



An unusual case of late hematoma after implant-based breast reconstruction mimicking an anaplastic large cell lymphoma: a case report and literature review

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Received: 24 November 2020 / Accepted: 14 January 2021 / Published online: 6 March 2021
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Abstract

Late hematoma associated with breast implants used in esthetic and reconstructive breast surgery represents a rare entity. These hematomas do not have a clear etiology, but triggering events like trauma, anticoagulant use, capsule contracture, or chronic inflammation are reported in literature. We describe an 82-year-old patient who developed a unilateral intra-capsular hematoma 19 years after mastectomy and breast reconstruction with McGhan 445 g implant. Differential diagnosis with anaplastic large cell lymphoma (ALCL) was considered and potential causes of hematoma were evaluated. Constant pressure forces on chest wall were defined as pathophysiological cause. A systematic literature review concerning late hematoma cases was carried out, focusing on late hematoma etiology and various surgical treatments.

Level of evidence: Level V, diagnostic study.

Keywords Late hematoma · Anaplastic large cell lymphoma · Breast implants

Introduction

Early hematoma is a well-documented complication observed in 2–10.3% of patients who underwent implant breast surgery [1, 2]. To date, peri-prosthetic late hematoma remains a very uncommon complication with increasing cases over last years in reconstructive and esthetic breast surgery. According to a recent review, [3] only 18 patients have reported late hematoma after reconstructive implant procedure and 31 after esthetic purpose with implants [4]. The most lasting breast implantation followed by explantation was reported in 2007 by Nahabedian [5], where the prosthesis removal was performed 41 years after its positioning, with late hematoma as the principle reason for surgery. Late hematomas do not have clear etiological mechanisms or specific symptoms, even if some authors [3] have suggested several triggering events like trauma, anticoagulant use, physical strain, post-chemotherapy

immunodeficiency, or highly vascular inflammatory response for polyurethane-coated implants. However, a peri-prosthetic fluid effusion may represent the clinical manifestation of breast implant associated-anaplastic large cell lymphoma (BIA-ALCL) [6]. ALCL clinically presents as a delayed, persistent peri-prosthetic seroma with a consequent breast swelling and other nonspecific clinical signs [7, 8]. Therefore, it should be considered in the differential diagnosis of breast swelling. The estimated incidence of BIA-ALCL is 2.03 per 1 million person years with an estimated prevalence of 1 per 30,000 women with breast implants [9]. Exclusion diagnosis is confirmed by immuno-histological and cytological findings of peri-prosthetic fluid, because BIA-ALCL is characterized by abnormal CD30 positive and anaplastic lymphoma kinase (ALK) negative lymphocytes. Expression of other T cell antigens, e.g., CD4 (84%), CD43 (80%), CD3 (30%), CD45 (36%), and CD2 (30%), is variable [10, 11].

In this article, we present a unique clinical case of 82-year-old female patient who came to our unit for an abrupt monolateral breast swelling. Nineteen years before, she had undergone mastectomy and two-stage expander/prosthesis breast reconstruction. In this clinical case, imaging data of CT and MRI showed no certain signs of intra- or extra-capsular implant rupture and could not discriminate a peri-prosthetic seroma from hematoma. Intraoperatively, a large

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late hematoma was found and an original etiological hypothesis was identified.

Case report

In January 2018, an 82-year-old woman came to first aid unit of Policlinico Umberto I Hospital for a non-surgical moderate pericardial effusion (18 mm). She presented a medical history of treated hypertension, left nephrectomy for renal tuberculosis (1972), treated chronic renal failure, and obstructive chronic bronchopathy (since 2009). In February 1999, she had developed a ductal infiltrating breast cancer and underwent a left radical skin-reducing mastectomy and axillary lymphadenectomy, followed by an immediate reconstruction with tissue expander, placed under pectoralis major and serratus anterior. Post-surgical hormone therapy was performed. The tissue expander was replaced by a definitive prosthesis McGhan 445 g (Natrella 410, Allergan®, Inc., Irvine, Calif; Mentor®, Breast Implants, Santa Barbara, CA, USA) in June 2000.

