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CASE REPORT

Post-surgical pyoderma gangrenosum in otherwise healthy patient with history of COVID-19

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Abstract

There are increasing reports of autoimmune and dermatologic sequelae of COVID-19. We describe an otherwise healthy patient with recent history of serious COVID-19 infection who developed post-surgical pyoderma gangrenosum following bilateral reduction mammoplasty and was successfully treated with infliximab, mycophenolic acid, and corticosteroids. We present this case to highlight the lingering systemic pro-inflammatory effects of COVID-19 infection that may increase the risk of rare autoimmune complications of surgery. As a complete understanding of the long-term effects of COVID-19 is poorly understood, patients with a history of COVID-19 infection should be appropriately counseled to these possible risks when discussing surgery.

KEYWORDS
autoimmune, breast, COVID-19, dermatology, pyoderma gangrenosum

1 | INTRODUCTION

Extrapulmonary manifestations of the novel Severe Acute Respiratory Syndrome Coronavirus 2 (COVID-19) are increasingly being reported. These manifestations are likely related to the proinflammatory effects of COVID-19 infection and its triggered cytokine release syndrome, which can result in serious cardiovascular, dermatologic, and autoimmune consequences.[1-4] Increasingly, researchers are also reporting possible prolonged consequences of the virus' proinflammatory effects, casually named "long COVID".[5-9] These lingering, dysregulated, proinflammatory consequences may increase an individual's susceptibility to inflammatory or autoimmune disorders.

Post-surgical pyoderma gangrenosum is an uncommon inflammatory skin disorder of unknown etiology that has been previously reported after breast surgery[10-12] and is associated with underlying autoimmune conditions such as rheumatoid arthritis. In patients without these traditional underlying autoimmune conditions, post-surgical pyoderma gangrenosum has not yet been associated with COVID-19 viral infection or its possible lingering proinflammatory effects. In this case report, we describe the first case of post-surgical pyoderma gangrenosum after bilateral reduction mammoplasty in an obese, otherwise healthy, 44-year-old woman with a recent history of COVID-19 infection.

2 | CASE DESCRIPTION

We present the case of a 44-year-old obese (BMI: 46) otherwise healthy woman of East Indian descent, who initially presented to our hospital in May 2020 with progressive respiratory symptoms in the setting of a positive COVID-19 test. She was hospitalized and underwent a 5-day course of Remdesivir. The patient was discharged home on hospital day six with improvement of her symptoms. Three months later, the patient returned to our same day surgical center for a planned bilateral reduction mammoplasty.

The patient had a protracted post-operative course with persistently elevated inflammatory markers Figure 1. After an extensive workup, the only potential nidus found for her infectious symptoms was a very small fluid collection on the medial aspect of the breast that was discovered on a CT angiogram of the chest while evaluating for a pulmonary embolism. Given there was no other obvious source to explain the systemic inflammatory response, operative exploration of the breasts was performed. There was no obvious fluid collection seen during the case but there was an abnormal coalescing of pustules and superficial skin sloughing around the nipple areolar complex (Figure 2A). Given the absence of any growth of microorganisms and persistent concerns, the rheumatology and dermatology services were consulted, who endorsed our concern

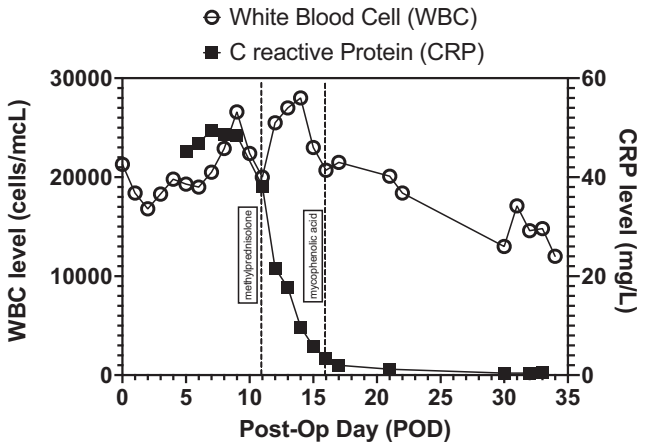

FIGURE 1 White blood cell (WBC) counts and C-reactive protein (CRP) measurements during post-operative course. Methylprednisolone therapy was initiated on POD 11, and mycophenolic acid therapy was initiated on POD 16

