







DOI: <https://doi.org/10.5554/22562087.e977>

Migration of liquid silicone, an emerging contraindication of neuraxial anesthesia

Migración de silicona líquida, una contraindicación emergente de la anestesia neuroaxial

William F. Amaya-Zúñiga^{a,c} , Viviana Mojica-Manrique^a , Iván Santos-Gutiérrez^{d,f} ,
Julia Alfonso-Jaimes^{d,e} 

^a Department of Anesthesia and Perioperative Medicine, Hospital Universitario Fundación Santa Fe de Bogotá. Bogotá, Colombia.

^b Universidad de los Andes. Bogotá, Colombia.

^c Universidad El Bosque. Bogotá, Colombia.

^d Department of Plastic Surgery, Hospital Universitario Fundación Santa Fe de Bogotá, Bogotá, Colombia.

^e Colombian Society of Plastic Surgery. Bogotá, Colombia.

^f International Society Aesthetic Plastic. Bogotá, Colombia.

Correspondence: Calle 119 # 7-75. Bogotá, Colombia. **Email:** williamf.amayaz@yahoo.es.

How to cite this article: Amaya-Zúñiga WF, Mojica-Manrique V, Santos-Gutiérrez I, Alfonso-Jaimes J. Migration of liquid silicone, an emerging contraindication of neuraxial anesthesia. Colombian Journal of Anesthesiology. 2021;49:e977.

Abstract

The illegal use of liquid silicone products or biopolymers in gluteal augmentation procedures is giving rise to multiple complications, with a significant negative health impact, both in the short and long-term. The migration of polymers to the sacral and lumbar region represents a major limitation to conducting neuraxial anesthesia procedures. This silicon migration is unpredictable through the superficial tissue as is widely described in the literature. Caudal, spinal and epidural anesthesia may cross the silicone in the fascia and contaminate the neural axis with substances that are highly capable of causing inflammation, edema and tissue necrosis. In order to improve the safety of neuraxial anesthetic procedures and avoid the potential risk of dissemination and contamination of the neural axis, this complication must be ruled out, or be considered an emerging contraindication for these anesthetic procedures.

Keywords: Silicone injection; Silicone migration; Regional anesthesia; Patient safety; Anesthesia.

Resumen

La aplicación ilegal de productos como silicona líquida o biopolímeros en procedimientos de aumento de glúteos está generando múltiples complicaciones con gran impacto negativo para la salud tanto a corto como a largo plazo. La migración de polímeros a la región sacra y lumbar representa una importante limitación para la realización de procedimientos de anestesia neuroaxial. Esta migración de silicona es impredecible a través del tejido superficial, la cual está ampliamente descrita en la literatura. Los procedimientos anestésicos caudal, espinal y epidural podrían atravesar los silicomos en la fascia del tejido y contaminar el neuroeje con sustancias con alta capacidad de generar inflamación, edema y necrosis de tejidos. Con el fin de aumentar la seguridad de los procedimientos anestésicos neuroaxiales y evitar el riesgo potencial de dispersión y contaminación del neuroeje, es necesario descartar esta complicación o considerar una contraindicación emergente en estos procedimientos anestésicos.

Palabras clave: Inyección de silicona; Migración de silicona; Anestesia regional; Seguridad del paciente; Anestesia.

Lea la versión en español de este artículo en www.revcolanest.com.co

Copyright © 2021 Sociedad Colombiana de Anestesiología y Reanimación (S.C.A.R.E.).