During the medical examination at first aid unit, left breast deformity was noted and the patient was referred to our plastic surgery unit. The patient showed a mammographic ultrasound exam from November 2017, which reported the presence of a voluminous seroma of 1500 ml and a severe prosthetic capsule contraction. The patient told that the cause of this examination was a slow swelling and consequent increase in left breast volume, which caused discomfort without pain. Our clinical examination showed an enlarged volume of the left breast and increased tension and slight inflammation of the overlying skin. Moreover, implant profile was not palpable and empty axilla for prior lymphadenectomy was evident. Given the clinical condition, high-resolution CT scan and MRI without contrast were carried out. High-resolution CT reported the presence of a voluminous liquid collection, capsular contraction, and prosthetic rupture. MRI without contrast increased the suspect of intra- and extra-capsular implant rupture and an associated peri-prosthetic fluid share (Figs. 1, 2, and 3). Moreover, MRI data evidenced an intra-capsular mass with an area of costal cartilage erosion that led us to consider ALCL in differential diagnosis (Fig. 4).

At the admission, patient's routine laboratory test results were within normal limits (except for creatinine) and she underwent surgery. Surgical left breast dissection was performed through the previous equatorial scar. Voluminous hematoma of 1500 ml was drained and peri-capsular vessels were cauterized. Peri-prosthetic fluid was sent for pathology examination for a differential diagnosis with anaplastic large cell lymphoma (ALCL). No neoplastic cells were found and serological tests were negative for ALCL.

Despite the imaging data, the removed breast implant was found intact. The capsule was very adherent to the surrounding tissues: pectoralis major muscle band, subcutaneous fat,



Fig. 1 This 83-year-old woman presented 19 years after left breast reconstruction with McGhan 445 g implants. Note the significant enlargement of the right breast

thoracic wall, and ribs. We noted a strange black, exophytic intra-pocket formation close to thoracic wall with soft consistency. After a complex superior pole capsulectomy, we proceeded with difficult partial inferior pole capsulectomy. Capsule was interrupted beneath the exophytic formation. We sent capsule, shaved black formation, and a fragment of wound bottom (adherent to the rib and corresponding to the back of black formation) for pathology examination. An accurate hemostasis, wash with H₂O₂ and saline solution, and sutures were performed. Complete healing was reached within 3 months and no complication occurred. The patient refused any further breast reconstruction surgeries.

Pathology results showed a dense hyaline fibrous capsule without neoplastic cells. Hemosiderin pigment accumulation and specific inflammatory cells were found in the black formation, which was described as fibrous tissue with hemosiderin pigment. The fragment of wound bottom showed rearrangement phenomena and necrosis areas of the superficial rib cartilage.

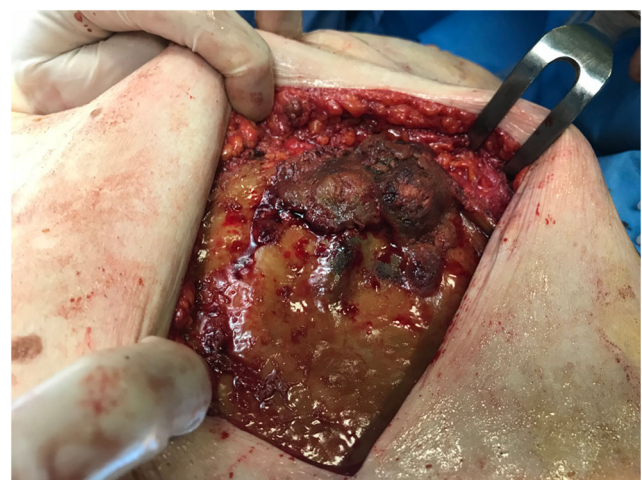


Fig. 2 and 3 Intraoperative situation, before and after removing peri-prosthetic capsule with necrotic area



Fig. 4 MRI image demonstrating an intra-capsular area of costal cartilage erosion

