Fluorodeoxyglucose-avid cosmetic poly-L-lactic acid filler on surveillance imaging for Merkel cell carcinoma

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Key words: dermal filler; FDG uptake; imaging; Merkel cell carcinoma; PET/CT; poly-L-lactic acid.

INTRODUCTION

Merkel cell carcinoma (MCC) is a rare but aggressive skin cancer with a recurrence rate of 40% and a mortality rate of 33% at 3 years.[1,2] Compared to melanoma, MCC has a higher risk of distant metastatic recurrence after initial treatment, highlighting the importance of surveillance imaging, typically with serial computed tomography (CT) or 18-fluorodeoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT) scans.[3] Circulating tumor DNA is a blood-based biomarker that measures the amount of DNA released by apoptotic and necrotic cancer cells into the bloodstream; it is used in other cancers to detect minimal residual disease and recurrence.[3]

Dermal filler injections are a nonsurgical procedure indicated for facial rejuvenation and correction of volume loss from medical conditions or surgical procedures. There are few published reports regarding the radiographic appearance of injectable fillers.[4] Poly-L-lactic acid (PLLA) is widely used and has long-lasting effects due to stimulation of collagen production and deposition in the extracellular matrix surrounding the injection site.[5]

Abbreviations used:

CT:	computed tomography
FDG:	fluorodeoxyglucose
HA:	hyaluronic acid
MCC:	Merkel cell carcinoma
PET/CT:	positron emission tomography/computed tomography
PLLA:	poly-L-lactic acid

CASE REPORT

A 28-year-old immunocompetent woman with a history of extensive tanning bed use and basal cell carcinoma presented to her primary care provider for evaluation of a marble-sized lesion overlying the left parotid. She underwent fine-needle aspiration which revealed high-grade neuroendocrine carcinoma that was positive for Pankeratin, Cam5.2, CK20, Synaptophysin, Chromogranin, and CD56, and negative for CK7, P63, P40, TFF-1, Desmin, CD45, and WT-1, most consistent with metastatic MCC. Magnetic resonance imaging showed a 15 × 9 mm largely circumscribed mass deep to the platysma muscle, within the caudal portion of the superficial left parotid gland. No cervical adenopathy was noted on imaging, and CT chest, abdomen and pelvis was negative for distant metastases. She was referred to our institution for further evaluation and treatment. Physical exam revealed a 2 cm firm left parotid mass; no cutaneous findings were suspicious for primary MCC. Staging PET/CT showed an intensely FDG-avid 14 × 11 mm mass with maximum standardized uptake value, (a parameter for quantifying FDG uptake, reflecting glucose metabolism of tissue) of 13.9 in the superficial aspect of the left parotid gland,

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Funding sources: None.

Patient consent: The patient gave consent for the included photographs and medical information to be published in print and online and with the understanding that this information may be publicly available.

IRB approval status: Not applicable.

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JAAD Case Reports 2024;48:74-6.
2352-5126

https://doi.org/10.1016/j.jdcr.2023.09.039

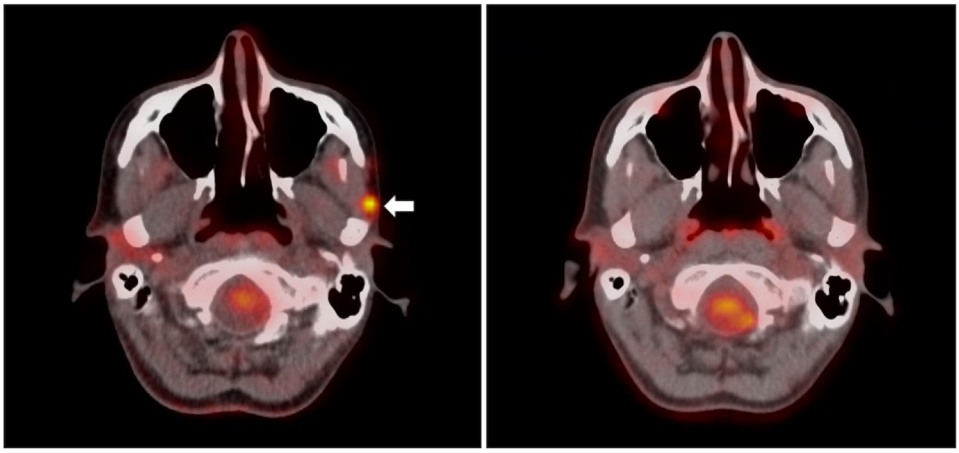

Fig 1. Axial fused positron emission tomography/computed tomography (*PET/CT*) image demonstrates fluorodeoxyglucose (*FDG*)-avidity in the subcutaneous tissue overlying the *left* masseter muscle and below the level of the zygomatic arch (*arrow on left* image), new compared to the PET/CT from 4 years prior (*right* image). Areas of high FDG uptake appear as *bright* "hot spots" on PET images.

consistent with biopsy-proven MCC. There was no evidence of FDG-avid primary lesion or distant metastasis. She was staged as a T0*N*1bM0, stage IIIA by the American Joint Committee on Cancer 8 staging system.[6]

The patient underwent a superficial parotidectomy that showed MCC involving 1 of 3 lymph nodes with focal extranodal extension into salivary gland parenchyma. Nineteen left level II-IV lymph nodes were negative for tumor. Given the extracapsular extension of her tumor, she received 50 gray of adjuvant radiotherapy to the left parotid gland and neck. She was followed closely every 3-12 months, and serial imaging with CT or PET/CT showed no evidence of recurrence.

