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Body Contouring

Case Report

Squamous Cell Carcinoma as a Result of Likely Industrial Grade Ruptured Poly Implant Prosthèse Silicone Buttock Implants

Juan P. Camacho, MD; Miguel Obaíd, MD, MSc; Camilo Bustos, MD; Wilfredo Calderón, MD, FACS; Juan J. Lombardi, MD; Rodrigo Subiabre, MD; Kenneth Guler, MD; and Francisca Correa, MD

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Abstract

The Poly Implant Prosthèse (PIP) implants were withdrawn from the market in 2010 due to the use of a nonmedical grade silicone filler. In 2012, the French medical authorities and the International Confederation of Societies of Plastic, Reconstructive and Aesthetic Surgery recommended the extraction of PIP implants. However, during the duration of this scandal, each country in the world did not agree with a uniform procedure, and this rule was not implemented in its entirety. Although laboratory test results on PIP implants were negative for cytotoxicity and genotoxicity, there are many reports in the literature of several complications associated with PIP implants, including high rupture rates and the fact that they are 3 to 5 times more likely to produce local tissue reactions. On the other hand, the development of more strange and worse prognosis complications, such as the development of squamous carcinoma associated with the use of silicone implants (not necessarily related to PIP implants), is less known. To date, only 6 cases have been reported, and all are related to breast augmentation. The authors made the first report of primary gluteal squamous cell cancer related to rupture and delayed removal of PIP silicone buttock implants.

Level of Evidence: 5

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Poly Implant Prosthèse (PIP) implants, manufactured in France, received European approval in 2000, and it is estimated that the company produced approximately 600,000 implants without following certified manufacturing processes and materials.[1,2] Most of them come from South American countries.[2] In 2006, there were reports from plastic surgeons that these implants had a higher risk of rupture. A new report of this nature in 2009 prompted inspection by the French Health Products Safety Agency (AFSSAPS) in March 2010,[3] which concluded that PIP implants were fraudulently manufactured and removed from the market because of the use of nonmedical grade silicone filler.[4]

Nevertheless, there are reports in the literature of several complications associated with PIP implants. In

From the Department of Plastic and Reconstructive Surgery and the Department of Pathology, Hospital del Salvador, Santiago, Chile.

Corresponding Author:
Dr Juan Pablo Camacho, Department of Plastic and Reconstructive Surgery, Hospital del Salvador, Av. Salvador 364, Providencia, Región Metropolitana, Santiago, Chile.
E-mail: jpcamachomartino@gmail.com

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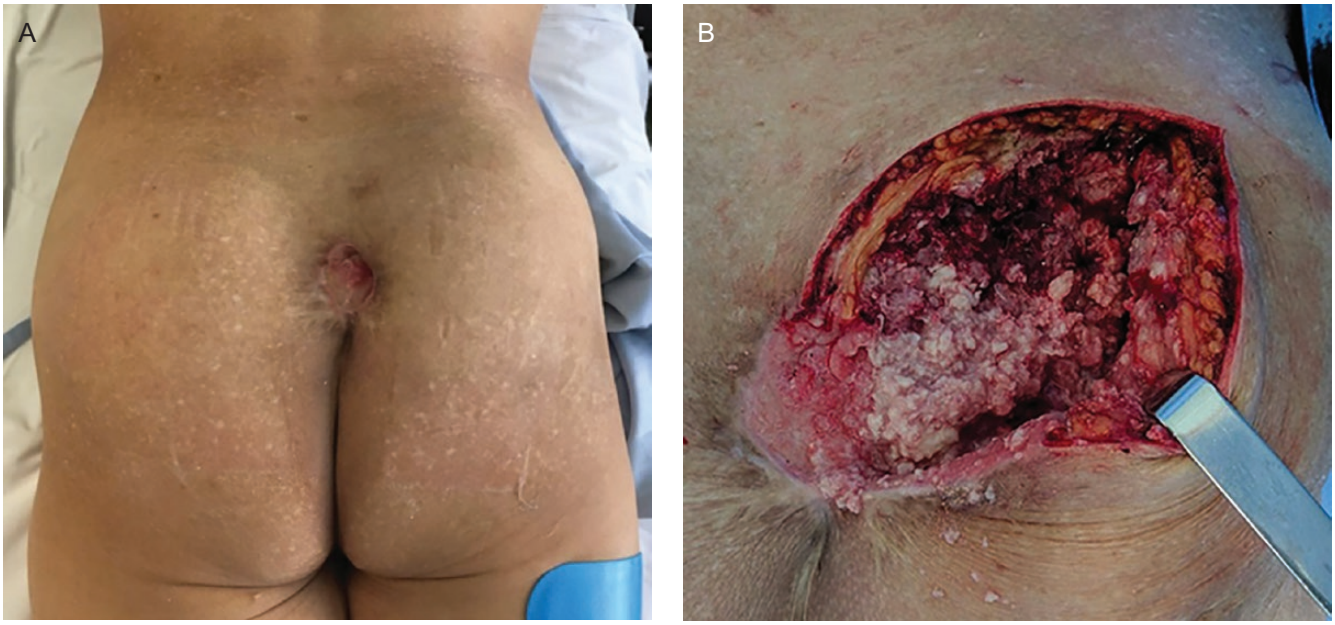