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

BACKGROUND

Silicon injections of unknown purity have been around since the 60's. (1) They were initially considered for medical use, but unfortunately their use has generated a growing negative impact on healthcare. (2,3) In 2017, The US Food and Drug Administration issued a warning to both patients and physicians against the use of injectable silicone for body contouring procedures. (4) Notwithstanding this caution, liquid silicone or biopolymers, are widely used both in females and males for buttocks and lips augmentation, or to correct facial furrows and wrinkles. (3,4)

The use of smaller amounts for body contouring has been observed in women, in contrast to extreme cases of transgender males with volumes between 4 to 15 liters in an attempt to feminize their bodies. (3) The incidence varies from country to country, though it is underestimated because these procedures are usually performed in an illicit fashion, leading to under-registration. There is also a close association with tourism for cosmetic procedures. (2,3) This practice, and its growing complications have been considered an emerging epidemic. (2)

The gradual increase of a wide variety of injectable substances in different areas of the body has shown multiple potential complications. Some of the most well-known complications include migration, inflammation, edema, development of granulomas and infections. Severe health problems have been documented in some cases such as pulmonary embolism, renal failure, tissue necrosis, and even fatalities. (1,5,6)

Its wide use in cosmetic procedures is due to its low cost, durability and thermal stability. Contrary to what was expected, and despite the fact that injected solutions are chemically inert, they give rise to different levels of local inflammatory reactions and necrosis. (3,7) Recently, they have been identified as a cause for systemic response associated with rheumatological involvement such as the autoimmune/inflammatory syndrome induced by

adjuvants (ASIA). (8) The persistence of the material and the negative health impact, developing sequelae even 25 or 30 years after their injection (2), has generated the need for multiple continuous treatments, including surgical resection as an essential part of timely management for control purposes. (8)

THE CURRENT SITUATION

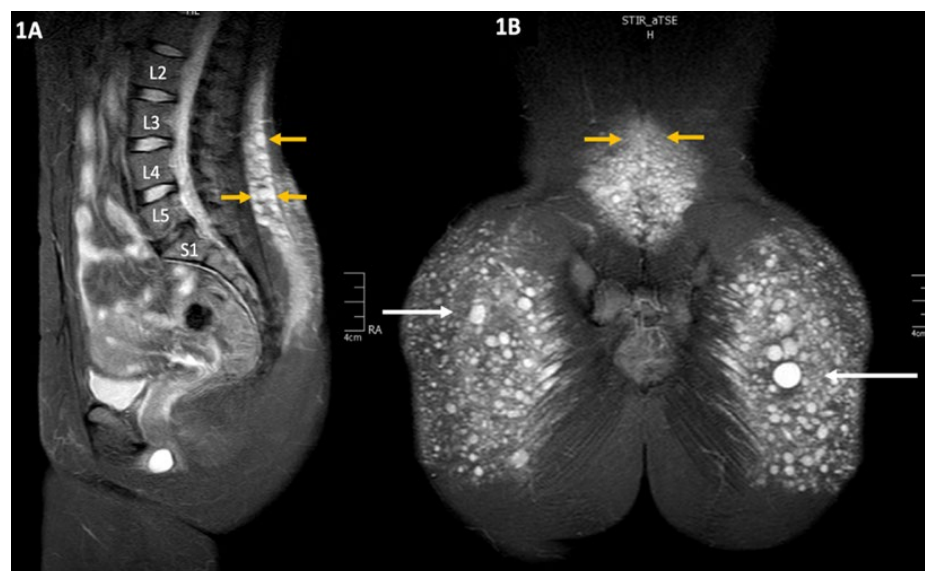
The analysis of patients undergoing biopolymer resection procedures has shown migration—even cephalic migration into the lumbar region (Image 1). The literature describes how unpredictable this migration is (6), considering the reports of some cases of migration to very distant areas from the initial injection site, such as the retroperitoneal space (9), the back of the thighs (10,11), the popliteal fascia, the perineum and the genital area (12), inter alia. The intraoperative findings include inflammatory tissue, fibrosis and multiple clusters of encapsulated silicone that in most cases still have fluid contents, despite the fact

that the injections were administered years and even decades before.

Magnetic resonance image (MRI) is the most frequently used imaging study for diagnosis because of its ability to identify the lesions, even when it is small particles that have migrated into the lumbar region. Unfortunately, it is usually not possible during the physical examination to properly palpate the clusters of encapsulated silicone (siliconomas). When assessing the tissue with ultrasound (Image 2), the image obtained only allows for the identification of some of the lesions, mostly the larger ones. Unfortunately, ultrasound does not deliver a clear and reliable assessment of the amount of migration and liquid silicone present, which is a limitation of this diagnostic tool for immediate bedside assessment.

