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GENERAL REVIEW

Oncological safety of nipple-sparing prophylactic mastectomy: A review of the literature on 3716 cases

Sécurité oncologique de la mastectomie prophylactique conservant la plaque aréolomamelonnaire : revue de la littérature à propos de 3716 cas

T. Muller^a, A. Baratte^a, C. Bruant-Rodier^a, F. Bodin^a,
C. Mathelin^{b,c,*}

^a Service de chirurgie esthétique et réparatrice, CHRU, hôpitaux universitaires de Strasbourg, hôpital civil, 1, place de l'Hôpital, 67091 Strasbourg cedex, France

^b Unité de sénologie, CHRU, hôpitaux universitaires de Strasbourg, hôpital de Hautepierre, 1, avenue Molière, 67098 Strasbourg cedex 09, France

^c IGBMC, institut de génétique et de biologie moléculaire et cellulaire, biologie du cancer, 1, rue Laurent-Fries, 67400 Illkirch-Graffenstaden, France

KEYWORDS

Nipple-sparing
mastectomy;
Prophylactic;
Oncological risk;
Local recurrence

Summary

Introduction. — The objective of our study was to evaluate the risk of cancer after prophylactic nipple-sparing mastectomy (PNSM).

Material and methods. — The PubMed database was consulted using the following key-words: "nipple-sparing mastectomy", "prophylactic", "locoregional recurrence", "oncological risk". Articles published between January 1995 and December 2016 were searched.

Results. — Out of the 270 articles found, 19 were included. Overall, 15 studies were retrospective, 2 prospective, 2 prospective and retrospective and 3 were multicentric. All told, they involved 3890 patients corresponding to 6786 mastectomies, among which the total number of prophylactic nipple-sparing mastectomies was 3716. Average age of the patients was 44.4 years and average follow-up was 38.4 months (8–168 months); 29.4% of them had a *BRCA 1* or 2 mutation; 85 and 15% underwent prosthetic and autologous reconstructions, respectively. Average cancer rates exterior to and within the nipple areolar complex (NAC) were 0.2 and 0.004%, respectively. The overall average rate of histological pre-malignant lesions in the nipple areolar complex was 1.5%. The overall complication rate was 20.5%, and necrosis rates of the nipple areolar complex and the skin were 8.1 and 7.1%, respectively.

* Corresponding author. Unité de sénologie, CHRU, hôpitaux universitaires de Strasbourg, hôpital de Hautepierre, 1, avenue Molière, 67098 Strasbourg cedex 09, France.

E-mail address: carole.mathelin@chru-strasbourg.fr (C. Mathelin).

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MOTS CLÉS

Mastectomie
prophylactique avec
préservation de la PAM ;
Prophylactique ;
Risque oncologique ;
Récidive locale

Conclusion. — In prophylactic breast surgery, conservation of the nipple areolar complex does not seem to increase the risk of cancer development. However, short follow-up time and the different methodologies applied in the different studies presently preclude generalization of the technique.

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Résumé

Introduction. — L'objectif de cette revue était d'évaluer le risque carcinologique après mastectomie prophylactique conservant la plaque aréolo-mamelonnaire (PAM).

Matériel et méthodes. — La base de données PubMed a été utilisée avec les mots clés « nipple sparing mastectomy », « prophylactic », « locoregional recurrence », « oncological risk », de janvier 1995 à décembre 2016.

Résultats. — Sur 270 articles retrouvés, 19 ont été inclus. Quinze études étaient rétrospectives, 2 prospectives, 2 prospectives et rétrospectives et 3 multicentriques. Le nombre total de patientes incluses était de 3890, pour lesquelles 6786 mastectomies ont été réalisées dont 3716 mastectomies prophylactiques conservant la PAM. L'âge moyen des patientes était de 44,4 ans ; le suivi moyen de 38,4 mois (8–168 mois) ; 29,4 % des patientes avaient une mutation délétère des gènes *BRCA1* ou *2* ; 85 % des reconstructions étaient prothétiques et 15 % autologues. Les taux moyens de développement d'un cancer à distance de la PAM et sur la PAM étaient respectivement de 0,2 et 0,004 %. Le taux moyen de lésions frontalières ou in situ situées sous la PAM était de 1,5 %. Le taux de complications global était de 20,5 %, les taux de nécrose de la PAM et de l'étui cutané étaient respectivement de 8,1 et 7,1 %.

