

## Evaluation of the influence of therapeutic factors on the cosmetic effects of conservative treatment of patients with breast carcinoma

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*The aim of the present study was to analyse the influence of therapeutic and clinical factors on the cosmetic effect after conservative treatment in patients with breast carcinoma. We analysed the relations between the cosmetic effect and the type of surgical treatment, the use of chemotherapy, the scope of radiotherapy and the age of patients. The research material consisted of a group of 67 consecutive patients treated between the years 1995 and 2001 at the 1<sup>st</sup> Department of Radiotherapy of the Lower-Silesia Centre of Oncology after previous conservative surgical treatment. The average period of observation was 49 months (30-82 months). Tumorectomy was performed in 30 patients (45%) and quadrantectomy – in 37 patients (55%). In 94% of all patients the size of the primary tumour did not exceed 2 cm (T1 feature). Metastases in the axillary lymph nodes were observed in 25% of patients. All patients treated conservatively were irradiated. In radiotherapy of the breast we used a total dose of up to 50 Gy (93%) with 46-48 Gy administered to the remaining 7% of patients. Additionally, the dose was boosted within the tumour site (average dose – 10 Gy). In 17 patients, the lymph node areas were also irradiated. Chemotherapy was administered to 27 patients.*

*To evaluate the cosmetic effect after treatment a doctor performed an annual evaluation using a scale defining the effect as very good, good, sufficient or insufficient. To render the assessment of alterations more objective, photographs were taken every 12 months with a note of the distances from the mamilla and the lower contour of breast to stable anatomical points on the body. We observed a statistically significant correlation between the subjective evaluation of the cosmetic effect and the measurements of the parameters of breast symmetry were observed. In the group after quadrantectomy, the difference between the measurements of breast asymmetry was significantly greater than in the group after tumorectomy. The difference was relevantly greater after 3 years of observation. We found no correlation between patient age, the administration of chemotherapy, irradiation of regional lymph nodes and the cosmetic effect.*

*Conclusions. The measurement of breast symmetry is a very useful method for the assessment of the cosmetic effect after conservative treatment. The cosmetic effect depends on the range of surgical treatment during breast conservation. Chemotherapy and radiotherapy of lymph node areas do not influence the cosmetic effect. The effect is not related to the age of patients.*

### Ocena wpływu czynników terapeutycznych na uzyskany efekt kosmetyczny po leczeniu oszczędzającym u chorych na raka piersi

*Celem pracy była analiza wpływu czynników terapeutycznych i klinicznych na uzyskany efekt kosmetyczny leczenia oszczędzającego u chorych na raka piersi. Określano zależność uzyskanego efektu kosmetycznego od rodzaju zabiegu chirurgicznego, stosowania chemioterapii, zakresu radioterapii i wieku chorych. Materiał badawczy stanowiła grupa 67 kolejnych chorych, leczonych napromienianiem na Oddziale Radioterapii I Dolnośląskiego Centrum Onkologii po oszczędzających zabiegach chirurgicznych w latach 1995-2001. Średni okres obserwacji wyniósł 49 miesięcy (30-82 miesięcy). W grupie 30 chorych (45%) wykonano tumorektomię, natomiast u 37 chorych (55%) kwadrantektomię. U 94% wszystkich chorych wielkość guza pierwotnego nie przekraczała 2 cm (cecha T1). Przerzuty w węzłach chłonnych pachy stwierdzono u 25% chorych. Wszystkie kobiety po oszczędzającym zabiegu chirurgicznym przebyły napromienianie. Radioterapia polegała na napromienianiu gruczołu piersiowego do dawki całkowitej 50 Gy (93%), u 7% podano dawkę całkowitą 46-48 Gy. Dodatkowo podwyższano dawkę w obrębie łoża po guzie (ang. boost), podając średnio dawkę 10 Gy. U 17 chorych napromieniano również okolice węzłowe. Chemioterapię stosowano u 27 chorych.*

*Oceniano efekt kosmetyczny przebytego leczenia poprzez przeprowadzenie oceny efektu przez lekarza, corocznie, według skali określającej efekt jako bardzo dobry, dobry, dostateczny lub zły. Dla obiektywizacji oceny zachodzących zmian co 12*

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miesiący dokonywano zdjęć fotograficznych piersi oraz pomiarów odległości brodawki i dolnego konturu piersi od stałych punktów anatomicznych tułowia. Wykazano istotną statystycznie korelację oceny subiektywnej uzyskanego efektu kosmetycznego z pomiarami parametrów symetrii piersi. W grupie z kwadrantektomią wystąpiła istotnie większa różnica pomiarów asymetrii piersi w porównaniu z tumorektomią. Różnica ta znacznie pogłębiła się po 3 latach kontroli. Nie wykazano wpływu wieku, stosowania chemioterapii ani napromieniania regionalnych węzłów chłonnych na wyniki uzyskanego efektu kosmetycznego.

**Wniośki.** Pomiar symetrii piersi jest bardzo użyteczną metodą oceny uzyskanego efektu kosmetycznego po leczeniu oszczędzającym. Uzyskany efekt kosmetyczny zależy od zakresu chirurgicznego zabiegu oszczędzającego piersi. Na efekt kosmetyczny nie wpływa stosowanie chemioterapii oraz radioterapii okolic węzłowych. Efekt ten nie zależy też od wieku chorych.