Figure 1. (A) A 61-year-old female patient with a cutaneous fistula in the area of the upper fold, with a large pocket in the right area. (B) Arciform incision accessing extensively to the right gluteal area evidencing the infiltrating tumor mass to the muscle tissue of the *gluteus maximus* and the underlying irregular bone, granulomatous, cerebroside, brown, and hemorrhagic characteristics associated with fat necrosis and devitalized coxal bone.

addition to high rupture rates, they are 3 to 5 times more likely to produce local tissue reactions or to involve lymph node complications,[5] such as axillary lymphadenopathy, intramammary siliconomas, chronic breast pain, and reported cases of breast implant-associated anaplastic lymphoma.[2]

On the other hand, the development of more strange and worse prognosis complications, such as the development of squamous carcinoma associated with the use of silicone implants (not necessarily related to PIP implants), is less known. To date, only 6 cases have been reported, and all are related to breast augmentation.[6-10] We made the first report of primary gluteal squamous cell cancer related to rupture and delayed removal of PIP silicone buttock implants.

CASE REPORT

This is the case of a healthy 61-year-old female patient who underwent primary bilateral buttock augmentation in 2007 with a 300-cc Poly Implant Prothesè (PIP); there was no information about the plane of augmentation or the exact type of PIP implant. In 2015, she experienced a rupture of her right implant but never visited a specialist. Two years later, she went to the emergency department because of the progressive onset of pain, edema, and erythema, without other major symptoms or weight loss. Two weeks before the medical consultation, she developed a cutaneous fistula related to the surgical scar. A computed tomography (CT) scan showed that the fistula associated with a collection initially interpreted as an abscess. The patient went to the emergency department and underwent surgery in January 2017, with a diagnosis of implant rupture and periprosthetic infection. During the procedure, a white liquid with debris and no odor was drained. The implant was removed to confirm its disruption; the fistula and scar were resected and then closed with previous drain placement. On day 14, the patient was dismissed without the drain and referred to a specialist. One month later, she rapidly developed greater pain, erythema, and pus. A new surgical procedure was performed, this time with wide exposure of the zone, showing broad necrosis of the *gluteus maximus* muscle and subcutaneous fat associated with gray keratinous debris that extended until the coccyx (Figure 1). Biopsies of the muscle and bone were taken and sent for pathology. Histological analysis confirmed an invasive, well-differentiated squamous cell carcinoma (SCC) in both biopsies (Figure 2). Further study was performed for extension and staging with abdominopelvic magnetic resonance imaging (MRI) and F-18 fluorodeoxyglucose positron emission tomography (PET)/CT (Figure 3), which demonstrated a 5 × 12 cm locally aggressive tumor arising from the compromised gluteus up to the peritoneal cavity. A second tumor was evidenced at the ipsilateral *psoas* muscle invading the fourth lumbar vertebra and its spinal canal. Multiple lesions were compatible with metastases. When confirming the primary SCC of the ruptured silicone buttock implant with metastatic involvement, the