Conclusion. — Dans le cadre de la chirurgie prophylactique mammaire, la conservation de la PAM ne semble pas majorer le risque carcinologique. Cependant, le recul faible et la méthodologie des différentes études ne permettent pas de généraliser cette technique.

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Introduction

Patients presenting a high risk of developing mammary tumors connected with either a genetic mutation (*BRCA1* or *BRCA2*, for example) or family history suggesting a genetic predisposition are regularly proposed a specific treatment strategy based on clinical and imagery-based monitoring and/or prophylactic mastectomy. Over recent years, we have witnessed a trend characterized by a steady increase in the number of prophylactic mastectomies [1–3]. Rather recently, Angelina Jolie's highly publicized preventive double mastectomy furthered this phenomenon through what is now called the "Angelina Jolie effect" [4]. However, this sociological tendency runs directly counter to an increasingly pronounced breast-conserving emphasis on plastic surgery and senological procedures.

The psychological repercussions of prophylactic mastectomy vary considerably from one woman to another, in certain cases leading to unequally profound perturbations of femininity and sexuality. In fact, breast reconstruction constitutes but one among a number of variably satisfactory responses to the psychological distress experienced by those women "at high risk of breast cancer" who have decided on surgical removal of their breasts. That much said, reconstruction fails to eliminate issues of bereavement over the lost breast(s) and appropriation of the reconstructed breast(s) [5], which may nonetheless be facilitated by conservation of the skin covering and the nipple-areolar complex (NAC).

Initially reported in 1962 by Freeman [6], "subcutaneous" mastectomy was the first conservative mastectomy (CM) technique, only to give way, in the mid-1990s, to more

modern methods. In the United States, a new technique, in which the skin covering is preserved but not the nipple-areolar complex (NAC), skin-sparing mastectomy, was developed [7–9]. As for surgery in which the NAC is also preserved, otherwise known as nipple-sparing mastectomy (NSM), it was presented for the first time in 1999 during a congress at the University of Texas Southwestern Medical School [10]. This technique allows to avoid the secondary reconstruction of the NAC, sometimes associated with a tattoo that can fade over time, requiring iterative recolorations [11].

Generally speaking, conservative mastectomies, particularly NSM, have yielded commendable results and appreciable patient satisfaction [12–15]. However, as these techniques keep mammary tissue in place behind the NAC [16], fears have been voiced concerning NSM's oncological safety, especially insofar as this tissue could possibly be a source of loco-regional recurrence following curative Therapeutic Nipple-Sparing Mastectomy (TNSM) or of cancer occurrence subsequent to Prophylactic Nipple-Sparing Mastectomy (PNSM).

From a curative standpoint, when patient selection criteria are properly observed and when complementary treatments (radiotherapy, chemotherapy, hormonal therapy and targeted treatments) are appropriately applied, TNSM does not seem to entail any supplementary risk, as is shown in the large-scale literature review carried out by Headon et al. [17], who reported a locoregional recurrence risk of 2.38% after 38 months (7.4–156 months) of follow-up.

From a prophylactic standpoint, few studies have been dedicated to PNSM and the oncological risks it may present, even though foreknowledge of the latter is of paramount importance, given that it is rather routinely proposed,

without complementary treatments, to women at high risk of breast cancer but who have not been suffering from mammary pathology.

The objective of this review was to evaluate the risk of cancer subsequent to PNSM through an exhaustive analysis of the recent international literature.

