Letter

Research letter

Characteristics and treatment of silicone granulomas: A retrospective multicenter cohort of 21 patients

To the Editor: In 2017, the United States Food and Drug Administration issued a warning against injectable silicone for body contouring after reports of serious complications.[1] Despite this, and given its low cost and relative permanence, injectable silicone remains offered in some countries and occasionally off-label within the United States.[2] Silicone granulomas (SGs) are the granulomatous responses that may occur after silicone injection or implant rupture.[2-4] Limited data on patients with SG are available. The largest cohort to date consists of only 9 patients.[3] We sought to characterize patients with SG in a retrospective multicenter cohort.

The Research Patient Data Registry, associated with Mass General Brigham hospitals, was queried using SG-related International Classification of Diseases 9/10 codes and terms. Demographics, clinical features, and treatment data were collected and analyzed, with P values of $\leq .05$ considered statistically significant.

We identified 21 patients with SG, 14 from silicone injections most commonly into the buttocks (57%, 8/14) and 7 from ruptured silicone breast implants (Table I). Compared with the implant group, the injection group included a significant number of Latino patients (64%, 9/14, $< .01$), patients having procedures outside the United States. (57%, 8/14, $P = .02$), and patients misinformed about the materials used or body parts injected (57%, 8/14, $P = .02$). Additionally, only the injection group included Medicaid (29%, 4/14), uninsured (7%, 1/14), and transgender patients (14%, 2/14).

Compared with implant patients, injected patients had more signs and symptoms ($P = .03$), with symptoms developing a median of 25 years sooner after silicone administration ($P = .05$, Table I). Only injected patients had silicone migration to distant sites (21%, 3/14), including 1 patient who presented with a life-threatening migration to the lungs.

Thirty-six percent (5/14) of injected patients were treated medically, 43% (6/14) surgically, and 7% (1/14) both medically and surgically. The most common medical therapies were systemic steroids (29%, 4/14), hydroxychloroquine (29%, 4/14), tetracyclines (29%, 4/14), and adalimumab (14%, 2/14) (Table II). Thirty-three percent (2/6) of medically treated injected patients had complete response (CR); 1 patient received hydroxychloroquine and adalimumab followed by adalimumab monotherapy, whereas the other received hydroxychloroquine, minocycline, and prednisone followed by hydroxychloroquine monotherapy. Both patients continued their final monotherapy without taper and were able to maintain CR. Although no surgically treated injected patients had CR, most (86%, 6/7) implant patients had CR to surgery.

SGs from injectable silicone disproportionately affected racial/ethnic, socioeconomic, and gender minorities and were associated with greater morbidity. Concordant with existing limited literature, medical therapy was more effective compared with surgery for SGs from injectable silicone,[2,3] whereas surgery was the treatment of choice for SGs from ruptured implants.[4] This difference is explained by the greater propensity of injected silicone to migrate, making it challenging to fully remove surgically, as compared with the silicone gel in implants.[2,3] Akin to the treatment algorithm for cutaneous sarcoidosis,[5] our results suggest that systemic steroids, hydroxychloroquine, and tetracyclines should be considered as first-line agents for SGs from injectable silicone, followed by tumor necrosis factor-alpha inhibitors for refractory disease. Study limitations include the small sample size and retrospective methodology. Further investigation, particularly regarding SG treatment, is warranted.

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Table I. Demographics and clinical features of patients with silicone granulomas

