



HAL
open science

The effect of immediate breast reconstruction with Becker-25 prosthesis on the preservation of proper body posture in patients after mastectomy

S. Ciesla, K. Polom

► **To cite this version:**

S. Ciesla, K. Polom. The effect of immediate breast reconstruction with Becker-25 prosthesis on the preservation of proper body posture in patients after mastectomy. *EJSO - European Journal of Surgical Oncology*, 2010, 36 (7), pp.625. 10.1016/j.ejso.2010.05.005 . hal-00603549

HAL Id: hal-00603549

<https://hal.science/hal-00603549>

Submitted on 26 Jun 2011

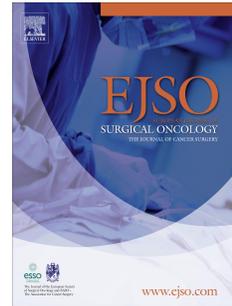
HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Accepted Manuscript

Title: The effect of immediate breast reconstruction with Becker-25 prosthesis on the preservation of proper body posture in patients after mastectomy

Authors: S. Ciesla, K. Polom



PII: S0748-7983(10)00113-7

DOI: [10.1016/j.ejso.2010.05.005](https://doi.org/10.1016/j.ejso.2010.05.005)

Reference: YEJSO 2967

To appear in: *European Journal of Surgical Oncology*

Received Date: 13 February 2010

Revised Date: 11 April 2010

Accepted Date: 4 May 2010

Please cite this article as: Ciesla S, Polom K. The effect of immediate breast reconstruction with Becker-25 prosthesis on the preservation of proper body posture in patients after mastectomy, *European Journal of Surgical Oncology* (2010), doi: 10.1016/j.ejso.2010.05.005

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Authors: Ciesla S ¹, Polom K ^{2 3}

Title: The effect of immediate breast reconstruction with Becker-25 prosthesis on the preservation of proper body posture in patients after mastectomy.

1. General Surgery Department State Regional Hospital in Leszno, Poland
2. 1st Surgical Oncology and General Surgery Department, Wielkopolska Cancer Center, Poznan, Poland
3. Cancer Pathology Department, Clinic of Oncology, Poznan University of Medical Sciences, Poznan, Poland.

Corresponding author: Karol Polom, Wielkopolska Cancer Center, 15 Garbary Street, 61-866 Poznan, Poland

Email: surgoncolclub@gmail.com

Mobile: +48 691 079 199, fax +48 61 885-0601

Abstract:

Purpose: This was a prospective study comparing coronal, sagittal and transverse plane body posture parameters in women after radical mastectomy and women after radical mastectomy with immediate breast reconstruction (IBR) for stage I and II breast cancer.

Methods: The three studied groups were one that underwent Madden's radical mastectomy (n=38), a second with skin sparing mastectomy with IBR with expander-prosthesis Becker-25 (n=38), and the control (n=38). All the women were examined to determine their body posture in the coronal, sagittal and transverse planes using three-dimensional (3D) body surface analysis before and 6, 12, 18 and 24 months after surgery.

Results: There is a significant difference body posture in the coronal, sagittal and transverse planes between groups of patients after mastectomy with IBR comparing with patients after mastectomy alone. The women after radical mastectomy demonstrated the greatest postural changes in particular parameters of body posture in postsurgical months 18 and 24. The IBR group only demonstrated significant postural changes in one parameter, though as time after surgery increased, these changes decreased.

Conclusions: IBR after mastectomy has an impact on proper body posture. Photogrammetric examination revealed important body posture disturbances only in the radical mastectomy group. It gives useful information on body posture parameters in the evaluation of quality of life in breast cancer survivors. It appears that immediate breast reconstruction helps to preserve proper body posture after mastectomy.

Key words: body posture, immediate breast reconstruction, mastectomy, Moire contourography.

Introduction:

Breast cancer remains the most frequent malignant neoplasm in women. Surgical options include radical mastectomy (RM), breast conservative treatment (BCT), and immediate breast reconstruction (IBR). Treatment of breast malignancies is currently centered on minimalizing surgical intervention while still eradicating the neoplasm. Despite an increasing proportion of indications for surgical intervention with breast conservation in early breast cancer stages, as many as 10% of stage I and 30% of stage II patients do not qualify for BCT [1]. In addition to difficulties in offering each patient a 5-week course of radiotherapy, the number of unwilling patients and difficulties in staging the disease before surgery, there are many women who still undergo RM in early stages of the disease [2,3]. In these patients, a good solution to minimize scarring is IBR [4]. To date, the value of IBR has been mainly in the return or improvement of quality of life and maintenance of a natural appearance, both factors leading to better self-esteem and emotional well-being in this group of women [5,6,7].