Material and methods

Research methodology

Research was carried out using the PubMed data base. It was consulted using the following keywords: "nipple-sparing mastectomy", "prophylactic", "locoregional recurrence", "oncological risk". Articles published between January 1995 and December 2016 were searched. Only articles written in English or French were taken into consideration.

Article inclusion and exclusion criteria

While the abstracts of all the articles were read, only those mentioning PNSM cases (with or without associated TNSM series) involving at least 10 cases and containing analysis of cancer rates were singled out for further consideration and read in their entirety, leading to the inclusion of 19 articles; the available data on each of them were then collected (Fig. 1).

Were excluded: articles involving fewer than 10 cases, articles only mentioning TNSM series, literature reviews, commentaries and case reports.

Main objective and primary endpoint

The main objective and consequently the primary endpoint of this study was the determination of cancer rates, within and exterior to the NAC, following PNSM.

Secondary objectives and secondary endpoints

There were several secondary objectives involving evaluation of:

- cancer rates (within and exterior to the NAC) following TNSM;
- pre-malignant lesions rates in areas close to or within the NAC (through intraoperative histological analysis of the mammary tissue subjacent to the NAC) following PNSM and TNSM;
- overall complication rates;
- NAC necrosis rates;
- necrosis rates following mastectomy of the cutaneous covering.

Data collection

The data collected consisted in: the author, the review, the year of publication, the objective of the study, the type of study (prospective or retrospective), multicentricity, patient inclusion period, number of patients, total number of mastectomies, number and percentage of PNSMs and TNSMs, average age (years), follow-up (months), number and percentage of patients with a deleterious mutation of the *BRCA1* or *BRCA2* genes, cancer rate exterior to the NAC (number and %) following PNSM and TNSM, cancer rate within the NAC (number and %) following PNSM and TNSM, pre-malignant lesions in areas close to or within the NAC (number and %) following PNSM and TNSM, overall complication rates (number and %), NAC necrosis rates (number and %), necrosis rates following mastectomy of the cutaneous covering (number and %), and, finally, prosthetic and autologous reconstruction rates (%).

Figure 1 Flow diagram of the articles included.

Results

All in all, 19 studies were included; their main characteristics are summarized in Table 1. Fifteen (79%) were retrospective [18–30], 2 were prospective [31,32], and the 2 others were both retrospective and prospective [33,34]. Three of the studies [33,35,36] were multicentric. Patient inclusion periods covered 10 years on average. The total number of patients was 3890, and all in all, they underwent 6786 mastectomies, of which 3716 were PNSMs, while 2778 were TNSMs. Taking all patients into consideration, 79% underwent bilateral mastectomies. Average age was 44.4 years, and average follow-up was 38.4 months (8 to 168 months). The total number of patients with a deleterious mutation of the *BRCA1* or *BRCA2* genes was 617, which came to 29.4% (in the series where the just-mentioned number was known). And, lastly, 85% of the reconstructions were prosthetic, while the remaining 15% were autologous.

Taken all the studies into consideration, Table 2 details cancer risk and pre-malignant lesions rates in areas close to or within the NAC following PNSM and TNSM. The average overall cancer rate exterior to the NAC following PNSM was 0.2%, whereas the average overall cancer rate within the NAC following PNSM was 0.004%. The average overall pre-malignant lesions rates in areas close to or within the NAC following PNSM was 1.5% (4.5% following TNSM).

The different complications and their rates of occurrence are reported in Table 3. The average overall complication rate was 20.5%. The average NAC necrosis rate was 8.1%, and for the cutaneous covering of the mastectomies, it was 7.1%.

Discussion

One of the strengths in our review consisted in the large number of patients taken into consideration; there were 3890 of them, a figure corresponding to 6786 NSMs, among which there were 3716 PNSM procedures. To our knowledge, there has previously existed no equally large series of PNSMs. Another strength consisted in the fact that during data collection, a distinction was made between PNSM and TNSM procedures, which placed us in an ideal position to assess the cancer risks possibly stemming from PNSM.