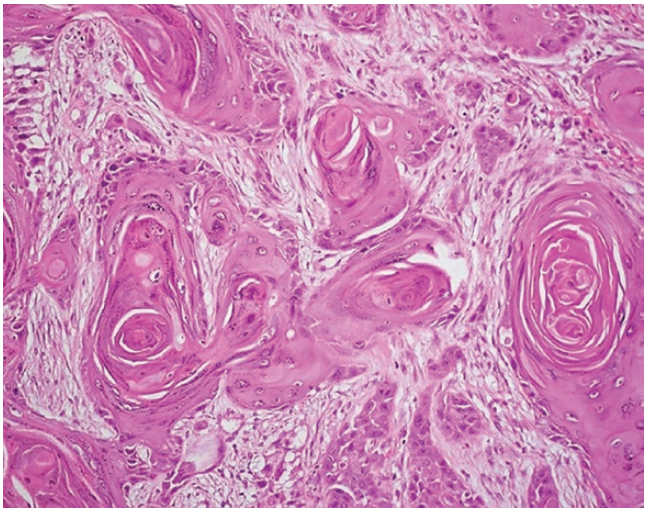

Figure 2. Hematoxylin and eosin 20×. Malignant epithelial neoplasia arranged in nests of cells of broad eosinophilic cytoplasm, with the presence of cornea pearls and dyskeratocytes, with desmoplasic stroma.

patient was considered to be out of the surgical scope. The patient evolved with rapidly progressive deterioration in the context of tumor lysis syndrome characterized by acute renal failure, hyperphosphatemia, hyperkalemia, and hypocalcemia, despite not having received palliative chemotherapy or radiation therapy. Despite supportive and palliative management, she died in the hospital 2 months after diagnosis.

DISCUSSION

PIP silicone breast implants were recalled between 2010 and 2012 due to the use of nonmedical grade silicone filler.[4] In June 2012, the Department of Health of the United Kingdom published a final report on the risk of rupture of PIP implants, concluding that PIP implants are twice as likely to rupture compared with other implants.[1] Regarding the content, PIP implant silicone gels contain significantly higher levels of low-molecular-weight cyclic silicones (dimethylsiloxanes) than medical grade silicone implants (10-fold or greater).[11] However, there is no evidence that chronic human exposure to siloxanes with levels found in the rupture condition of PIP implants is carcinogenic.[12]

Information about the development of primary SCC related to silicone implants, especially in those cases with rupture, older silicone implants (15-30 years), or direct exposure to silicone as in liquid silicone injection, is not known, but the prognosis is ominous.[6] To date, only 6 cases have been reported, and all are related to breast augmentation.[6-10] However, none of these related specifically to PIP prostheses. This is the first case report of a primary SCC related to a gluteal silicone implant PIP rupture.

Primary SCC usually occurs in organs covered with squamous epithelium.[13] It is not unusual to find a different type of epithelium on a specific organ because of metaplasia, which is caused by chronic trauma, infection, or abnormal hormonal stimuli. Some metaplasia has clinical significance because of the predisposition to cancer development.[14] In the clinic, exposure to silicone can produce local accumulation or distant dissemination through the lymphatic or vascular system and induce a chronic inflammatory response that can lead to granulomas, silicone lymphadenopathy, connective tissue diseases, and cancer.[15-17]

Primary breast SCC related to breast implants is extremely rare, with few reports to date.[6-10] However, there are older reports of numerous complications, including the development of squamous carcinoma by injection of liquid silicone.[18,19] These carcinomas are characterized by their large size, fast progression, frequent relapse, and poor prognosis. For the diagnosis, 3 conditions must be met: (1) more than 90% of the malignant cells must have squamous differentiation, (2) there are no other primary SCC sites, and (3) the tumor must be separated from the skin,[8,20] characteristics that are present in the clinical case.

To understand the pathophysiology, it is important to describe the cases of documented primary squamous carcinoma of the breast originating with or without a silicone implant. There were 2 cases described by Talmor et al[19] and Smith et al[18] of SCC of the breast after silicone injection. More rare and controversial are primary squamous carcinomas of the breast attributed to the use of silicone implants.

Paletta et al[7] described the first case of squamous carcinoma presumably originating from the breast implant capsule with a 16-year history of mammaplasty. The exploration of the capsule revealed a mass along the posterior aspect of the capsule. Microscopic analysis revealed that the capsule and the focal areas were covered by stratified squamous epithelium. This epithelium in some areas showed a benign pattern, while in others, there was a transformation to invasive squamous carcinoma.[7]

Kitchen et al[6] described 2 cases in which the capsule was covered by benign squamous epithelium and another by SCC.[15] These authors suggest that metaplastic squamous epithelium may represent a precursor of SCC and that both processes are complications of long-standing chronic inflammation. Zomerlei et al[8] described a case of a 58-year-old patient with a history of long-standing augmentation mammaplasty, without implant rupture, with a mass on the posterior aspect of the capsule compatible with well-differentiated SCC.