There have been almost no attempts to determine the effect of mastectomy and breast reconstruction on the maintenance of proper body posture after surgery. A large number of women after mastectomy complain of increased back pain a few months to years after mastectomy [8,9]. The studies by Rostkowska et al. have shown a statistically significant disturbance of proper body posture in women after mastectomy [10]. These disturbances have even been demonstrated in women who underwent intensive rehabilitation. It has also been noted that these disturbances in body posture are decreased in women who used an external prosthesis not only during the day but also at night, while sleeping [11]. This leads to the assumption that IBR may have a positive effect in maintenance of proper body posture in women after mastectomy.

The purpose of this study was to compare the changes in body posture of women after RM and women who underwent IBR with expander-prosthesis Becker-25.

Patients and methods:

Prospective studies were performed in a group of women with stage I and II breast cancer, operated in 2000-2005 at the General Surgery Department of the State Regional Hospital in Leszno, Poland.

Group A (n=38) underwent RM using Madden's method. Group B (n=38) underwent skin sparing mastectomy (SSM) with single-stage IBR using a subpectorally placed expander-prosthesis Becker-25. The control group,

group C (n=38), were healthy women who have not had surgery. Groups A and B were comparable in terms of age, body mass, height, the degree of cancer advancement, and comorbidities (Table 1). The study continued until all dimensional parameters had been obtained for each group's 38 women.

All the women were examined to determine their body posture using three-dimensional (3D) analysis of the body surface with photogrammetry. This method involves objective anthropometric measurements based on computer analysis of the 3D image constructed of the spine of each examined woman. The theoretical basis of the measurements is Moire contourgraphy, described in optics. A ray of white light hitting an uneven surface leads to this light reflecting at various degrees. The reflected image was registered by a camera and digitally configured and saved by a special computer program. This system allowed for real-time registration and comparison of the resultant changes in the body posture of the examined women (Photograph 1).

This non-invasive and non-burdening manner of obtaining measurements allowed for multiple measurements in each woman post-operatively. Before taking a measurement, characteristic bony structures were marked on the patient's back: the C7 to S1 spinous processes, the lower borders of the scapulae, and the superior posterior iliac spines. The static measurements were taken in specific, reproducible conditions, accounting for the same parameters of the visual apparatus, at a constant distance of 3.2 m between the camera and the patient, who was standing in a relaxed position. This examination allowed for the measurement of 54 parameters in the coronal, sagittal, and transverse planes, which made it possible to objectively evaluate the body posture of the patients.

For the purposes of this study, only a few parameters that best demonstrated differences in the coronal, sagittal and transverse planes were used, and were selected before the first examination:

- MDL – the maximal deviation of the line of the superior posterior iliac spines from C7-S1,
- DHS_h – the difference in the height of the shoulders,
- DHS – the difference in the height of the lower border of the scapulae (angling of the body),
- API – the angle of pelvic inclination,
- APR – the angle of pelvic rotation in the sagittal plane, and
- RS – the difference in the depth of the lower border of the scapulae (rotation).

Five measurements were taken for each patient: before the surgery (after final diagnosis and determining the best method of treatment), and 6, 12, 18, and 24 months after surgery.

Statistical analysis:

To compare the measurable parameters at each interval that met the initial criteria for one-way ANOVA were analyzed with the post hoc Newman-Keuls test with the assumption of Gaussian distribution and homogeneity of variance at the $p < 0.05$ level. When the parameters did not meet the above criteria, the nonparametric Kruskal-Wallis test was used with Dunn's multiple comparisons test, also at $p < 0.05$. To compare groups of examined women univariate assessment for nominal data was made using Fisher exact test or Chi-square test. Analysis was performed using STATISTICA (data analysis software system), v 8.0

Results:

Between September 20 2000 and June 19 2005, there were 125 women operated for breast cancer at the General Surgery Department of the State Regional Hospital in Leszno, and all of these women underwent breast reconstruction with expander-prosthesis Becker-25. Of these patients, 102 had IBR, while in 23 patients the use of expander-prosthesis Becker-25 was delayed by 6 months to 10 years after mastectomy. During the same time period, 142 patients underwent RM without use of an expander-prosthesis.