**Key words:** conservative treatment, breast carcinoma, cosmetic effect

**Słowa kluczowe:** leczenie oszczędzające, rak piersi, efekt kosmetyczny

## Introduction

Modified radical mastectomy and conservative treatment are of equal therapeutic value in the treatment of stage I and II breast carcinoma. However, conservative treatment is the method of choice in case of most patients with early stages of breast cancer. This results from the fact that, given adequate patient selection, conservative treatment allows for long-term results which are comparable to those obtained after mastectomy with concomitant preservation of the breast [1-4]. The cosmetic effect depends on numerous factors, mainly on the elements of conservative treatment, i.e. surgical treatment, radiotherapy and chemotherapy. The appreciation of this dependency may help in the proper selection of treatment procedures.

## Material

The research material comprised a group of 67 patients, who were observed prospectively after being treated with irradiation between the years 1995 and 2001 at the 1<sup>st</sup> Department of Radiotherapy of the Lower-Silesia Centre of Oncology, following conservative surgical treatment and with histologically confirmed breast carcinoma. Average patient age was 49 years (27-70 years). The number and distribution of patients in 10-year age groups are presented in Figure 1. The average period of observation was 49 months (30-82 mos). All patients had unilateral invasive breast carcinoma. In 31 patients, the tumour was found in the left breast, in 36 patients – in the right breast. Tumorectomy was performed in 30 patients (45%) and quadrantectomy was performed in 37 patients (55%).

There were patients in the I (T1N0M0) or II (T1N1M0, T2N0M0 and T2N1M0) stage according to TNM classification, with the tumour not exceeding 3 cm in diameter. 95% of them presented with the T1 feature. Excision of the three levels of the axillary nodes was performed in 64 patients (95%). The N1 feature was observed in 17 (25%) patients. Figure 2 presents the characteristics of clinical advancement according to TNM. Invasive ductal carcinoma was diagnosed in 56 patients (84%). Figure 3 presents the distribution of histological types of breast carcinoma in the group under observation. After surgery, the patients with axillary lymph node involvement (pN1) were administered systemic treatment, i.e. chemotherapy or hormone-therapy, depending on the receptor status. Chemotherapy was administered to 27 patients – in 12 cases during irradiation. 25 patients received chemotherapy according to the CMF programme (cyclophosphamide, methotrexate, 5-fluorouracil), 2 according to the AC programme (doxorubicin, cyclophosphamide).

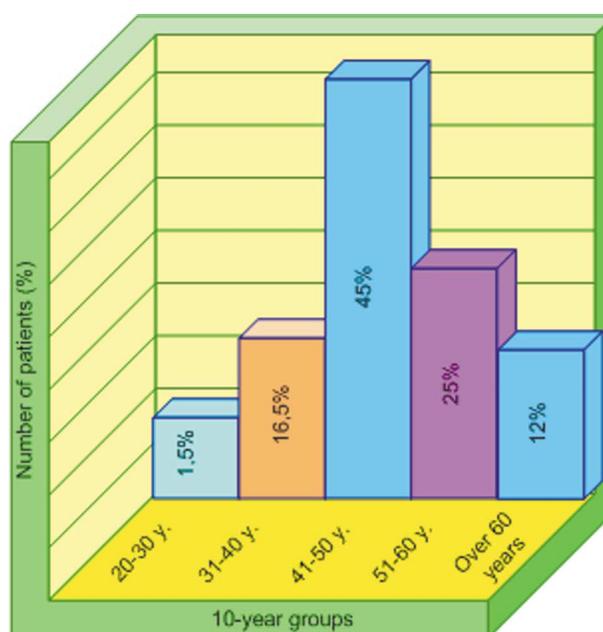


Figure 1. Number of patients in 10-year groups

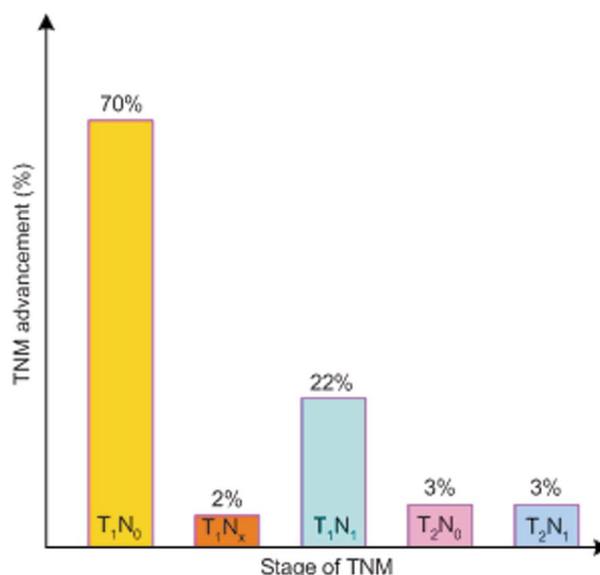
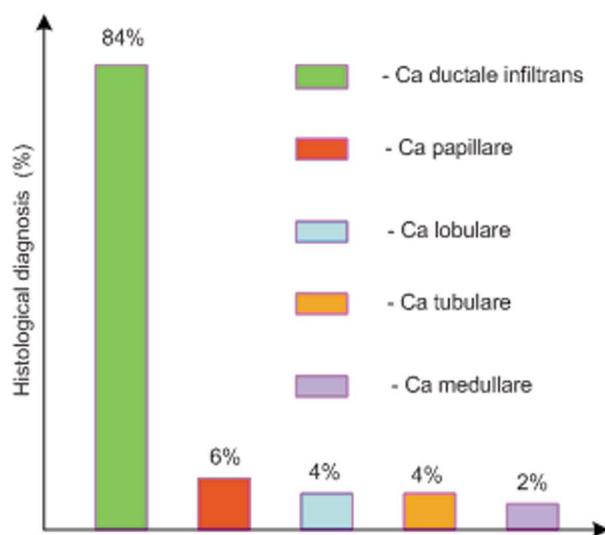