Discussion

A systematic literature review concerning late hematoma cases was carried out. Late breast hematoma occurrences were studied analyzing their etiology and differential diagnosis. Searching on PubMed for “late breast hematoma”, “delayed complications in breast surgery”, and “Anaplastic Large Cell Lymphoma (ALCL)”, 30 case reports regarding late hematoma were identified. Breast implant was inserted for esthetic purpose in 18 studies and for breast reconstruction in 12 reports. The average age for patients that underwent esthetic surgery was 41.65 years and 51.1 years for patients that underwent reconstructive surgery. Late hematoma onset varied from 4 months to 41 years after surgery. Several aetiologies were described and mechanical friction between the textured surface of the prosthesis and the high vascular capsule with a consequent capsule microfractures being the most common. Alike, various surgical treatments were explained, and breast implant removal with capsulectomy was the most frequent. Post-surgical outcomes were regular for most of patients, and only five cases reported complications or hematoma recurrences. These results are resumed in Table 1.

Since the first case of BIA-ALCL reported by Keech and Creech J [33], the awareness of this rare pathology increased, and nowadays, its estimated incidence is 2.03 per 1 million person years, while its prevalence is estimated to be 1 per 30,000 women with breast implants [34]. In 2016, the World Health Organization (WHO) provisionally classified BIA-ALCL as a distinct lymphoma with disease-specific surgical treatment recommendations, [35] and in 2018, the FDA updated a safety communication in which a possible association between anaplastic large cell lymphoma (ALCL) and breast implants is showed. [36]. Reported cases to date worldwide are little more than 400, [37] and for its rarity, absolute risk remains low, even if the odds ratio for ALCL associated with

breast implants is reportedly 18.2 [38]. Every spontaneous periprosthetic breast seroma not related to infection or trauma and occurring more than 1 year after surgery should be considered suspicious for BIA-ALCL [39]. BIA-ALCL has been estimated to occur in 9–13% of delayed seroma presentations [40] and it appears as a rapid onset of a spontaneous fluid collection (60–90%) or capsular mass (10–40%) at an average of 8 to 10 years after implantation [41].

BIA-ALCL must be distinguished from other, more frequent, periprosthetic liquid masses as seroma or hematoma. Late seroma is defined as a serous accumulation of periprosthetic exudate or effusion within the implant capsule, which appears at least 12 months after the implantation. It is a rare entity with an incidence of 0.88–1.84%, while earlier seroma represents a more common complication [42–44].

Peri-prosthetic hematoma that occurs in the early postoperative period (first 3 days usually) presents an incidence of 2–10.3% [15, 45]. Inadequate hemostasis, trauma, or coagulopathy represent the possible aetiologies.

Meanwhile, peri-prosthetic late hematomas that occur more than 6 months after surgery are considered rare complication with causes that remain often unknown [21]. The longest continuous breast implantation followed by explantation due to late hematoma was reported in 2007 by Nahabedian [5], where the prosthesis removal was performed 41 years after its positioning.

In the 76.9% of cases, it occurs in breasts with implants inserted for esthetic reasons [28] and ultrasonography and MRI appear to be useful tools for diagnosis, even if they do not distinguish late hematomas from implant ruptures easily and can give false results [19, 25, 46]. Chronic inflammation and erosion or corticosteroid therapies can damage pericapsular arteries and lead to late capsular hematoma [17]. Traumas are considered an another factor that can bring to late hematoma formation [18, 26].

In 1979, Georgiade et al [12] was the first to report a case of late hematoma in breast implant. This one was due to large use of corticosteroid that leads to erosion of a capsular artery and consequent bleeding. After this report, several authors described various physiopathologic events related to late hematomas in breasts with implants. Bleeding secondary to contracted capsular microfractures [47] was reported as cause of bilateral late hematoma in 1992 by Marques et al [13] and in 1995 by Cederna [14]. In 2003, the first case of late hematoma in association with tissue expander (Becker implant) was reported by Goyal et al., [20] who considered infective etiology, recurrent cancer, or implant rupture as differential diagnosis to investigate. In 2004, Brikman et al. [21] described a late hematoma 9 years after breast augmentation related to highly vascular inflammatory response created by polyurethane-coated implant, while Viega et al. [22] linked the development of a late hematoma to friction forces between textured prosthesis surface and surrounding tissues in only

