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Ana de Oliveira Costa Parreira

Immediate Breast Reconstruction at a Multicenter Hospital: A Comprehensive Review of 279 cases

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Immediate Breast Reconstruction at a Multicenter Hospital: A Comprehensive Review of 279 cases

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Ao meu avô Parreira,

que, sem saber, foi a razão pela qual embarquei nesta aventura.

Aos meus pais,

por serem o meu porto seguro.

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Immediate Breast Reconstruction at a Multicenter Hospital:
A Comprehensive Review of 279 cases

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Abstract

Background: This study aims to evaluate and compare the outcomes and complications of various immediate breast reconstruction (IBR) techniques following mastectomy at Centro Hospitalar Universitário São João (CHUSJ) to identify correlations between these variables.

Methods: A retrospective cohort study was conducted, auditing all women registered for mastectomy and immediate breast reconstruction (IBR) at the Breast Centre of our institution from January 2021 to December 2023. Data were extracted from clinical records, focusing on surgical details, patient demographics, and complication rates. Statistical analyses, including univariate and multivariate analyses, were performed to identify significant differences and correlations.

Results: A total of 279 IBRs were analyzed. Of these, 85.7% were heterologous reconstructions (57.1% with expanders, 28.6% with direct implants) and 10.7% were autologous (3.2% with DIEP, 7.5% with TRAM flaps). Immediate complications were observed in 48% of cases, with nipple-areola complex (NAC) necrosis being the most frequent (15%). Late complications occurred in 35.5% of IBRs, with asymmetry being the most common (9.3%). Mastectomies with a peri-areolar incision were more likely to require unexpected skin or NAC excision intraoperatively (66.7%). Statistically significant differences in immediate complications were not observed among different reconstructive techniques. However, direct implants and retromuscular expanders were associated with higher incidences of late complications.

Conclusions: This study found no significant differences in immediate complication rates among various IBR techniques. However, late complications were more common in reconstructions involving direct implants and retromuscular expanders. This research contributes valuable data for improving breast reconstruction practices and patient education at ours' and comparable institutions.

Key words: Breast cancer, mastectomy, immediate breast reconstruction, postoperative complications

Resumo

Objetivos: O objetivo deste estudo é avaliar e comparar os resultados e complicações das várias técnicas de reconstrução mamária imediata (RMI) após mastectomia no Centro Hospitalar Universitário São João (CHUSJ) e identificar correlações entre estas variáveis.

Métodos: Foi realizado um estudo de coorte retrospetivo, selecionando todas as mulheres registadas como propostas para mastectomia e reconstrução mamária imediata (RMI) no Centro de Mama do CHUSJ, de janeiro de 2021 a dezembro de 2023. Os dados foram colhidos dos registos clínicos, com foco em detalhes cirúrgicos, dados demográficos dos pacientes e taxas de complicações. Análises estatísticas, incluindo análises univariadas e multivariadas, foram realizadas para identificar diferenças e correlações significativas.

Resultados: Foram analisadas 279 RMI. Destas, 85,7% foram reconstruções heterólogas (57,1% com expansores, 28,6% com implantes) e 10,7% autólogas (3,2% com DIEP, 7,5% com retalhos TRAM). Complicações imediatas foram observadas em 48% dos casos, sendo a necrose do complexo areolar mamilar (CAM) a mais frequente (15%). Complicações tardias ocorreram em 35,5% das RMIs, sendo a assimetria a mais comum (9,3%). As mastectomias com incisão peri-areolar tiveram maior probabilidade de necessitar de excisão inesperada da pele ou do CAM no intra-operatório (66,7%). Não foram observadas diferenças estatisticamente significativas nas complicações imediatas entre as diferentes técnicas de reconstrução. No entanto, os implantes e os expansores retromusculares foram associados a uma maior incidência de complicações tardias.

Conclusões: Este estudo não encontrou diferenças significativas nas taxas de complicações imediatas entre as várias técnicas de RMI. No entanto, as complicações tardias foram mais comuns nas reconstruções com implantes e expansores retromusculares. Esta investigação contribui com dados valiosos para melhorar as práticas de reconstrução mamária e a educação das pacientes no CHUSJ e em instituições comparáveis.

Palavras chave: cancro da mama, mastectomia, reconstrução mamária imediata, complicações pós-operatórias.

Introduction

In Portugal, breast cancer is the second most common type of cancer among women, with approximately 7,000 new cases diagnosed annually[1]. This includes a significant number of young women who anticipate that their treatment will not only ensure long-term survival but also provide favorable aesthetic and psychological outcomes [2,3]. Nowadays, as a consequence of years of scientific progress, a plethora of treatments are available that can be tailored to each individual according to their disease staging, comorbidities, and in some ways personal preferences. Surgical options now offer a greater range of choices than ever before, including different techniques from breast-conserving surgery to nipple-sparing mastectomy [1,4].

Literature has indicated an increase in all types of mastectomies, including both unilateral and bilateral procedures [2]. These surgeries may be performed with curative intent, prophylactic, or as a combination of curative and contralateral prophylactic[5,6]. Prophylactic mastectomies are considered in women with increased breast cancer risk, such as those with genetic mutations (that account for less than 15% of all breast cancers)[7] or familial risk.[8]

The increased number of mastectomies has led to a rise in breast reconstruction surgeries [8] Furthermore, the number of patients choosing to undergo breast reconstruction following mastectomy has increased in recent years [6,9,10], due to multiple factors, including surgical technique refinements, which contribute to predictable and better aesthetic outcomes [5].

Breast reconstruction can be performed either immediately after mastectomy or delayed [11]. This decision is made based on a multitude of variables such as cancer stage, and the patient's informed preference [3,5,10].

Immediate breast reconstruction (IBR) has been associated with improved psychosocial and quality of life outcomes, due to its association with higher satisfaction[12], improved body image [13] and increased self-esteem [11,14,15]. This is particularly relevant in the context of young patients, for whom the mastectomy alone has an important effect on the body and mind, and who may therefore benefit from IBR in order to improve their quality of life after surgery [2,5,16].

Breast reconstruction can be performed with several reconstructive techniques which may include the use of autologous tissues, implants, or a combination of both [2,17,18]. Studies showed that autologous tissues are chosen to provide a more aesthetic, better symmetrization of the contralateral side, natural appearance and avoid complications related to subsequent radiotherapy [2,15,19]. On the other hand, heterologous reconstruction can be performed in single-stage surgery using definitive

implants or in two-stage surgery by first placing a tissue expander, followed by a definitive implant [20,21], which often requires more revision surgeries.

This analysis aims to evaluate and compare the different types of breast reconstruction techniques in terms of their outcomes and their short and long-term complications, as well as estimate the number of surgeries that each one requires to achieve the desired result. It also pretends to establish associations between patients' intrinsic factors (BMI, underlying pathologies) and postoperative complications.

All types of reconstruction described have their complications – some more technique-specific and others transversal to all techniques. Surgeons need to be aware of them, as well as the length of hospitalization and reintervention rate to better explain their reconstructive options to patients.

Subsequently, this study aims to compare its results with other centers dedicated to breast reconstruction. Therefore, future procedures will be optimized, if necessary, and patients will be informed more thoroughly about their prospects according to each type of reconstruction, thus leading to much more informed decision-making [22].

Methods

Data source and Study population

This research project is a retrospective cohort study that was conducted exclusively at the Centro Hospitalar Universitário São João, specifically within the Plastic and Reconstructive Surgery Department.

An audit was performed on all women registered as having undergone a mastectomy, from the list of women registered on the Breast Centre of our institution, which is recognized by EUSOMA, (European Society of Breast Cancer Specialists) from January 2021 to December 2023. Subsequently, each clinical file was consulted to verify whether the procedure described was a mastectomy with immediate breast reconstruction, as this was the focus of this study. Consequently, patients who had undergone mastectomy alone or who were proposed for deferred mastectomies were excluded.

Once the women deemed eligible for this study had been identified, the clinical processes were accessed via our institution informatic system (SClinico) to collect the necessary information to complete all the parameters we aim to evaluate.