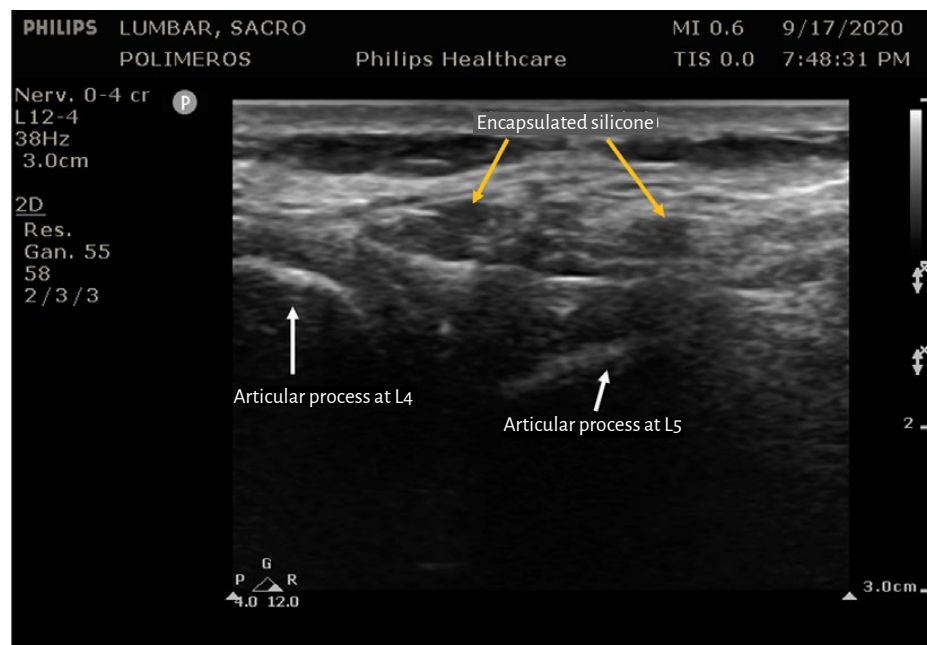
The potential risk of perforation of the siliconomas that migrated and remain in the areas of intervention of anesthetic procedures (caudal, epidural, spinal), give rise to a potential displacement of different substances injected and contamination of the spine and the nervous system. Since

IMAGE 1. MRI showing the migration of liquid silicone (white arrows) into the lumbar region, with multiple lesions or varying sizes (yellow arrows) and local inflammatory reaction.



SOURCE: Authors.

IMAGE 2. Ultrasonographic assessment of the lumbar region, with evidence of a few liquid silicon capsules (siliconomas).



SOURCE: Authors.

these substances are clearly associated with inflammation, edema and necrosis, the motor and sensory nerves are exposed to a high risk of direct injury from toxicity and inflammatory response. The anesthesia team should then be aware of this potential issue when approaching the neural axis.

Considering the well acknowledged multiple benefits of neuraxial anesthesia, this procedure may be safely used in patients with a history of liquid silicone injections or biopolymers, having and MRI available to rule out any migration or local complications. Due to the potential toxicity and keeping in mind the safety of the patient during neuraxial procedures, these procedures should be avoided in patients with a history of polymer injection and the identification of migration into the lumbar region.

In conclusion, the indiscriminate use of liquid silicone or biopolymers for cosmetic procedures, the denial of the patient of its use when taking his/her medical history, or the lack of awareness about the lesions caused by such injections, make it necessary to create awareness among patients and healthcare practitioners

about such potential risks. Being cognizant of the complications associated with the migration and dissemination of these potentially toxic substances for the neural axis, there is a need to revisit the considerations prior to the administration of neuraxial anesthesia, based on the potential edema, inflammation or necrosis that these substances may elicit in the human body.

In patients with a history of silicon or polymer injection, diagnostic imaging studies such as MRI may contribute with valuable information about the condition of the anatomical structures to complement the puncture site assessment before administering epidural, spinal or even caudal anesthesia.

