Chapter 21 / Capítulo 21

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Frequency of tuberous breasts in female patients consulting for breast augmentation in a private practice and at the Hospital Privado de Rosario between 2019 and 2024

Frecuencia de presentación de la mama tuberosa en pacientes femeninas que consultan por mamoplastia de aumento en un consultorio privado y en el Hospital Privado de Rosario en el período 2019-2024

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ABSTRACT

Introduction: tuberous breasts are a malformation commonly seen in patients who seek augmentation mammoplasty. When surgical correction is performed without taking this condition into account, the results can be unpredictable.
Objective: To quantify the frequency of tuberous breasts in female patients who consult for breast augmentation in a private practice in the city of Rosario (Centrum) and in the Plastic and Reconstructive Surgery Department of the Hospital Privado de Rosario between 2019 and 2024.
Method: a descriptive, cross-sectional, quantitative, observational, and retrospective study was conducted. A photographic analysis was performed on 240 patients. The results were transcribed into a Microsoft Excel spreadsheet and then processed by the SPSS statistical programme.
Results: Of the 240 patients who consulted for breast augmentation, 28 patients had tuberous breasts (11,7 %). In 6 patients, the presentation was unilateral (21,4 %), and in the remaining 22 patients, it was bilateral (78,6 %). In cases of bilateralism, it was symmetrical in 14 patients (63,6 %) and asymmetrical in 8 patients (36,4 %). Considering the degree of malformation of each breast according to Grolleau's classification, Type I was the most frequent, occurring in 31 breasts (62 %), and Grade III was the least frequent, occurring in 5 breasts (10 %).
Conclusions: tuberous breasts are observed with some frequency in patients who consult for cosmetic breast surgery. The frequency in this study determined that 11,7 % of patients who consult have this anomaly.

Keywords: Tuberous Breast; Breast Augmentation; Frequency Of Occurrence.

RESUMEN

Introducción: la mama tuberosa es una malformación que se suele ver en pacientes que consultan por mamoplastia de aumento. Al momento de la corrección quirúrgica, da resultados impredecibles cuando no se tiene en consideración.
Objetivo: cuantificar la frecuencia de presentación de la mama tuberosa en pacientes femeninos que consultan por una mamoplastia de aumento en un consultorio privado de la ciudad de Rosario (Centrum) y en el Servicio de Cirugía Plástica y Reparadora de Hospital Privado de

Rosario entre el periodo 2019-2024.
Método: se llevo a cabo un estudio tipo descriptivo de corte temporal tipo transversal, cuantitativo, observacional y retrospectivo. Se realizó un análisis fotográfico en 240 pacientes. Los resultados fueron transcriptos a una planilla de Microsoft Excel y luego fueron procesados por el programa estadístico SPSS.
Resultados: de las 240 pacientes que han consultado por mamoplastia de aumento, 28 pacientes presentaron mama tuberosa (11,7 %). En 6 pacientes la presentación fue unilateral (21,4 %) y en 22 pacientes restantes bilaterales (78,6 %). En casos de bilateralidad se presentó simétricamente en 14 pacientes (63,6 %) y en 8 pacientes (36,4 %), asimétricamente. Luego teniendo en consideración el grado de malformación de cada mama según la clasificación de Grolleau, el Tipo I es el más frecuente presentándose en 31 mamas (62 %) y el grado III el menos frecuente, en 5 mamas (10 %).
Conclusiones: la mama tuberosa se observa con cierta frecuencia en pacientes que consultan por cirugía estética mamaria. La frecuencia en este estudio determinó que el 11,7 % de las pacientes que consultan presentan esta anomalía.

Palabras clave: Mama tuberosa; Mamoplastia de aumento; frecuencia de presentación.

INTRODUCTION

Tuberous or tubular breasts are a malformation observed in patients who consult for breast augmentation. It is diagnosed by plastic surgeons, often when patients consult for cosmetic modification of their breasts. It gets its name from the abnormal shape of the breast, which resembles a tuber or a tube. This malformation began to be recognized because experienced surgeons reported that certain breast anatomical configurations are difficult to correct surgically and yield unpredictable results (Rees & Aston, 1976).

It has five key characteristics: a) contracted skin envelope (horizontally and vertically), b) contracted breast base, c) reduction in breast parenchyma volume, d) abnormal elevation of the inframammary fold, and e) areolar herniation of the breast parenchyma (Klinger et al., 2016).

Its etiology is unknown to date, but some authors (Mandrekas et al., 2003) suspect that it is due to the formation of a fibrous ring around the periphery of the nipple-areola complex, preventing normal breast development. A genetic link has also been observed (Dessy et al., 2017).

Many authors have studied this pathology and have different degrees of deformity. Several have created their own classifications, but most experts use the classification by Grolleau et al. (1999), which takes von Heimburg et al. (1996) as a reference and unifies types II and III into type II, as they are very similar. This makes it one of the simplest and most understandable classifications, allowing the recommended surgical technique for each degree to be quickly identified.