Olsen et al[9] reported 2 cases of breast implant capsule-associated SCC. In both patients, implants were removed

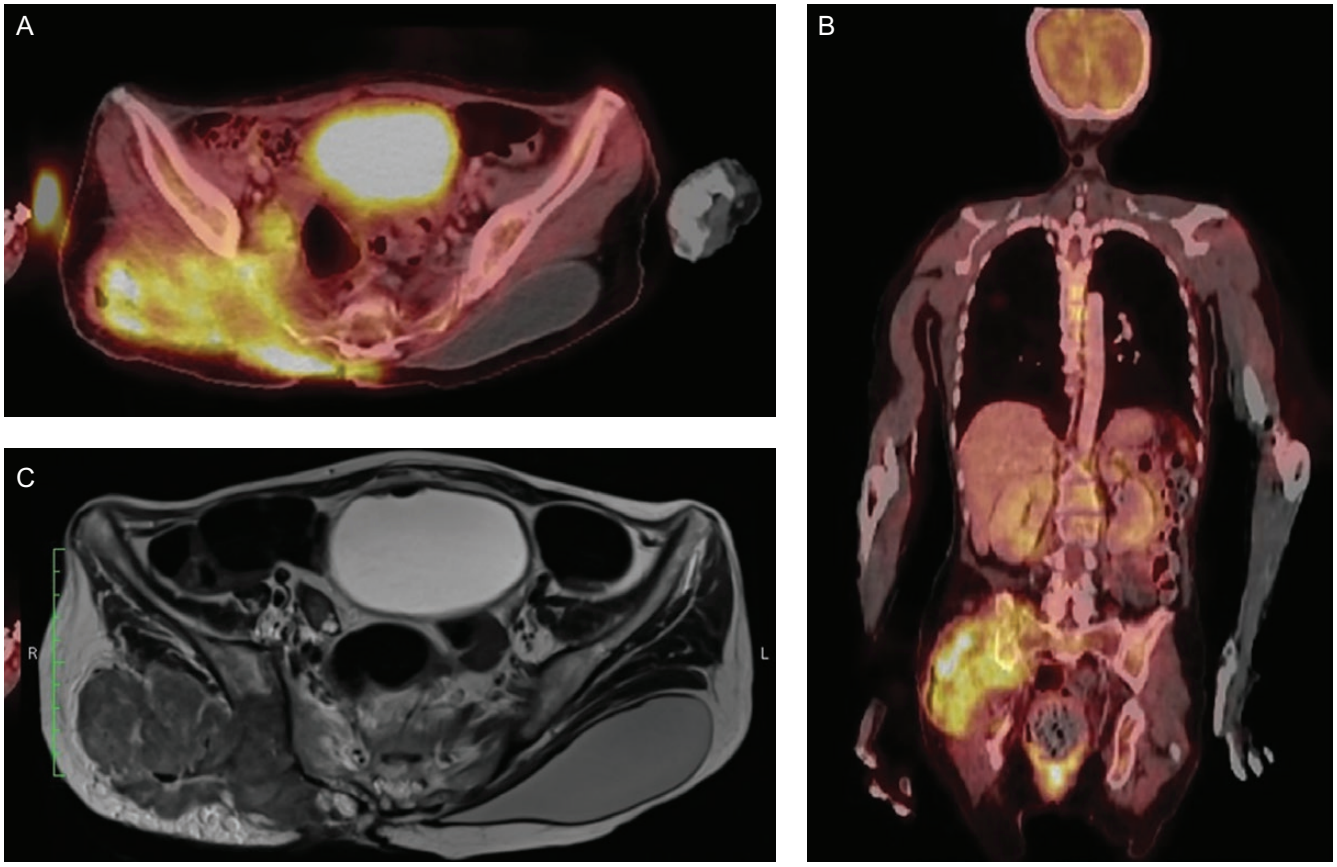

Figure 3. (A) PET/CT axial cut of the pelvis: Hypermetabolism in an extensive ulcerated lesion in the right gluteal region that extends deeply involving the gluteal plane in its entire thickness and the right iliac bone extending to the pelvic excavation where some hypermetabolic solid nodules are identified in a right paravesical situation adjacent to the mesorectal fascia. It emphasizes the absence of hyper uptake in the cutaneous plane, therefore, discarding its origin at this level. (B) PET/CT coronal body section: An extensive primary hypermetabolic neoplastic lesion of the right buttock is seen. (C) MRI pelvis axial cut: Extensive ulcerated lesion in the right gluteal region that extends deeply involving the gluteal plane in its entire thickness and the right iliac bone, determining the extensive osteolytic lesion at this level, which together measures 12 × 5 cm, extending to the pelvic excavation.

but were found to be intact. The patients developed metastases, and one of them died after 1 year. Although the pathophysiology is not elucidated, they suggest that at least the development of squamous epithelialization may serve as a protective mechanism against chronic injury or shear forces from implant placement and/or silicone leakage.[9]

The last case described by Buchanan et al[10] was a 65-year-old woman with a remote history of breast augmentation using foam-covered silicone implants. Again, these cases lend support to the theory that the presence of chronic inflammation results in metaplasia and finally the development of squamous carcinoma. Our case is the first report of a primary SCC related to a ruptured PIP silicone implant in the buttocks.

The histological analysis also demonstrated a variety of presentations, including isolated malignant cells, the coexistence of benign and malignant squamous metaplasia, and solid tumors of SCC. The histogenesis of SCC is not well known, especially considering the epithelial origin in the buttock area, which is the mesoderm. Different hypotheses are proposed: (1) introduction of different epithelial elements during implant positioning, (2) metastases from an SCC located in a different zone, (3) malignant growth from intrinsic epidermal elements such as cysts, and (4) squamous malignant metaplasia from chronic inflammation.[6-8,21,22]

Regarding the theories described, the most supported is the presence of chronic inflammation that leads to squamous metaplasia and finally to the development of squamous carcinoma. This theory is, in turn, the most concordant and supported by the various authors who reported this event associated with long-standing breast implants.

