

H73 Neuropathologic Findings in Fatal Silicone Embolism Syndrome: Potential Contributions to Cause of Death

*Sarah C. Thomas, MD**, New York City Office of Chief Medical Examiner, New York, NY 10016; *Michelle Stram, MD*, New York City Office of Chief Medical Examiner, New York, NY 10016; *Rebecca Folkerth, MD*, New York City Office of Chief Medical Examiner, New York, NY 10016

Learning Overview: After attending this presentation, attendees will better understand fatal silicone embolism syndrome when approaching forensic autopsies. The goal of this presentation is to highlight the neuropathologic findings seen in systemic silicone embolism syndrome, which has been seldom described in the literature. After attending this presentation, attendees will better understand the pathophysiologic mechanisms involved in fatal silicone embolism syndrome and how to appropriately assign manner of death in these particular cases.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by bringing to light the various neuropathologic findings seen in fatal silicone embolism syndrome, increasing awareness of this uncommon diagnosis, bringing forth the reasoning behind accurate manner of death reporting for these cases in the forensic arena, and defining both the well-known acute and less-understood long-term sequelae of this pathology.

The illegal or unregulated use of liquid silicone for cosmetic purposes, including breast and buttock augmentation, often injected subcutaneously by non-medical personnel at in-home “pumping parties” has been well-described in the medical literature as potentially fatal. Systemic silicone embolism syndrome shares many clinical similarities with fat embolism syndrome, and both may have fatal outcomes. Recent injections tend to present with respiratory distress, chest pain, nausea, and fever, followed by loss of consciousness and death within hours to days. Alternatively, some sequelae may appear many years later and reflect profound multiorgan complications, in particular chronic renal failure with calciphylaxis. General histopathologic findings in autopsy cases, whether deaths are recent or delayed, comprise intravascular rounded filling defects that do not stain with fat stains, such as Oil-Red-O. Despite the recognition of silicone emboli in lungs and other organs, there is a paucity of literature regarding involvement of the central nervous system. Herein, the experience of the New York City Office of the Chief Medical Examiner’s (NYC OCME) over a period of 12 years in which death certification included silicone embolism as a cause of or contributing factor to death is reported.

Thirteen such cases were identified in the NYC OCME files (6 Females [F] and 7 Transgender Females [TGF]; age range, 22 to 75 years). Sources of silicone exposure were related to breast implant (with non-traumatic rupture) ($n=1$) and subcutaneous injection to buttocks, breasts, and/or face ($n=12$). The intervals from exposure to death ranged from less than an hour up to 30 years, but were not always known with complete certainty. At autopsy, systemic emboli of silicone material were noted in all cases, except for the ruptured breast implant, which showed silicone pulmonary emboli. The organs most usually affected were the lungs and kidneys, with the brain, liver, heart, and spleen also often involved. Among the cases with longer intervals following exposure, reactive changes including granulomatous inflammation of the lungs, kidneys, and liver, with pronounced involvement of prior subcutaneous injection sites by both granulomas and fat necrosis. Of note, in three of the four with a long interval of silicone exposure and chronic renal failure, calciphylaxis (the deposition of calcium in skin and soft tissue sites such as buttocks, breasts, hips, and perineum) was a prominent feature.

Of the 13 cases, 7 cases had formal neuropathologic consultation and 1 of the cases submitted brain for histology independently. Of these 8 cases with histology performed on brain tissue, 4 showed intravascular vacuoles and 5 of the cases showed ischemic changes, including acute neuronal injury (2) and axonal swelling (3); 1 of the cases with axonal injury also showed a microscopic infarct. Two cases had no histopathologic changes. A minority of cases ($n=2$) had associated petechial hemorrhages in the white matter, highly reminiscent of those seen in fat embolism syndrome. One of these cases also showed patchy areas of necrosis.

With regard to cause of death, 11 were attributed directly to systemic silicone embolization; 1 case had a confounding picture, including drug use disorder history and terminal hospitalization; the other case was likewise complex due to acquired immune deficiency syndrome, although silicone embolization was considered contributory because of infected ulcerated buttock lesions (injection sites). Of note, only 1 of the 11 systemic silicone embolization cases had a patent foramen ovale listed as a contributory factor.

With regard to manner of death, 5 of the 13 were deemed undetermined, 6 were homicides, and 2 were therapeutic complications. Those of undetermined manner had incomplete data regarding the individual performing the injection (i.e., self, another person, or both). Homicide cases were clearly those in which the injection was performed by another person, all of which were unlicensed, non-medical personnel. Of the 2 therapeutic complications, one was due to a non-traumatic ruptured silicone breast implant, while the other case had limited retained medical records at the time of this retrospective analysis.

In summary, clandestine use of liquid silicone for cosmetic purposes has acute as well as long-term effects, including on the central nervous system. Moreover, because of its unique physicochemical properties, it does not require an overt left-to-right shunt to gain access to arterial territories, leading to fatal systemic vascular occlusions.

Silicone, Embolism, Neuropathology