Figure 2. TNM advancement in 66 patients with breast cancer undergoing conservative treatment

During radiotherapy, three cytostatics from the CMF programme were administered.



**Figure 3.** Histological diagnosis in 66 patients with breast cancer undergoing conservative treatment

After conservative surgical treatment all the patients were irradiated. On average, radiotherapy began 9 weeks after surgical treatment. The shortest time lapse between radiotherapy and surgery was 3 weeks, the longest – 26 weeks. All patients who began irradiation after more than 12 weeks from the surgical treatment also underwent chemotherapy.

For irradiation we used megavolt therapy with photons, mainly at 4 and 6 MeV, and during the period between the years 1995 and 1997, Co-60 rays at 1.25 MeV and photons at 9 MeV. In 93% of the patients, the entire breast was irradiated up to total dose of 50 Gy. In 7% of patients (i.e. 5 patients), the total dose was 46-48 Gy with a 2 Gy daily fraction dose. Additionally, the dose was boosted within the tumour site with a 10 Gy radiation beam at 6, 9, 12 or 16 MeV. The photon boost was administered sporadically. Irradiation of the adjoining lymphatic basins, including clavicular zones and the axilla was performed in 17 cases (25%).

## Methods

The cosmetic effect of the treatment was evaluated annually by a physician, using a scale which graded the effect as very good, good, satisfactory or unsatisfactory. The cosmetic effect was evaluated in 66 patients (due to over-extensive excision of the gland, after 24 months from the conservative treatment one patient underwent endoprosthesis implantation and the cosmetic effect was not evaluated in her case).

### Definitions of the grades of the cosmetic effect

#### A very good effect

A minimal difference or no difference in the size and shape between the treated and the non-treated breast. Slight thickening or scars within the gland or skin not altering the look of the breast are considered permissible.

#### A good effect

A slight asymmetry between the treated and the non-treated breast in the size or shape. Slight reddening or darkening (browning) of the skin of the breast. The thickening or scars within the breast result in only slight alterations of its shape.

#### A satisfactory effect

A moderate deformation with a visible difference in the size and shape of the treated breast. The changes are observed in less than 1/4 of the volume of the breast. The thickening or scars on the skin and breast are moderate. Visible changes of the colour of the skin of the breast.

#### An unsatisfactory effect

Visible changes in the look of the treated breast in over 1/4 of the breast tissue. Obvious skin changes. Very intense scars and thickening. Retrospectively, mastectomy would have been a better therapeutic solution.

To render the evaluation of the changes more objective, photographs of the breasts were taken every 12 months and the distance between the mammilla and the lower contour of the breast from constant anatomical points on the body marked in the following way were measured:

- A – the distance between the jugular notch of the sternum and the mammilla.
- B – the distance between the centre of clavicle and the mammilla.
- C – the distance between the centre of clavicle and the lower contour of the breast.
- D – the distance between the mammilla and the middle line of the body.

The difference between the corresponding distances in the treated and the non-treated breast was measured and presented as the following measurements:

1. (A'-A) – the difference in the distance between the jugular notch of the sternum and the mammillas of both breasts.
2. (B'-B) – the difference between the level of the mammillas of both breasts, i.e. the difference of the distance between the centre of clavicle and the mammillas.
3. (C'-C) – the difference of the level between the lower contours of both breasts.
4. (D'-D) – the difference of the distance between the mammillas and the middle line of the body.

In the analysed group of 66 patients the obtained cosmetic effect was assessed and, to make the assessment objective, the results were correlated with the measurements of the parameters of symmetry in both breasts. The parameters of symmetry of the treated breast (A, B, C, D) and the non-treated breast (A', B', C', D') were measured in all the patients and the difference between the two distances was assessed. The measurements were taken before the onset of radiotherapy and then at 12-months intervals. For statistical calculations, the measurements after the surgery and after 3 years from the end of radiotherapy, when the postradiation reaction is stabilised, were used. The measurements were taken when the patients were in standing position, with the upper limbs along the body.

The first photographs and measurements of the treated breast were taken after surgery, before the onset of radiotherapy. An example of the measurement of the parameters of breast symmetry is presented in Figure 4.

The cosmetic effect in the group after quadrantectomy (36 patients) and after tumorectomy (30 patients), in the patients chemically treated (27 patients) and without chemical treatment (39 patients) was compared. In the group with chemotherapy, due to the small number of patients, the order in which chemotherapy and radiotherapy were performed was not taken into account. The influence of the radiotherapy of lymph nodes and the energy of radiation on the cosmetic effect was also assessed.