Usually, patients who come to the clinic are unaware that they have this deformity and want to have more aesthetic and/or symmetrical breasts. It is common for the consultation to take place because patients do not feel comfortable with themselves, which affects them physically and psychologically, and they wish to consult a plastic surgeon (Donnenfield et al., 2024).

The prevalence of this condition is not well known because, as mentioned above, its presentation varies greatly. Klinger et al. (2016) conducted a study of 1,600 patients who consulted between January 2009 and July 2014. Twenty-five percent of these patients (400) consulted for breast augmentation. They showed that 48,5 % (194 patients) of this group had tuberous breasts. In addition, they noted an increase in incidence in recent years.

This raises the following questions: What is the frequency of presentation, the form of presentation, and the degree of deformity of tuberous breasts in female patients who consulted for breast augmentation in a private practice and in the Plastic, Aesthetic, and Reconstructive Surgery Department of the Hospital Privado de Rosario between 2019 and 2024?

General objective

To quantify the frequency of occurrence of tuberous breasts in female patients who consulted for breast augmentation in a private practice in the city of Rosario and at the Plastic and Reconstructive Surgery Department of the Hospital Privado de Rosario between 2019 and 2024.

METHOD

Design

A descriptive, cross-sectional, quantitative, observational, and retrospective study was conducted. The research was carried out between September and November 2024, for a duration of three months. The time period considered in this study was five years, from November 2019 to November 2024 inclusive.

Scope

The research was conducted in the Plastic, Aesthetic, and Reconstructive Surgery Department of the Hospital Privado de Rosario, a tertiary care hospital located at 2440 Presidente Roca Street, and in the private practice Centro de Cirugía Plástica y Reparadora (Centrum) at 1992 Cochabamba Street, both in the province of Santa Fe, city of Rosario, Argentina.

Population and Sample Selection Criteria

The population consists of all women over the age of 18 who consulted for breast augmentation between November 2019 and November 2024, inclusive, at the Centrum office and at the Hospital Privado de Rosario.

Inclusion Criteria

- Female patients over the age of 18 who consulted for breast augmentation at the Centrum clinic and the Hospital Privado de Rosario between 2019 and 2024 inclusive.

Exclusion Criteria

- Transgender female patients
- Patients presenting with: Malformations such as Poland syndrome (breast agenesis) o Chest wall deformities o Infections o Breast tumors or breast skin tumors o Radiation treatment prior to consultation
- Patients with incomplete medical records
- Patients with no photographic records

Sampling and sample size

A consecutive non-probabilistic sampling was performed. The sample consisted of all patients who consulted for breast augmentation at the Centrum clinic and the Hospital Privado

de Rosario.

Instruments

Patients meeting the eligibility criteria were identified by consulting the clinic's database with the authorization of the Head of Plastic, Cosmetic, and Reconstructive Surgery at the Hospital Privado de Rosario and the Director of Centrum. Once the subjects were identified, their medical records were reviewed, noting the reason for consultation, the patient's age, and, finally, preoperative photos were reviewed.

Data analysis

The collected data were transcribed into a Microsoft Excel spreadsheet and processed using IBM SPSS Statistics Base 30.0 software. Continuous quantitative variables were expressed as the mean, median, standard deviation, minimum, and maximum. Qualitative variables were expressed as both absolute values and percentages.

To determine the value of the qualitative variables, a photographic analysis of the patients was performed prior to breast augmentation surgery. The photographs were taken in four planes: front, oblique, profile, and torso tilted forward. This was used to determine whether or not they had tuberous breasts and, in patients with tuberous breasts, to establish whether the condition was unilateral or bilateral. In the case of bilateralism, it was established whether the presentation was symmetrical or asymmetrical. Finally, the type of deformity in each breast was characterized according to Grolleau's classification.

Ethical considerations

The ethical and legal measures implemented in the research aim to maintain the anonymity and confidentiality of patients, in accordance with the Declaration of Helsinki and the Personal Data Protection Law (Law 25,326).

In addition, permission was requested from the head of the Plastic and Reconstructive Surgery Department at the Hospital Privado de Rosario and the director of Centrum (Plastic and Reconstructive Surgery Clinic), both headed by Prof. Dr. Ernesto A. Moretti, to access the institutions' databases to collect the data necessary to carry out this scientific work. Prior to the surgical procedure, the patients signed an informed consent form authorizing the use of their images for academic and scientific purposes.

The following work was authorized by the Department of Medicine at the Inter-American Open University.

RESULTS

We analyzed 247 cases of patients who consulted for breast augmentation. During the search, 7 cases were excluded for not meeting the inclusion criteria. This left 240 cases to be analyzed below.

Regarding the frequency of tuberous breast presentation, of the 240 patients who consulted for breast augmentation, 28 patients presented with tuberous breasts. This is equivalent to 11,7 % of the total number of patients who consulted for breast augmentation. This can be seen in table and figure 1.