Patients with stage I and II breast cancer, evaluated clinically prior to surgery, were qualified to IBR assuming no contraindications to this type of surgery. All the women qualified for IBR agreed to radical mastectomy with reconstruction and also declared their intention to participate actively in postoperative breast modeling and rehabilitation. Approximately 5-8 months after IBR, 50 of the 102 patients who had undergone IBR also had corrective surgery of the healthy breast, to correct symmetry, using the McKissock (n=25), Lejour (n=19), or Benelleg (n=6) procedure.

In this prospectively planned photometric study of body posture, it was possible to obtain full data on the measurements in 38 women of each group. As result analysis included only those women whose measurements were taken preoperatively and at the four postoperative times designated, these measurements took two postoperative years to be completed. Women whose complete measurements could not be obtained, for any reason, for the five time periods, were excluded from the study. In this manner, two groups of women of similar age, body mass, height, mass of breast tissue removed, degree of disease advancement, and type of postoperative treatments were obtained.

The photogrammetric results obtained for these women demonstrate a significant difference in body posture between the patients who underwent IBR and those with RM who never had reconstruction. The measurements taken preoperatively, but after clinical diagnosis and qualification to surgical treatment, did not differ significantly in the women who were treated with IBR or RM, either between each other or in comparison to the control group (Table 2).

Examination of the patients 6 months postoperatively demonstrated a considerable increase in body posture divergence in the patients who had RM without breast reconstruction.

Twelve months postoperatively, this body posture divergence is even more obvious in the group of patients without reconstruction after RM, and is significantly different from the results obtained from the IBR and control groups.

In the eighteenth postoperative month, the difference between the RM and IBR groups reached its peak, with the RM group showing even more divergence in body posture. Two years after surgery, there is no further increase in divergence demonstrated by the parameters of body posture in the coronal plane in the patients with RM. We can therefore presume that adaptation of the body stabilizes approximately 18 months after surgery and does not progress further (Photograph 2).

There is no difference between IBR patients and healthy controls in MDL, regardless of when the measurements are taken postoperatively. This indicates that the changes in MDL in women after mastectomy increase over time, and therefore women who underwent RM without reconstruction demonstrate increasing divergence of body posture from healthy controls and patients with IBR (Figure 1a).

Analysis of DHS also demonstrates significant changes just 6 months after surgery. The greatest differences between patient groups are seen 18 months after surgery (Figure 1b).

Similarly, analysis of DHS shows a significant difference in the RM and IBR groups just 6 months after surgery, and this difference increases over time between these groups (Figure 1c).

Analysis of API also shows a significant difference in the RM and IBR groups just 6 months after surgery, and this difference increases over time between these groups (Figure 1d).

The measurements of APR demonstrate an obvious increase in the angle of pelvic rotation in women 12 months after radical mastectomy. This trend continues over the 24 months that measurements were taken (Figure 1e).

The values of RS are statistically significant from 6 months after surgery only in the IBR and RM groups. This difference is also present between the RM and control groups over all postoperative months. There is no significant difference between the IBR and control groups at any time (Figure 1f).

Changes in proper body posture occurring in patients after RM involved raising of and moving anteromedially the shoulder on the operated side, with a simultaneous rotation of that scapula in the sagittal plane.

Discussion:

Breast size and body posture:

It is well known that back pain is common in women with large breasts. The weight of the breasts is responsible for a change in the center of gravity of these women, and also leads to a change in body posture [10,12]. This can cause frequent neck pain, back pain, shoulder pain, a feeling of neck stiffness, painful ras serie strap grooving, and persistent intertrigo in the inflammatory folds. As explained by Findikcioglu et al. [12], there are statistical differences in the angle of thoracic kyphosis and lumbar lordosis between women of breast cup A and cup D. Patients of breast cup B and D were also compared, and demonstrated a significant difference in the angle of lumbar lordosis [10,12]. No differences were noted in the sacral inclination angle. This demonstrates that the vertebral column changes dynamically, and disturbances of one part of the spine are compensated by changes in another part of the spine. In the 38 IBR patients, twenty of the women that underwent conturography had corrective surgery of the healthy breast 5-8 months after IBR. However, in the initial evaluations this corrective surgery did not appear to have an effect on conturography results. It seems that, regardless of how similar symmetrically the breasts were, maintaining the correct body posture is more greatly affected by the presence of a replacement breast. Further studies must be performed to confirm this.