The patients were divided into three age groups:

- Patients up to 40 years of age n=11
- Patients between 41 and 60 years of age n=47
- Patients over 60 years of age n=8

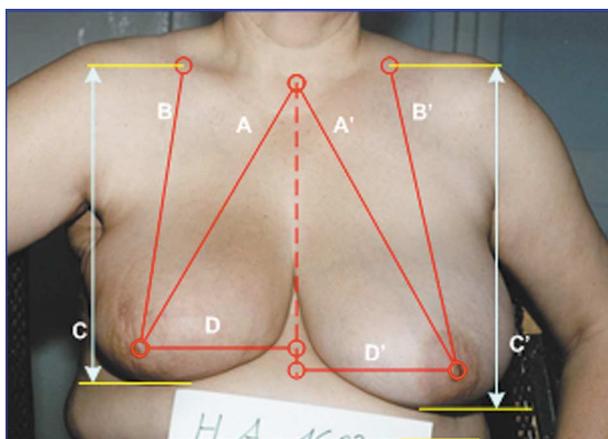


Figure 4. Measurements of the parameters of breast symmetry

An analysis of the relation between the age and the final cosmetic effect was performed.

The statistical analysis was performed according to recommendations presented by Stanisz [5] using Statistica 6.0 PL software. The compatibility of distribution of the frequency of the data, which were analysed with normal distribution, was tested using the Kolmogorov-Smirnov test. As in the majority of the analysed variables the distribution was significantly different from normal ( $p > 0.05$ ), the following non-parametric tests were used to analyse the differences and relations between the variables: the Mann-Whitney U test – to compare the values between two variables, the ANOVA Kruskal-Wallis test – to compare the values between numerous groups at the same time, the Spearman correlation – to analyse the direction, force and statistical relevance of relations between two variables, the Gamma correlation – as above, but for the variable (radiation energy) in which many values were identical.

## Results

### Evaluation of the cosmetic effect in all the group of patients

The cosmetic effect evaluated after surgery (before the beginning of radiotherapy) is presented in Figure 5. The final cosmetic effect after three years from the end of radiotherapy is presented in Figure 6.

A very good and a good effect before radiotherapy was observed in 85% of patients, and three years after radiotherapy – in 71% of patients. We observed a very high level of statistical relevance between the subjective assessment of the effect and the results of the measurements of the differences between the parameters of breast symmetry. Graphical dependencies between the evaluation of the cosmetic effect and the parameters of breast symmetry are presented in Figures 7, 8, 9 and 10. The subjective evaluation of the cosmetic effect was found to correlate the best with the measurements of differences ( $A'-A$ ), ( $B'-B$ ) and ( $C'-C$ ). This correlation is the weakest in the case of the ( $D'-D$ ) measurement, although its level of statistical relevance was also high, as presented in Table I.

Figures 11, 12, 13 and 14 present the photographs of exemplary measurements of the parameters of breast symmetry for each cosmetic effect evaluated three years

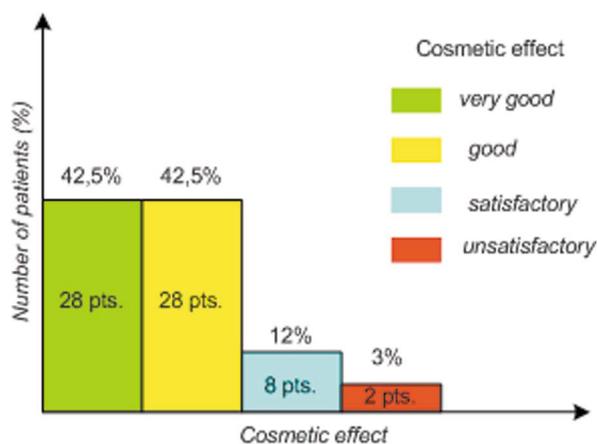


Figure 5. Evaluation of the cosmetic effect before the beginning of radiotherapy

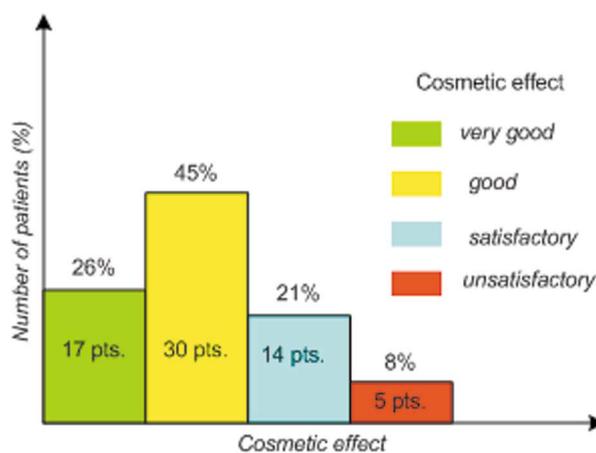


Figure 6. Evaluation of the cosmetic effect 3 years after radiotherapy

after the end of radiotherapy. They present the methods of measuring the symmetry of the breasts. All distances are given in centimetres.

