

Title: Predicting Breast Cancer Conservative Treatment Aesthetic Outcome

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Background:

There are many studies reporting the evaluation of the cosmetic results of breast-conserving therapy (BCT) after the intervention. However, the development of new oncoplastic techniques in breast conservation raises the problem of selecting the most appropriate treatment during the pre-operative planning. Now, more than ever, it is important not only to compare results after the treatment but also to predict the cosmetic result before the intervention.

This is a preliminary report investigating the creation of a new objective and prospective methodology able to predict the aesthetical result after BCT. We are carrying out a multicentric study using pictures captured in different timings in the process of BCT (before and after surgery and radiotherapy) and a set of features collected about patients and tumour. The objective of the present work is to foretell the patients aesthetic result submitted to BCT 30 days after surgery.

Material and Methods:

Digitalized photographs of 32 patients taken 30 days after surgery were objectively evaluated with BCCT.core (Breast Cancer Conservative Treatment. cosmetic results), a software developed to evaluate the overall cosmetic result after BCT. The result reported by BCCT.core is based on the standard Harry scale (excellent, good, fair, poor).

Next, we developed a predictor of this cosmetic result based on information collected before surgery (patient and tumour characteristics). The predicting model, constructed with a well-established technique (SVMs), automatically uncovers the optimally relation between the input parameters to categorize the images. Agreement between the predicted aesthetic result and the actual result as given by BCCT.core was calculated using kappa statistics (k) and the correct classification rate (cr).

Results:

A performance of ($k=0.42$; $cr = 63\%$) was obtained when categorizing the set of 32 images into the aforementioned four classes. Although the agreement was only moderate, it was observed that all errors, except two, were to continuous classes.

Conclusions:

Although it is difficult to predict with rigor how the breast will be changed by a specific procedure, models to estimate the cosmetic result are important to assist on the pre-operative planning. The prediction model we are investigating was capable, with a moderate agreement, of predicting the 30 days after surgery aesthetic outcome of the BCT by including only preoperative clinical information. The dimension of the study does not allow us to obtain conclusive results and therefore more patients will be included in future works.