Dedicated Verification of an Accessory Parotid Gland via Minimal-Activity PSMA-PET/CT

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Key Words: Minimal-activity protocol, PSMA-PET/CT, salivary glands
Abbreviations: prostate-specific membrane antigen (PSMA), positron emission tomography (PET), computed tomography (CT)

ABSTRACT

Gallium-68-labeled prostate-specific membrane antigen ligands are not only established radiopharmaceuticals for staging of prostate cancer but also accumulate physiologically in nonprostate organs, including the salivary glands. We show the converted application of prostate-specific membrane antigen -positron emission tomography/computed tomography (PSMA-PET/CT) as a dedicated method to depict salivary gland tissue using a region-focused, low-dose protocol. An accessory parotid gland at the right buccal region could be confirmed; therefore, further diagnostic or invasive therapeutic steps were not necessary.

INTRODUCTION

Prostate-specific membrane antigen-positron emission tomography/computed tomographic (PSMA-PET/CT) is used to depict salivary gland tissue with high physiological uptake (1). Histopathological examinations ascertained that specific radioligand accumulation within these glands is only partially caused by PSMA expression of intercalated ducts and therefore not fully understood yet (2). Nevertheless, PSMA-PET/CT has shown its potential for salivary gland evaluation. By now, the depiction has solely been accomplished retrospectively or incidentally in patients screened for recurrence of prostatic cancer (3, 4).

METHOD

For a minimal-activity PET protocol, to minimize radiation burden, only 10%–20% of the standard amount of radioactivity is applied to the patient. The reduced activity is compensated by a prolonged acquisition time to achieve visually adequate image quality and spatial resolution. With F-18 and Ga-68 tracers, the combined radiation exposures of radiopharmaceutical and low-dose CT can be kept below 1 mSv, <10% of a standard examination. The examination is focused to an organ or a region of the body (5, 6).

CLINICAL EXAMPLE

A 48-year-old woman presented after developing a new swelling on the right cheek. Ultrasonography and magnetic resonance imaging revealed a nonspecific 1.1-cm-diameter nodular process at the lateral aspect of the masseter muscle (Figure 1A). Morphological appearance was similar to that of the salivary glands, but in accordance to the symptoms, another genesis should be ruled out.

The patient gave full informed consent. In total, 23 MBq of Gallium-68-PSMA-11 was administered intravenously. After an uptake time of 70 minutes, one bed position of the head region was scanned for 20 minutes. Combined radiation exposure was 0.75 mSv. The PET scan showed physiological, symmetrical tracer accumulation in lacrimal glands, parotid glands, and submandibular and sublingual salivary glands (Figure 1B). The buccal nodule showed intense focal uptake (Figure 1, C and D), comparable to the uptake shown by the parotid gland (maximum standardized uptake value [SUVmax] = 10.4 and 15.3, respectively).

DISCUSSION

Although other tumors of the head and neck, such as adenoid cystic carcinoma, squamous cell carcinoma, or medullary thyroid cancer, may also be PSMA-positive (7–9), in our patient, a right-sided accessory parotid gland was highly probable owing to corresponding magnetic resonance imaging findings and PSMA uptake intensity. An accessory parotid gland is defined as a separated salivary gland anterior to the proper parotid gland and appears in 10% of humans (10). Although it is characterizable in morphologically oriented examinations such as CT, PSMA-PET/CT can help clarify the diagnosis for ambiguous cases in a descriptive manner. In the presented case, this method proved its ability to visualize special features or variants of salivary gland anatomy in clinical practice. The scope of PSMA-PET/CT,

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ISSN 2379-1381 https://doi.org/10.18383/j.tom.2020.00030

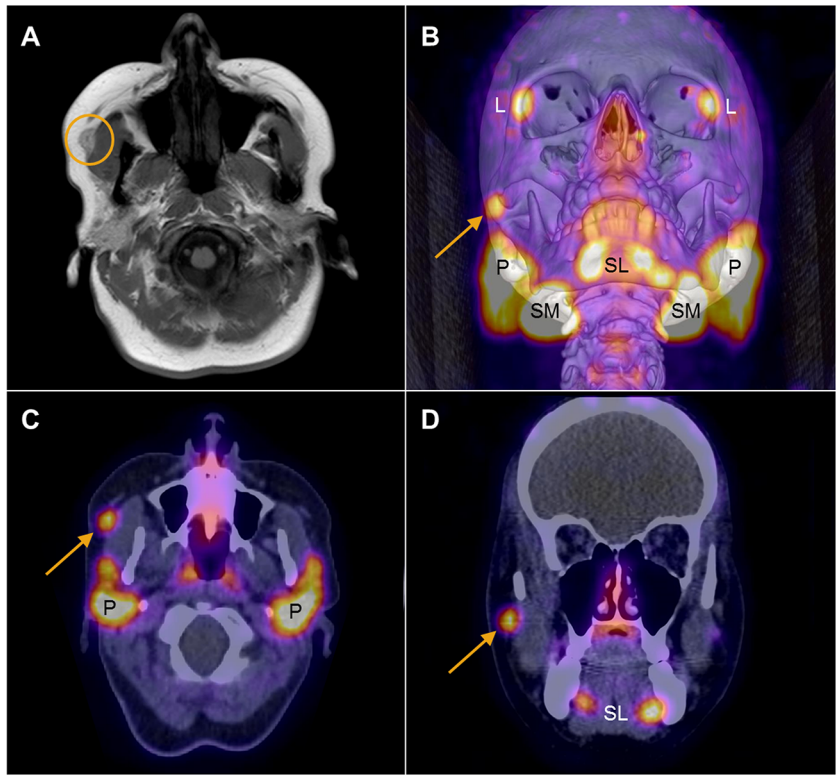

Figure 1. Magnetic resonance imaging (MRI) showing the soft tissue process of the right cheek (yellow circle) (A). Positron emission tomography (PET) in maximum-intensity projection/computed tomography (CT) in a volume-rendering technique showing the uptake of lacrimal glands (L), parotid glands (P), and submandibular (SM) and sublingual (SL) salivary glands (B). Transversal (C) and Coronal (D) planes of PET/CT verifying the intense uptake of the right-sided accessory parotid gland (yellow arrow).

especially in a region-focused low-dose protocol, can be broadened by this modified application beyond patients who have prostate cancer. Furthermore, this case illustrates that PET is not only a whole body investigation but it can also focus on an organ of interest. Biochemical characterization of a lesion might help avoid biopsy and histological examination.

ACKNOWLEDGMENT

We thank Ferdinand Ndum for grammatical review.

Conflict of Interest: None reported.

Disclosures: No disclosures to report.

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