### Influence of the type of surgical treatment on the cosmetic effect

In the group of 30 patients after tumorectomy, the cosmetic effect was evaluated after the surgical treatment – before the onset of radiotherapy and three years after the end of radiotherapy.

Similarly, in the group of 36 patients after quadrantectomy, the cosmetic effect was evaluated after the surgical treatment – before the onset of radiotherapy and three years after the end of radiotherapy.

Table I. Relationships between subjective evaluation of the cosmetic effect and measurements of breast symmetry A, B, C and D in Kruskal-Wallis test in 66 patients with breast cancer undergoing conservative treatment

measurement	value of test $H$	significance level $P$
A	37.8	0.00001
B	31.4	0.00001
C	27.3	0.00001
D	12.1	0.007

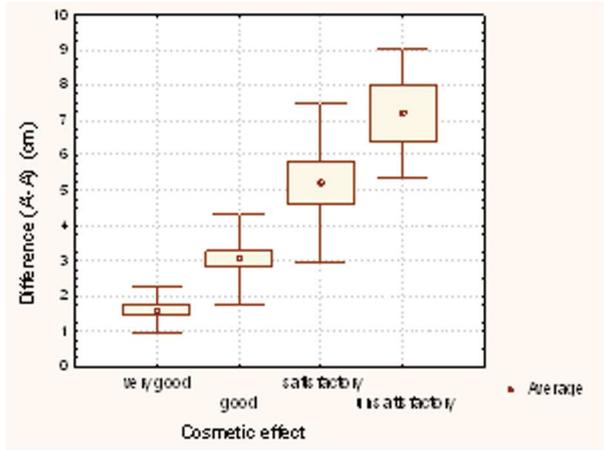


Figure 7. Relationship between the evaluation of the cosmetic effect and measurement A (average, standard error and standard deviation)

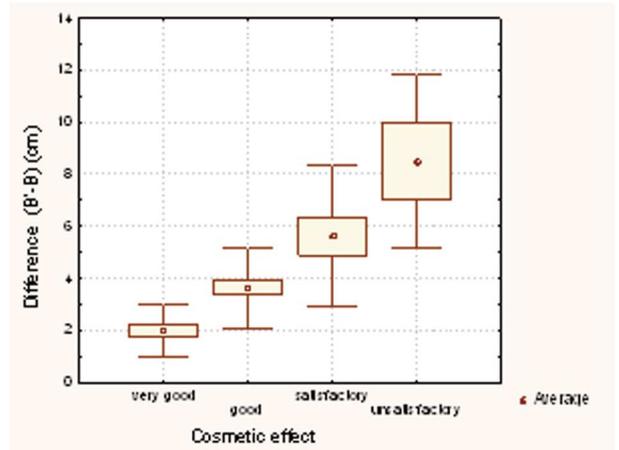


Figure 8. Relationship between the evaluation of the cosmetic effect and measurement B (average, standard error and standard deviation)

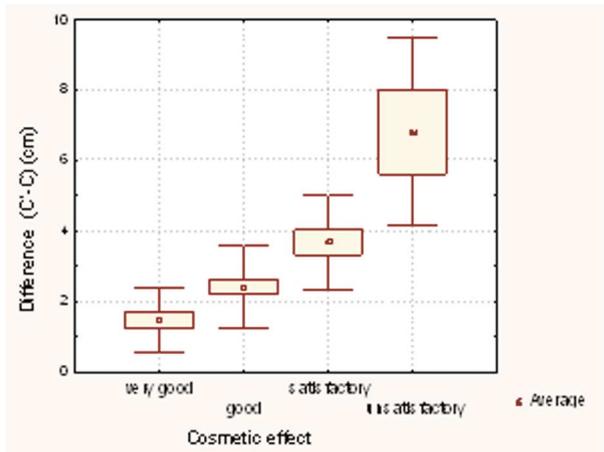


Figure 9. Relationship between the evaluation of the cosmetic effect and measurement C (average, standard error and standard deviation)

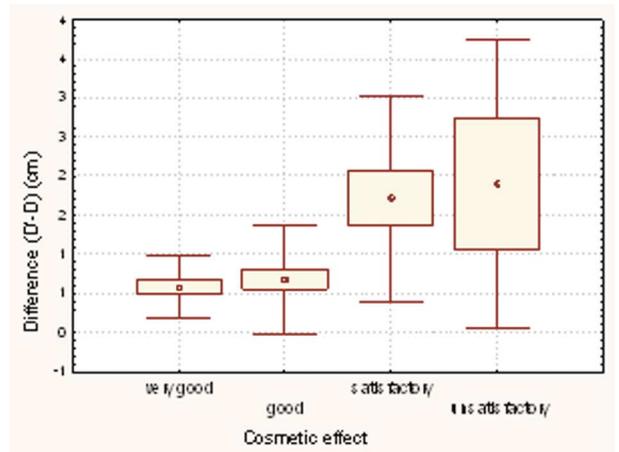


Figure 10. Relationship between the evaluation of the cosmetic effect and measurement D (average, standard error and standard deviation)

