OPEN

CASE REPORT

High-grade Angiosarcoma Associated with Ruptured Breast Implants

Nicolas R. Smoll, MBBS*†
Ross D. Farhadieh, MBBS, FRACS‡
Ross Ferguson, MBBS, FRACS†
Michael W. Findlay, MBBS, PhD, FRACS†§¶
David J. Hunter-Smith, MBBS, MD, FRACS†§

Summary: Since the serendipitous discovery that implanted polymers cause sarcomas in rats, much research has been conducted to prove or disprove a link between silicone breast implants and/or polymer-based materials and breast cancer. In light of an initial report that 35% of rats implanted with a variety of polymers developed fibrosarcomas, we report a case of primary angiosarcoma found in a patient presenting with bilateral rupture of gel-filled breast implants. *(PRS GO 2013;1:e11; doi:10.1097/GOX.0b013e31828ff1cb; Published online 25 April 2013.)*

INTRODUCTION

Since the serendipitous discovery that implanted polymers cause sarcomas in rats, much research has been conducted to prove or disprove a link between silicone breast implants and/or polymer-based materials and breast cancer. Contrary to the findings in animals, human studies demonstrate a surprising relationship between breast implants and breast cancer. Several studies have shown that patients who have undergone breast augmentation have a lesser or same risk of getting breast cancer as nonaugmented patients. This not only suggests that breast augmentation does not increase the risk of, or cause, breast cancer, but proponents suggest that breast augmentation may actually provide a protective effect against the development of breast cancer.[1–3] Critics point to a lack of controlling for breast tissue volume as an independent risk factor, that is, women who undergo breast augmentation as a group may have lesser breast tissue than the rest of the population and therefore are less likely to the risk of developing cancer within this smaller tissue volume. Efforts to quantify pre- and postoperative breast volumes relative to nonimplanted subjects have been problematic due to inherent confounders such as measurement error and variability in body composition under the influences of time, age, hormones, diet, and exercise. By focusing specifically on the most common types of breast cancer (adenocarcinoma), these population-based studies have failed to address the pivotal clinical question posed by the original rat studies, namely, whether the presence of breast implants can increase the risk of rare soft-tissue sarcomas in humans. In light of Oppenheimer's[4] initial report that 35% of rats implanted with a variety of polymers developed fibrosarcomas, we report a case of primary angiosarcoma found in a patient presenting with bilateral rupture of gel-filled breast implants.

*From the *Gippsland Medical School, Monash University, Churchill, Vic., Australia; †Departments of Surgery, Peninsula Health, Frankston, Vic., Australia; ‡Department of Plastic and Reconstructive Surgery, The Canberra Hospital, ACT, Australia; §Peninsula Clinical School, Monash University, Frankston, Vic., Australia; and ¶University of Melbourne, Department of Surgery, St Vincent's Hospital Vic., Australia*
Ethical approval was obtained from Peninsula Health Human Research and Ethics committee, Melbourne, Victoria, Australia, 2011.

DOI: 10.1097/GOX.0b013e31828ff1cb

CASE REPORT

A 69-year-old woman presented with a 6-month history of shape changes and discomfort in breast (Fig. 1). She had bilateral subpectoral breast augmentation with silicone gel implants (second generation) at the age of 34 (1976). Eight weeks before presentation, she developed severe pain in the inferior-medial aspect of her right breast. Implant rupture

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*

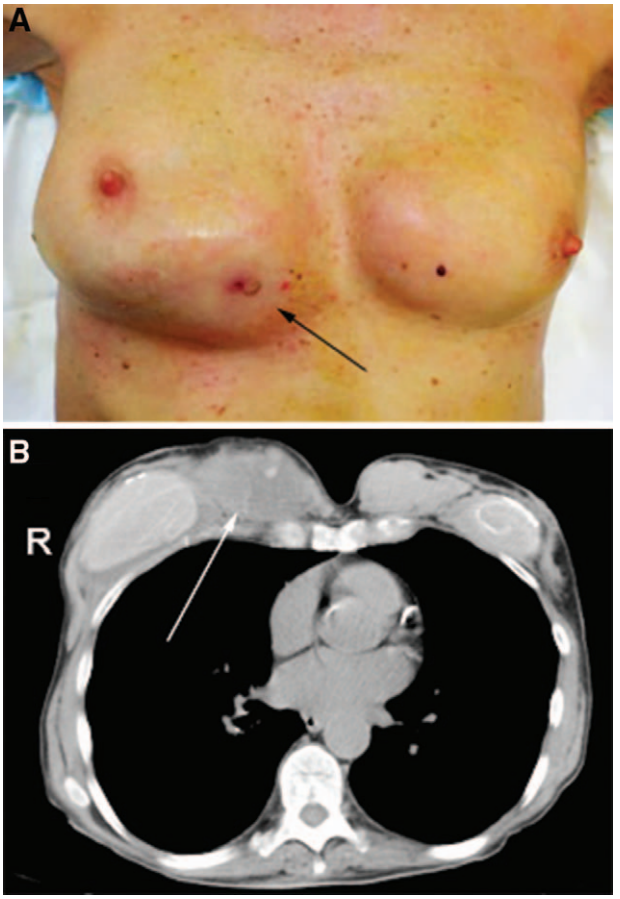

Fig. 1. A, Appearance of right breast at surgery denoting the dimpling associated with the breast implant. B, MRI of chest, pointing to the base of the angiosarcoma.