Five years and 9 months after the patient's initial diagnosis, surveillance PET/CT showed new focal FDG-avidity anterior to the surgical bed along the superficial aspect of the left masseter muscle within the overlying subcutaneous tissue with maximum standardized uptake value 5.3, concerning for recurrent disease (Fig 1). No discrete anatomic correlation was seen, but there was new soft tissue inflammation overlying the masseter compared to her CT neck the year before. There were no FDG-avid or enlarged cervical lymph nodes. On physical exam, no palpable lesion was found. Discussion with the patient and detailed chart review revealed that the patient had begun receiving dermal filler injections in her left cheek for volume loss nearly 5 years after surgery. She first received hyaluronic acid (HA) gel filler for 2 treatments, then PLLA injection for 3 treatments, with her last injection 9 months prior to her latest PET/CT. She also received small amounts of HA gel filler to the bilateral nasolabial folds and tear troughs, which were not FDG-avid on PET/CT. Upon discussion with radiology colleagues, the focal finding was deemed compatible with long-lasting injectable materials. Neck CT and ultrasound-guided fine-needle aspiration of the FDG-avid lesion were ordered. Contrast-enhanced CT showed no clear anatomic correlation for the FDG-avidity. Intraprocedure ultrasound showed amorphous hypoechoic tissue in the region of focal FDG-avidity, and fine-needle aspiration showed a sparsely cellular specimen with rare histiocytes associated with polarizable material, likely related to the injected foreign material (Fig 2). The circulating tumor DNA drawn at the time of suspected recurrence returned negative at 0.00 MTM/mL.

DISCUSSION

While dermal fillers are increasingly popular, there have been few reports of their radiographic features. One systematic review of the radiographic features of facial cosmetic materials found that most reports described injected paraffin, wires, and calcium hydroxylapatite, and did not reflect the most commonly used materials in the face such as HA or PLLA.[7,8] While PLLA injections can cause noninflammatory nodules and foreign body granulomas that show enhancement on magnetic resonance imaging or FDG uptake on PET/CT, these are usually palpable on physical exam.[4] One prior report described a case of bilateral FDG-avidity in the cheeks on PET/CT for squamous cell carcinoma of the tongue 6-13 weeks after PLLA injection.[9] In our case, there

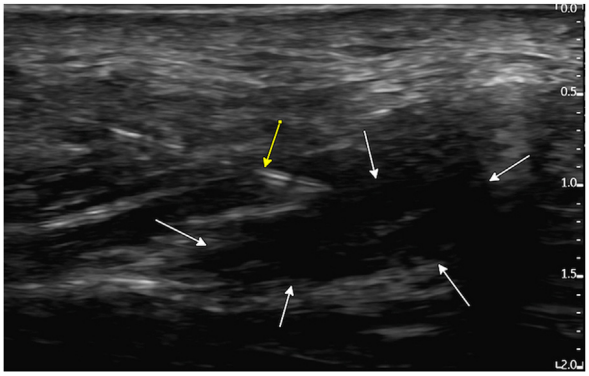

Fig 2. Intraprocedural gray scale ultrasound image shows the 25-gauage fine-needle aspiration needle (*yellow arrow*) being advanced into the amorphous-appearing hypoechoic region (*white arrows*) that correlated with the focal fluorodeoxyglucose-avidity on the positron emission tomography/computed tomography examination.

was a unilateral focus of FDG-avidity and soft tissue stranding on PET/CT in the location of a prior Merkel cell tumor, which was alarming for recurrence. Detailed discussion with both the patient and radiologist pointed to PLLA injection 9 months prior as the cause of FDG-avidity, highlighting the longevity of this collagen stimulant, though HA filler 12-14 months prior cannot be completely ruled out. Due to concern that PLLA can mask tumor recurrence, one would ideally wait 5 years following treatment of a high-risk skin cancer to receive such injections.

When there is a new focus of FDG-avidity on imaging, especially in younger patients, physicians should ask patients about filler history, including injection type and timing. Like our patient, others who suffer from volume loss following excision of a tumor may wish to pursue filler injections to restore facial structure. PLLA is a good option in these cases, as its effects usually last for 18-24 months.[10] Dermatologists, oncologists, and radiologists should be aware that PLLA can have focal FDG-avidity on PET/CT that may last months to years, and may confound true pathology on cancer surveillance imaging. Awareness of these imaging features can help to avoid misinterpretation and anxiety for the patient and clinicians.

Conflicts of interest

None disclosed.

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