Table 1. Frequency of tuberous breast presentation – City of Rosario – Years 2019 to 2024			
Presence of tuberous breasts		**Frequency**	**Percentage**
Valid	Absent	212	88,3 %
	Present	28	11,7
	Total	240	100

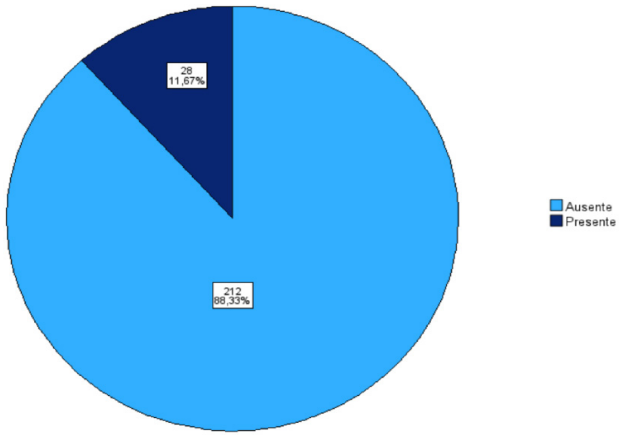

Figure 1. Frequency of tuberous breast presentation – City of Rosario – Years 2019 to 2024

Regarding the presentation of tuberous breasts, 22 patients presented bilateral tuberous breasts, accounting for 78,6 % of the total. On the other hand, 8 patients presented unilateral tuberous breasts, accounting for 21,4 % (table and figure 2).

Table 2. Presentation of tuberous breast – City of Rosario – Years 2019 to 2024			
Presentation of tuberous breast		**Frequency**	**Percentage**
Valid	Unilateral	6	21,4
	Bilateral	22	78,6
	Total	28	100

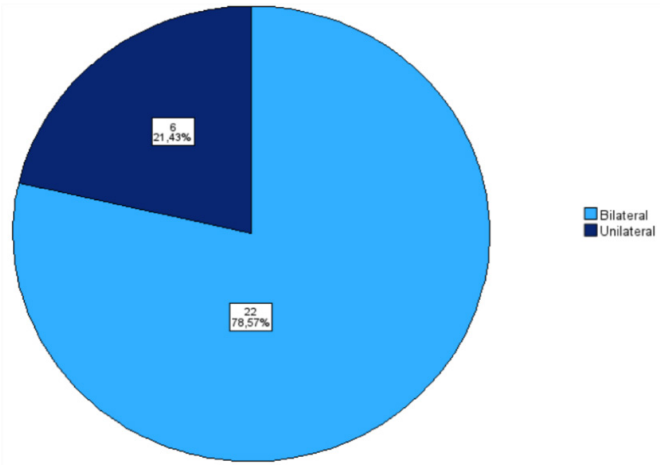

Figure 2. Presentation of tuberous breast – City of Rosario – Years 2019 to 2024

In bilateral tuberous breasts, presentation can be symmetrical or asymmetrical, referring to the presence of the same or different types of deformity, according to Grolleau's classification. There have been 14 cases of symmetrical presentation (63,6 %) and 8 cases of asymmetry (36,4 %). As shown in table 3 and figure 3.

Table 3. Symmetry in bilateral tuberous breast – City of Rosario – Years 2019 to 2024

Symmetry in bilateralism		Frequency	Percentage
Valid	Asymmetric	8	36,4
	Symmetrical	14	63,6
	Total	22	100

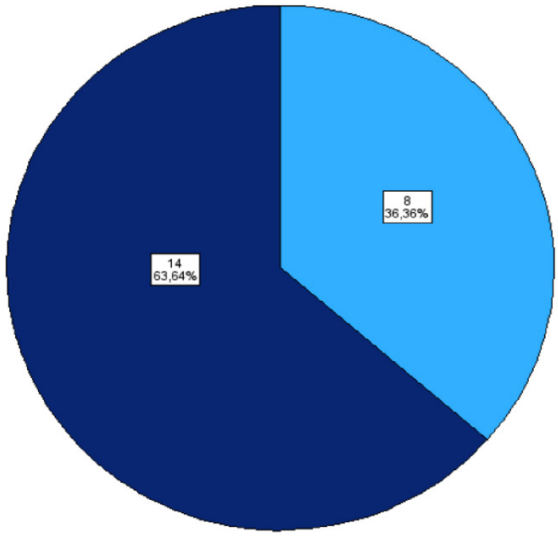

Figure 3. Symmetry in bilateral tuberous breast – City of Rosario – Years 2019 to 2024

Regarding Grolleau's classification for unilateral tuberous breast, among the 6 cases, the most frequent type was type I (3 cases, 50 %), and the least frequent was type III (1 case, 16,7 %). The remaining 2 cases were type II, equivalent to 33,3 % of the total. As shown in table 4 and figure 4.

