomatics* 1989;30:192–7.
18. Cassileth B, Zupkis R, Sutton-Smith K, March V. Information and participation preferences among cancer patients. *Ann Intern Med* 1980;92:832–6.
19. Owens R, Ashcroft J, Leinstef S, Slade P. Informal decision analysis with breast cancer patients: an aid to psychological preparation for surgery. *J Psychosoc Oncol* 1987;5:23–33.
20. Ward S, Heidrich S, Wolberg W. Factors women take into account when deciding upon type of surgery for breast cancer. *Cancer Nurs* 1989;12:344–51.