Table 1 Studies reporting cases of late hematoma after implant-based

Author, journal (year)	Age of patient	Age of breast implant	Type of breast implant	Purpose of breast implant	Suspected cause of late hematoma	Surgical procedure	Outcome	Follow-up
Georgiade, et [12]	25 years old	4 years	185 cc saline-filled silicone prostheses	Esthetic purpose	Erosion of a medium sized artery in the capsule secondary to steroids in the implant	300 cc of hematoma was drained. Hemostasis was performed. Breast implant was replaced.	Regular	/
Marques et al. [13]	60 years old	3 years	Dow-corning 275 cc, silastic silicone gel retropectoral prosthesis	Breast reconstruction	Hepatitis B +micro-fractures in the capsules	200 cc of hematoma was drained by both mammary regions. Capsular space was cleaned with saline solution. New breast implants were placed.	Regular	2 years later, a bilateral late hematoma recurred and was performed a bilateral capsulectomy. After capsulectomies, there was no evidence of hematoma reappearance.
Cederna JP [14]	33 years old	5 years	/	Breast reconstruction	Capsular microfractures	200 cc of hematoma was drained. Capsulectomy. Smaller textured saline implant was placed (Mc Ghan)	Regular	/
Daw et al [15]	59 years old	7 years	/	Breast reconstruction	Probable capsule bleeding	100 cc of hematoma was evacuated. Intact breast implant was removed. Capsulotomy. Smaller saline-filled prosthesis was inserted	Regular	/
Daw et al [15]	70 years old	8 years	/	Breast reconstruction	Probable capsule bleeding	300 cc of hematoma was evacuated. Intact breast implant was removed. Capsulotomy. Smaller saline-filled prosthesis was inserted	Regular	/
Daw et al [15]	54 years old	6 years	/	Breast reconstruction	Probable capsule bleeding	Hematoma was evacuated. Intact breast implant was removed. Capsulotomy. Smaller saline-filled prosthesis was inserted	Regular	/
Willens et al [16]	52 years old	15 years	Silicone gel prosthesis	Breast reconstruction	Anticoagulant therapy for atrial fibrillation	Breast implant was inserted. Hematoma evacuation. Saline breast prosthesis (Mc Ghan) was placed.	Regular for 10 weeks	After other 2 weeks, she developed late hematoma that was managed conservatively.
Wang et al [17]	41 years old	5 months	Polyurethane-coated breast implant	Breast reconstruction	Polyurethane coating was found to elicit a much more intense foreign body inflammatory response, which is highly vascular and persists for a longer period	Hematoma was evacuated. Intact breast implant was removed. Capsulectomy. Breast implant replacement	Regular	/

Table 1 (continued)