That much said, average follow-up in our series (38.4 months) was of relatively short duration. Only four studies [18,19,27,29] involved monitoring exceeding 40 months (maximum 14 years) [18]. Moreover, it was in the last-mentioned publication that the most elevated cancer rate was observed (7 out of the 10 different cases included in the series); this finding is likely to be associated with singularly lengthy follow-up.

Up until now, not even a single randomized study has been published. Ideally, patients having undergone prophylactic

Table 1 Main characteristics of the studies included.

Author	Year	Type of study	Inclusion period	Patients (n)	Follow-up (months)	Average age	BRCA1/2 mutation n (%)	Mastectomies (n)	PNSM n (%)	TNSM n (%)
Hartmann [18]	1999	R	1960–1993	639	168	42	ND	1278	1278 (100)	0 (0)
Yiacoumettis [19]	2005	R	1991–2000	52	84	39.5	3 (5.8)	104	104 (100)	0 (0)
Sacchini [35]	2006	R (M)	ND	123	24.6	45	3 (2.4)	192	124 (65)	68 (35)
Wijayanayagam [32]	2008	P	2001–2005	43	ND	43.7	11 (17)	64	29 (45)	35 (55)
Garcia-Etienne [20]	2009	R	2000–2005	25	10.5	44	ND	42	34 (81)	8 (19)
Babiera [31]	2010	P	ND	ND	15	ND	ND	54	ND	ND
Maxwell [23]	2011	R	2007–2009	98	22	ND	ND	186	45 (46)	53 (54)
Alcantara Filho [21]	2011	R	2000–2010	200	10.4	44	36 (18)	353	196 (56)	157 (45)
Harness [22]	2011	R	2004–2009	43	18.5	48.7	6 (14)	60	20 (33)	40 (67)
Spear [24]	2011	R	1989–2010	101	36.5	43	23 (23)	162	113 (70)	49 (30)
Warren Peled [34]	2012	P/R	2001–2010	428	28	46.9	19 (4.4)	657	245 (37)	412 (63)
Camp [25]	2014	R	2007–2012	ND	8	ND	ND	438	218 (50)	220 (50)
Eisenberg [26]	2014	R	2007–2011	215	ND	50	ND	325	117 (36)	208 (64)
Peled [27]	2014	R	2001–2011	106	44	43.7	53 (50)	212	104 (49)	108 (51)
Yao [36]	2015	R (M)	2007–2014	201	32.6	41	201 (100)	397	298 (75)	99 (25)
Manning [28]	2015	R	2005–2013	89	27	40	89 (100)	177	151 (85)	26 (15)
Manning [29]	2016	R	2000–2013	413	49	ND	89 (22)	728	459 (63)	269 (37)
Orzalesi [33]	2016	P/R (M)	2009–2014	913	36	47	40 (4.4)	1006	124 (12)	882 (88)
Donovan [30]	2016	R	2012–2015	201	ND	47	44 (22)	351	57 (28)	144 (72)
Total	1999–2016	-	1960–2015	3890	38.4	44.4	617 (29)	6786	3716 (57)	2778 (43)

P: prospective; R: retrospective; M: multicentric; n: number; %: percentage; PNSM: prophylactic nipple-sparing mastectomy; TNSM: therapeutic nipple-sparing mastectomy; ND: no data.

Table 2 Cancer risk and margins involvement rate subsequent to PNSM and TNSM in the different studies.