In order to fulfil the aforementioned purpose, the following data were collected: date of surgery, oncological surgeon, plastic surgeon, mastectomy side, types of mastectomy, unexpected need for skin excision or intra-operative nipple-areola complex (NAC), type of incision, reconstructive technique, flap used, BMI, smoking habbits, diabetes, autoimmune diseases, anticoagulation therapy, previous surgery and type of surgery, need for intraoperative transfusion, previous radiotherapy , weight of the piece, prophylactic or therapeutic mastectomy, number of days with drain, length of stay, immediate complications, late complications, which is the corresponding Clavien-dindo, need for readmission, need for reintervention, pre and post operative image, time between the last expansion and implant's placement, type of implant, need for reintervention due to aesthetic defect and number of surgical interventions the patient underwent in total.

Statistical analyses

All continuous variables exhibited a non-normal distribution, as evidenced by the Shapiro-Wilk normality test. Consequently, the median and P25-P75 were employed to describe these variables. Categorical variables were described using absolute and relative frequencies. The Chi-square test was employed to assess the statistical significance of differences between groups when

both variables were categorical. In instances where the assumptions of the Chi-square test were not met, Fisher's exact test was utilised. The Mann-Whitney test was employed to assess the statistical significance of differences between groups comprising a categorical variable (with two categories) and a continuous variable. The Kruskal-Wallis test was employed to assess the statistical significance of differences between groups defined by a categorical variable (with three or more categories) and a continuous variable. Missing data were classified as “no info” in the respective category. A significance level of 0.05 was deemed appropriate for all analyses.

Results

This study analyzed 279 immediate breast reconstructions performed between January 2021 and December 2023. The patients who underwent immediate breast reconstruction and were included in this study had a median age of 47 years (P25-P75: 40-54 years) and a median body mass index (BMI) of 24 kg/m² (interquartile range: 21.8-26.6 kg/m²). Additionally, regarding comorbidities, 21.9% of the cohort were identified as current smokers, 1.5% were diabetic, 5.5% had a diagnosis of an autoimmune disease, and 2.9% had anticoagulant therapy.

With regard to surgical history, 21.1% of the patients had previously undergone surgery on the breast that was the subject of the planned procedure. Table 1 provides an overview of the types of previous surgery that women underwent. Of those 21,1%, 14,0% underwent tumorectomies, 4.7% reductions mammoplasties, 0.7% augmentations mammoplasties and 0.7% contralateral mammoplasties for symmetry.

Of the 279 reconstructions conducted, 52% were on the right side and 48% on the left side, as seen on Table 2.

With regard to the intention of the mastectomy, the majority of patients underwent mastectomy with the intention of treatment (61.3%), while 31.9% underwent mastectomy for prophylactic reasons: due to a previous family history (1.8%) or a positive genetic test (16.5%), a lesion that posed a higher risk of breast cancer (0.7%), a personal history of breast cancer (10.8%) or of their own volition (2.1%).

In this study, 85,7% were heterologous reconstructions and 10,7% were autologous. Regarding heterologous techniques, 57,1% used expanders and 28,6% direct implants. As autologous reconstruction, 3,2% were with DIEP and 7,5% with TRAM flap. (Table 3).

Regarding immediate complications, at least one complication was observed in 48% of the immediate breast reconstructions included in the study. This included NAC necrosis (15%), of these, 10.0% were partial and 3.6% were total necrosis, hematoma (10.7%), mastectomy flap necrosis (9.7%), seroma (9.3%), NAC epidermolysis (8.2%), dehiscence (5.0%), infection (3.6%) and flap epidermolysis (2.9%). Additionally, 1.8% of patients experienced necrosis of the DIEP/Latissimus dorsi /TRAM mastectomy flap and 1.4% required the removal of the expander.

Table 4 presents the relationship between sociodemographic and clinical characteristics and the presence of immediate complications. There were significant differences between smokers and non-smokers in terms of the occurrence of immediate complications, with a higher proportion of

smokers experiencing complications (29.8% vs. 14.7%; p=0.003). Among patients on anticoagulant therapy, there were significant differences in the proportion of patients who had complications and those who had no complications (5.3% vs. 0.7%; p=0.031).

Table 5 delineates the correlation between sociodemographic and clinical characteristics and the occurrence of late complications. Late complications were identified in 35.5% of the IBR performed, with asymmetry being the most frequently identified complication (9.3%). Other complications included rippling (5.7%), contour defects (5.0%), and exposure of the implant/expander (3.6%).

Although statistically significant differences were observed regarding smoking habits, the proportion of smokers with and without complications did not differ significantly (24.3% vs. 23.5%). Consequently, this difference can be attributed to the proportion of patients without a one-year follow-up.

Concerning specimen weight, the median value was 409.5 mg (25th to 75th percentile: 270–590).

Table 6 presents an analysis of other factors that can influence the occurrence of immediate complications, including intention of the mastectomy, specimen weight and reconstructive techniques. As illustrated, among patients who experienced immediate complications, 36.6% had a retromuscular expander, 12.7% had a prepectoral expander, and 11.9% had a prepectoral implant. No statistically significant differences were observed between those who did or did not experience immediate complications and the type of reconstructive technique employed. In contrast, the use of direct implant and retromuscular expander followed by an implant were found to be associated with a higher incidence of late complications.

Table 7 presents a comparison of the distribution of Clavien-Dindo classification grades and the reconstructive technique employed.

Table 7 illustrates that the majority of IBR analysed in this study, regarding a dual plane expander, retromuscular implant and homolateral TRAM, resulted in complications classified as grade IIIb according to the Clavien-Dindo classification (65.0%, 66.7% and 55.6%, respectively). Not a single IBR performed resulted in complications classified as grade IV or V.

Table 8 illustrates the proportion of IBR that had immediate complications, according to the type of reconstructive technique and type of complication.

Table 8 illustrates that the majority of seroma incidents occurred in reconstructions where the retromuscular expander (26.9%), prepectoral implant (23.1%) and prepectoral expander (19.2%)

were choosen, whereas the DIEP and TRAM techniques were not associated with this complication. With regard to mastectomy flap necrosis, all reconstructive techniques were associated with this complication, retromuscular expander being the most frequent one.

Tables 9a, 9b and 9c illustrate the proportion of late complications by type of reconstructive technique. It is notable that a considerable proportion (35.7%) of cases of contour defects were attributable to the reconstruction with a dual plane implant. Furthermore, of the 16 instances of rippling, 68.8% had been associated with a prepectoral implant. With regard to asymmetry, the most prevalent late complication, this was observed with greater frequency in reconstructions performed with the use of a implants (14 IBRs, 53.8%).

A review of the data from patients who underwent skin-sparing mastectomy and NAC (Table 10) revealed no association between the volume of the specimen and the unexpected need to excise the skin or NAC intraoperatively (p=0.243). Furthermore, it was observed that none of the mastectomies in which an incision was made through the inferior or lateral breast fold required unexpected NAC excision. Mastectomies with a peri-areolar incision with extension accounted for the majority of mastectomies in which skin or NAC had to be excised unexpectedly (66.7%).

In addition to the unexpected need for skin excision or NAC, we also assessed the need for intraoperative blood transfusion. Table 11 shows that 98,2% of patients did not require transfusion, while 0,7% did.

Table 12 presents a comparison of the characteristics of hospitalisation and re-interventions according to the reconstructive technique employed. As evidenced in Table 10, patients who had prepectoral expander exhibited a markedly longer median duration of drain usage (10 days vs. 8 days; p=0.002). With regard to the number of days spent in the hospital, it was found that patients who had a prepectoral expander and a dual plane expander placed had a longer median associated hospitalization stay when compared to patients who did not use this technique. The retromuscular expander was associated with a shorter median hospitalization time (7 days vs. 9 days). It is also noteworthy that 23.9% of cases of readmission due to complications occurred in patients who had undergone IBR using a retromuscular expander, while 24.4% had reintervention due to complications using the same technique.

Table 13 presents a comparison of the various reconstructive techniques in relation to the incidence of reintervention due to aesthetic defects. It is important to note that a significant proportion of patients who underwent a retromuscular expander (54.0%) had a clear indication for

reintervention. In contrast, none of the reconstructions performed using a prepectoral expander had an indication for this type of reintervention.

In our sample, 121 immediate breast reconstructions performed with expanders were followed by the placement of an implant. The mean time between the two surgeries was 293 days (49-1237).