for pyoderma gangrenosum. The recommendation was a punch biopsy and starting methylprednisolone. The final pathology returned as "neutrophilic abscess" with deeper acute/chronic inflammation. Once steroids were initiated, the patient improved both from a clinical as well as inflammatory marker standpoint. Following discharge, she was re-admitted to the hospital once due to concerns of further wound dehiscence. She was started on infliximab by her dermatologist and has showed slow but steady improvement of her wounds, Figure 2.

During her last follow-up clinic visit, the patient's wounds were stable with no areas left to debride. The wounds healed by secondary intention cause distortion of both breasts. Dermatology has cautioned the patient to abstain from further surgeries because of fear of reactivating the destructive process from the pyoderma gangrenosum. There are no further operative surgical interventions planned at this time.

3 | DISCUSSION

We discuss the case of an obese 44-year-old woman with no previous history of autoimmune disease or problems healing minor wounds who developed post-surgical pyoderma gangrenosum in the setting of a bilateral reduction mammoplasty and a recent COVID-19 infection. Dermatologic complications or manifestations of COVID-19 are known to occur, though have been less consistently documented then cardiac and pulmonary complications. An article discussing the autoimmune sequelae of COVID-19 found numerous potential cutaneous manifestations of the virus with most being benign.[1] To our knowledge, there have been no documented cases of cutaneous complications, including pyoderma gangrenosum, following major breast surgery in patients with a recent COVID-19 diagnosis.

Reduction mammoplasty is a common surgery for plastic surgeons to perform, though this procedure is not without known complication.[13] The complication experienced by our patient, post-surgical pyoderma gangrenosum, is very uncommon and typically reported in the setting of another underlying autoimmune conditions like inflammatory bowel disease or rheumatoid arthritis.[10] Though our patient did not have a chronic autoimmune condition, she did have a recent history of COVID-19, which has known long-term proinflammatory effects on the immune system and widespread sequelae.[1,5,6,14] At the time of surgery, our patient did not have any symptoms that suggested "long COVID," but persisting proinflammation may have been present without our knowledge. There are now suggestions for pre-operative workup of patients with previous COVID-19 infection to identify the presence of any long-standing smoldering effects, and these suggestions may prove useful in the future for identifying lingering proinflammatory conditions and preventing related complications.[15] We describe this case to draw attention to this rare complication in an otherwise healthy 44-year-old woman with a previous COVID-19 infection.

The diagnosis of post-operative pyoderma gangrenosum is a clinical challenge, especially in patients without known risk factors. In our patient with a prolonged course, increased inflammatory markers, and failure to improve on intravenous antibiotics, a high index of suspicion for other diagnoses should be present. With this small fluid collection being the only suspected nidus for the patient's increased inflammatory markers, she was taken back to the operating room, where investigation of the fluid collection revealed the absence of any signs of infection. The superficial skin demonstrated an uncommon finding of scattered coalescing pustules. A systematic review of other post-operative pyoderma gangrenosum cases found the mean time to formation of non-healing wounds was 7 days, though some were reported as early as post-operative day one.[10] Our time to a presumptive diagnosis was approximately 9 days, and intravenous steroids were initiated before the final diagnosis of pyoderma gangrenosum had been confirmed as the patient was experiencing a significant systemic inflammatory response with no identifiable source. There is not a current standard of care for management of post-surgical pyoderma gangrenosum, though early initiation of oral corticosteroids as first-line therapy is generally recommended as well as the avoidance of any future unnecessary surgical interventions. Pending clinical improvement, more potent immunosuppression with infliximab or mycophenolic acid can be initiated.[16] In our patient, corticosteroids, mycophenolic acid, and infliximab were used with steady improvement in the patient's wounds and inflammatory markers.

4 | CONCLUSION

Previous infection with COVID-19 may predispose otherwise healthy patients to a higher risk of post-surgical pyoderma gangrenosum due to the lingering proinflammatory effects of the virus. Patients with history of COVID-19 infection should be adequately counseled to this possibility when discussing risks and benefits of breast surgery.