Author, journal (year)	Age of patient	Age of breast implant	Type of breast implant	Purpose of breast implant	Suspected cause of late hematoma	Surgical procedure	Outcome	Follow-up
Wang et al [17]	34 years old	3 years	Polyurethane-coated breast implant	Breast reconstruction	Polyurethane coating was found to elicit a much more intense foreign body inflammatory response, which is highly vascular and persists for a longer period	Hematoma was evacuated. Intact breast implant was removed. Capsulectomy. Remodeling without breast implant.	Regular	/
Görgü et al [18]	18 years old	4 years	Subpectoral 240-ml saline-filled textured silicone prostheses	Esthetic purpose	Trauma + mechanical friction between the textured surface of the prosthesis and the high vascular capsule	Hematoma was drained. Breast implant was replaced	Discharged on the second postoperative day.	/
Iorwerth et al. [19]	54 years old	12 years	/	Esthetic purpose	Erosion of a medium sized artery in the capsule secondary to steroids in the implant/microfractures of the capsule/rigidity of the capsule may prevented retraction of damaged vessels leading to continued bleeding/inflammation leading to a chronic expanding hematoma.	Hematoma was drained. Intact breast implant was removed. Breast remodeling without breast implant.	Regular	/
Hsiao et al [1]	32 years old	2 years	250-ml saline-filled textured silicone prostheses placed sub-pectorally via axillary incisions	Esthetic purpose	Mechanical friction between the textured surface of the prosthesis and the high vascular capsule	300 cc of hematic fluid was aspirated. Textured prosthesis was removed. Capsular space was cleaned with saline solution. Smooth-surface prosthesis was inserted.	Discharged on the second postoperative day.	At 6 months after surgery, there had been no recurrence.
Hsiao et al [1]	22 years old	1 year	250-ml saline-filled textured silicone prostheses placed sub-pectorally via axillary incisions	Esthetic purpose	Mechanical friction between the textured surface of the prosthesis and the high vascular capsule	Hematoma evacuation. Textured prosthesis was removed. Capsular space was cleaned. Smooth-surface prosthesis was inserted	Regular	At 2 months after surgery, there had been no recurrence.
Goyal and Mansel [20]	54 years old	3 years	Subpectoral Becker's prosthesis	Breast reconstruction	Capsular microfractures	Breast implant was removed. Hematoma was evacuated. The pocket was irrigated with saline. Breast remodeling without breast Implant.	Regular	/
Brickman et al [21]	35 years old	9 years	Subglandular insertion of polyurethane--covered Replicon (Bristol, Myers	Esthetic purpose	Polyurethane coating was found to elicit a much more intense foreign body inflammatory response, which is highly	Breast implant was removed. 400 cc of Hematic fluid was drained. The pocket was irrigated with saline. Breast	The drain produced serous fluid for	5 months later, the patient was seen again for increasing swelling and pain. 30 ml of liquefied clot was aspirated. Total capsulectomy with

Table 1 (continued)

Author, journal (year)	Age of patient	Age of breast implant	Type of breast implant	Purpose of breast implant	Suspected cause of late hematoma	Surgical procedure	Outcome	Follow-up
Veiga. et al. [22]	25 years old	1 year	Squibb) breast implants (385 ml) Subpectoral textured gel-filled silicone prosthesis	Esthetic purpose	vascular and persists for a longer period Mechanical friction between the rough textured surface of the prosthesis and the highly vascular capsule	remodeling without breast Implant. Percutaneous needle aspiration was performed, guided by ultrasound, and approximately 100 cc of serosanguineous fluid was aspirated the first time. Second time 100 cc after 12 h and third time 80 cc after other 12 h	the next 8 days. Regular	excision of areas of granulation tissue was performed. After 9-month follow-up period, the patient had no other problems with the implants.
Roman and Perkins [23]	46 years old	22 years	/	Esthetic purpose	Capsular microfractures with the rigidity of the capsule preventing the retraction of damaged blood vessels leading to continued bleeding Capsular microfractures for chronic inflammatory reaction that produces a highly vascular fibrous capsule.	Breast implant was removed. Capsulectomy. new breast implant was placed.	Regular	At 18 months post-surgery, she remained free of complication.
Schiavon et al. [24]	64 years old	6 months in right breast 11 months in left breast	Textured surface prosthesis	Esthetic purpose	One day before hematoma formation, the patient underwent a 10-min bilateral myoelectrostimulation in her upper arm.	100 cc of hematoma was drained and prosthesis was changed.	The patient was discharged on postoperative day 4.	No recurrence of hematoma or seroma was evident after operation
Cagli et al. [24]	40 years old	4 months in right breast	Dual plane-textured, cohesive gel-filled, anatomical implant.	Esthetic purpose	Calcified capsule caused the gradual erosion of an adjacent blood vessel.	Organized hematoma evacuation. Total capsulectomy. Breast implant replacement	Regular	No recurrence
Nahabedian [5]	74 years old	41 years	/	Esthetic purpose	Trauma	Organized hematoma evacuation. Breast implant was removed. Capsulectomy. Breast remodeling without breast implant. Hematoma evacuation. Capsulectomy. Breast implant replacement	Regular	At 2 months after surgery, there had been no recurrence.
Van et al [25]	43 years old	6 months	Subglandular silicone prosthesis (McGhan style 410, 245 ml)	Esthetic purpose	Trauma	500 ml of hematoma was drained. The pocket was irrigated with saline. Breast implant replacement	Regular	5 months later, however, she again presented with another late breast Hematoma. Conservative treatment was performed.
Van et al [25]	23 years old	6 months	/	Esthetic purpose	Trauma	/	Regular	/
		1 year		Esthetic purpose			Regular	