Table 14 and 15, respectively, represent the number of pre- and post-operative images that were taken. In terms of preoperative imaging, 81,0% of patients underwent mammography and magnetic resonance imaging, 15.8% underwent mammography alone, 2.5% underwent magnetic resonance imaging alone, and 0.7% did not undergo any imaging method. Regarding, postoperative imaging, 63.4% underwent mammography, 6.8% underwent mammography and MRI, 0.7% underwent only MRI, and 29,0% did not undergo any imaging method.

Table 16 presents the number of surgical procedures performed on the patients. Consequently, 10.7% of the women underwent one surgery, 33.7% two, 29.4% three, 17.6% four, 5.7% five, 2.1% six, 0.4% seven and 0.4% nine surgeries.

Discussion

This study compares these numerous variables regarding immediate breast reconstruction.

Some concerns have been raised regarding delays in adjuvant treatment due to surgical complications and the worst outcomes resulting from adjuvant radiotherapy in the context of IBR. In response to this concern, studies were conducted to compare these complications. The results demonstrated that the timing of breast reconstruction has no effect on overall complication rates. Furthermore, there was no increase in overall complication rates in patients who underwent immediate reconstruction rather than delayed reconstruction in the setting of post-mastectomy radiotherapy. It can therefore be concluded that there is no advantage to be gained from delaying reconstruction of the breast in these patients.[15] The existing literature indicates that immediate reconstruction is considered oncologically safe[23] and that radiotherapy is no longer a contraindication[5, 24].

Some studies have reported mean post-mastectomy IBR rates of 21% in the United Kingdom and 24% in the United States[19]. In our institution, this rate is approximately 70%, as sentinel lymph node biopsy is performed previously and therefore the needs of adjuvant therapy is anticipated, such as radiotherapy. This is possible due to the fact our institution has 13 surgeons allocated to this procedure.

A population-based study of inpatient IBR patients enables the formulation of significant observations. The majority of the IBRs observed were heterologous reconstructions, which is in accordance with the literature and demonstrates the growing preference for this technique and the decline of autologous reconstruction[14, 17, 19, 27]. Nevertheless, some studies have argued that autologous reconstruction is superior due to its more natural behaviour[6], its safety regarding complications in the event of adjuvant radiotherapy [18] and better symmetrization of the contralateral side.

In this study, the most frequent reconstructive technique performed was a retromuscular expander, which was also the technique most associated with complications. However, no significant statistical difference was found between reconstructive techniques and immediate or late complications.

As indicated in analogous articles, the incidence of complications varies according to the severity of the procedure and the centre where the reconstruction was performed. Major complications have been reported to occur in a range of 12% to 37% of cases.[28] Another study

demonstrated that the overall complication rate was 26.5%, which is comparable to previous series of oncoplastic breast surgery.[2] Conversely, another study reported a complication rate that ranged from 15% to 18%. [29] Despite the fact that almost half of the surgeries performed at our institution had at least one complication, these were mostly minor complications that reflected the inherent complexity of the process of immediate breast reconstruction.

As anticipated and supported by the existing literature[18, 19, 27], smoking habits are significantly associated with a higher proportion of immediate complications. Consequently, it is of paramount importance to inform patients about this risk in order to encourage them to cease smoking before undergoing surgery.

The results demonstrated that NAC necrosis was one of the most prevalent complications, occurring in 15% of cases. A number of studies have reported that periareolar incisions result in inferior outcomes in terms of NAC necrosis [26]. Therefore, it is unsurprising that we also conclude that mastectomies with a peri-areolar incision with extension account for the majority of mastectomies in which skin or NAC had to be excised unexpectedly (66.7%), since this approach is associated with a more vascularly fragile mastectomy flap.

This complication is a significant concern[29], not only due to the necessity for reintervention for exposed heterologous material utilized in reconstruction, but also due to its detrimental aesthetic impact on the patient's identity.

With regard to late complications, our study demonstrated that asymmetry was the most prevalent, occurring in 9.3% of cases. This complication frequently requires reintervention, particularly in younger women due to its aesthetic impact and subsequent impact on overall wellbeing. It is notable that older women tend to consider cosmetic outcomes as a lower priority [14].

With regard to the intention of the mastectomy, no study was identified that had hypothesized whether this may be a factor in postoperative complications. It is, however, encouraging to note that this did not correlate with complications. This suggests that the thickness of the mastectomy flaps performed by the oncological surgeon is not related to the therapeutic or prophylactic intention of the mastectomy.

It should be noted that the study is subject to certain limitations. Firstly, as the study was observational in nature, it is possible that the observed associations may not be causal, but instead reflect imbalances in other features. Consequently, it is not possible to exclude the possibility of confounders, particularly by factors that could not be measured.

As the study was retrospective, there is a possibility of selection bias, particularly given that data collection was performed by three authors. In addition, there may be information bias, as the identification of complications depends on the records from their hospital stay and the attending surgeon's consults, and therefore there is heterogeneity in the quality of this information.

It should be noted that this study was conducted exclusively at an urban academic centre, and since the results of breast reconstruction are partly dependent on the surgeon, and thus inherent to this hospital's group, it becomes more difficult to apply in other hospital centres. Hence these findings may not be generalizable to women treated at other centre including smaller, non-academic ones.

Furthermore, the sample size is a limiting factor in our ability to draw conclusions and make associations. Moreover, the follow-up period was relatively brief in comparison to the length of time required to observe long-term outcomes.

In conclusion, this study found no significant differences in immediate complication rates among various IBR techniques. However, late complications were more common in reconstructions involving direct implants and retromuscular expanders. In future studies, a larger study population with a long-term follow-up is needed to more accurately determine late complications and aesthetic defects.

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Conflict of interest/financial disclosure

The authors declare that they have no conflict of interest. None of the authors have a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

Declaration of Generative AI in scientific writing

Only used to improve readability and language, not to replace key researcher tasks such as interpreting data or drawing scientific conclusions.

Ethics committee

The project was submitted to the ethics committee of CHUSJ for review and consideration.

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None

Authors contribution

Ana de Oliveira Costa Parreira[1,2],

Eliane Jaconiano[1,2],

Ricardo Horta [3],

Pedro Machado[1]

(1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data

(2) drafting the article or revising it critically for important intellectual content

(3) final approval of the version to be submitted.

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Tables

Table 1. Description of the types of surgeries women had undergone previously

Previous surgery		
	Frequency N	Percentage %
	223	79,9
Augmentation mammoplasty	2	,7
Reduction mammoplasty	13	4,7
Contralateral symmetrisation	2	,7
Tumorectomy	39	14
Total	279	100,0

Table 2. Comparison of mastectomy side of the IBR

Mastectomy side		
	Frequency N	Percentage %
Right	145	52,0
Left	134	48,0
Total	279	100,0

Table 3. Overview of types of reconstruction techniques

	Reconstruction technique N (%)
Heterologous reconstruction technique	240 (85,7)
Retromuscular expander	101 (36,1)
Prepectoral expander	39 (13,9)
Dual Plane expander	20 (7,1)
Prepectoral implant	38 (13,6)
Dual plane implant	27 (9,6)
Retromuscular implant	15 (5,4)
Autologous reconstruction technique	30 (10,7)
DIEP	9 (3,2)
Homolateral TRAM	9 (3,2)
Contralateral TRAM	12 (4,3)

Table 4. Comparison of sociodemographic, clinical and surgical characteristics between patients with and without immediate complications

	Immediate Complications		
	No Complications N (%)	**Complications** N (%)	**p**
	145 (52,0)	134 (48,0)	
Age (years)*	47,0 (40,0 – 54,0)	48,0 (41,0 – 54,0)	0,340
Body Mass Index *	24,1 (22,3 – 26,2)	23,8 (21,0 – 26,9)	0,648
Smoking habits			0,003
No	116 (85,3)	87 (70,2)	
Yes	20 (14,7)	37 (29,8)	
Anticoagulant therapy			0,031
No	141 (99,3)	125 (94,7)	
Yes	1 (0,7)	7 (5,3)	
Diabetes *mellitus*			0,355
No	141 (99,3)	129 (97,7)	
Yes	1 (0,7)	3 (2,3)	
Autoimmune Diseases			0,680
No	137 (95,0)	123 (93,9)	
Yes	7 (5,0)	8 (6,1)	
History of breast radiotherapy			0,063
No	108 (74,5)	112 (83,6)	
Yes	37 (25,5)	22 (16,4)	