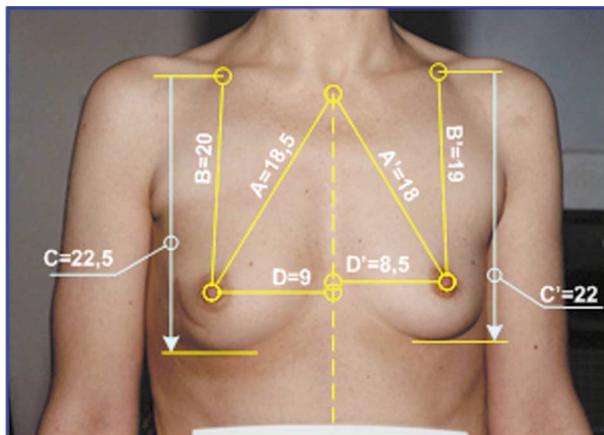


Figure 11. Very good cosmetic effect

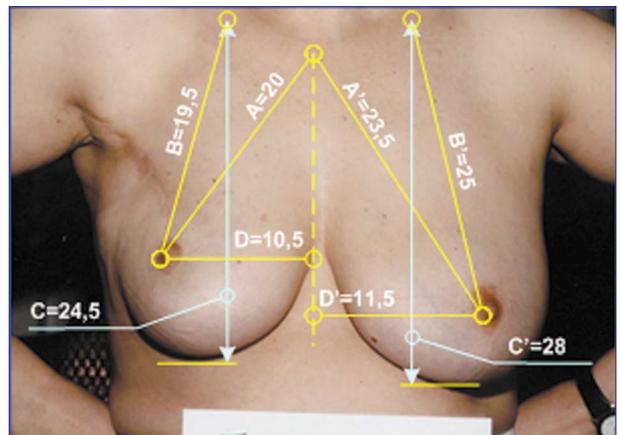


Figure 12. Good cosmetic effect

For each parameter A, B, C and D, the difference between quadrantectomy and tumorectomy was statistically significant. The difference was even higher three years after the end of radiotherapy, as presented in Table II and Table III.

The statistical analysis performed using the Mann-Whitney U test has proven that the use of chemotherapy

does not influence the cosmetic effect, neither in the group after tumorectomy nor after quadrantectomy (for all parameters  $p > 0.05$ ).

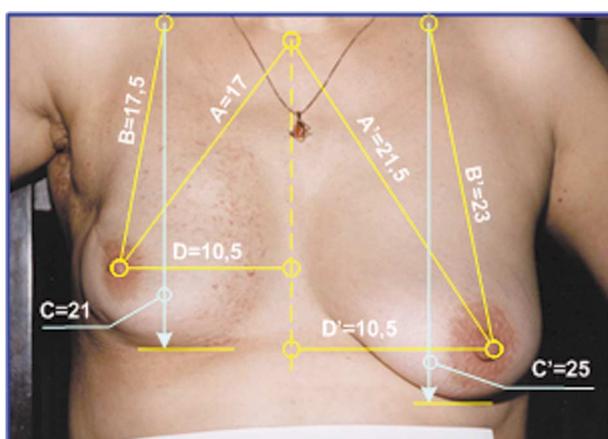
The Mann-Whitney U test was used for the statistical analysis of the dependency between the cosmetic effect and lymph node irradiation within the supraclavicular-axillary area. The differences between each of the

**Table II. The level of significance of the differences (Mann-Whitney U test) in the parameters of breast symmetry between tumorectomy and quadrantectomy before the beginning of radiotherapy (after surgical treatment)**

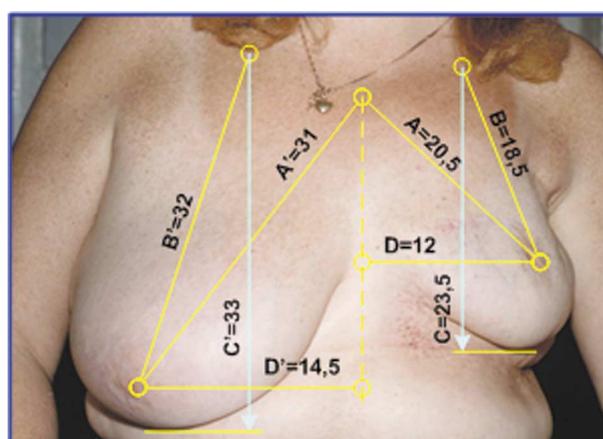
differences in the parameters of breast symmetry	tumorectomy		quadrantectomy		value Z	significance level P
	average (cm)	S.D. (cm)	average (cm)	S.D. (cm)		
(A'-A)	1.53	1.15	3.31	2.73	-2.80	0.0049
(B'-B)	1.62	1.31	3.75	2.70	-3.59	0.0003
(C'-C)	1.00	0.72	2.42	1.81	-3.67	0.0002
(D'-D)	0.43	0.58	1.07	0.99	-3.24	0.0011

**Table III. The level of significance of the differences (Mann-Whitney U test) in the parameters of breast symmetry between tumorectomy and quadrantectomy 3 years after the end of radiotherapy**

differences in the parameters of breast symmetry	tumorectomy		quadrantectomy		value Z	significance level P
	average (cm)	S.D. (cm)	average (cm)	S.D. (cm)		
(A'-A)	2.17	1.05	4.53	2.31	-4.78	0.000002
(B'-B)	2.62	1.39	5.14	2.82	-4.23	0.000023
(C'-C)	1.78	0.99	3.60	2.07	-4.20	0.000026
(D'-D)	0.47	0.39	1.39	1.21	-3.80	0.000142



**Figure 13. Satisfactory cosmetic effect**



**Figure 14. Unsatisfactory cosmetic effect**

parameters of breast symmetry in the patients who had undergone lymph node irradiation and in those not administered irradiation were analysed. We found no statistically significant correlation between the irradiation of lymph nodes and the cosmetic effect ( $p > 0.05$ ).