Table 1 (continued)

Author, journal (year)	Age of patient	Age of breast implant	Type of breast implant	Purpose of breast implant	Suspected cause of late hematoma	Surgical procedure	Outcome	Follow-up
McArdle and Layt [26]	49 years old		450-ml textured gel-filled silicone implants were inserted subpectorally via the inframammary fold		Chronic inflammation and hyperpermeability of neovascular structures	120 cc of hematoma was drained. Breast implant was removed. Capsulectomy. Identical prosthesis was placed.		After 9 months, patient developed 150 cc of Sieroma that was drained. Capsulectomy. Breast implant was replaced.
Cheng et al. [27]	35 years old	8 months	Subpectorally with 210-g textured silicone gel prosthesis	Esthetic purpose	Mechanical friction between the textured surface of the prosthesis and the high vascular capsule	Breast implant was removed and 110 ml hematoma with blood clots was drained out. Breast remodeling without breast implant.	Regular	/
Ibrahim and Atiyeh [28]	44 years old	5 years	350-ml anatomic McGhan_ (Inamed Corporation, Santa Barbara, CA, USA) silicone cohesive gel textured implant	Breast reconstruction	Irritation and forceful disruption of the capsule by a textured surface implant in combination with chemotherapy-induced thrombocytopenia	Breast implant was removed. 200 cc of serosanguinous fluid was aspirated. Capsulotomy. hemostasis. A 240-ml moderate-profile smooth CEREFORM_ (Cereplas-Z.A.C., Provville, France) implant was inserted.	Discharged on the second postoperative day	The drain was kept for 10 days and removed only when the 24-h drainage became less than 30 ml.
Collins and Verheyden [4]	/	2 years (21 months)	/	/	Larger textured breast implant size is associated with hematoma incidence due to greater weight and mass and their propensity to exert tensile and shearing forces on the capsule neovasculature.	/	/	/
Grippaudo et al [3]	61 years old	2 years (20 months)	Anatomically shaped Biocell textured implants.	Breast reconstruction after skin sparing mastectomy	Mechanical friction between the two capsules	300-ml hematoma was drained. Capsular small-sized arterial vessel was cauterized. Breast implant was intact and surrounded by a double capsule.	Regular	At 4 months after surgery, there had been no recurrence.
Peters et al [29]	5 patients	9 years 12 years 14 years 22 years	Smooth, round, silicone gel implants that were	Esthetic purpose	Mechanical friction between the surface of the prosthesis and the high vascular capsule	The hematoma occurred between the two capsules. Capsulectomy was performed. An Allergan Natrelle 410-ST-MF-525 g implant was inserted into the pocket Hematoma was drained. Breast implant was removed. Capsulectomy. All pockets	/	/

Table 1 (continued)

Author, journal (year)	Age of patient	Age of breast implant	Type of breast implant	Purpose of breast implant	Suspected cause of late hematoma	Surgical procedure	Outcome	Follow-up
Kim et al [30]	58 years old	26 years	inserted in the submuscular plane. Polyurethane-coated, 325-ml silicone gel Replicon implants via inframammary incisions.	Esthetic purpose	Capsular contracture	were irrigated with bacitracin saline solution. 150 cc of hematoma was drained. Bilateral implant exchange with total capsulectomies was performed.	/	/
Dean et al [31]	65 years old	3 years	/	Esthetic purpose	Chest trauma	Ruptured breast implants were removed. 200 cc of hematoma was drained from right breast and 600 cc from the left breast. Capsulectomy. Breast remodeling without breast implant.	Regular	At follow-up 1 month later, the patient was doing well, with no further complaints or complications

