THE CONTRIBUTION OF COMPUTERIZED SYSTEM IN SELECTION OF THE IMPLANT FOR BREAST AUGMENTATION

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REZUMAT

ABSTRACT
Introduction: A computerized system allows the creation of a three-dimensional simulation model of the breast that allows the surgeon to predict the outcome of the intervention based on the tissue characteristics and desires of each patient, making the patient a part of the decision. Aim of study: Although breast augmentation has become lately the most demanded aesthetic surgical procedure of our decade there is no dedicated system that can assist the surgeon in selecting an implant, educating the patient. This is why such a computerized system became mandatory. Material and methods: 869 patients that requested breast augmentation surgery were admitted in our clinic beginning with January 2006; all the patient’s consultations were done using the biodynamic implant selection system. The dimensions measured on the patients were introduced in the software that selected in the end an implant. The simulation of the future breast was done using external sizers and each patient was asked to check the simulation in the mirror. The precision of the system was confirmed postoperatively by 90% of the patients that found that the result was similar to the preoperative simulation. Results and discussions: Using the system is similar to following a script. The patient is informed and educated at every step about the implications and limits of her characteristics and desires. Conclusions: The computerized system in implant selection is a precious tool that assists surgeons in educating patients, implicating them in the final decision and therefore increasing the outcome satisfaction rate. Key Words: breast augmentation, implant selection, computerized system

INTRODUCTION
A computerized system allows the creation of a three-dimensional, morphable simulation model of the breast that allows the surgeon to predict, within reasonable limits, the outcome of the intervention. The system creates an ideal representation of the future breast, considering patient characteristics and patient desires in the context of ideal ratios between the dimensions of the breast and thorax. This ideal representation is moderated by the limits dictated by
patient soft tissues, IMF location, NAC position as well as by possible complications.¹

The construction of the ideal breast is dimensional, considering the Width, Height and Projection of the future breast as well as the consistency of the patient’s parenchyma.²

**AIM OF THE STUDY**

Breast augmentation has become lately the most demanded aesthetic surgical procedure of our decade.³ Although it became a common procedure in every cosmetic plastic surgeons daily routine the selection of the implant according to the patients desires and anatomic safety limits has yet remained in the hands of “hazard”.

Patient education and consultation on form stable/high cohesive gel implants requires a different approach when compared with the traditional way of selecting a round, responsive gel implant.⁴-⁶

The absence of a system that can guide the surgeon through the consultation process by helping him highlighting the important issues regarding breast augmentation from anatomical limits to the complications that can occur and help the patient make a fully consented decision has motivated us to develop such a system. This system will assist the surgeon and the patient to construct the future breast step by step, pointing on all advantages and disadvantages of going beyond or under certain limits. By helping the patient make a consented implant selection the system will increase the percentage of satisfied patients, and will decrease the complication rate which is the aim of every surgeon. A well selected implant (dimensions and size) that is in good equilibrium with the soft tissues of the patient will have a long term rejuvenating effect on the breast whether it is round or anatomical, except that in our experience, shaped implants will better enhance the upper pole and therefore appear more natural.⁷

**MATERIAL AND METHODS**

Beginning with January 2006, 869 patients that requested breast augmentation surgery were admitted in our Medical Service Clinic; they represented the study group for elaboration of the computerized implant selection system. A recent large demographic study demonstrated that women are concerned about shape just about as or even more than about size.⁸

We have started from the basic idea that before you can make a correct choice of the implant you must take in consideration a few mandatory measurements that point out the limits of the existing breast characteristics, the limits that you should not exceed in order to reduce the complication rate and the measurements of the desired future breast indicated by the patient by simulating the future breast in an easy three step maneuver pattern.

After making all the measurements, including the desire of the patient they are introduced in the software that will choose the closest implant size according to the introduced measurements. The system will also indicate the proper sizers that can simulate the future outcome of the breast. The sizers are placed in the special bra and the patient is invited to check the appearance in the mirror. Adjustments can be done further on if the patient desires. The system supports the surgeon in outlining the complications that can occur by going beyond the anatomical safety limits, by pointing out the exceeded measurements with red color meaning ”danger” or with yellow meaning ”close to the edge”. In addition to this there is an icon that pops up with a photo of the possible complication if the limit is exceeded.

Moreover, the software has also a surgical technique section where the surgeon is provided with all the details regarding the surgical plan. Validation of the precision of the system in choosing the right implant according to the patient’s desires and characteristics was done postoperatively by asking the patient if the result is satisfactory and if it matches the simulation that we did preoperatively with the external sizers. In more than 90% of the cases the answer was yes.