The relation between the age of patients and the cosmetic effect was evaluated in three age groups three years after the end of radiotherapy. As the type of treatment significantly influenced the cosmetic effect, before the age-effect relation was analysed, it was checked whether the age of patient was taken into account when deciding on a particular treatment modality. The Mann-Whitney U test did not confirm any correlation between the type of treatment and the age of patients ( $p > 0.05$ ). As there was no correlation between the age and type of treatment, the correlation between the patient age and the cosmetic effect was analysed. The Kruskal-Wallis test  $H(3, n=66) = 2.44, p = 0.48$  was used – we observed no correlation between the patient age and the cosmetic effect. Using the analysis of the Gamma correlation

coefficient, it was observed that, for the breast symmetry parameter A, there is a significant tendency (although weak, with  $p = 0.046$ ) for the breast asymmetry to decrease when the radiation energy is growing. No statistically significant relations were observed for the other parameters of breast symmetry.

## Discussion

The treatment of patients with early stages of breast carcinoma has significantly changed during the last quarter of the century. Frequent use of mammographic screening has resulted in earlier diagnosing of breast carcinoma and in a growing number of carcinoma cases without lymph nodes being attacked or of pre-invasive carcinomas. The common use of systemic treatment – chemotherapy and hormonotherapy – results in the improvement of survival time in patients with and without metastases in the axillary lymph nodes. Moreover, the last twenty years have also seen a change in the opinion

that mastectomy is the only effective local treatment of breast carcinoma. Conservative treatment is more and more frequently used in early stages of breast carcinoma. In the 70s, several prospective trials were started to compare the effectiveness of conservative treatment and mastectomy in comparable degrees of breast carcinoma progression. Publication of the results of such randomised prospective trials resulted in the more frequent use of conservative treatment. In 1995, results of a metaanalysis conducted by the *Early Breast Cancer Trialist Collaborative Group* were published. They unequivocally confirmed the equality of radical mastectomy and conservative treatment, as the results of general survival time and local recurrence were almost identical [6-9]. As a result, the factors influencing the cosmetic effect and the undesirable effects of conservative treatment were given a lot of attention. Numerous researches on such treatment indicated that the cosmetic effects are satisfactory in most patients and that the intensification of complications is at an acceptable level. However, a comparative analysis of the factors potentially influencing the results of treatment proved, in many cases, very difficult as the methods of treatment were diversified during the years. The differences concerned the extent of the resection of gland, lymph nodes of armpit, methods of radiotherapy, total and daily dose, the use of systemic treatment and also of various sequences of using radio- and chemotherapy. The results of many experiments show that cosmetic effects tend to stabilise after two to three years after the treatment and, after that period, remain relatively stable [10-12]. In the present research, the shortest period of observation was 30 months, in 66% patients it was 37 months. Thus, a large majority of the group was under observation for three years. In the entire group of 66 patients, after 3 years from the end of treatment, 71% of results were very good and good, 21% sufficient and 8% insufficient. In the group of patients after tumorectomy, a very good and good result after 3 years from radiotherapy was observed in 100% patients, whereas in the group after quadrantectomy – in 47%.

It is difficult to objectively evaluate the deformation of breast after surgical treatment and after radiotherapy and the subjective assessments of physicians are varied. Asymmetry may occur in the breast after surgical treatment as displacement or deformation of the mammilla-areola complex and a visible deficiency of gland tissue. Asymmetry caused by radiotherapy may result from retraction or fibrosis of breast. Evaluation of the cosmetic effect may be made more objective by measuring the symmetry of breast in relation to stable anatomic points on the body. Evaluation of the retraction of the breast is an objective test and an efficient tool for eliminating a biased approach of the observers [13].

A significant correlation of the subjective assessment of the cosmetic effect and the measurements of breast symmetry was observed in the present study. A statistically significant relation between the evaluation of the cosmetic effect with the measurement of the oblique distance between the jugular notch of sternum and the mammilla,

with the measurement of the level of the mammilla and the level of the lower contour of the breast ( $p=0.00001$ ) was observed. The relation was weaker in case of the distance between the mammilla and the central line of the body, although the level of statistical significance was still high ( $p=0.007$ ). The correlation between the subjective assessment and the measurements allows for an objective comparison of the effects of treatment and a comparison of various methods of treatment. A weaker relation in case of the distance between the mammilla and the central line of the body may indicate a more significant displacement of the mammilla and the breast in the upper direction rather than to the side.

Van Limbergen et al., Taylor et al. and Sacchini clearly indicate that the scope of the surgical resection of the breast is the most important therapeutic factor causing breast asymmetry after conservative treatment. The cause of asymmetry, more frequent after quadrantectomy than after tumorectomy, is the upward displacement of the mammilla and a greater difference of the distance between the jugular notch of sternum and the mammillas ( $p<0.01$ ) [14-16].

