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ARTICLE

Changes in Benign to Malignant Ratio of Surgically Treated Breast Diseases in a District Hospital

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The benign to malignant ratio (BMR) of open surgical biopsies is often used to monitor the efficacy of diagnostic workup of breast lesions. Avoiding the unnecessary removal of benign lesions is of recognized importance. Histopathology archives of the Department of Pathology of the Bács-Kiskun County Hospital were retrieved for breast lesions and the BMR of surgical specimens was determined for each year between the period of 1965-1996. The introduction of mammography and especially fine-needle aspiration cytology was paralleled by a reduction in the benign to malignant ratio from 1.7 to 0.7. Only the introduction of breast aspiration cytology seemed to have a significant effect on the BMR, but the more adequate diagnostic approach to breast lesions (mostly palpable in their nature) was in part masqueraded by the late shift in attitude of both surgeons and patients towards breast lumps. This is why the BMR can give a basic information on preoperative diagnostic workup of breast lesions, but in itself it is not able to monitor them. (Pathology Oncology Research Vol 3, No 2, 109–114, 1997)

Key words: benign to malignant ratio, breast, fine-needle aspiration cytology, mammography

Introduction

In past decades most palpable breast lesions have been surgically removed to afford a correct diagnosis based on histopathology and to prevent malignant transformation of lumps that were considered premalignant in many surgeons' mind. A lump in the breast equaled the indication for its removal. Diagnostic approaches have considerably improved, risk factors for cancer of the breast, including histological alterations have been better known, and the previous surgical approach is no longer tenable. The ideal approach to treatment would be the removal of all malignant or premalignant (atypical) lesions at an early stage and practically no surgery for benign tumors. The lack of a 100% sensitive and specific diagnostic tool, does not allow such an ideal situation, but proper combination of diagnostic techniques, including mammography, ultrasonography, and fine needle aspiration cytology can result in a considerable decrease in the number of operated benign lesions. The availability of these diagnostic tools is much less favorable in Hungary than in many other countries, and district or local hospitals located elsewhere than the capital can offer even less access to these diagnostic possibilities.

In the current study all reports on breast specimens between 1965 and 1996 have been retrieved from the archives of the Department of Pathology of the Bács-Kiskun County Hospital, a medium size district hospital. Their benign to malignant ratio (BMR) was determined in order to assess whether the introduction of mammography or fine needle aspiration cytology had any impact on the surgical treatment of breast lumps.

Materials and Methods

Hard copy files of the archives of the Department of Pathology of the Bács-Kiskun County Hospital were reviewed for the period between 1965 and 1996, and these were complemented by computer stored records for the period between 1994 and 1996. All breast specimens have been retrieved and put into benign or malignant category on the basis of the final histology reports. Specimens were

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Abbreviations: BMR: benign to malignant ratio; FNAC: fine-needle aspiration cytology

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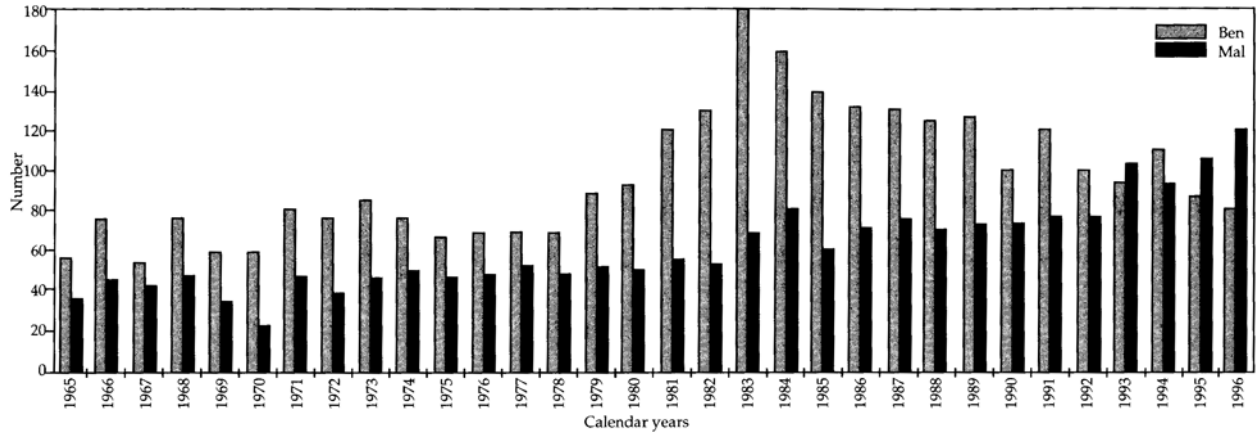