Author	Mastectomies (n)	PNSM n (%)	TNSM n (%)	PNSM		TNSM		PNSM		TNSM	
				LR outside NAC n (%)	LR within NAC n (%)	LR outside NAC n (%)	LR within NAC n (%)	LR outside NAC n (%)	LR within NAC n (%)	Margin + within NAC, n (%)	Margin + within NAC, n (%)
Hartmann [18]	1278	1278 (100)	0 (0)	6 (0.5)	1 (0.1)	ND	ND	ND	ND	ND	ND
Yiacoumettis [19]	104	104 (100)	0 (0)	0 (0)	0 (0)	ND	ND	ND	ND	ND	ND
Sacchini [35]	192	124 (65)	68 (35)	2 (1.6)	0 (0)	2 (3)	0 (0)	ND	ND	ND	ND
Wijayanayagam [32]	64	29 (45)	35 (55)	0 (0)	0 (0)	0 (0)	0 (0)	2 (6.9)	0 (0)	0 (0)	0 (0)
Garcia-Etienne [20]	42	34 (81)	8 (19)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2.9)	0 (0)	0 (0)	0 (0)
Babiera [31]	54	ND	ND	ND	0 (0)	ND	0 (0)	ND	ND	ND	ND
Maxwell [23]	186	45 (46)	53 (54)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Alcantara Filho [21]	353	196 (56)	157 (45)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11 (7)
Harness [22]	60	20 (33)	40 (67)	0 (0)	ND	0 (0)	ND	0 (0)	0 (0)	0 (0)	0 (0)
Spear [24]	162	113 (70)	49 (30)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.9)	4 (8.2)	4 (8.2)	4 (8.2)
Warren Peled [34]	657	245 (37)	412 (63)	0 (0)	0 (0)	8 (1.9)	0 (0)	ND	ND	ND	ND
Camp [25]	438	218 (50)	220 (50)	ND	0 (0)	ND	0 (0)	1 (0.5)	21 (9.5)	21 (9.5)	21 (9.5)
Eisenberg [26]	325	117 (36)	208 (64)	ND	0 (0)	ND	1 (0.5)	0 (0)	29 (14)	29 (14)	29 (14)
Peled [27]	212	104 (49)	108 (51)	0 (0)	0 (0)	1 (0.9)	0 (0)	3 (2.9)	2 (1.9)	2 (1.9)	2 (1.9)
Yao [36]	397	298 (75)	99 (25)	1 (0.3)	0 (0)	3 (3)	0 (0)	0 (0)	3 (3)	3 (3)	3 (3)
Manning [28]	177	151 (85)	26 (15)	0 (0)	0 (0)	0 (0)	0 (0)	6 (4)	2 (7.7)	2 (7.7)	2 (7.7)
Manning [29]	728	459 (63)	269 (37)	0 (0)	0 (0)	1 (0.4)	0 (0)	4 (0.9)	11 (4.1)	11 (4.1)	11 (4.1)
Orzalesi [33]	1006	124 (12)	882 (88)	ND	ND	22 (2.5)	5 (0.6)	ND	ND	ND	ND
Donovan [30]	351	57 (28)	144 (72)	ND	ND	ND	ND	0 (0)	4 (2.8)	4 (2.8)	4 (2.8)
Total	6786	3716 (57)	2778 (43)	9 (0.2)	1 (0.004)	37 (0.9)	6 (0.1)	18 (1.5)	87 (4.5)	87 (4.5)	87 (4.5)

n: number; %: percentage; PNSM: prophylactic nipple-sparing mastectomy; TNSM: therapeutic nipple-sparing mastectomy; LR: loco-regional recurrence; NAC: nipple-areolar complex; ND: no data.

mastectomy would be randomized into two groups, one of them having had their NAC preserved, and the others having had it removed; it would then be possible to compare their respective cancer rates.

Only two of the reported series were prospective [31,32], while two others [33,34] were at once prospective and retrospective. Unfortunately, most of the articles presented descriptive as well as retrospective series, thereby detracting from their scientific weight.