* the median (P25-P75) is used to describe this variable

Table 5. Comparison of sociodemographic, clinical and surgical characteristics between patients with and without late complications

	Late Complications			
	No Complications N (%)	**Complications** N (%)	**Without 1-year follow-up** N (%)	**p**
	145 (52,0)	99 (35,5)	35 (12,5)	
Age (years)*	46,5 (41,0 – 52,0)	48,0 (40,0 – 55,0)	50,0 (40,0 – 57,0)	0,394
Body Mass Index *	24,3 (21,0 – 25,9)	23,5 (21,1 – 25,9)	24,2 (20,5 – 25,7)	0,229
Smoking habits				0,033
No	103 (75,7)	67 (75,3)	33 (94,3)	
Yes	33 (24,3)	22 (24,7)	2 (5,7)	
Anticoagulant therapy				0,287
No	141 (97,9)	90 (94,7)	35 (100,0)	
Yes	3 (2,1)	5 (5,3)	0 (0,0)	
Diabetes *mellitus*				0,449
No	143 (99,3)	93 (97,9)	34 (97,1)	
Yes	1 (0,7)	2 (2,1)	1 (2,9)	
Autoimmune Diseases				0,651
No	136 (95,1)	89 (94,7)	32 (91,4)	
Yes	7 (4,9)	5 (5,3)	3 (8,6)	
History of breast radiotherapy				
No				0,759
Yes	116 (80,0)	78 (78,8)	26 (74,3)	
	29 (20,0)	21 (21,2)	9 (25,7)	

* the median (P25-P75) is used to describe this variable

Table 6. Comparison of other clinical and surgical characteristics between patients with and without immediate and late complications

	Immediate complications			**Late complications**			
	No Complications N (%)	**Complications** N (%)	**p**	**No Complications** N (%)	**Complications** N (%)	**Without 1-year follow-up** N (%)	p
	145 (52,0)	134 (48,0)		145 (52,0)	99 (35,5)	35 (12,5)	
Intention of mastectomy			0,568				0,798
Post-recurrence	7 (4,8)	5 (3,7)		7 (4,8)	5 (5,1)	0 (0,0)	
For totalisation	3 (2,1)	4 (3,0)		3 (2,1)	4 (4,0)	0 (0,0)	
For treatment	84 (57,9)	87 (64,9)		89 (61,4)	58 (58,6)	24 (68,6)	
Prophylactic	51 (35,2)	38 (28,4)		46 (31,7)	32 (32,3)	11 (31,4)	
Reconstructive technique							
Retromuscular expander	52 (35,9)	49 (36,6)	0,903	82 (56,6)	12 (12,1)	7 (20,0)	< 0,001
Prepectoral expander	22 (15,2)	17 (12,7)	0,550	22 (15,2)	9 (9,1)	8 (22,9)	0,109
Dual Plane expander	8 (5,5)	12 (9,0)	0,266	12 (8,3)	7 (7,1)	1 (2,9)	0,644
Prepectoral implant	22 (15,2)	16 (11,9)	0,432	11 (7,6)	16 (16,2)	11 (31,4)	0,001
Dual plane implant	14 (9,7)	13 (9,7)	0,990	4 (2,8)	19 (19,2)	4 (11,4)	< 0,001
Retromuscular implant	5 (3,5)	10 (7,5)	0,137	3 (2,1)	12 (12,1)	0 (0,0)	0,002
DIEP	5 (3,5)	4 (3,0)	0,827	4 (2,8)	5 (5,1)	0 (0,0)	0,442
Homolateral TRAM	4 (2,8)	5 (3,7)	0,742	3 (2,1)	5 (5,1)	1 (2,9)	0,391
Contralateral TRAM	7 (4,8)	5 (3,7)	0,652	1 (0,7)	10 (10,1)	1 (2,9)	0,001
Volume of specimen*	428 (280 – 543)	398 (266 – 629)	0,989				

* the median (P25-P75) is used to describe this variable

Table 7. Clavien-Dindo classification by type of reconstructive technique

	No complications	I	II	IIIa	IIIb
	145 (52,0)	145 (52,0)	145 (52,0)	145 (52,0)	134 (48,0)
Reconstructive technique					
Retromuscular expander	63 (62,4)	14 (12,9)	1 (1,0)	3 (1,7)	69 (38,8)
Prepectoral expander	19 (48,7)	5 (12,8)	1 (2,56)	2 (5,1)	12 (30,8)
Dual Plane expander	6 (30,0)	1 (5,0)	0 (0,0)	0 (0,0)	13 (65,0)
Prepectoral implant	22 (57,9)	4 (10,5)	0 (0,0)	0 (0,0)	12 (31,6)
Dual plane implant	16 (59,3)	4 (14,8)	0 (0,0)	0 (0,0)	7 (25,9)
Retromuscular implant	4 (26,7)	1 (6,7)	0 (0,0)	0 (0,0)	10 (66,7)
DIEP	5 (55,6)	1 (11,1)	0 (0,0)	0 (0,0)	3 (33,3)
Homolateral TRAM	2 (22,2)	1 (11,1)	0 (0,0)	1 (11,1)	5 (55,6)
Contralateral TRAM	5 (41,7)	2 (16,7)	0 (0,0)	0 (0,0)	5 (41,7)

Table 8. Proportion of immediate complications by type of reconstructive technique

	Seroma N (%)	**Flap necrosis** N (%)	**Infection** N (%)	**Epidermolysis** N (%)	**Hematoma** N (%)	**Dehiscence** N (%)	**Expander removal** N (%)
	26 (100)	69 (100)	7 (100)	30 (100)	30 (100)	14 (100)	4 (100)
Reconstructive technique							
Retromuscular expander	7 (26,9)	22 (31,9)	4 (57,1)	17 (56,7)	12 (40,0)	3 (21,4)	2 (50,0)
Prepectoral expander	5 (19,2)	5 (7,3)	1 (14,3)	4 (13,3)	4 (13,3)	3 (21,4)	1 (25,0)
Dual Plane expander	2 (7,7)	8 (11,6)	0 (0,0)	1 (3,3)	0 (0,0)	4 (28,6)	0 (0,0)
Prepectoral implant	6 (23,1)	10 (14,5)	0 (0,0)	0 (0,0)	6 (20,0)	0 (0,0)	0 (0,0)
Dual plane implant	1 (3,9)	5 (7,3)	1 (14,3)	3 (10,0)	5 (16,7)	1 (7,1)	1 (25,0)
Retromuscular implant	2 (7,7)	6 (8,7)	0 (0,0)	2 (6,7)	1 (3,3)	3 (21,4)	0 (0,0)
DIEP	0 (0,0)	4 (5,8)	0 (0,0)	0 (0,0)	1 (3,3)	0 (0,0)	0 (0,0)
Homolateral TRAM	0 (0,0)	4 (5,8)	0 (0,0)	1 (3,3)	1 (3,3)	0 (0,0)	0 (0,0)
Contralateral TRAM	0 (0,0)	4 (5,8)	0 (0,0)	2 (6,7)	0 (0,0)	0 (0,0)	0 (0,0)
Other*	3 (11,5)	1 (1,4)	1 (14,3)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)

* includes unspecified implant or expander

Table 9a: Proportion of late complications by type of reconstructive technique

	Infection N (%)	**Implant Rotation** N (%)	**Flap necrosis** N (%)	**Implany/expander exposure** N (%)	**Contour defects** N (%)	**Abdominal wall bulging** N (%)
	5 (1,8)	2 (0,7)	5 (1,8)	10 (3,6)	14 (5,0)	2 (0,7)
Reconstructive technique						
Retromuscular expander	2 (40,0)	0 (0,0)	0 (0,0)	0 (0,0)	1 (7,1)	0 (0,0)
Prepectoral expander	1 (20,0)	0 (0,0)	0 (0,0)	1 (10,0)	0 (0,0)	0 (0,0)
Dual Plane expander	0 (0,0)	1 (50,0)	0 (0,0)	1 (10,0)	1 (7,1)	0 (0,0)
Prepectoral implant	0 (0,0)	1 (50,0)	0 (0,0)	1 (10,0)	2 (14,3)	0 (0,0)
Dual plane implant	1 (20,0)	0 (0,0)	0 (0,0)	2 (20,0)	5 (35,7)	0 (0,0)
Retromuscular implant	0 (0,0)	0 (0,0)	0 (0,0)	5 (50,0)	0 (0,0)	0 (0,0)
DIEP	0 (0,0)	0 (0,0)	1 (20,0)	0 (0,0)	1 (7,1)	0 (0,0)
Homolateral TRAM	0 (0,0)	0 (0,0)	1 (20,0)	0 (0,0)	1 (7,1)	0 (0,0)
Contralateral TRAM	0 (0,0)	0 (0,0)	3 (60,0)	0 (0,0)	3 (21,4)	2 (100,0)
Other*	1 (20,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)