Because the development of this neoplasm was so aggressive, it could not distinguish a capsule or a siliconoma, but the clinical course was concordant with the oncogenic course. This chronic inflammation could also lead to reactive epithelial changes, explaining the appearance of

stratified squamous epithelium[6,23] and the development of SCC in the silicone implant capsule, in the area of silicone injection and especially in cases of extravasation by a broken silicone implant as in this case, but this corresponds to a hypothesis that must be investigated with a greater depth to be answered fully.

Although chronic inflammation is involved, the presence of the fistulous path in relation to the scar could also be considered a possible origin, although this is less likely given the extensive and predominantly gluteal involvement in its entire thickness. Limitations in this regard are the absence of a pathological study of the first emergency surgery, where the scar and fistulous tract were resected.

There are several recommendations in this regard. Although it is a pathology of very low frequency, there are common aspects in relation to the other published cases of squamous carcinoma associated with breast implants. It corresponds to long-standing implants and not necessarily to cases of implant rupture. In contrast, most cases occurred in nonbroken implants. There should be a high index of suspicion, especially in long-term implants, associated with increased unilateral volume and pain. In cases of periprosthetic collection, the same protocols for anaplastic large cell lymphoma (ALCL) with its serological CD markers and histological study should be performed. If it is of squamous origin, keratinized squamous cells can be observed in the histological study of the sample.[10,24]

When the implant is removed, it should be checked for possible rupture. Complete excision of any suspicious mass should be performed associated with capsulectomy for anatomopathological study. Registration and notification of the implant used should be done.

Finally, unlike ALCL, it corresponds to a more aggressive cancer that requires multidisciplinary management, often requiring new surgery associated with adjuvant treatment with chemotherapy and radiotherapy.[9]

CONCLUSIONS

Squamous carcinoma associated with implants is extremely rare and has been reported so far in relation to breast implants. Although the pathophysiology is not elucidated, the most suggestive theory is that it is a consequence of chronic inflammation, followed by squamous metaplasia and finally spinocellular cancer. The PIP implant, given its characteristic content, would contribute mostly to the inflammatory process. The first report of the association of squamous cancer with buttock implants was made.

Disclosures

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