Use of Moire conturography

Moire conturography is used to evaluate body posture divergence in scoliosis [13-15]. Detailed analysis of Moire conturography has demonstrated that it is an adequate tool to diagnose the presence, degree, and direction of scoliotic changes, but cannot precisely evaluate the size of the scoliosis [10,13]. Body position, buttock rotation, body type, and fat rolls and folds are all involved in the lack of precision in evaluating vertebral curvature using body surface topography. However, this is a good tool in the evaluation of disturbances of body posture. In studies conducted under reproducible conditions by an experienced physiotherapist Moire conurography is a good tool for the evaluation of changes occurring to the body posture, though radiologic studies are required to evaluate changes in the vertebral column itself. Two positive aspects of conturography are the noninvasive nature of the test and the possibility to perform repeated examinations over time.

Asymmetry of body posture after mastectomy

In the coronal plane, the asymmetry of the buttocks in women after RM was studied by Rostowska et al. [10,11]. The results of these studies indicated that the asymmetry was related to the position of the shoulders and scapulae. In the case of RM without breast reconstruction, an external prosthesis worn as a special bra was a significant factor in the degree of buttock asymmetry. Women who wore such a prosthesis regularly, both during sleep and during the day, demonstrated a lesser degree of body posture disturbances. It is also necessary for the patient to undergo rehabilitation to decrease the changes in body posture [10].

Our study demonstrated that body posture disturbances significantly affect the vertebral column of patients after RM. The study by Bak et al. also showed a change in body posture in women after mastectomy as compared to healthy women, but no correlation was found between the operated side (left or right) and the direction of asymmetry in body posture [11]. This publication also noted a statistical significance in clinical observations. The scapula on the operated side was higher than the scapula on the unoperated side. Women who were older at the time of surgery more frequently have a right rotation to their buttocks and their pelvis is located more posterior on the right side. The spinous process with the greatest deviation from a vertical line perpendicular to the ground was expressed to a greater degree in women after mastectomy. This deviation was most significant in the lower thoracic spine (Th 7-12) of older women, while in younger women it was at a higher part of the thoracic spine (Th 1-6). Another interesting clinical observation is the change in body posture depending on how much time had passed since surgery. In the early postoperative time, there is a tendency to thrust the buttocks forward, and as more time passes after surgery the buttocks are thrust posteriorly. This is due to the fact that thrusting the buttocks forward in the early postoperative period has an anesthetic and psychological effect, which passes over time [10,11,13].

The MDL measurement in the women after RM depended on whether they wore their external prosthesis at night or only during the day, with a lesser deviation in women who wore the prosthesis also while sleeping.

Statistic and selection bias:

Certain criteria were used to determine which of the 102 IBR patients would be chosen to participate in the 38-women group. One of the criteria used to determine each woman's participation in the study was her compliance in having all of the analysis performed at the set post-operative times. Therefore, women who did not participate in all conturography analyses, patients who had to receive postoperative radiotherapy (n=8), and women with postoperative complications requiring repeat surgery (n=10) were excluded from the study.

It should be noted that breast reconstruction surgery has a significant effect on the patient's postoperative body posture. Although the changes in body posture are not completely eliminated, breast reconstruction considerably decreases the amount of divergence from normal body posture, as compared to patients who do not have reconstruction after mastectomy. It is possible that those women who had breast reconstruction may be more body-conscious, be more involved in physical fitness, place greater emphasis on their appearance, be more attentive to their posture, and may be more likely to comply with postoperative rehabilitation.

Future studies should aim at determining the effects of perimammary procedures on body posture, as such procedures can also impact the patient's quality of life.

Conclusions

In prospective studies of women treated operatively for breast cancer, it was demonstrated that RM causes significant changes in body posture. Divergence from proper body posture appeared just 6 months after surgery, with a tendency to further diverge until the 18-24 postoperative month. Similar studies conducted on women who underwent RM with IBR using expander-prosthesis Becker-25 did not show significant changes in proper body posture over the 24-month observation and study period. The parameters used to measure body posture did not differ significantly between the group of women who underwent IBR and the control group. We therefore suggest that simultaneous breast reconstruction leads to a better postoperative outcome, not only in terms of aesthetic results or patient self-esteem, but mainly through preventing complex changes in body posture that can result in permanent changes in the patient's physical equilibrium and related symptoms.