Figure 1. Operations for benign and malignant lesions per calendar years (Ben: benign; Mal: malignant)

not selected on the basis of the hospital they originated from. Our Department of Pathology serves two other hospitals, too. The Kiskunfélegyháza City Hospital sends all histology specimens to our laboratory while the Military Hospital at Kecskemét sends to us only a part of its surgical specimens, but this part includes most breast lumps, since these are almost always sent for frozen sections. It must be noted that the Department of Surgery of our institution makes more than 90% of all breast tissue removals seen at the Pathology Department. However the other two hospitals are also served by the Radiology and Pathology Departments of our hospital in the context of mammographies and cytology, and there are no other easily accessible facilities for these investigations.

Specimens and related interventions were interpreted as benign or malignant on the following basis. Each biopsy that was histologically benign was considered to reflect a surgical intervention for benign disease, independently of the time of the biopsy and the identity of the patient. (E.g.: if a patient had had 2 biopsies from different quadrants of the same breast at one time, and another biopsy from the opposite breast some time later, from the point of the study 3 surgical interventions for benign lesions would have been entered.) Excision of local recurrences was entered as one intervention for malignant disease independently of the number of lesions found in the same breast. Operations for a malignant disease were evaluated per disease. (E.g.: an excision biopsy for frozen sections and the following mastectomy, even if the latter was postponed because of the uncertainty of the frozen diagnosis, were considered as one intervention for malignancy. No benign entry would have been made for a mastectomy specimen with no residual tumor).

Data reflecting the diagnostic opportunities were also collected. The number of mammographies performed by the Department of Radiology of our institution and the number of breast aspiration cytology specimens evaluated were retrieved from the corresponding statistic files.

The chi squared test was used to evaluate differences in the number of benign and malignant lesions surgically removed during the three periods of the study defined later.

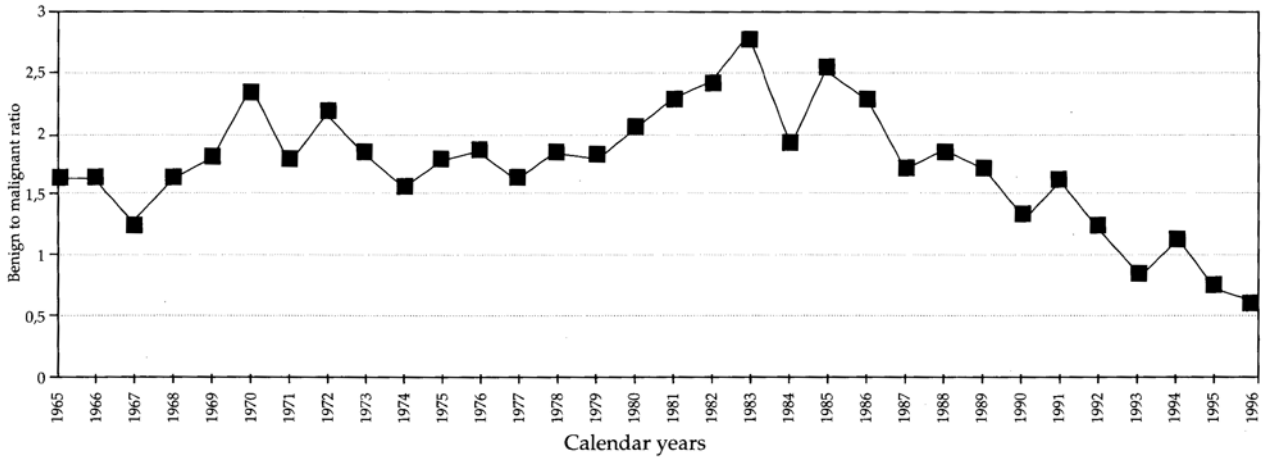

Figure 2. Changes in the value of the benign to malignant ratio during the years of study

Results

A total number of 4987 entries were made during the 32 years of the study period. The benign to malignant ratio for the whole period was 3104/1883 (1.64). The surgical interventions were evaluated in relation to calendar years of the study period (*Fig.1*). The benign to malignant ratio for each year has been plotted in *Fig.2*.