More positively, in most of the articles the inclusion and exclusion criteria for patients having undergone TNSM were clearly specified. In general, patients presenting with a relatively peripheral tumor of less than 3 cm, at more than 2 cm from the NAC and without axillary lymph node metastases, were included. On the other hand, the inclusion criteria pertaining to patients having undergone PNSM were not always fully detailed; as a result, it was not possible to be precisely apprised of the indications taken into consideration when deciding on PNSM performance. In 6 of the 19 articles studied, the percentage of patients having a deleterious mutation of the *BRCA1* or *BRCA2* genes was not known. In addition, at times it was difficult to determine whether the mutated patients included had had PNSM or TNSM.

Virtually all of the articles presented mixed series of PNSMs and TNSMs. Only two series, those of Hartmann et al. in 1999 [18] and Yiacoumettis in 2004 [19] included PNSM cases alone. Theirs were older series bringing together

cases of subcutaneous mastectomy preserving the NAC complex, and they were somewhat different from surgical procedures applying more recently developed and currently employed NSM techniques. And yet, given the size ability of the above series, they were included in our study. In the article by Hartmann et al. [18], out of 639 patients having undergone 1278 PNSMs, only 7 cases of breast cancer were detected during a 168 month (14-year) follow-up period, 1 of them within the NAC and the other 6 exterior to the NAC. As for Yiacoumettis [19], out of 52 patients having undergone 104 PNSMs, during an 84 month (7-year) follow-up period no case of breast cancer was detected.

Only two series were limited to patients having deleterious mutation of the *BRCA1* or *BRCA2* genes. The first of them, analyzed in the article by Manning et al. [28], included 89 patients and involved 177 NSMs, of which 151 were PNSMs. In that series, no new case of breast cancer (either within or exterior to the NAC) was detected during a 27 month follow-up period. Secondly, the series of NSMs in the mutated patients studied by Yao et al. [36] was somewhat larger. Among 201 patients having undergone 397 NSMs of which 298 were PNSMs, only one case of breast cancer, which occurred outside the NAC, was detected during the 32.6 month follow-up period.

Several authors have shown interest in the residual breast tissue remaining under the NAC after mastectomy; they wished to better understand the reportedly low rates of

Table 3 Overall complication rates, necrosis rates (NAC and skin), types of reconstruction: global perspective on the different studies.

Author	Patients (n)	Mastectomies (n)	Overall complication rates n (%)	NAC necrosis rates n (%)	Skin necrosis rates n (%)	Reconstruction by MP (%)	Reconstruction by flap (%)
Hartmann [18]	639	1278	ND	ND	ND	ND	ND
Yiacoumettis [19]	52	104	4 (4)	1 (1)	2 (1.9)	100	0
Sacchini [35]	123	192	43 (22)	22 (11)	ND	80.7	19.3
Wijayanayagam [32]	43	64	27 (42)	3 (5)	11 (17)	46.9	53.1
Garcia-Etienne [20]	25	42	ND	12 (29)	ND	100	0
Babiera [31]	ND	54	ND	(7.2)	ND	ND	ND
Maxwell [23]	98	186	ND	ND	ND	98.2	1.8
Alcantara Filho [21]	200	353	75 (21)	ND	69 (20)	99.7	0.3
Harness [22]	43	60	12 (20)	9 (15)	ND	100	0
Spear [24]	101	162	46 (28)	11 (6.8)	3 (1.9)	96.3	3.7
Warren Peled [34]	428	657	274 (42)	23 (3.5)	78 (12)	85.7	14.3
Camp [25]	ND	438	ND	ND	ND	ND	ND
Eisenberg [26]	215	325	ND	ND	ND	ND	ND
Peled [27]	106	212	39 (18)	3 (1.4)	9 (4.2)	84.4	13.6
Yao [36]	201	397	33 (8.3)	4 (1)	10 (2.5)	5.5	94.5
Manning [28]	89	177	37 (21)	6 (3.4)	7 (4)	98.9	1.1
Manning [29]	413	728	105 (14)	ND	47 (6.5)	97	1.7
Orzalesi [33]	913	1006	44 (4.4)	44 (4.8)	23 (2.3)	ND	ND
Donovan [30]	201	351	73 (21)	56 (16)	22 (6.3)	93.4	5.1
Total	3890	6786	812 (20.5)	194 (8.1)	281 (7.1)	85	15

n: number; %: percentage; NAC: nipple-areolar complex; MP: mammary prosthesis, FL: flap; ND: no data.