Table 4. Grolleau classification for unilateral tuberous breast – City of Rosario – Years 2019 to 2024

Grolleau classification		Frequency	Percentage
Valid	Type I	3	50
	Type II	2	33,3
	Type III	1	16,7
	Total	6	100

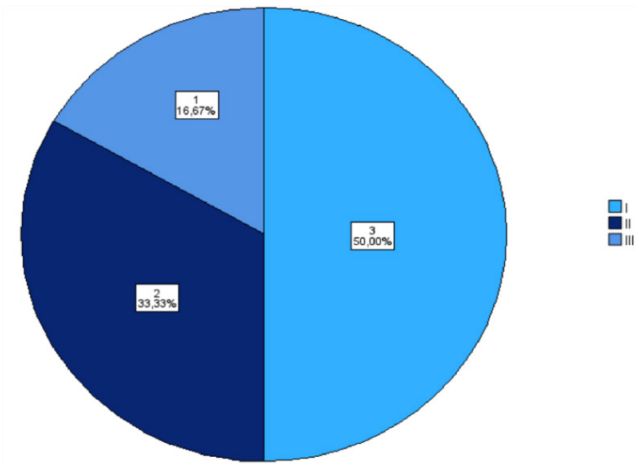

Figure 4. Grolleau classification for unilateral tuberous breast – City of Rosario – Years 2019 to 2024

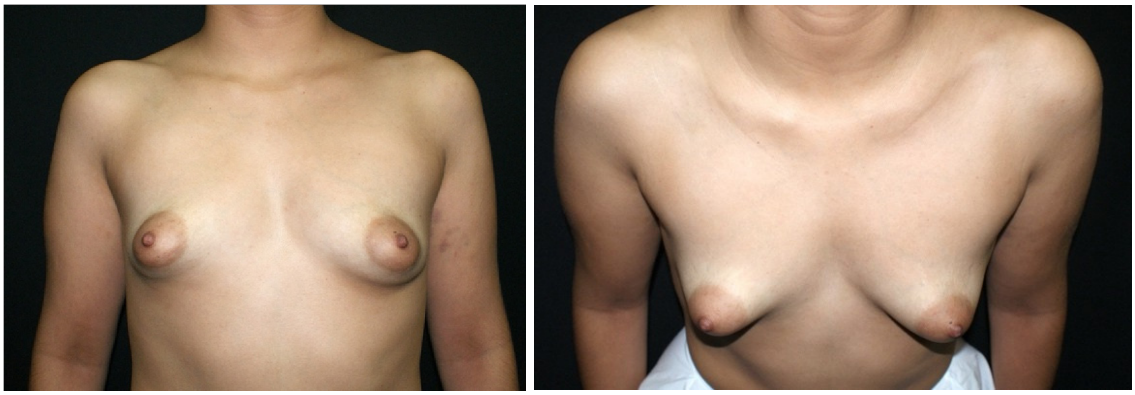

Figure 5. Patient No. 2: Unilateral tuberous breast. Right breast, type I – City of Rosario – Year 2019

Figure 6. Patient No. 3: Unilateral tuberous breast. Right breast, type II – City of Rosario – Year 2020

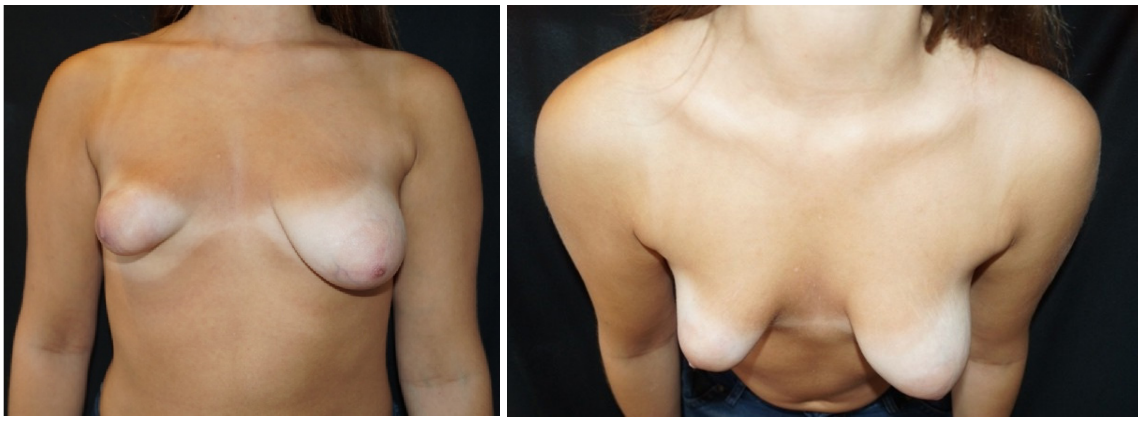

Figure 7. Patient No. 4: Unilateral tuberous breast. Right breast, type III – City of Rosario – Year 2022

As shown in table 5 and figure 8, Grolleau's classification of symmetrical bilateral tuberous breasts, out of 14 cases, 10 were type I, i.e., 71,4 %. Three cases were type II, proportional to 21,4 %. Finally, one case was type III, representing 7,2 %.