ACKNOWLEDGEMENTS

Contribution by the authors

WAZ: Original design of the article, structural planning, data collection, image

interpretation and final drafting of the manuscript.

VMM: Planning of article structure, data collection, initial drafting of the manuscript.

ISG and JAJ: Collection of images, drafting and final approval of the manuscript.

Assistance for the article

None declared.

Financial support and sponsorship

None declared.

Conflict of interests

None declared.

Presentations

None declared.

Acknowledgements

Department of Anesthesia and Plastic Surgery, Hospital Universitario Fundación Santa Fe de Bogotá

REFERENCES

1. Narins RS, Beer K. Liquid injectable silicone: a review of its history, immunology, technical considerations, complications, and potential. *Plast Reconstr Surg.* 2006;118(3 Suppl):77S-84S. doi: <http://www.doi.org/10.1097/01.prs.0000234919.25096.67>
2. Leonardi NR, Compoginis JM, Luce EA. Illicit cosmetic silicone injection: A recent reiteration of history. *Ann Plast Surg.* 2016;77(4):485-90. doi: <http://www.doi.org/10.1097/SAP.0000000000000756>
3. Bertin C, Abbas R, Andrieu V, Michard F, Rioux C, Descamps V, et al. Illicit massive silicone injections always induce chronic and definitive silicone blood diffusion with der-

- matologic complications. *Medicine (Baltimore)*. 2019;98(4):e14143. doi: <http://www.doi.org/10.1097/MD.00000000000014143>
4. FDA warns against use of injectable silicone for body contouring and enhancement: FDA safety communication [internet]. 2017 [citado: 2017 nov, 14]. Disponible en: <https://www.fda.gov/medical-devices/safety-communications/fda-warns-against-use-injectable-silicone-body-contouring-and-enhancement-fda-safety-communication>
 5. Rapkiewicz AV, Kenerson K, Hutchins KD, Garavan F, Lew EO, Shuman MJ. Fatal complications of aesthetic techniques: The gluteal region. *J Forensic Sci*. 2018;63(5):1406-12. doi: <http://www.doi.org/10.1111/1556-4029.13761>
 6. Altmeyer MD, Anderson LL, Wang AR. Silicone migration and granuloma formation. *J Cosmet Dermatol*. 2009;8(2):92-7. doi: <http://www.doi.org/10.1111/j.1473-2165.2009.00436.x>
 7. Chasan PE. The history of injectable silicone fluids for soft-tissue augmentation. *Plast Reconstr Surg*. 2007;120(7):2034-43. doi: <http://www.doi.org/10.1097/01.prs.0000267580.92163.33>
 8. Barilaro G, Spaziani Testa C, Cacciani A, Donato G, Dimko M, Mariotti A. ASIA syndrome, calcinosis cutis and chronic kidney disease following silicone injections. A case-based review. *Immunol Res*. 2016;64(5-6):1142-9. doi: <http://www.doi.org/10.1007/s12026-016-8871-1>
 9. Alahmari HS, Alarfaj AS, Aljohani TE. Retroperitoneal fibrosis after chronic abscesses of silicone fluid fillers in a case of gluteal augmentation. *Case Rep Med*. 2020;2020:7236295. doi: <http://www.doi.org/10.1155/2020/7236295>
 10. Leyva A, Tran T, Cibulas AT, et al. Filler migration and granuloma formation after gluteal augmentation with free-silicone injections. *Cureus*. 2018;10(9):e3294. doi: <http://www.doi.org/10.7759/cureus.3294>
 11. Gold HL, Wang I, Meehan S, Sánchez M, Smith GP. Gluteal silicone injections leading to extensive filler migration with induration and arthralgia. *Dermatol Online J*. 2015;21(2).
 12. Harker DB, Turrentine JE, Desai SR. Vulvar asymmetry due to silicone migration and granulomatous immune response following injection for buttock augmentation. *J Clin Aesthet Dermatol*. 2017;10(4):50-4.