References:

1. Morrow M, Scott SK, Menck HR, Mustoe TA, Winchester DP. (2001) Factors Influencing the use of Breast Reconstruction Postmastectomy: A national Cancer Database Study. *J Am Coll Surg* 192:1-8.
2. Parker PA, Youssef A, Walker S, Basen-Engquist K, Cohen L, Gritz ER, Wei QX, Robb GL. (2007) Short-term and long-term psychosocial adjustment and quality of life in women undergoing different surgical procedures for breast cancer. *Ann Surg Oncol*; 14:3078-89.
3. Janni W, Rjosk D, Dimpfl TH, Haertl K, Strobl B, Hepp F, Hanke A, Bergauer F, Sommer H. (2001) Quality of life influenced by primary surgical treatment for stage I-III breast cancer- Long term follow up of a matched pair analysis. *Ann Surg Oncol* 8:542-548.
4. Cordeiro PG (2008) Breast reconstruction after surgery for breast cancer. *N Eng J Med* 359:1590-601.
5. Elder EE, Brandberg Y, Bjorklund T, Rylander R, Lagergren J, Jurell G, Wickman M, Sandelin K. (2005) Quality of life and patient satisfaction in breast cancer patients after immediate breast reconstruction: a prospective study. *Breast* 14:201-218.
6. Al-Ghazal SK, Fallowfield L, Blamey RW. (2000) Comparison of psychological aspects and patient satisfaction following breast conserving surgery, simple mastectomy and breast reconstruction. *Eur J Cancer* 36:1938-43.
7. Cordeiro PG, McCarthy CM. (2006) A single surgeon's 12-year experience with tissue expander/implant breast reconstruction: II. A prospective analysis of long-term complications, aesthetic outcomes and patients satisfaction. *Plast Reconstr Surg* 118:832-9.
8. Rietman JS, Dijkstra PU, Hoekstra HJ, Eisma WH, Szabo BG, Groothoff JW, Geertzen JH. (2003) Late morbidity after treatment of breast cancer in relation to daily activities and quality of life: a systemic review. *EJSO* 29:229-238.
9. Kopański Z, Wojewoda T, Wojewoda A, Schlegel-Zawadzka M, Woznicka R,

- Suder A, Kościuk T (2003) Influence of some anthropometric parameters on the risk of development of distal complications after mastectomy carried out because of breast carcinoma. *Am J Human Biol* 15(3):433-9.
10. Rostkowska E, Bak M, Samborski W. (2006) Body posture in women after mastectomy and its changes as a result of rehabilitation. *Advances in Medical Sciences* 51:287-297.
 11. Bak M, Rostkowska E. (2000) The influence of using breast prosthesis during the night on the changes of body posture among woman after mastectomy. *Fizjoterapia* 8(4):11-15.
 12. Findikcioglu K, Ozmen S, Guclu T. (2007) The impact of breast size on the vertebral column: a radiologic study. *Aesth Plast Surg* 31:23-27.
 13. Wong H-K, Balasubramaniam P, Rajan U, Chng S-Y. (1997) Direct spinal curvature digitization in scoliosis screening – a comparative study with Moire conturography. *J Spinal Disord* 10(3):185-192.
 14. Takasaki H. (1970) Moiré topography. *Appl Optics*;9:1457:1472.
 15. Meadows DM, Johnson WO, Allen JB. (1970) Generation of surface contours by Moiré patterns. *Appl Optics* 9:942-947.