* includes unspecified implant or expander

Table 9b: Proportion of late complications by type of reconstructive technique *(cont.)*

	Implant rupture N (%)	**Double-bubbled lower pole** N (%)	**Implant Displacement** N (%)	**Chronic Pain**N (%)	**Rippling** N (%)	**Asymmetry** N (%)
	2 (0,7)	2 (0,7)	1 (0,4)	2 (0,7)	16 (5,7)	26 (9,3)
Reconstructive technique						
Retromuscular expander	0 (0,0)	0 (0,0)	1 (100,0)	0 (0,0)	0 (0,0)	4 (15,4)
Prepectoral expander	1 (50,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)
Dual Plane expander	1 (50,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)
Prepectoral implant	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	11 (68,8)	1 (3,8)
Dual plane implant	0 (0,0)	0 (0,0)	0 (0,0)	1 (50,0)	5 (31,2)	8 (30,8)
Retromuscular implant	0 (0,0)	1 (50,0)	0 (0,0)	0 (0,0)	0 (0,0)	5 (19,2)
DIEP	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	2 (7,7)
Homolateral TRAM	0 (0,0)	0 (0,0)	0 (0,0)	1 (50,0)	0 (0,0)	2 (7,7)
Contralateral TRAM	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	2 (7,7)
Other*	0 (0,0)	1 (50,0)	0 (0,0)	0 (0,0)	0 (0,0)	2 (7,7)

* includes unspecified implant or expander

Table 9c: Proportion of late complications by type of reconstructive technique *(cont.)*

	Capsular contracture N (%)	**Expander removal required** N (%)	**Animation Deformity** N (%)
	4 (1,4)	7 (2,5)	7 (2,5)
Reconstructive technique			
Retromuscular expander	1 (25,0)	4 (57,1)	0 (0,0)
Prepectoral expander	0 (0,0)	2 (28,6)	0 (0,0)
Dual Plane expander	0 (0,0)	1 (14,3)	0 (0,0)
Prepectoral implant	0 (0,0)	0 (0,0)	0 (0,0)
Dual plane implant	1 (25,0)	0 (0,0)	5 (71,4)
Retromuscular implant	2 (50,0)	0 (0,0)	1 (14,3)
DIEP	0 (0,0)	0 (0,0)	0 (0,0)
Homolateral TRAM	0 (0,0)	0 (0,0)	0 (0,0)
Contralateral TRAM	0 (0,0)	0 (0,0)	0 (0,0)
Other*	0 (0,0)	0 (0,0)	1 (14,3)

* includes unspecified implant or expander

Table 10. Description of the unexpected need to excise skin or NAC according to incision type and specimen volume

	No N (%)	NAC N (%)	Skin and NAC N (%)	Skin N (%)	p
	171 (86,8)	17 (8,6)	7 (3,6)	2 (1,0)	
Specimen volume*	340 (246 – 507)	317 (245 – 574)	416 (318 – 663)	180,5 (150 – 211)	0,243
Type of incision					0,071
Associated with reduction pattern	23 (14,9)	4 (28,6)	0 (0,0)	0 (0,0)	
Peri-areolar	6 (3,9)	1 (7,1)	1 (16,7)	0 (0,0)	
Peri-areolar with extension	74 (48,1)	9 (64,3)	4 (66,7)	0 (0,0)	
Inferior breast fold	46 (29,9)	0 (0,0)	1 (16,7)	2 (100,0)	
Lateral breast fold	5 (3,3)	0 (0,0)	0 (0,0)	0 (0,0)	

* the median (P25-P75) is used to describe this variable

Table 11. Description of the unexpected need of intraoperative transfusion

Intraoperative transfusion		
	Frequency N	Percentage %
Yes	2	,7
No	274	98,2
No info	3	1,1
Total	279	100,0

Table 12. Comparison of the different reconstructive techniques with variables relating to hospitalization and reintervention needs

	Days with drain Median (P25-P75)	**p**	**Hospitalization days** Median (P25-P75)	**p**	**Readmission due to complications** N (%)	**p**	**Reintervention due to complications** N (%)	**p**	**N.º de intervenções a que foi submetida** N (%)	**p**
	8 (7-11)		8 (6-11)		67 (24,0)		86 (30,8)		3 (2-4)	
Reconstructive Technique										
Retromuscular expander		0,06		<0,001		0,016		0,006		<0,001
No	9 (7-11)		9 (7-11)		51 (76,1)		65 (75,6)		2 (2-3)	
Yes	8 (6-11)		7 (5-9)		16 (23,9)		21 (24,4)		3 (2-4)	
Prepectoral expander		0,002		0,020		0,339		0,001		0,099
No	8 (6-11)		8 (6-11)		60 (89,6)		73 (84,9)		3 (2-3,5)	
Yes	10 (8-11)		9 (7-11)		7 (10,5)		13 (15,1)		3 (2-4)	
Dual Plane Expander		0,335		0,035		0,005		0,001		0,393
No	8 (7-11)		8 (6-11)		57 (85,1)		73 (84,9)		3 (2-4)	
Yes	10 (6-12)		10 (8,5-12,5)		10 (14,9)		13 (15,1)		3 (2-4)	
Pre-pectoral implant		0,841		0,853		0,959		0,305		<0,001
No	8 (7-11)		8 (6-11)		58 (86,6)		77 (89,5)		3 (2-4)	
Yes	8 (6-12)		8 (6-12)		9 (13,4)		9 (10,5)		3 (2-3)	
Dual plane implant		0,553		0,471		0,482		0,562		0,004
No	8 (7-11)		8 (6-11)		62 (92,5)		79 (91,7)		3 (2-4)	
Yes	8 (7-12)		8 (7-11)		5 (7,5)		7 (8,1)		2 (2-3)	
Retromuscular implant		0,383		0,121		0,001		0,002		0,615
No	8 (7-11)		8 (6-11)		58 (86,6)		76 (88,4)		3 (2-4)	
Yes	7,5 (7-10)		8 (7-20)		9 (13,4)		10 (11,6)		2 (1-4)	
DIEP		0,309		0,782		0,692		1,000		0,713
No	8 (7-11)		8 (6-11)		66 (98,5)		83 (96,5)		3 (2-4)	
Yes	7 (6,5-9)		7 (7-9)		1 (1,5)		3 (3,5)		3 (2-3)	
Homolateral TRAM		0,007		0,051		0,452		1,000		0,382
No	8 (7-11)		8 (6-11)		64 (95,5)		83 (96,5)		3 (2-4)	
Yes	4 (4-5,5)		6 (4-8)		3 (4,5)		3 (3,5)		3 (2-3)	
Contralateral TRAM		0,124		0,784		0,031		0,141	3 (2-4)	0,817
No	8 (7-11)		8 (6-11)		61 (91,0)		80 (93,0)		3 (2-3,5)	
Yes	7 (6,5-8,5)		8 (7-9,5)		6 (9,0)		6 (7,0)			

Table 13. Comparison of the different reconstructive techniques with the need for reintervention due to an aesthetic defect.