Table 5. Grolleau classification of bilateral symmetrical tuberous breasts – City of Rosario – Years 2019 to 2024

Grolleau classification		No.	%
Valid	Type I	10	71,4
	Type II	3	21,4
	Type III	1	7,2
	Total	14	100 %

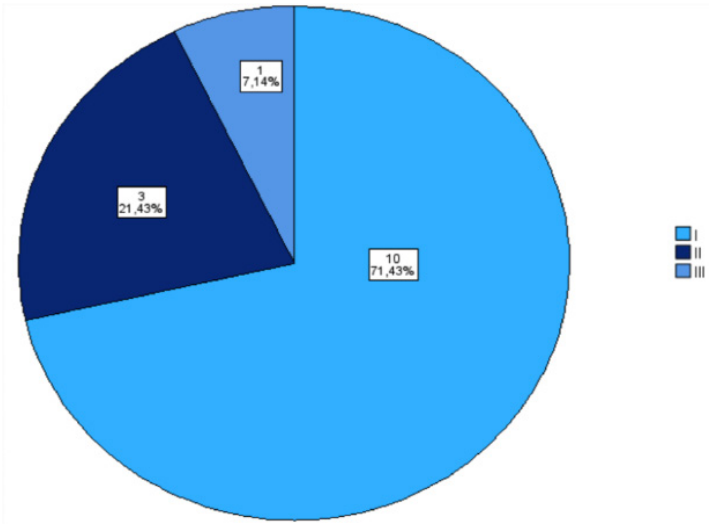

Figure 8. Grolleau classification of bilateral symmetrical tuberous breasts – City of Rosario – Years 2019 to 2024

Figure 9. Patient No. 5: Bilateral symmetrical tuberous breast, type I – City of Rosario – Year 2020

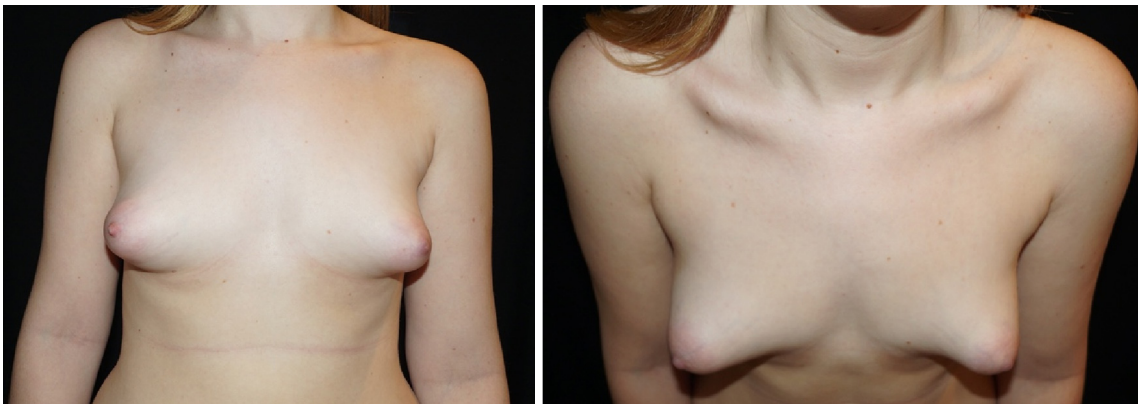

Figure 10. Patient No. 6: Bilateral symmetrical tuberous breast, type II – City of Rosario Year 2024

Figure 11. Patient No. 7: Bilateral symmetrical tuberous breast, type III – City of Rosario – Year 2023

There were 8 cases of asymmetric bilateral tuberous breasts. The most common type was I+II, with 6 cases, accounting for 75 %. There were also 2 cases of types III+I, corresponding to 25 %. On the other hand, there were no cases of types II or III, as shown in table 6 and figure 12.

Table 6. Grolleau classification of bilateral asymmetric tuberous breasts - City of Rosario - 2019 to 2024

Grolleau classification		No.	%
Valid	Types I + II	6	75
	Types II + III	0	0
	Types III + I	2	25
	Total	8	100

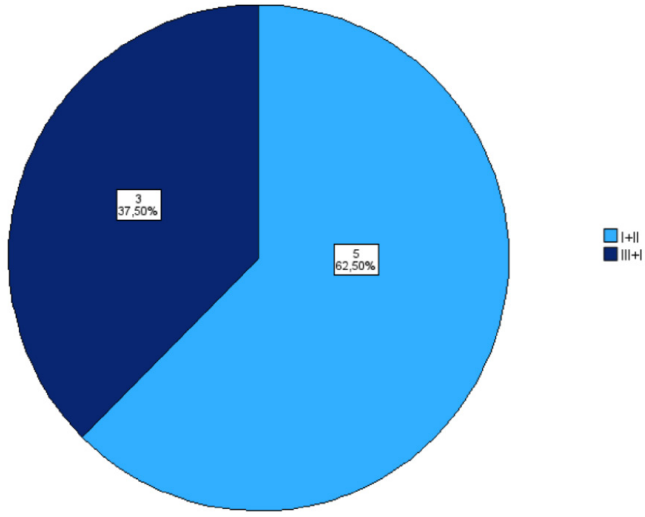

Figure 12. Grolleau classification of bilateral asymmetric tuberous breasts - City of Rosario - Years 2019 to 2024