Table 1: Characteristics of women in groups A, B, and C, who underwent photogrammetric examination

	IBR n=38	RM n=38	Control n=38	p-value
age (years)	48,5 ± 10,99 (29-65)	51,3 ± 9,2 (36-68)	49,8 ± 11,1 (34-66)	p=0,66 (ANOVA)
height (cm)	163 ± 14,8 (146-176)	160,7 ± 9,8 (152-169)	158,9 ± 8,9 (145-168)	p=0,8 (ANOVA)
weight (kg)	61,3 ± 12,4 (48-79)	64,1 ± 11,7 (50-82)	62,4 ± 10,2 (51-77)	p=0,57 (ANOVA)
mass of resected breast tissue (g)	455 ± 156	512 ± 182		p=0,09 (t-Student)
Hormonal status:				
Menstruating	17	16	19	p=0,9 (Fisher-Freeman-Halton)
Menopausal	21	22	19	
Additional treatment:				
Chemotherapy	26	28		p=0,8 (Fisher)
Hormone therapy	33	31		p=0,75 (Fisher)
Radiotherapy	0	0		

Table 2: Results of body posture measurements in the coronal, saggital and transverse planes in women after mastectomy with immediate breast reconstruction (IBR), women after radical mastectomy without reconstruction (RM), and controls.

	I	II	III	IV	V
MDL					
IBR	2,16 ± 1,2	3,18 ± 2,92	3,25 ± 2,89	3,11 ± 2,6	3,11 ± 2,6
RM	2,58 ± 0,97	3,42 ± 1,12 *	5,18 ± 2,45 *	6,21 ± 2,51 **	5,99 ± 2,49 **
CONTROL	2,33 ± 0,84				
DHSh					
IBR	4,52 ± 3,69	3,77 ± 3,10	4,01 ± 3,39	4,47 ± 3,61	4,46 ± 3,35
RM	3,45 ± 1,33	5,69 ± 4,31 *	7,45 ± 4,85 *	8,41 ± 5,82 **	7,97 ± 5,36 **
CONTROL	2,69 ± 1,35				
DHS					
IBR	3,34 ± 3,22	3,60 ± 3,10	3,58 ± 4,03	3,51 ± 3,79	3,39 ± 3,59
RM	3,81 ± 2,56	4,96 ± 3,27 *	7,25 ± 4,66 *	7,64 ± 4,02 **	8,01 ± 5,80 **
CONTROL	2,08 ± 1,24				
API					
IBR	0,78 ± 0,85	0,81 ± 0,88	0,97 ± 0,97	0,99 ± 0,94	0,99 ± 0,88
RM	1,13 ± 0,91	1,92 ± 1,29 *	2,41 ± 1,9 *	2,62 ± 2,11 **	2,62 ± 1,81 **
CONTROL	1,1 ± 0,99				
APR					
IBR	2,41 ± 0,51	2,72 ± 1,1	2,83 ± 1,63	2,71 ± 1,75	2,85 ± 1,86
RM	2,11 ± 0,66	3,41 ± 0,99 *	4,50 ± 1,55 *	4,61 ± 1,66 *	4,58 ± 1,54 *
CONTROL	1,78 ± 0,88				
RS					
IBR	2,99 ± 1,56	4,26 ± 2,69	4,18 ± 2,94	4,38 ± 3,24	4,28 ± 3,10
RM	3,00 ± 1,32	6,26 ± 3,68 *	7,51 ± 5,27 *	8,31 ± 7,11 **	8,27 ± 6,18 **
CONTROL	2,87 ± 1,16				