1 year after sub-glandular breast augmentation. In 2011, Ibrahim et al. [29] reported an another late hematoma case due to a bleeding disorder. The risk of late hematoma in anticoagulated patients with breast implants was previously described by Willens et al. [16] in 1996. Peters et al. [30] described a series of five cases of late hematomas that occurred from 9 to 38 years after breast augmentation surgeries. The authors portray those cases like chronic expanding hematomas [48] as they found multiple areas of recent and older hemorrhage within the structure of the capsules and on their surface. This comparison of late breast hematomas with chronic subdural hematomas was described by Roman [23] in 2005 even. In the past year, 2018, two cases of late hematoma were reported: Kim et al. [31] explained its development as a consequence of severe capsular contracture, while Dean et al. [32] described a case of silicone extravasation that may have led to chronic lymphocytic granulomatous reaction and a consequent recurrent acute-on-chronic hematoma.

Grippaudo et al. [3] in 2013 reported a singular case of late hematoma developed 2 years after breast surgery, due to mechanical friction in the space between the two layers of a double capsule. In the same article, a review of the literature is displayed and several cases of late hematomas are described. Late hematoma development between the two layers of a double capsule was also reported by Cagli et al. [25] in 2007. In this paper, the hematoma developed 4 months after an augmentation mammoplasty. Its physiopathologic cause was referable to a 10-min bilateral myoelectrostimulation in patient's upper arms, even if none of the electrodes was positioned on the pectoralis muscles.

Clear etiology of late hematoma is not always identified. Schiavon et al. [24] report an example of unknown etiology of late hematoma, showing a case that presented as a recurrent late complication, even. No causative factor was found also in the original case described by McArdle et al., [27] in which the patient presented late hematoma followed by late seroma 9 months after.

We would like to show the case that came to our unit, which appears to depend on original physiopathologic causes not described before. Our patient did not have painful swelling and there was not a triggering event. Differential diagnosis with ALCL was carried out with pathologic exam that did not find neoplastic cells. Based on macroscopic and pathologic exam evidences, we suggest that the implant applied a constant and continuous pressure on soft surrounding tissues. This force may have eroded tissues of thoracic wall until intercostal vessel damage and it caused bleeding with consequent late hematoma and the black formation that was identified as a necrosis area.

The first case reported by Georgiade et al. [12] is the only one in which a precise source of active bleeding in late breast hematoma was described. We show the second case in which

the source of bleeding is identified and an original pathophysiology is suspected.

Conclusions

In the last years, ALCL has elicited much interest in scientific society as one of the most rare and important breast implant-related complications. The ALCL phenomenon is widely discussed in many scientific journals [49] and may mislead surgeons. In every clinical case, physicians have to evaluate variables and differential diagnosis is led by accurate clinical examination, imaging data, and laboratory tests. In our case, late hematoma diagnosis was validated by surgery and laboratory tests because imaging data were not enough.

To date, peri-prosthetic late hematomas are considered a rare complication. Their pathophysiology is hard to explain and several authors reported in literature various possible aetiologies. In this specific report, we suppose that constant and continuous prosthesis's pressure on soft surrounding tissues, associated to high blood pressure, may have involved tissues of thoracic wall until causing rupture of a small costal vessel, producing a late bleeding with consequent hematoma. However, other reports are useful to establish frequency, etiology, and clinical manifestations of this rare complication that has presented a noticeable increase in recent years. Plastic surgeons have to know this rare condition and apply proper management when it is necessary.

Funding Open access funding provided by Università degli Studi di Roma La Sapienza within the CRUI-CARE Agreement.

Compliance with ethical standards

Conflict of interest Fioramonti P, Lovero S, Kaciulyte J, Ribuffo D, and Frattaroli JM declare that they have no conflict of interest.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This is a case report and literature review. For this kind of studies, approval from an ethics committee is not required.

Informed consent Informed consent was obtained from the patient.

Patient consent Patient signed informed consent regarding publishing her data and photographs. The patient has consented to the submission of the case report to the journal.

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