**RESULTS**

The computerized implant selection system is an important tool that assists the surgeon during the consultation, helps educating the patient in a comprehensive way and also is an important database that can store personal data, photos, medical history of the patients. (Fig. 1)
Biodimensional implant selection steps

1. Prior to selecting any implant the surgeon should measure the existing characteristics of the patient's breast, meaning: width, height, soft tissue and skin envelope. (Fig. 2)

- Breast width - indicates the current breast width.
- Breast height - important measure that indicates the disposition of the current breast on a vertical plane.
- Parenchyma thickness - indicates the amount of tissue that contributes to the projection of the future breast beside the projection of the implant.
- Soft tissue medial pole/lateral pole - indicates the thickness of the tissue that covers the medial and lateral borders of the implant.
- Soft tissue upper pole - indicates the thickness of the tissue that covers the upper slope of the implant.

2. The second measurements section refers to the desires of the patients:

- Desired intermammary distance - shows the desired future distance between the breasts. (Fig. 3)

- Desired upper fold position - indicates the height of the future breast. (Fig. 4)

- Desired lateral fold position - Indicates the lateral limit of the future breast width. (Fig. 5)

3. The implant selection section allows the surgeon to select a family of implants that was prior chosen by the patient.

After completing this last step the software is automatically choosing the most appropriate implant to the selected dimensions introduced in the system. If
the selected dimensions should be beyond anatomical safety limits the system is pointing them out giving the surgeon the opportunity to explain all the related risks and complications to the patient. The surgeon can as well adjust the position of the implant on the vertical plane and can show the patient a 2D projection increasing simulation. (Fig. 7)

Also the system suggests the proper sizers that can simulate the future result on the patient by placing them into a breast. (Fig. 8)

DISCUSSIONS

The system starts with a default model with average characteristics. This model is then adjusted using real patient data until it represents a realistic representation of the patient characteristics and desires.

At each step the system provides support materials (photos and movies) to help you do the measurements in a more standardized way and to help you better educate the patient about the limits and the possible complications.

The system defines an ideal implant by subtracting from the ideal desired breast, the existing patient soft tissues in the three dimensions: width, height and projection. This ideal implant is then compared to the entire range of available implants and the closest implant is selected automatically.

Once selected, an implant can be manipulated vertically so that it is placed in the optimal position (at 50% of the future breast height). The system provides instant feedback, showing to the doctor the implications of the simulated implant placement. All through the simulation the system considers the surgical implications of the selections and warns the surgeon when limits are exceeded or when the simulated outcome is not possible (surgical limitations).

After the computer simulation is completed, the outcome can be simulated for the patient in a more realistic way by using a family of external sizers. The system instructs the surgeons about the most appropriate sizers and he can simulate the outcome on the patient by placing them in a bra. The patient can take a look at the simulation in the mirror and confirm the validity of the selection.

The using of the system is similar to following a script or a plan ensuring in this way that the doctor covers every step and understands every patient as well as possible. The patient is informed and educated at every step about the implications and limits of her characteristics and desires.

The selection of the implant is a shared responsibility between the surgeon and the patient. The patient must understand and accept all the limitations and possible complications of the intervention before giving her consent.9,10

When the patient comes for surgery, the system assists the doctor with the dimensional details of the surgical techniques. It automatically computes all the relevant distances related to the creation and position of the implant pocket as well as the skin required to cover the lower pole of the implant.

The system is supplemented by a postoperative module that allows the doctor to monitor the evolution of key measurements and to assess the patient satisfaction.

The data collected at the consultation is available “one click away” being saved in an internal database.

The system also includes basic photo management and manipulation as well as a statistics module that allows the doctor to assess the evolution of his practice in terms of used implants, conversion of the patients to surgery and trends in implants.

CONCLUSIONS

In conclusion, the advantages of a computerized system in the management of a breast augmentation are:

1. Improves the patient education and information through a visual media system (specific photos and movies).
2. Collects objective patient breast parenchyma/tissues and thorax characteristics for describing the patient limits and current breast dimensions.


4. Assists the patient/surgeon in the four-dimensional (width, height, projection and consistency) creation of an ideal desired breast.

5. Assists the surgeon in finding the “ideal implant” and dimensional selection of the most appropriate available implant.

6. Improves the communication between the surgeon and the patient predicting visually the future breast and outcomes.

7. Creates a morphable “3D-like” model used in simple breasts but also in difficult breasts (ptotic breasts, asymmetric breasts, tuberous breasts).

8. Once selected the most appropriate implant, assists the surgeon in finding the combination of external sizers to show the patient (in front of the mirror) the future desired breast.

9. Improves the conversion rates even for beginner surgeons creating patient trust.

10. Reduces reoperation rates for aesthetic size and shape reasons and surgical complications related to tissue limits.

11. Provides useful information for external markings of pocket creation (implant location, pocket base-size and contour limits, and location of nipples areola complex and inframammary fold).

12. Provides a before and after database of patient photos.

REFERENCES