* p-value < 0,05

** p-value < 0,001

I before OP

II 6 months after OP

III 12 months after OP

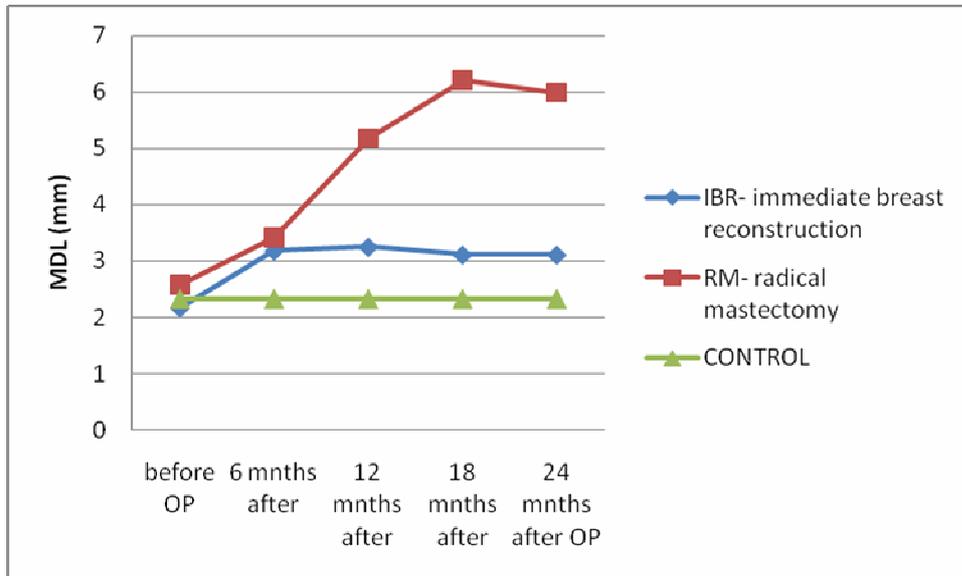
IV 18 months after OP

V 24 months after OP

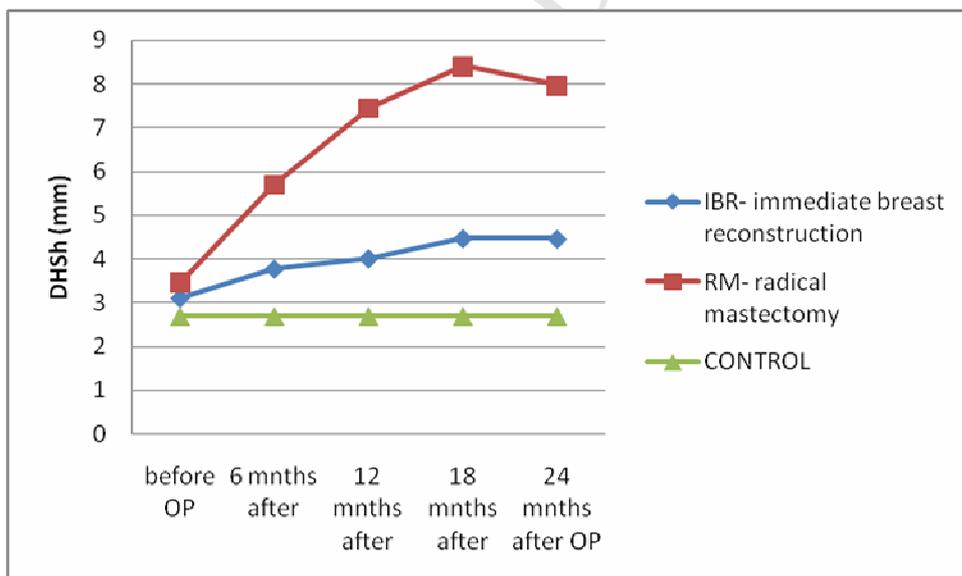
Figure 1

Dynamic changes in body posture parameters in the coronal, sagittal and transverse planes for women after radical mastectomy with IBR and women after RM without reconstruction in the 24 months after surgery:

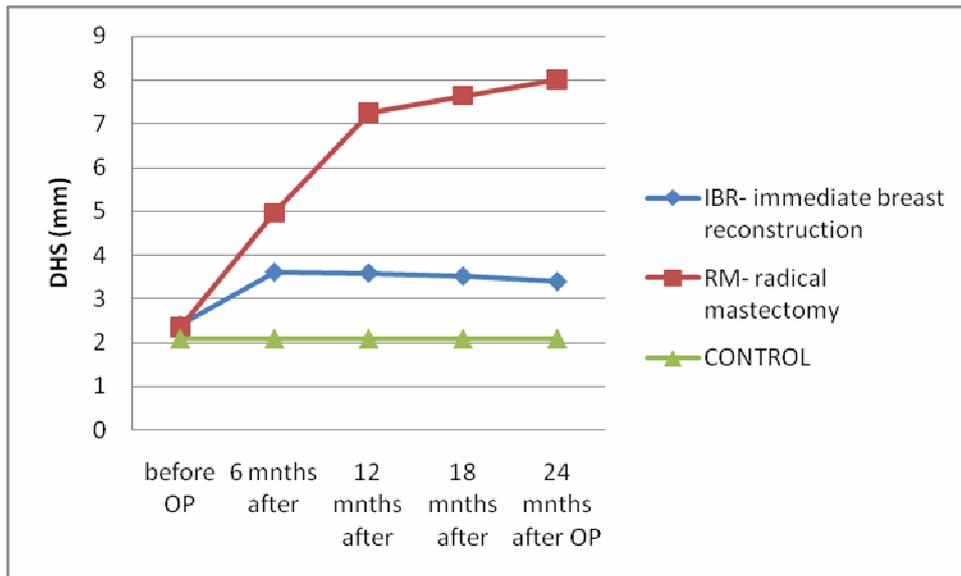
a/ MDL – the maximal deviation of the line of the superior posterior iliac spines from C7-S1;