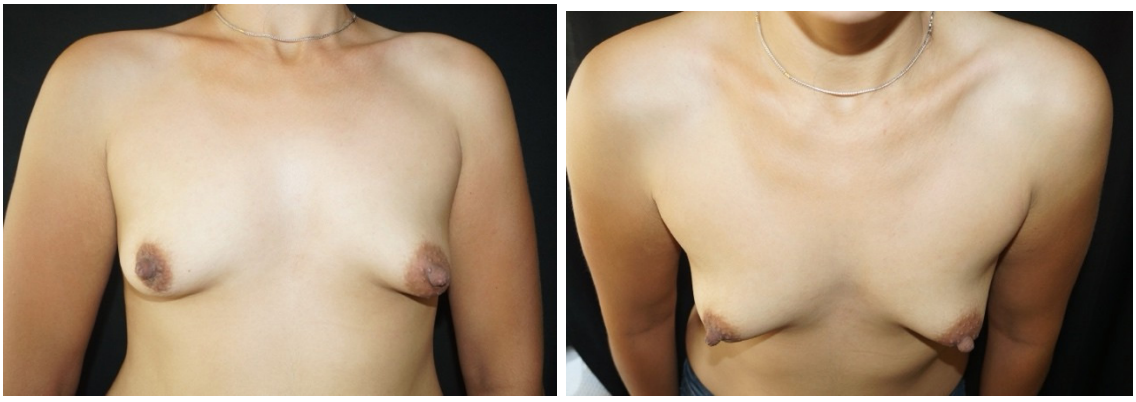

Figure 13. Patient No. 8: Asymmetric bilateral tuberous breast. Right breast, type I. Left breast, type II - City of Rosario - Year 2019

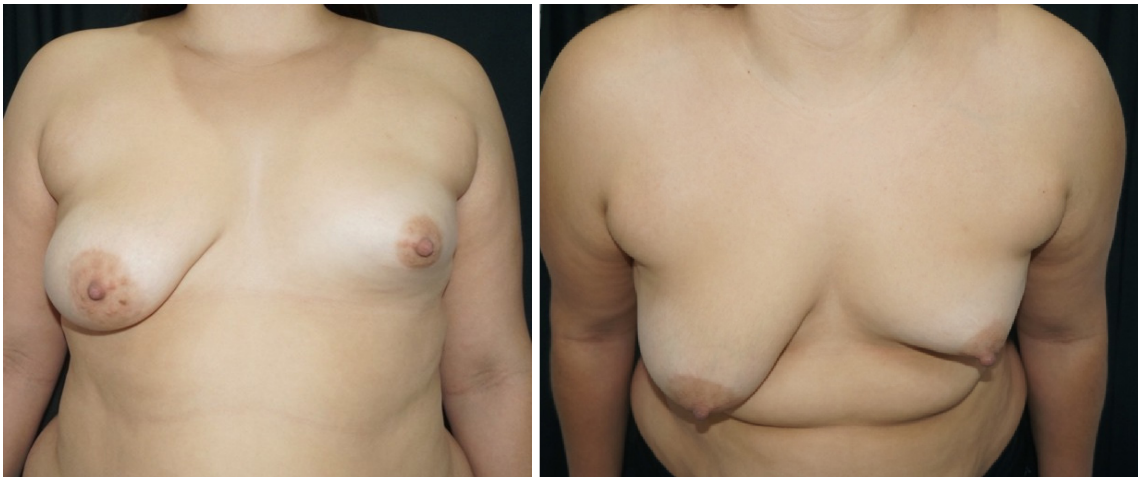

Figure 14. Patient No. 9: Asymmetric bilateral tuberous breast. Right breast, type I. Left breast, type III – City of Rosario – Year 2020

Regarding individual breasts, 31 type I tuberous breasts have been recorded according to Grolleau's classification, accounting for 62 % and indicating that it is the most frequent type overall. In order of frequency, type II follows with 14 breasts, representing 28 %. Finally, the least frequent is type III with 5 breasts (10 %). As shown in table 7 and figure 15.