The number of mammographies and FNACs carried out at the Bács-Kiskun County Hospital have been plotted in *Fig.3*. Mammographies increased gradually year by year, while the number of FNACs did not increase substantially after its introduction.

The study period has been divided into 3 periods on the basis of the introduction of the above mentioned diagnostic procedures. The benign to malignant ratios calculated for the first (1965-1980), second (1981-1991) and third (1992-1996) period were 1177/662 (1.77), 1473/734 (2.01) and 454/487 (0.93) respectively. There was no statistical difference between the number of benign and malignant lesions removed during the first two periods ($chi^2 = 3.33$; $p>0.05$), but the difference was significant between the first and third ($chi^2 = 63.73$; $p<0.005$) and second and third periods ($chi^2 = 95.05$; $p<0.005$).

Discussion

The benign to malignant ratio of surgically removed breast lesions has often been used to show the effectiveness of preoperative diagnostic investigations. Reduction in the number of open surgical biopsies for benign breast lesions is a target that all parties should consider.

Some areas in Hungary, especially those away from the capital are underdeveloped in many fields of breast cancer diagnosis and treatment. There are only a few centers that can be adequately matched with developed health systems.

Table 1. displays an incomplete survey of papers dealing with benign to malignant ratio on the basis of a Medline search of the past 8 years. Although the range (3.18-0.15) is wide and reflects the extremes, most studies document a BMR<1.

***Table 1.* Survey of studies dealing with benign to malignant ratio of breast tumors detected by mammography**

# Type	Location	Period: from-to (years)	Age range	Screened	Recalled	Biposy taken	Benign	Malignant	B/M ratio	FNAC	References
1. NP	Florence	1984–1985 (2)	NI	–	–	35	22	13	1.69	–	8
		1986–1987 (2)	NI	–	–	30	10	20	0.50	+	
2. NP	Oslo	1983–1987 (5)	<20–90	–	–	256	67	178	0.38	NI	11
3. SC	Helsinki	1986–1988 (3)	50–59	18012	579	124	42	82	0.51	+	14
4. SC	Stockholm	1989–1990 (0.75)	50–60	8370	302	70	9	61	0.15	+	2
5. SC	Hull	1989–1990 (1)	NI	12832	642	135	60	75	0.80	+	3
6. SC	Melbourne	1988–1990 (2)	50–69	16283	1500	231	259	131	1.98	+	17
7. SC	Montpellier	1990–1991 (0.75)	40–70	5098	NI	61	35	26	1.35	–/+	9
8. SC	UK 2 districts	1979–1985 (7)	45–64	49956	NI	1528	754	774	0.97	NI	18
		last year of study					46	101	0.46	prob	
	UK 4 districts	1979–1985 (7)		127109	NI	2258	801	1457	0.55	NI	
		last year of study					93	177	0.53	prob	
9. PSC	Debrecen	1981–1985 (5)	NI	59275	3994	509	311	198	1,57	+	12
10. SC	Edinburg	1990–1991 (1.3)	>50	31146	1846	261	70	191	0.37	+	1
11. NP	Florence	1970–1992 (23)	<40–59<	–	–	1182	634	548	1.16	–/+	7
		1970–1985 (16)					397	163	2.44	–	
		1986–1992 (7)					237	385	0.62	+	
12. NP	Philadelphia	1974–1992 (19)	NI	–	–	3752	2575	1175	2.19	NI	15
13. SC	Stockholm	1989–1991 (2.5)	50–69	107870	3236	925	249	676	0.37	+	13
14. sc	Sydney	1988–1991 (4)	>40	18961	NI	177	72	105	0.69	+/–	10
15. SC,NP	Genoa	1987–1992 (4.8)	30–75	–	–	253	175	55	3.18	NI	6
16. SC	London	1988–1993 (4.3)	NI	35533	2212	412	137	275	0.5	+	4
17. NP	Nottingham	1987–1994 (7)				425	200	225	0.88	+	5

(SC: screening reports, NP: reports on non-palpable tumors detected by clinical or screening mammographies, PSC: paramedical physical examination screening where recall number means medical physical examination; NI: not indicated; B/M ratio: benign to malignant ratio; FNAC: fine-needle aspiration cytology, +: largely contributing to diagnoses of the study, +/- or -/+: contributing to some extent [more or less], -: not used)