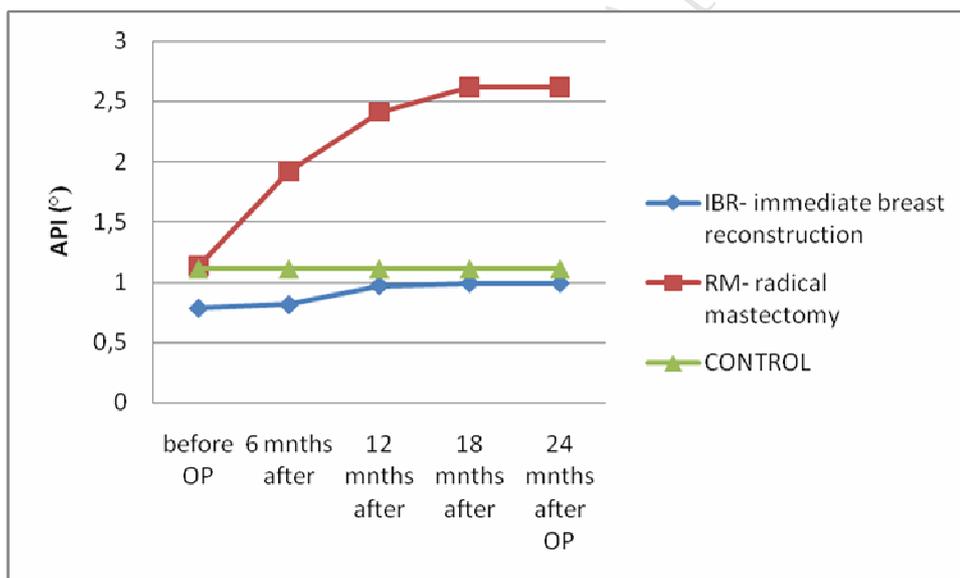
b/ DHSh – the difference in the height of the shoulders;



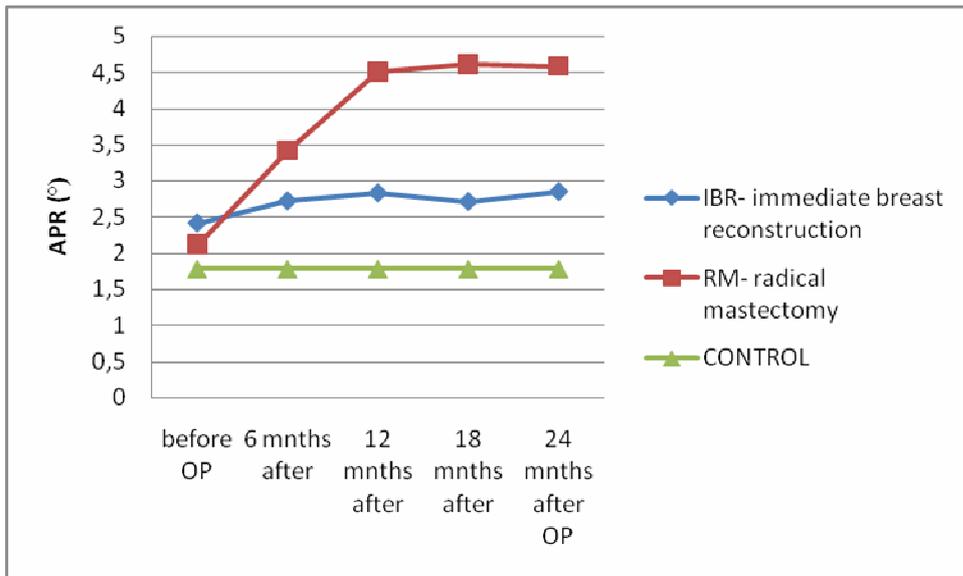
c/ DHS – the difference in the height of the lower border of the scapulae (angling of the body);



d/ API – the angle of pelvic inclination;



e/ APR – the angle of pelvic rotation in the sagittal plane;



f/ RS – the difference in depth of the lower border of the scapulae (rotation)