	Reintervention for an aesthetic defect N (%)				p
	Yes or with indication	No	Pending decision	No two-year follow-up	
Reconstructive Technique					
Retromuscular expander					0,035
No	17 (46,0)	15 (55,6)	96 (70,6)	50 (63,3)	
Yes	20 (54,0)	12 (44,4)	40 (29,4)	29 (36,7)	
Prepectoral expander					0,001
No	37 (100,0)	27 (100,0)	111 (81,6)	65 (82,3)	
Yes	0 (0,0)	0 (0,0)	25 (18,4)	14 (17,7)	
Dual Plane Expander					0,043
No	36 (97,3)	27 (100,0)	120 (88,2)	76 (96,2)	
Yes	1 (2,7)	0 (0,0)	16 (11,8)	3 (3,8)	
Pre-pectoral implant					0,007
No	33 (89,2)	19 (70,4)	114 (83,8)	75 (94,9)	
Yes	4 (10,8)	8 (29,6)	22 (16,2)	4 (5,1)	
Dual plane implant					0,832
No	32 (86,5)	25 (92,6)	124 (91,2)	71 (89,9)	
Yes	5 (13,5)	2 (7,4)	12 (8,8)	8 (10,1)	
Retromuscular implant					0,334
No	33 (89,2)	26 (96,3)	131 (96,3)	74 (93,7)	
Yes	4 (10,8)	1 (3,7)	5 (3,7)	5 (6,3)	
DIEP					0,491
No	35 (94,6)	26 (96,3)	131 (96,3)	78 (98,7)	
Yes	2 (5,4)	1 (3,7)	5 (3,7)	1 (1,3)	
Homolateral TRAM					0,036
No	37 (100,0)	24 (88,9)	134 (98,5)	75 (94,9)	
Yes	0 (0,0)	3 (11,1)	2 (1,5)	4 (5,1)	
Contralateral TRAM					0.001
No	37 (100,0)	27 (100,0)	134 (98,5)	69 (87,3)	
Yes	0 (0,0)	0 (0,0)	2 (1,5)	10 (12,7)	

Table 14. Description of the pre-operative image performed

Pre-operative image		
	Frequency N	Percentage %
Mammography	44	15,8
Mammography, MRI	226	81,0
MRI	7	2,5
No image	2	,7
Total	279	100,0

Table 15. Description of the post-operative image performed

Post-operative image		
	Frequency N	Percentage %
Mammography	177	63,4
Mammography, MRI	19	6,8
MRI	2	,7
No image	81	29,0
Total	279	100,0

Table 16. Description of the number of surgeries women had undergone

Number of surgeries		
	Frequency N	Percentage %
1	30	10,7
2	94	33,7
3	82	29,4
4	49	17,6
5	16	5,7
6	6	2,1
7	1	,4
9	1	,4
Total	279	100,0

Appendices

Appendix I: Abstract guidelines

Appendix II: Reporting guidelines

Appendix III: Ethics Committee documents

Appendix IV: Formatting rules of *Journal of Plastic, Reconstructive & Aesthetic Surgery*

Appendix I: Abstract guidelines

STROBE Statement—Items to be included when reporting observational studies in a conference abstract

	Recommendation	Check
Title	Indicate the study's design with a commonly used term in the title (e.g cohort, case- control, cross sectional)	Yes
Authors	Contact details for the corresponding author	Yes
Study design	Description of the study design (e.g cohort, case-control, cross sectional)	Yes
Objective	Specific objectives or hypothesis	Yes
Methods		
Setting	Description of setting, follow-up dates or dates at which the outcome events occurred or at which the outcomes were present, as well as any points or ranges on other time scales for the outcomes (e.g., prevalence at age 18, 1998-2007).	Yes
Participants	Cohort study—Give the most important eligibility criteria, and the most important sources and methods of selection of participants. Describe briefly the methods of follow-up	Yes
	Cohort study—For matched studies, give matching and number of exposed and unexposed	Not applicable
Variables	Clearly define primary outcome for this report.	Yes
Statistical methods	Describe statistical methods, including those used to control for confounding	Yes

Results		
Participants	Report Number of participants at the beginning and end of the study	Yes
Main results	Report estimates of associations. If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period Report appropriate measures of variability and uncertainty (e.g., odds ratios with confidence intervals.	Yes
Conclusions	General interpretation of study results	Yes

Appendix II: Reporting guidelines

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	11
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	13
Objectives	3	State specific objectives, including any prespecified hypotheses	14
Methods			
Study design	4	Present key elements of study design early in the paper	15
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	15
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (*b*) For matched studies, give matching criteria and number of exposed and unexposed	15 Not applicable
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	15
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	15

Bias	9	Describe any efforts to address potential sources of bias	15
Study size	10	Explain how the study size was arrived at	15
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	16
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	16
		(*b*) Describe any methods used to examine subgroups and interactions	16
		(*c*) Explain how missing data were addressed	16
		(*d*) If applicable, explain how loss to follow-up was addressed	16
		(*e*) Describe any sensitivity analyses	16
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Not applicable
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	17
		(b) Indicate number of participants with missing data for each variable of interest	16
		(c) Summarise follow-up time (eg, average and total amount)	17
Outcome data	15*	Report numbers of outcome events or summary measures over time	Tables 3,4,5,6,8,9

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Tables 4,5,6,10 Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Tables 1, 10,11,12, 13,14,15,16
Discussion			
Key results	18	Summarise key results with reference to study objectives	21
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	22, 23
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	23
Generalisability	21	Discuss the generalisability (external validity) of the study results	23
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Not applicable

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and

Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

Items and respective paragraphs

#1(a/b) Page 11, Paragraph 2 “Methods: A retrospective cohort study was conducted, auditing all women registered for mastectomy and immediate breast reconstruction (IBR) at the Breast Centre of CHUSJ from January 2021 to December 2023. Data were extracted from clinical records, focusing on surgical details, patient demographics, and complication rates. Statistical analyses, including univariate and multivariate analyses, were performed to identify significant differences and correlations.”

#2 Page 13, paragraph 1 “In Portugal, breast cancer is the second most common type of cancer among women, with approximately 7,000 new cases diagnosed annually (1)”

#3 Page 14, paragraph 1 “This analysis aims to evaluate and compare the different types of breast reconstruction techniques in terms of their outcomes and their short and long-term complications, as well as estimate the number of surgeries that each one requires to achieve the desired result. It also pretends to establish associations between patients' intrinsic factors (BMI, underlying pathologies) and postoperative complications” and paragraph 3 “this study aims to compare its results with other centers dedicated to breast reconstruction. Therefore, future procedures will be optimized, if necessary, and patients will be informed more thoroughly about their prospects according to each type of reconstruction, thus leading to much more informed decision-making.”

#4 Page 15, paragraph 1 “This research project is a retrospective cohort study that was conducted exclusively at the Centro Hospitalar Universitário São João, specifically within the Plastic and Reconstructive Surgery Department.”

#5 Page 15, paragraph 1 and 2 “This research project is a retrospective cohort study that was conducted exclusively at the Centro Hospitalar Universitário São João, specifically within the Plastic and Reconstructive Surgery Department. An audit was performed on all women registered as having undergone a mastectomy, from the list of women registered on the Breast Centre of our institution, which is recognized by EUSOMA (European Society of Breast Cancer Specialists), from January 2021 to December 2023”

#6a Page 15, paragraph 2 and 3 “each clinical file was consulted to verify whether the procedure described was a mastectomy with immediate breast reconstruction, as this was the focus of this study. Consequently, patients who had undergone mastectomy alone or who were proposed for deferred mastectomies were excluded.Once the women deemed eligible for this study had been identified, the clinical processes were accessed via our institution informatic system (SClinico) to collect the necessary information to complete all the parameters we aim to evaluate.”

#6b, not applicable due it not being matched studies.

#7 Page 15, paragraph 4 “the following data were collected: date of surgery, oncological surgeon, plastic surgeon, mastectomy side, types of mastectomy, unexpected need for skin excision or intra-operative nipple-areola complex (NAC), type of incision, reconstructive technique, flap used, BMI, smoking habbits, diabetes, autoimmune diseases, anticoagulation therapy, previous surgery and type of surgery, need for intraoperative transfusion, previous radiotherapy , weight of the piece, prophylactic or therapeutic mastectomy, number of days with drain, length of stay, immediate complications, late complications, which is the corresponding Clavien-dindo, need for readmission, need for reintervention, pre and post operative image, time between the last expansion and implant’s placement, type of implant, need for reintervention due to aesthetic defect and number of surgical interventions the patient underwent in total.”

#8 Page 15, paragraph 3 “Once the women deemed eligible for this study had been identified, the clinical processes were accessed via our institution informatic system (SClinico) to collect the necessary information to complete all the parameters we aim to evaluate.”