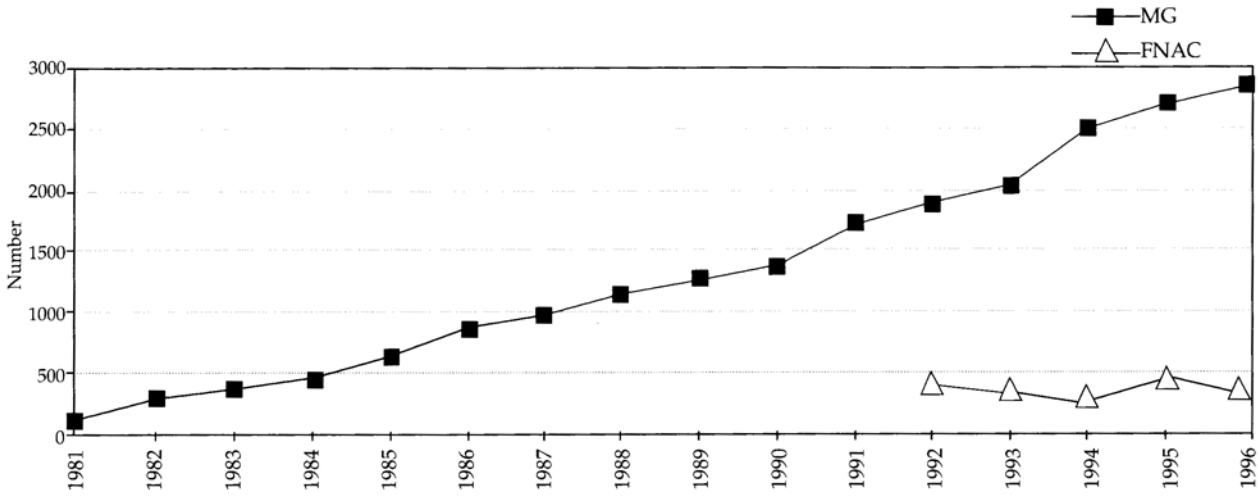

Figure 3. Number of clinical mammographies and breast FNAC specimens at the Bács-Kiskun County Hospital from the introduction of these techniques at the institution.

It may seem unreasonable to compare our results with those of screening studies or reports on non-palpable breast lesion biopsies. Only a small minority of the cases reported here were non-palpable. We feel that palpable breast lesions should have the same diagnostic workup if recognized to prevent unnecessary operations for benign disease. The approach is somewhat easier, since there is no need for stereotaxis or image guidance. That is why the practically acceptable BMR may be somewhat lower than in the case of non-palpable disease.

These considerations should be kept in mind when interpreting and comparing our results with those included in the table. There is no organized mass screening for breast cancer in our county; the only mass screening reference relates to physical screening of palpable lesions, that however resulted in early diagnosis of the detected cases reflected by the survival benefit of the screened population compared to that of a non screened control population.[12] These circumstances also point to the fact that the majority of the operated lesions are palpable. The number of mammographies shown on the figures reflects practically only clinical investigations. Screening of healthy women was done in 1995 only, and the number of mammographies was limited to 5000 because of the lack of financial background. The results of this screening were the following. Besides 3511 negative bilateral mammograms 946 were interpreted as mastopathic changes, 351 as benign lesions on the basis of further evaluation by ultrasound.