Table 7. Grolleau classification for each individual tuberous breast – City of Rosario – Years 2019 to 2024

Grolleau classification		No.	%
Valid	Type I	31	62
	Type II	14	28
	Type III	5	10
	Total	50	100 %

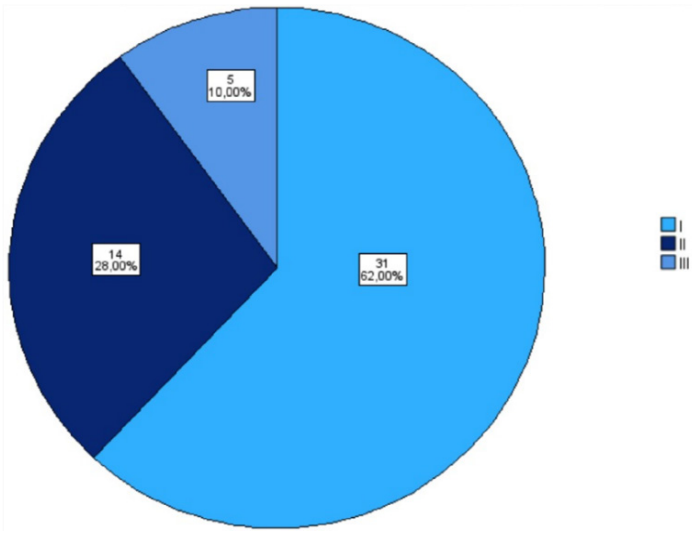

Figure 15. Grolleau classification for each individual tuberous breast – City of Rosario – Years 2019 to 2024

In the studied population, the average age at the time of breast augmentation consultation was 30,791 years, with a median of 29 years. With a standard deviation of 8,258. The youngest patient was 18 years old, and the oldest was 61 (table 8).

Table 8. Age in years of patients at the time of consultation for breast augmentation – City of Rosario – Years 2019 to 2024

Valid	240
Mean	30,791
Median	29
Standard deviation	8,258
Minimum	18
Maximum	61

In the 28 patients with tuberous breast, the mean age at diagnosis was 25,857 years, with a median of 25,5 years. With a standard deviation of 6,747. The youngest patient was 18 years old, and the oldest was 49 years old (table 9).

Table 9. Age in years of patients at the time of diagnosis with tuberous breast – City of Rosario – Years 2019 to 2024

Valid	**28**
Mean	25,857
Median	25,5
Standard deviation	6,747
Minimum	18
Maximum	49

Ages were grouped into five-year intervals. The age group that most frequently sought consultation for breast augmentation was patients aged 25 to 29 ([25-30>), representing 27,4 % of the total sample studied. On the other hand, patients aged 60 to 64 inclusive ([60-65>) were the least likely to consult for breast augmentation (figure 16)

Edad en años (agrupado)		Frecuencia	Porcentaje
Válido	[18-20>	7	2,9%
	[20-25>	53	22,9%
	[25-30>	65	27,4%
	[30-35>	49	18,9%
	[35-40>	26	10,9%
	[40-45>	24	10%
	[45-50>	10	4,3%
	[50-55>	3	1,3%
	[55-60>	2	0,9%
	[60-65>	1	0,5%
	TOTAL	**240**	**100%**

Figure 16. Age in years grouped by patients at the time of consultation for breast augmentation – City of Rosario – Year 2019 to 2024

When analyzing patients diagnosed with tuberous breasts, the results showed that the most frequent age group was 25 to 29 years old ([25-30>), accounting for 53,6 % of the total sample analyzed. In contrast, no cases of tuberous breasts were identified in patients between 35 and 39 years old (table 10).

Table 10. Age in years of patients at the time of diagnosis with tuberous breast – City of Rosario – Years 2019 to 2024

Age in years (grouped)		Frequency	Percentage
Valid	[18-20>	5	17,8
	[20-25>	5	17,8
	[25-30>	15	53,6
	[30-35>	1	3,6
	[35-40>	0	0
	[40-45>	1	3,6
	[45-50>	1	3,6
	Total	28	100

DISCUSSION

Tuberous breast is a congenital breast deformity that has been studied since its description by Rees and Aston (1976), largely due to its complex treatment. However, its incidence and frequency are not the subject of research in many studies, and even less so in our population. Furthermore, they vary widely across studies and methodologies used for diagnosis, probably in relation to these.

When comparing the results with other studies, it becomes difficult because, in a bibliographic search covering the last 48 years and 41 papers on the subject, no publications were found that addressed the topic in this way. For this reason, we had to draw on important points from papers published more than 20 years ago to make the following comparisons and provide an update on this topic.

For this study, we used Grolleau's classification due to its simplicity and wide acceptance among plastic surgeons. This classification allows clear differentiation of the degrees of deformity and facilitates the selection of the most appropriate surgical technique. In previous studies, it has proven reliable and reproducible, with the advantage of allowing more accurate comparisons with other research. Regarding publications related to the types of tuberous breasts according to different authors, we found that Grolleau et al. (1999) report the following statistical values: Type I: 54 %, Type II: 26 %, and Type III: 20 %. In the work of Persichetti et al. (2005), they report that Type I or Grade I (as the authors classify them) accounts for 54,4 % of cases, which is similar to the above-mentioned data.