Demographics	Silicone injection group (n = 14) n (%)	Silicone implant group (n = 7) n (%)	*P* value[*]
Age at diagnosis, median (range), years	43.3 (24.5-71.9)	67.8 (44.6-79.1)	**.03**[†]
Gender identity			.36
Cisgender women	10 (71)	7 (100)	
Cisgender men	2 (14)	0	
Transgender women	2 (14)	0	
Race/ethnicity			
Latinx	9 (64)	0	<**.01**
White	4 (29)	6 (86)	**.02**
Middle Eastern	1 (7)	0	1
Asian	0	1 (14)	.33
Insurance type			.42
Medicare	6 (43)	5 (71)	
Medicaid	4 (29)	0	
Private	3 (21)	2 (29)	
Uninsured	1 (7)	0	
Procedure performed outside the United States[‡]	8 (57)	0	**.02**
Misinformed about procedure	8 (57)	0	**.02**
Reason for silicone administration			.19
Augmentation	11 (79)	5 (71)	
Gender confirmation	2 (14)	0	
Reconstruction	0	2 (29)	
Unspecified	1 (7)	0	
Site of silicone administration			
Buttocks	8 (57)	0	<**.01**
Breasts	5 (36)	7 (100)	.06
Lower extremities	3 (21)	0	.52
Face	2 (14)	0	.53
Upper extremities	1 (7)	0	1
Signs and symptoms			
Pain	9 (64)	3 (43)	.40
Erythema	6 (42)	0	.06
Edema	6 (42)	0	.06
Induration	5 (36)	1 (14)	.61
Pruritus	3 (21)	0	.52
Hyperpigmentation	3 (21)	0	.52
Warmth	1 (7)	1 (14)	1
Number of signs and symptoms			**.03**
0-1	2 (14)	5 (71)	
2-3	7 (50)	2 (29)	
≥4	5 (36)	0	
Migration of silicone			.48
Local[§]	4 (29)	3 (43)	
Distant[‖]	3 (21)	0	
Time between silicone administration and symptom onset, median (range), years	5.0 (1.0-48.0) (n = 11)	30.0 (21.0-46.0) (n = 4)	**.05**[†]
Time between symptom onset and diagnosis, median (range), months	5.8 (0.5-122.3) (n = 11)	4.1 (1.5-9.8) (n = 5)	.77[†]
Method of diagnosis			1
Biopsy only	2 (14)	1 (14)	
Imaging only[¶]	2 (14)	1 (14)	
Both biopsy and imaging[¶]	10 (71)	5 (71)	

Continued

Table I. Cont'd

Demographics	Silicone injection group (n = 14) n (%)	Silicone implant group (n = 7) n (%)	*P* value*
Tissue cultures performed to exclude concurrent infection	7 (50)	1 (14)	.17
Developed autoimmune disease after silicone exposure[#]	1 (6)	0	1
Follow-up period, median (range), months	28.3 (2.1-180.4)	8.5 (0.07-145.7)	.12[†]

Bolded numbers indicate statistical significance.
**P* values based on Fisher's exact test unless otherwise specified; all *P* values calculated using STATA version 15.1 (StataCorp).
[†]*P* values based on Mann-Whitney test.
[‡]Procedure performed in Dominican Republic (n = 4), Republic of Colombia (n = 1), Mexico (n = 1), United Arab Emirates (n = 1), and an unspecified country in South America (n = 1).
[§]From breasts to axillary lymph nodes (n = 4), legs to ankles (n = 2), and buttocks to anterior pelvis (n = 1).
[‖]From breasts to nose (n = 1), breasts to abdominal soft tissues (n = 1), and breasts and buttocks to lungs and abdominal soft tissues (n = 1).
[¶]Magnetic resonance imaging (n = 10), computed tomography (n = 9), and ultrasound (n = 9).
[#]Celiac disease (n = 1).

Table II. Treatment modalities and outcomes of patients with silicone granulomas

Treatment modalities	Silicone injection group (n = 14) n (%)[†]	Silicone implant group (n = 7) n (%)[†]	*P* value*
Treatment			
Medical	5 (36)	0	.12
Surgical	6 (43)	7 (100)	**.02**
Medical and surgical	1 (7)	0	1
No treatment because of comorbidities	2 (14)	0	.53
Medical treatments[‡]			
Intralesional steroids	1 (7)	N/A	-
Systemic steroids	4 (29)	N/A	-
Hydroxychloroquine	4 (29)	N/A	-
Tetracycline antibiotics	4 (29)	N/A	-
Methotrexate	1 (7)	N/A	-
Mycophenolate mofetil	1 (7)	N/A	-
Adalimumab	2 (14)	N/A	-
Medical treatment (n = 6 for injection group)			
Complete response[§]	2 (33)	N/A	-
Partial response	4 (67)	N/A	-
Number of medical treatments per patient, median (range)			
Complete response	2.5 (2-3)	N/A	-
Partial response	3 (1-5)	N/A	-
Surgical treatment (n = 7 for each group)			**<.01**
Complete response	0	6 (86)	
Partial response	7 (100)	1 (14)	
Long-term contour change/scarring			.17
Medical treatment (n = 6 for injection group)	2 (33)	N/A	
Surgical treatment (n = 7 for each group)	3 (43)	1 (14)	
No treatment (n = 2 for injection group)	2 (100)	N/A	

Bolded numbers indicate statistical significance.
N/A, Not applicable.
**P* values based on Fisher's exact test unless otherwise specified; all *P* values calculated using STATA version 15.1 (StataCorp).
[†]All percentages based on denominator as defined by n in the first row unless otherwise specified by n in the first column.
[‡]Medical treatment duration was at least 2 months.
[§]Complete and partial responses were defined as complete and partial improvement, respectively, of physician-observed signs and patient-reported symptoms in Table I.

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Conflicts of interest

None disclose.

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