#9 Page 16, paragraph 1 “All continuous variables exhibited a non-normal distribution, as evidenced by the Shapiro-Wilk normality test. Consequently, the median and P25-P75 were employed to describe these variables. Categorical variables were described using absolute and relative frequencies. The Chi-square test was employed to assess the statistical significance of differences between groups when both variables were categorical. In instances where the assumptions of the Chi-square test were not met, Fisher's exact test was utilised. The Mann-Whitney test was employed to assess the statistical significance of differences between groups comprising a categorical variable (with two categories) and a continuous variable. The Kruskal-Wallis test was employed to assess the statistical significance of differences between groups defined by a categorical variable (with three or more categories) and a continuous variable. Missing data were classified as “no info” in the respective category. A significance level of 0.05 was deemed appropriate for all analyses.”

#10 Page 15, paragraph 2 “An audit was performed on all women registered as having undergone a mastectomy, from the list of women registered on the Breast Centre of our institution, which is recognized by EUSOMA, (European Society of Breast Cancer Specialists) from January 2021 to December 2023. Subsequently, each clinical file was consulted to verify whether the procedure described was a mastectomy with immediate breast reconstruction, as this was the focus of this study. Consequently, patients who had undergone mastectomy alone or who were proposed for deferred mastectomies were excluded.”.

#11 Page 16, paragraph 1 “All continuous variables exhibited a non-normal distribution, as evidenced by the Shapiro-Wilk normality test. Consequently, the median and P25-P75 were employed to describe these variables. Categorical variables were described using absolute and relative frequencies. The Chi-square test was employed to assess the statistical significance of differences between groups when both variables were categorical. In instances where the assumptions of the Chi-square test were not met, Fisher's exact test was utilised. The Mann-Whitney test was employed to assess the statistical significance of differences between groups comprising a categorical variable (with two categories) and a continuous variable. The Kruskal-Wallis test was employed to assess the statistical significance of differences between groups defined by a categorical variable (with three or more categories) and a continuous variable. Missing data were classified as “no info” in the respective category. A significance level of 0.05 was deemed appropriate for all analyses.”

#12 Page 16, paragraph 1 “All continuous variables exhibited a non-normal distribution, as evidenced by the Shapiro-Wilk normality test. Consequently, the median and P25-P75 were employed to describe these variables. Categorical variables were described using absolute and relative frequencies. The Chi-square test was employed to assess the statistical significance of differences between groups when both variables were categorical. In instances where the assumptions of the Chi-square test were not met, Fisher's exact test was utilised. The Mann-Whitney test was employed to assess the statistical significance of differences between groups comprising a categorical variable (with two categories) and a continuous variable. The Kruskal-Wallis test was employed to assess the statistical significance of differences between groups defined by a categorical variable (with three or more categories) and a continuous variable. Missing data were classified as “no info” in the respective category. A significance level of 0.05 was deemed appropriate for all analyses.”

#13 not applicable

#14a Page 17, paragraph 1 “The patients who underwent immediate breast reconstruction and were included in this study had a median age of 47 years (P25-P75: 40-54 years) and a median body mass index (BMI) of 24 kg/m² (interquartile range: 21.8-26.6 kg/m²). Additionally, regarding comorbidities, 21.9% of the cohort were identified as current smokers, 1.5% were diabetic, 5.5% had a diagnosis of an autoimmune disease, and 2.9% had anticoagulant therapy. With regard to surgical history, 21.1% of the patients had previously undergone surgery on the breast that was the subject of the planned procedure.”.

#14b, Page 16, paragraph 1 “Missing data were classified as “no info” in the respective category

#14c Page 17, paragraph 1 “This study analyzed 279 immediate breast reconstructions performed between January 2021 and December 2023”

#15 Tables 3,4,5,6,8,9.

#16b Tables 4,5,6,10 “* the median (P25-P75) is used to describe this variable”

#16c Not applicable

#17 Tables 1,10,11,12,13,14,15,16

#18 Page 21, paragraph 3 “In our institution, this rate is approximately 70%,”. paragraph 4 “The majority of the IBRs observed were heterologous reconstructions”. Paragraph 5 “the most frequent reconstructive technique performed was a retromuscular expander, which was also the technique most associated with complications. However, no significant statistical difference was found between reconstructive techniques and immediate or late complications.”. Page 22, paragraph 1 “smoking habits are significantly associated with a higher proportion of immediate complications.” Paragraph 2 “The results demonstrated that NAC necrosis was one of the most prevalent complications, occurring in 15% of cases (…) we also conclude that mastectomies with a peri-areolar incision with extension account for the majority of mastectomies in which skin or NAC had to be excised unexpectedly (66.7%)”

#19 Page 22, paragraph 6 “It should be noted that the study is subject to certain limitations. Firstly, as the study was observational in nature, it is possible that the observed associations may not be causal, but instead reflect imbalances in other features. Consequently, it is not possible to exclude the possibility of confounders, particularly by factors that could not be measured” and page 23 paragraph 1, 2 and 3 “As the study was retrospective, there is a possibility of selection bias, particularly given that data collection was performed by three authors. In addition, there may be information bias, as the identification of complications depends on the records from their hospital

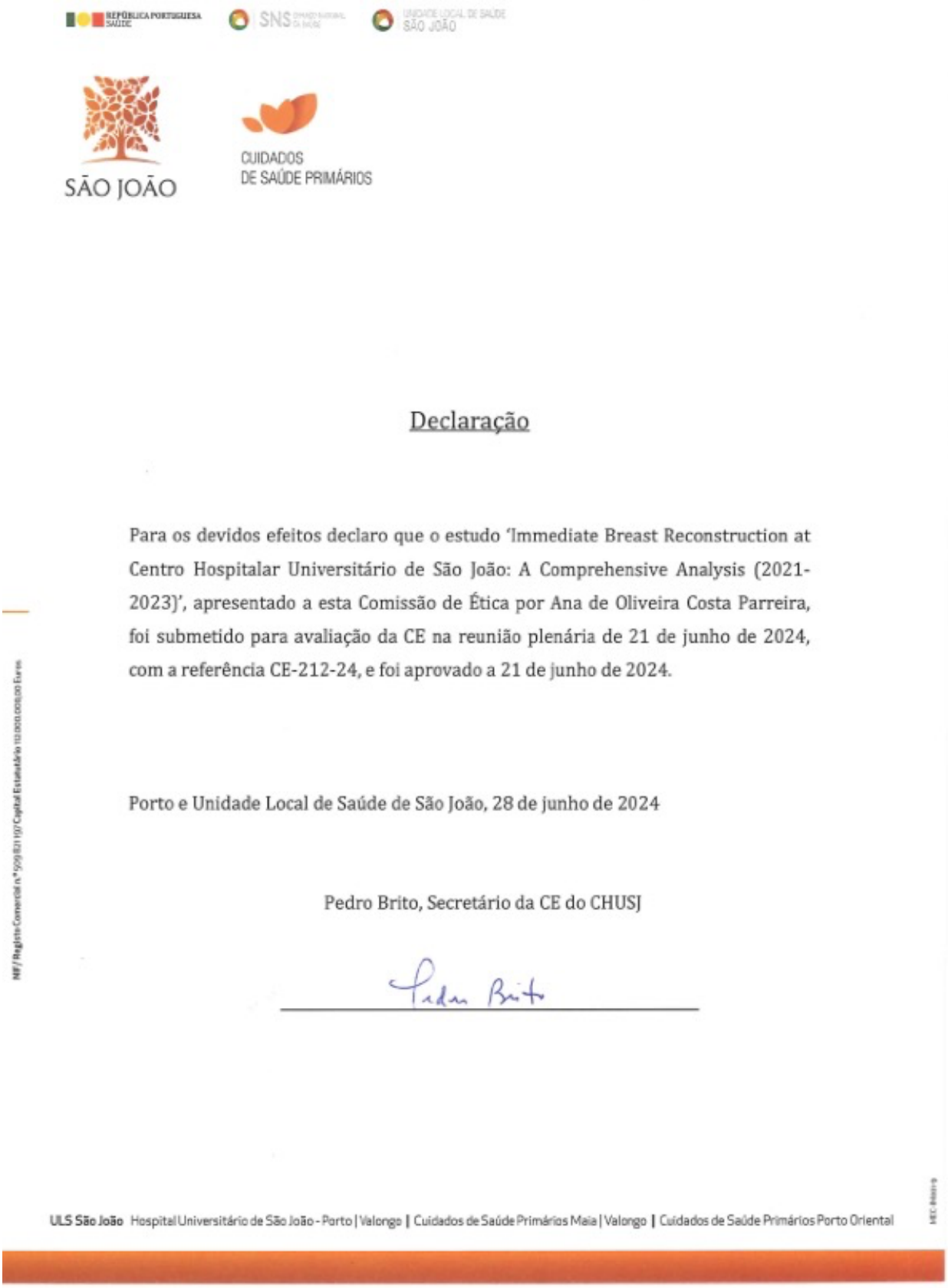
stay and the attending surgeon's consults, and therefore there is heterogeneity in the quality of this information.It should be noted that this study was conducted exclusively at an urban academic centre, and since the results of breast reconstruction are partly dependent on the surgeon, and thus inherent to this hospital's group, it becomes more difficult to apply in other hospital centres. Hence these findings may not be generalizable to women treated at other centre including smaller, non-academic ones. Furthermore, the sample size is a limiting factor in our ability to draw conclusions and make associations. Moreover, the follow-up period was relatively brief in comparison to the length of time required to observe long-term outcomes."