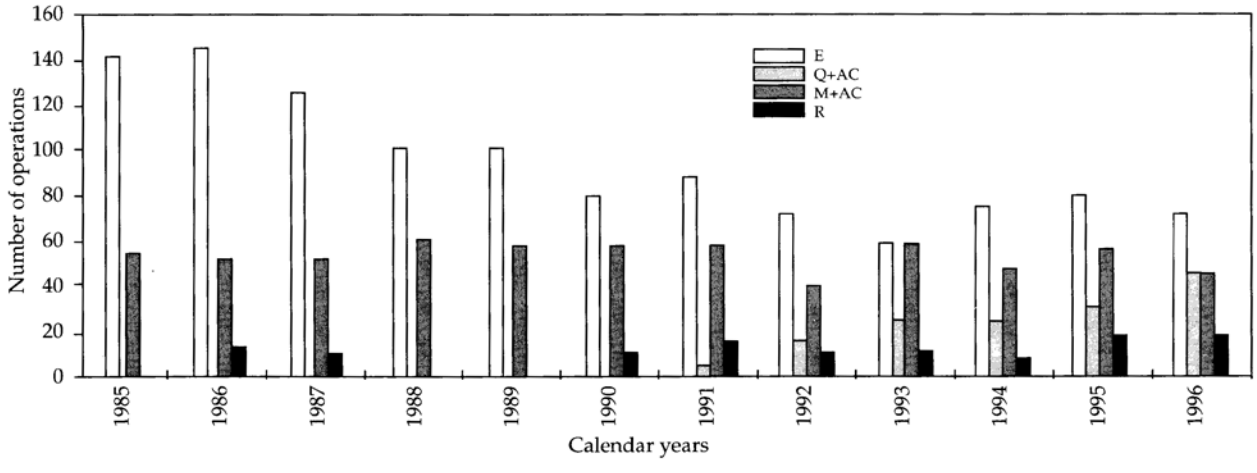

Figure 4. Breast surgery at the Bács-Kiskun County Hospital (1985-1996) making up more than 90% of our mammary surgical pathology material during this period (E: excision; Q+AC: quadrantectomy and axillary clearance; M+AC mastectomy and axillary clearance; R: removal of recurrent lesions)

There were 166 benign calcifications and 26 malignant lesions on the basis of radiological alterations. Only the malignant lesions were confirmed by histology, and there are no data available on the proportion of operated lesions.

When comparing *Figs.2.* and *3.* and data relating to the third period of the study it seems quite evident that FNAC has a significant impact on the reduction of the BMR not only in the case of non-palpable,[7] but also in the case of palpable lesions. Because palpation has a low specificity and sensitivity the figures between the two types of tumors should not differ too much. There was not much change in the number of breast aspirations performed, and there was no immediate significant impact on the BMR after the introduction of the technique. This is partly due to the familiarization process, since no one at the Department of Pathology was familiar with FNAC previously. (The same process could also act in the interpretation of mammograms in the early stages of this technique).

Since there was a trend towards an increase in the BMR for the first half of the second period and the BMR for this period was also higher (not significantly however), there could be a false interpretation suggesting that clinical mammographies, despite their steady increase were of no help in reducing the number of open biopsies for benign lesions. This would be in sharp contradiction with well known and reported use of mammography (e.g).[1-4, 13,14,17] The explanation for this contradiction must lie in other causes. The real role of radiological approach to breast lesions in our institution could be better reflected by the small slope during the second half of the second period and the 5000 screenings. The 26 carcinomas detected by this screening (many of them palpable) largely contributed to the BMR being below 1 in 1995.

Changes in the BMR may have much more causes than those analyzed here. A change in the attitude of surgeons and patients was also necessary to achieve a BMR<1.

Many women are scared of having something in their breasts and would choose the operation if the choice was given. The wish of the patient certainly and naturally influences the indication of a surgical intervention. This reflects the lack of sufficient basic knowledge on diseases. However, during the last years several medias have transferred such knowledge to a wide proportion of the population.

The earlier false premise that all breast lumps must be removed also took time to disappear. This might be one of the main causes preventing the increasing use of mammography to act in the direction of reducing BMR. A change in the mentality of our surgeons has obviously occurred, without this no positive changes in the BMR could have occurred. This change of attitude is also reflected by the reduction of mastectomies and the increase in more conservative procedures (*Fig.4*). This trend parallels the decrease in the BMR and absolute number of removed benign lesions. It must be noted that these trends are about 10 years behind those suggested by data from the National Institute of Oncology.[16]

The false idea of qualifying a Surgical Department on the basis of the operations performed per year could lead to the removal of many benign lesions. Unfortunately the Hungarian health financing system does not have any impact on the reduction of removal of benign lesions. If it has any effect on the BMR it could be adverse; leading to the best possible diagnostic approach and surgical treatment... Fortunately, patient oriented physicians can overcome the trap of this financing system.

BMR values <1 and probably closer to 0.5 are what we feel ideal. However, a too low BMR could result in missing and not treating some cancers. Although most authors agree that preoperative diagnostic tools can significantly reduce the BMR, one must always consider the given personal and technical possibilities of all parties involved in the diagnosis and surgical management of breast lesions, and accept that the BMR highly depends on these. Thus no practically acceptable ideal value can be given for the BMR. BMR by itself cannot be used to monitor the accuracy of diagnostic workup, but can give a basic information on breast disease management.

On the other hand, an important point to make is that the target is not the reduction in the BMR, but the reduction in the number of removed, but obviously benign lesions, that should be left in place and followed up. This goal should also incorporate a high specificity of diagnostic tools in order to minimize to 0 the number of false negatives left in the breast.

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