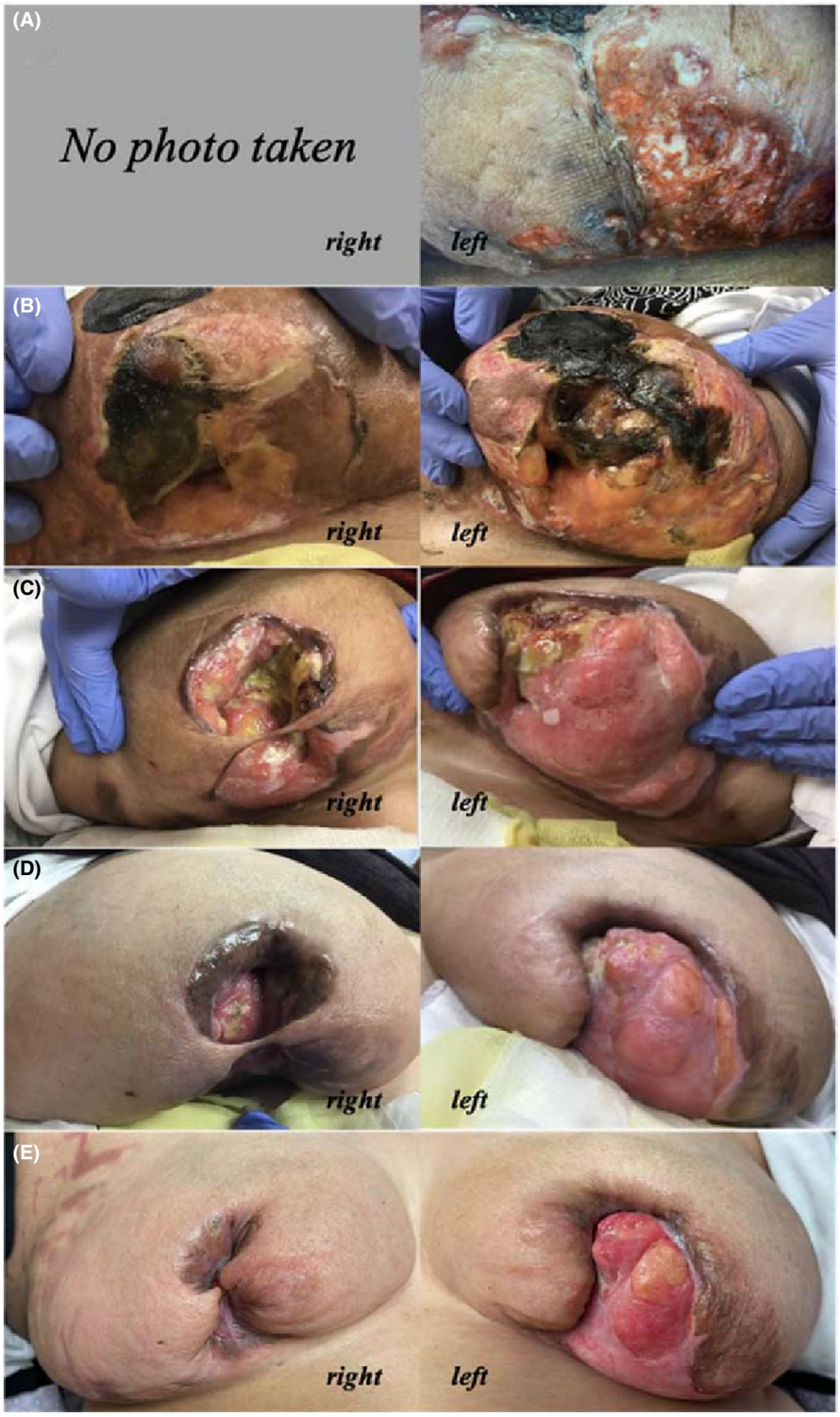

FIGURE 2 Progression of pyoderma gangrenosum of the right and left breast from (A) 9/4/2020, (B) 9/18/2020, (C) 11/17/2020, (D) 01/12/2021, and (E) 03/16/2021