was confirmed by mammography and ultrasonography. Computed tomography scanning showed intracapsular rupture of both breast implants with "linguini" signs bilaterally. A large, low-density soft-tissue mass on the medial aspect of the right breast prosthesis, measuring 6.5×6.0×4.5 cm in diameter, was also identified. The underlying bony structures of the chest wall appeared intact with no erosion (Fig. 1B). Radiologic-guided core biopsy was suggestive of an undifferentiated tumor, possibly angiosarcoma. At surgery, an extensive high-grade primary angiosarcoma of the breast was resected en bloc with a radical mastectomy. Histopathology demonstrated a 10-cm high-grade angiosarcoma of the breast, with margins that included the pectoralis major muscle, periosteum, and intercostal muscle. Numerous mitotic figures were identified. The tumor cells were cytokeratin AE1/3, Cam5.2, S100, HMB45, CD3, CD20, CD31, CD34, estrogen receptor, progesterone receptor, and HER-2 negative. There was a diffuse and weak staining to moderate cytoplasmic tumor cell CD68.

Axillary dissection revealed silicon granulomas but no evidence of metastatic angiosarcoma.

Staging with positron emission tomography and computed tomography scanning failed to demonstrate metastatic disease; however, biopsy-proven local tumor recurrence developed within 3 weeks of surgery. The patient was offered a chemoradiation regimen but was refused chemotherapy. Despite delivery of a total of 45Gy in 30 fractions, local disease progression continued unabated, leading to progression of disease with numerous nodules over the right chest wall and the mastectomy site, and it included perihilar and metastatic pulmonary diseases.

The patient requested palliative care and died within 3 months of the initial presentation.

DISCUSSION

Since Dow Corning introduced silicone gel prostheses in 1962, there has been controversy regarding the safety of silicone breast implants.[5] The use of prosthetic implants in other disciplines such as orthopedic surgery has been linked with rare but well-documented cases of sarcomatous tumors.[6–8]

Extensive research considers that there is no association between silicone breast implants and cancer and that they will not adversely affect pregnancy, breast-feeding, or health of the breast-fed children. However, the controversy surrounding breast implants has been reignited by the reports of anaplastic large cell lymphoma and the more recent concerns over the use of non-medical-grade silicone within Poly Implant Prosthese brand implants.

Laboratory carcinogenesis assays including the insertion of implant materials in rodents are invaluable to establish the safety of new devices. However, there are a number of significant limitations of these techniques for the assessment of breast implant carcinogenicity. For example, rodents are the most extensively used animal models in assessments of carcinogenicity as they display a phenomenon called solid-state carcinogenesis. Solid-state carcinogenesis refers to the predisposition to develop high rates of mesenchyme-lineage tumors (sarcomas) at the insertion sites of solid implants. This produces a background sarcoma rate that is usually controlled using positive (more carcinogenic) and negative (less carcinogenic) controls. The implant is considered to be noncarcinogenic in cases where the tested implant is significantly different from the positive control yet is not significantly different from the negative control. This approach relies on the power of the study to correctly identify a mild-to-moderate carcinogenic agent as statistically different from the negative control. Furthermore,

this testing can only be carried out over the reasonable lifespan of the animal (2 years in rodents) and therefore cannot approximate the long-term effects of implants within humans. The addition of surface coatings and textures, as is found in many breast implants in current use, is also beyond the capacity of these tests to assess with certainty.

At least 2 major studies (13,500 women over 8 years) raise questions about the long-term safety and health effects of breast implants.[8, 9] The first study found that women with breast implants are more likely to die from brain tumors, lung cancer, other respiratory diseases, and suicide compared with other patients who have undergone plastic surgery. The second study found a 21% overall increased risk of cancer for women with implants, compared with women of the same age in the general population. The efficacy of augmentation mammoplasty on psychological well-being is also poorly defined. Many reports have attributed patient's improved self-image and self-esteem to breast augmentation; others, however, have documented increased suicide risk and a trebled death risk from alcoholism and the abuse of prescription as well as recreational drugs,[10,11] which is a seemingly contradictory outcome to the manufacturers' assertion that implants improve a woman's feeling of self-worth.

The Food and Drug Administration has recently warned about the medical risks of breast implants. It has recommended that augmented women periodically undergo screening magnetic resonance imaging examinations for signs of rupture and/or leakage. In addition, the Food and Drug Administration has ordered that breast surgery patients be provided with detailed informational brochures explaining the medical risks of using breast implants.

Here, we report a rare primary angiosarcoma of the breast in a patient with a long-standing breast implant. A causal link cannot be established, either based on this case report or on the rarity of angiosarcoma; however, there is strong argument for the institution of breast implant registries as the most objective assessment of the long-term safety of tens of thousands of implants inserted in humans every year. The use of breast implants in aesthetic surgery should be tempered with an understanding of these many issues, both for the patient and the treating surgeon.

David Hunter-Smith,
PO Box 52, Frankston
VIC 3199
Australia
E-mail: david.hunter-smith@monash.edu

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