Among the studies evaluated, three contrast with the previous findings: the publication by von Heimburg et al. (1996) classifies tuberous breasts into four types. To use a single classification and provide comparative parameters, Type I is considered Type I tuberous breast in Grolleau's classification (Grolleau et al., 1999). Types II and III correspond to type II in Grolleau et al. (1999). Type IV is therefore type III. Thus, von Heimburg et al. (1996) demonstrate that 27,9 % of their patients had type I tuberous breasts, 44 % had type II, and 27,9 % had type III. The study published by DeLuca-Pytell et al. (2005) reports that Type III is the most common among their patients (60,3 %), followed by Type II (24,1 %) and Type I (15,6 %). The third study showing

differences is that of Kolker and Collins (2015), who report that Type II is the most common, accounting for 51 %, Type III for 25 %, and Type I for 24 % of their patients.

The publication by Klinger et al. (2017) cannot be compared with other studies because it divides tuberous breasts into eight types. The same is true of the publication by Innocenti et al. (2018), who divide tuberous breasts into soft and hard. However, this publication coincides with the work of Grolleau et al. (1999), who report that Type I is the most common in their patients (57,8 %), Type II has a frequency of 25,3 %, and Type III is the least common (16,9 %).

Comparatively, our research and case series from 50 tuberous breasts are consistent with the world literature: Type I in 62 %, Type II in 28 %, and Type III in 10 %.

Regarding unilateral or bilateral involvement, Mandrekas and Zambacos (2010) reported that 86 % of cases were bilateral and 13,6 % were unilateral in the original work by Grolleau et al. (1999). In the same study, 81 % of patients were reported to have bilateral involvement. In our study, we found that bilateral involvement occurred in 78,6 % of cases and unilateral involvement in 21,4 %. These values do not differ significantly, statistically, from those reported in studies by other authors.

In cases of bilateral involvement, only the study by Grolleau et al. (1999) compares the types of involvement in each breast. Therefore, the symmetry or asymmetry of the involvement is expressed. In 40,5 % of cases, the presentation is symmetrical; in 59,5 %, it is asymmetrical. In the first group, Type I is the most frequent, followed by Type II (8 %) and Type III (5,5 %). In asymmetric cases, the most frequent is Type I-Type II (27 %), followed by Type II-Type III (5,5 %). The study conducted in Rosario found that symmetry accounted for 63,6 % and asymmetry for 36,4 %. This value differs from that reported by Grolleau et al. (1999), although their sample comprised 37 patients and ours 28. A larger sample size clarifies this difference.

It is important to note that in most epidemiological studies of this malformation, the patients' age at consultation was not recorded. In the present study, the mean age at the time of consultation was 25,857 years, with a median of 25,5 years and a standard deviation of 6,747. It is interesting to note that the age at which the disorder was most frequently diagnosed was in the 25-30 age group. This value corresponds to 53,6 % of the total number of patients. The youngest patient at the time of consultation was 18 years old, and the oldest was 49. Therefore, the vast majority of consultations received were from young patients who were unaware of the malformation. Only in cases of asymmetry were the patients aware of the issue, having received information from gynecologists or found it online.

Regarding the prevalence of tuberous breasts, no studies have been published on this topic in the last 5 years. The only published work on this topic was conducted in 2016 by Klinger et al. (2016), who reported that among patients who consulted about primary breast augmentation, 48,5 % had features of tuberous breasts, with a contracted base as the most frequent presentation. As this is the only study to report on the prevalence of tuberous breasts, it is only possible to compare it with this study. In this analysis, we disagree with the author and conclude that tuberous breasts were present in 11,7 % (28 out of 240 cases) of patients who consulted for breast augmentation.

This disparity could be explained by differences in sample selection, diagnostic criteria used, or the geographic population studied. In addition, Klinger's study included patients with various

breast surgeries, while this study exclusively analyzes patients with an indication for breast augmentation, which could generate a bias in the results.

This study contributes to understanding the incidence and characteristics of tuberous breasts in a specific, understudied population and, despite differences from previous studies, reinforces the importance of accurate diagnosis and detailed assessment of symmetry and the type of deformity before performing corrective surgery.

LIMITATIONS

As this is a bicentric study, the characteristics observed in the subjects may not be extrapolated to all patients who consult for breast augmentation.

Furthermore, as the study is retrospective, underreporting may be present in the files consulted.

CONCLUSIONS

Tuberous breasts are a relatively common deformity in patients who consult for breast augmentation (11,7 %). The bilateral type is the most frequent (78,6 %). Among bilateral cases, 63,6 % presented the same degree of deformity according to Grolleau. In our setting, we observed that type I was the most common in each tuberous breast, at 62 %. These data show that, given its high frequency, the lowest degree of deformity is the most common. In terms of age group, 25 to 29 years is the age at which most patients consult for breast augmentation, coinciding with those diagnosed with tuberous breasts.

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