#20 Page 23, paragraph 4 "In conclusion, this study found no significant differences in immediate complication rates among various IBR techniques. However, late complications were more common in reconstructions involving direct implants and retromuscular expanders.In future studies, a larger study population with a long-term follow-up is needed to more accurately determine late complications and aesthetic defects. "

#21 Page 23, paragraph 2 "this study was conducted exclusively at an urban academic centre, and since the results of breast reconstruction are partly dependent on the surgeon, and thus inherent to this hospital's group, it becomes more difficult to apply in other hospital centres. Hence these findings may not be generalizable to women treated at other centre including smaller, non-academic ones."

#22 not applicable, this project was not founded.

Appendix III: Ethics Committee documents



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SÃO JOÃO

CUIDADOS DE SAÚDE PRIMÁRIOS

Declaração

Para os devidos efeitos declaro que o estudo 'Immediate Breast Reconstruction at Centro Hospitalar Universitário de São João: A Comprehensive Analysis (2021-2023)', apresentado a esta Comissão de Ética por Ana de Oliveira Costa Parreira, foi submetido para avaliação da CE na reunião plenária de 21 de junho de 2024, com a referência CE-212-24, e foi aprovado a 21 de junho de 2024.

Porto e Unidade Local de Saúde de São João, 28 de junho de 2024

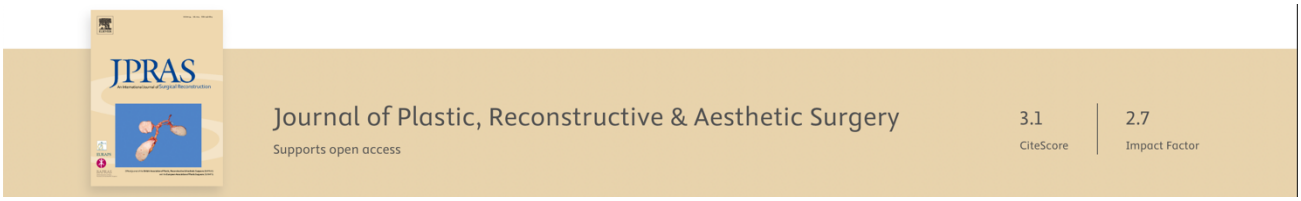
Pedro Brito, Secretário da CE do CHUSJ

Pedro Brito

NIF/Registo Comercial nº 509 821 197/Capital Estatutário 10.000.000,00 Euros

ULS São João Hospital Universitário de São João - Porto | Valongo | Cuidados de Saúde Primários Maia | Valongo | Cuidados de Saúde Primários Porto Oriental

Appendix IV: Formatting rules of *Journal of Plastic, Reconstructive & Aesthetic Surgery*



Guide for authors

Please note: failure to follow our detailed instructions to authors may influence the decision to accept or reject the manuscript and will adversely affect time to publication.

Journal scope

The *Journal of Plastic, Reconstructive & Aesthetic Surgery* is the official journal of the British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS). Its objective is to publish original articles about developments in all areas related to plastic, reconstructive and aesthetic surgery and to provide a forum for correspondence and discussion. Significant papers on any aspect of plastic surgery are invited for publication. These include operative procedures with an emphasis on outcome, technical innovations, clinical or laboratory research, letters to the Editor and review articles.

Editorial policy

Original contributions are welcomed from any country, but the prose used in manuscripts must conform to acceptable English usage. The text must be clear, logical and concise. In assessing a manuscript for publication the Editor will also consider its originality, educational value and validity. Recommendations regarding major rearrangements or corrections may be offered to help authors re-write their submission in a way that is acceptable to the journal. The Editor reserves the right to make editorial and literary changes and accepted articles may be subject to further copy-editing to conform to journal style.

This journal operates a single anonymised review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then sent to a minimum of

two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. More information on types of peer review.

As reviewers assist in their own time, without remuneration, authors can greatly assist the process by submitting correctly formatted papers in accordance with the following guidelines.

Language editing services

Authors who require information about language editing and copyediting services pre- and post-submission please visit https://www.elsevier.com/languagepolishing for more information. Use of an English-language editing service is not mandatory, and will not guarantee acceptance or preference for publication. Elsevier neither endorses nor takes responsibility for any products, goods or services offered by outside vendors through our services or in any advertising. For more information, please refer to our Terms &
Conditions: https://www.elsevier.com/termsandconditions.

Online submission

All material should be submitted through the online submission and review system (https://www.editorialmanager.com/JPRAS/default.aspx). All text, including references, figure legends and tables should be prepared in a single file. Illustrations should be supplied as separate files.

Authorship

All authors should have made substantial contributions to **all** of the following:
(1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data
(2) drafting the article or revising it critically for important intellectual content
(3) final approval of the version to be submitted.

Acknowledgements

All contributors who do not meet the criteria for authorship as defined above should be listed in an acknowledgements section. Examples of those who might be acknowledged include a person who

provided purely technical help, writing assistance, or a department chair who provided only general support. Authors should disclose whether they had any writing assistance and identify the entity that paid for this assistance.

Conflict of interest

Authors

At the end of the text, under a subheading 'Conflict of interest statement', all authors must disclose any financial and personal relationships with other people or organisations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. If the authors have no conflicts of interest, they should state 'none'.

Declaration of Generative AI in scientific writing

Where authors use generative artificial intelligence (AI) and AI-assisted technologies in the writing process, authors should:

- Only use these technologies to improve readability and language, not to replace key researcher tasks such as interpreting data or drawing scientific conclusions.
- Apply the technology with human oversight and control, and carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased.
- Not list AI and AI-assisted technologies as an author or co-author, or cite AI as an author. Authorship implies responsibilities and tasks that can only be attributed to and performed by humans, as outlined in Elsevier?s AI policy for authors.
- Disclose in their manuscript the use of AI and AI-assisted technologies in the writing process by following the instructions below. A statement will appear in the published work. Please note that authors are ultimately responsible and accountable for the contents of the work.

Disclosure instructions

Authors must disclose the use of generative AI and AI-assisted technologies in the writing process by adding a statement at the end of their manuscript in the core manuscript file, before the References list. The statement should be placed in a new section entitled `Declaration of AI and AI-assisted technologies in the writing process?. *Statement: During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.* This declaration does not apply to the use of basic tools for checking grammar, spelling, references etc. If there is nothing to disclose, there is no need to add a statement.

Reviewers

Reviewers must disclose to the Editor any conflicts of interest that could bias their opinions of the manuscript, and they should disqualify themselves from reviewing specific manuscripts if they believe it to be appropriate. Reviewers must state explicitly whether conflicts do or do not exist. Reviewers must not use knowledge of the work, before its publication, to further their own interests.

Role of the funding source

All sources of funding should be declared as an acknowledgement at the end of the text. Authors should declare the role of study sponsors, if any, in the study design, in the collection, analysis and interpretation of data; in the writing of the manuscript; and in the decision to submit the manuscript for publication. If the study sponsors had no such involvement, the authors should so state.

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Book: Mathes SJ, Nahai F. Reconstructive Surgery: principles, anatomy, and technique. New York: Churchill Livingstone, 1997.

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