breast cancer subsequent to PNSM. In 2014, in a study limited to patients having had a deleterious mutation of the *BRCA1* or *BRCA2* genes, Baltzer et al. [37] undertook volumetric analysis by Magnetic Resonance Imaging (MRI) so as to make comparisons concerning the volume of the residual fibroglandular breast tissue remaining under the NAC after mastectomy. In their analysis, for tissue 5 mm thick (measured using MRI), residual breast volume at the level of the NAC was found to represent 1.3% of total breast volume. But for tissue 10 mm thick, it significantly increased, representing 3% of total breast volume. And so, according to the conclusions of this study, when tissue only 5 mm thick was removed during PNSM, subsequent residual breast volume was very small and deemed to be acceptable, a result that was not found for greater thicknesses. Rather similarly, Reynolds et al. [38] studied the NACs ($n = 62$; 33 prophylactic and 29 curative) having taken place in 33 patients with a deleterious mutation of the *BRCA1* or *BRCA2* genes. They were subsequently in a position to evaluate the percentage of NACs with terminal lobular or ductal units, as well as the percentage of NACs presenting occult malignant or "pre-malignant" lesions (atypical hyperplasia or in situ carcinoma). In this study, 15 NACs (24%) indeed presented terminal ductal lobular units. Contrarily to 3 NACs (10%) extracted on curative indication, none of the NACs extracted on prophylactic indications contained any occult lesion. Furthermore, according to Reynolds et al. [38], during prophylactic mastectomy in mutated patients, likelihood of NAC injury by occult lesions is exceedingly low. These observations are congruent with those of Kryvenko et al. [39], who reported 26% of NACs presenting terminal units, without any occult

malignant or pre-malignant lesions appearing during prophylactic mastectomies.

Our results are complementary to those of a previous literature review published in 2015 by Van Verschuer et al. [40]. While this study brought together 24 articles, the inclusion criteria were broader, enabling analysis of different types of conservative and non-conservative (radical) prophylactic mastectomies (with or without NAC preservation) mastectomies. That said, our work is divergent from that of Van Verschuer et al. [40] insofar as these authors were aiming to compare cancer risk in conservative as opposed to non-conservative prophylactic mastectomies. All in all, 17 cases of breast cancer were observed among 5548 conservative prophylactic mastectomies, representing a rate of 0.3%, as opposed to 3 cases of cancer among 496 non-conservative prophylactic mastectomies, representing a rate of 0.6%. To sum up, the just-mentioned work did not determine the impact of NAC preservation on oncological risk, whereas in our study, which involved 3716 PNSMs, 9 cases (0.2%) of breast cancer exterior to the NAC and just one case (0.004%) within the NAC complex were detected. Our findings not only demonstrate but highlight the exceedingly low risk of cancer subsequent to PNSM.

Conclusion

The psychological repercussions of prophylactic mastectomy vary considerably from one woman to another. Breast reconstruction represents one response to the psychological distress experienced by women requesting breast ablation. Nevertheless, it fails to eliminate issues of bereavement

over the lost breast(s) and appropriation of the reconstructed breast(s), which may nonetheless be facilitated by conservation of the skin covering and the NAC.

As concerns prophylactic mastectomies, NAC conservation does not seem to increase cancer risk either within or at some distance from the latter. Nevertheless, randomized prospective studies covering a longer period seem necessary in view of corroborating the data reported and analyzed in this paper.

Disclosure of interest

The authors declare that they have no competing interest.

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