In the present study, the differences between all the measured parameters of breast symmetry were significantly greater in patients after quadrantectomy than in those after tumorectomy (the level of statistical significance for the 4 measurements was within 0.0002 and 0.004). The differences were greater after 3 years of observation and the level of significance ranged between 0.000002 and 0.0001 for the four measurements. The cosmetic effect after conservative treatment changes with time, which is caused by postradiation changes in the skin and breast gland (breast retraction) and the interactions between post-surgical cicatrization of tissue and postradiation fibrosis. Significant differences of the effects in the two groups of patients may also result from the fact that almost all patients with quadrantectomy had a long common scar after *en bloc* removal of the breast quadrant and the axillary lymph nodes. The common scar was necessary due to the location of primary tumour in the upper-outer quarter in most patients.

The cosmetic effect after treatment depends on many factors, including those related to surgery, radiotherapy techniques, the use of systemic treatment, clinical features such as the size and location of tumour and to individual features of the patients.

The studies of Harris, Olivotto, Abner and Clark confirm that irradiation of the lymph nodes areas (with supraclavicular and axillary lymph nodes) results in significantly lower percentage of good and very good results than in the cases when tangential fields are used ( $p=0.004$ ). Such effects were observed not only in patients treated using "old" methods when the fields overlapped and fibrosis was visible at the crossing of tangential and nodular fields. Worse cosmetic effects are also observed in patients treated with modern methods, when the fields are almost perfectly adjusted [17-20]. Rochefordiere et al., who compared the cosmetic effects in a group of patients treated in the 70's and 10 years later, indicate that due to

the precision of methods of radiotherapy used later, irradiation of the lymph nodes did not correlate with worse cosmetic effects [21].

17 patients from our study group had undergone irradiation of nodal areas including the supraclavicular-axillary zone. We observed no statistically significant differences between the cosmetic effect in the group in which nodular fields were applied and in the group with only tangential fields. No fibrosis at the crossing of tangential and nodular fields was observed in any of the patients. This results from the use of the method of "common isocenter" with irradiation of breast and lymph nodes eliminating the possibility of field overlapping. This may explain the lack of statistically significant influence of lymph node irradiation on the cosmetic effect. The group of 17 patients under observation might not have been representative.

The more frequent use of conservative treatment of breast carcinoma is accompanied by a more frequent use of adjuvant chemotherapy and hormonotherapy in order to reduce the risk of distant metastases. Chemotherapy becomes increasingly more important in the conservative treatment of patients with breast carcinoma with axillary lymph node involvement and in those with non-affected nodes. The optimal sequence of the administration of chemotherapy and radiotherapy has not, as yet, been definitively defined and numerous studies are conducted to arrive at the best method.

Ray et al. have analysed the cosmetic effects and complications in a group of patients with conservative treatment and irradiation with and without the use of chemotherapy. After 3 years of observation, the cosmetic effect was evaluated. It was significantly better in the group of patients without chemotherapy ( $p < 0.05$ ) [22]. Markiewicz et al., after 3 years of observation, arrived at a border relationship ( $p = 0.56$ ) between chemotherapy and the cosmetic effect. The use of chemotherapy, regardless of the sequence it was used in, had an unfavourable influence on the cosmetic results as compared to the group where chemotherapy was not used (92% of very good and good result vs. 96%, respectively). However, after 5 years of observation, no statistically significant differences were observed between the two groups [23]. Basing upon the examination of 234 women, Wazer et al. did not observe any relevant influence of chemotherapy on the cosmetic results. Its use, however, results in an increased risk of complications after treatment, 19% vs. 8% ( $p = 0.03$ ) [11].

In the group of 66 patients, chemotherapy was administered in 27 cases and it was observed that, for all parameters of breast symmetry, the use of chemotherapy does not significantly influence the cosmetic effect ( $P$  from 0.21 to 0.68). Taylor et al. have indicated that women at the age of over 60 have a lower coefficient of very good effects as compared to women under the age of 60 ( $p = 0.001$ ). The coefficient of very good effects is also lower in the group of patients after menopause as compared to those before ( $p = 0.02$ ) [15]. Pezner et al. have arrived at similar results. The retraction in the

measurements of breast symmetry was significantly bigger in women who were over 60 years old. Higher post-radiation retraction in women after menopause and those over 60 results from anatomically higher content of fat tissue than gland tissue. However, Taylor observed a slightly greater volume of the gland resection in older women as compared to those under the age of 60 (138 cm<sup>2</sup> vs. 117 cm<sup>2</sup> respectively). It is worth noting that the general proportion of women before menopause or at the age of over 60 with very good and good cosmetic effects is relatively high and considered satisfactory [13, 15]. No relation between the patient age and the cosmetic effect was observed in the present study.

## Conclusions

1. The measurement of breast symmetry is a very useful method for evaluating the cosmetic effect after conservative treatment and for comparing various methods of treatment.
2. The cosmetic effect depends on the scope of surgical conservative treatment of breast. The use of chemotherapy and nodal irradiation does not affect the cosmetic effect. Moreover, the effect is not related to patient age.

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