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CONFLICT OF INTERESTS

The authors have no conflicts of interest to declare. The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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REFERENCES

1. Novelli L, Motta F, De Santis M, Ansari AA, Gershwin ME, Selmi C. The JANUS of chronic inflammatory and autoimmune diseases onset during COVID-19 - A systematic review of the literature. *J Autoimmun*. 2021;117:102592. https://doi.org/10.1016/j.jaut.2020.102592

2. Wee C, Younis J, Xia T, Guyuron B. Delayed septal perforation as a complication of COVID-19: a case report. *Aesthetic Plast Surg*. 2021:1-4. https://doi.org/10.1007/s00266-020-02078-2
3. Zinder R, Andrews C, Cristallo J, Flattau A. COVID-19 wounds: unusual lower extremity bullae. *Int J Low Extrem Wounds*. 2020;153473462096428. https://doi.org/10.1177/1534734620964284
4. Joob B, Wiwanitkit V. COVID-19 can present with a rash and be mistaken for dengue. *J Am Acad Dermatol*. 2020;82(5):e177. https://doi.org/10.1016/j.jaad.2020.03.036
5. Mudd PA, Remy KE. Prolonged adaptive immune activation in COVID-19: implications for maintenance of long-term immunity? *J Clin Invest*. 2021;131(1):e143928. https://doi.org/10.1172/JCI143928
6. Files JK, Boppana S, Perez MD, et al. Sustained cellular immune dysregulation in individuals recovering from SARS-CoV-2 infection. *J Clin Invest*. 2021;131(1):e140491. https://doi.org/10.1172/JCI140491
7. Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A. Coronavirus disease 2019 (COVID-19): a systematic review of imaging findings in 919 patients. *Am J Roentgenol*. 2020;215(1):87–93. https://doi.org/10.2214/AJR.20.23034
8. Hu Y, Li W, Gao T, et al. The severe acute respiratory syndrome Coronavirus nucleocapsid inhibits type I interferon production by interfering with TRIM25-mediated RIG-I ubiquitination. *J Virol*. 2017;91(8):e02143. https://doi.org/10.1128/JVI.02143-16
9. Moldofsky H, Patcai J. Chronic widespread musculoskeletal pain, fatigue, depression and disordered sleep in chronic post-SARS syndrome; a case-controlled study. *BMC Neurol*. 2011;11:37. https://doi.org/10.1186/1471-2377-11-37
10. Zuo KJ, Fung E, Tredget EE, Lin AN. A systematic review of post-surgical pyoderma gangrenosum: identification of risk factors and proposed management strategy. *J Plast Reconstr Aesthet Surg*. 2015;68(3):295-303. https://doi.org/10.1016/j.bjps.2014.12.036
11. Ehrl DC, Heidekrueger PI, Broer PN. Pyoderma gangrenosum after breast surgery: a systematic review. *J Plast Reconstr Aesthet Surg*. 2018;71(7):1023–1032. https://doi.org/10.1016/j.bjps.2018.03.013
12. Tuffaha SH, Sarhane KA, Mundinger GS, et al. Pyoderma gangrenosum after breast surgery: diagnostic pearls and treatment recommendations based on a systematic literature review. *Ann Plast Surg*. 2016;77(2):e39-e44. https://doi.org/10.1097/SAP.0000000000000248
13. Winter R, Haug I, Lebo P, et al. Standardizing the complication rate after breast reduction using the Clavien-Dindo classification. *Surgery*. 2017;161(5):1430-1435. https://doi.org/10.1016/j.surg.2016.11.028
14. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of Coronavirus disease 2019 (COVID-19): a review. *JAMA*. 2020;324(8):782-793. https://doi.org/10.1001/jama.2020.12839
15. Bui N, Coetzer M, Schenning KJ, O'Glasser AY. Preparing previously COVID-19-positive patients for elective surgery: a framework for preoperative evaluation. *Perioper Med (Lond)*. 2021;10(1):1. https://doi.org/10.1186/s13741-020-00172-2
16. Brooklyn T, Dunnill G, Probert C. Diagnosis and treatment of pyoderma gangrenosum. *BMJ*. 2006;333(7560):181-184. https://doi.org/10.1136/bmj.333.7560.181

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