

Giant Pilomatrixoma of the Cheek Mimicking Malignancy in an Adult With Concurrent Lymphadenopathy: A Case Report and Review of the Literature

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Abstract

Pilomatrixoma is a benign adnexal tumor of hair-matrix origin that typically presents as a small nodule in childhood. We present a 45-year-old male with a left cheek mass, first noted in July 2025, that enlarged rapidly over approximately three weeks from the size of a grape to the size of a baseball, measuring more than 5 cm on computed tomography (CT), with ulceration, serous drainage, and bleeding. He had a 20-year history of smokeless tobacco use and a biopsy-negative, corticosteroid-responsive episode of mediastinal lymphadenopathy more than five years earlier. Contrast-enhanced CT and whole-body 18F-fluorodeoxyglucose (FDG) positron emission tomography-CT (PET-CT) showed an intensely hypermetabolic exophytic facial mass with cervical, mediastinal, and bilateral hilar hypermetabolic lymphadenopathy, raising concern for lymphoma or metastatic carcinoma. Core-needle biopsy of a left cervical lymph node showed reactive lymphadenitis with scattered eosinophils, and punch biopsy of the overlying skin showed a chronic granulomatous and foreign-body giant-cell reaction. Excision confirmed a ruptured pilomatrixoma with an exuberant foreign-body reaction, tumor-free margins, and no evidence of malignancy. Rupture-associated granulomatous inflammation is the most plausible explanation for the lesion's FDG avidity. The mediastinal and hilar lymphadenopathy, which predated the facial mass, was not further characterized and is best regarded as a separate, unresolved process. In this patient, FDG avidity and concurrent lymphadenopathy produced a convincing picture of malignancy that was resolved only by tissue diagnosis of the primary lesion.

Categories: Nuclear Medicine, Otolaryngology, Pathology

Keywords: calcifying epithelioma of malherbe, cheek mass, facial mass, fdg-pet, giant pilomatrixoma, lymphadenopathy, malignancy mimic, pilomatricoma, pilomatrixoma

Introduction

Pilomatrixoma (pilomatricoma or calcifying epithelioma of Malherbe) is a benign adnexal tumor arising from hair-matrix cells. It typically presents in the first two decades of life as a small, firm, slow-growing dermal nodule, most often in the head and neck, and it is frequently misdiagnosed before excision [1-3]. Histologically, it consists of basaloid matrical cells that keratinize abruptly into ghost (shadow) cells, the anucleate keratinized remnants of tumor cells, often accompanied by calcification [4]. When this keratinous material is exposed to the surrounding dermis, it provokes a granulomatous, foreign-body giant-cell reaction, which characterizes the early regressive stage of the tumor [5].

Two departures from this typical picture can make pilomatrixoma resemble a malignancy. The first is size. Lesions 4 cm or larger (5 cm or larger in some reports) are designated giant pilomatrixoma, an uncommon variant that may grow rapidly, ulcerate, and exceed 10 cm [6-8]. The second is metabolic activity. The inflammatory reaction within a pilomatrixoma is thought to concentrate 18F-fluorodeoxyglucose (FDG) on positron emission tomography (PET), and FDG-avid pilomatrixomas have been mistaken for carcinoma and sarcoma [9-12]. When FDG-avid lymph nodes accompany such a lesion, the resemblance to metastatic disease becomes closer still. In the reported cases, however, these nodes have been few, have lain within the drainage basin of the primary tumor, and have shown no malignancy when sampled [8,12,13]. To our knowledge, no report has described a pilomatrixoma presenting alongside hypermetabolic lymphadenopathy extending to the mediastinum and hila, and the literature offers little guidance on how such nodal disease should be interpreted.

We report a 45-year-old male with a giant, ulcerated, intensely FDG-avid pilomatrixoma of the left cheek accompanied by cervical, mediastinal, and bilateral hilar hypermetabolic lymphadenopathy. Because mediastinal lymphadenopathy had first been documented more than five years before the cheek mass appeared, we regard the nodal disease as most likely a separate, coexisting process rather than a reaction to, or metastasis from, the tumor, while recognizing that it was not fully characterized. We describe the

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diagnostic course and review published pilomatrixomas and pilomatrix carcinomas that mimicked malignancy.

Case Presentation

A 45-year-old male first noticed a grape-sized mass on his left cheek in July 2025. Beginning in mid-January 2026, the mass enlarged rapidly, reaching approximately the size of a baseball over about three weeks. In the month before presentation, the overlying skin ulcerated, with intermittent serous drainage and bleeding, and he reported intermittent blurry vision and stabbing pain localized to the mass (Figures 1, 2). He denied numbness, trauma, prior surgery, or infection of the area.



FIGURE 1: Preoperative frontal photograph of a giant pilomatrixoma of the left cheek.

Frontal photograph of a 45-year-old male at presentation, showing a large, exophytic, dome-shaped mass of the left cheek with a partly epithelialized, partly ulcerated surface, adherent serosanguineous crust, and focal active bleeding superiorly. The lesion was subsequently excised and confirmed histopathologically as a ruptured giant pilomatrixoma.



FIGURE 2: Preoperative close-up photograph of the ulcerated pilomatrixoma surface.

Close-up photograph of the same lesion described in Figure 1, showing a lobulated, glistening surface with confluent ulceration, adherent serosanguineous and keratinous crust, and a focal point of active bleeding.

His medical history was notable for an episode of mediastinal lymphadenopathy with cough and syncope more than five years before the cheek mass appeared. Lymphoma was suspected at that time, but an excisional lymph node biopsy was negative for malignancy, and his symptoms resolved after a prolonged course of corticosteroids. He had no known autoimmune disease, asthma, or history of radiation therapy. He had never smoked cigarettes but reported 20 years of chewing tobacco use, and he denied alcohol and illicit drug use.

One week before presentation, he began a seven-day course of oral corticosteroids, which improved his neck swelling and cough but did not reduce the size of the facial mass.

He presented to the emergency department (ED), designated here as day 1, with a five-day history of severe coughing episodes resulting in syncope, accompanied by fever, headache, and myalgias. No cervical lymphadenopathy was palpable, although imaging identified lymphadenopathy within the chest and abdomen. Contrast-enhanced computed tomography (CT) of the neck performed the same day showed an exophytic soft-tissue mass in the left premaxillary region, described as consistent with a neoplastic process, together with extensive cervical and mediastinal lymphadenopathy; several level II nodes were prominent, and metastatic spread from the mass could not be excluded. The mass was well circumscribed, arose from a broad cutaneous base, and did not invade the underlying musculature, deep fascial planes, or facial skeleton. It measured more than 5 cm in greatest axial dimension (Figures 3, 4).

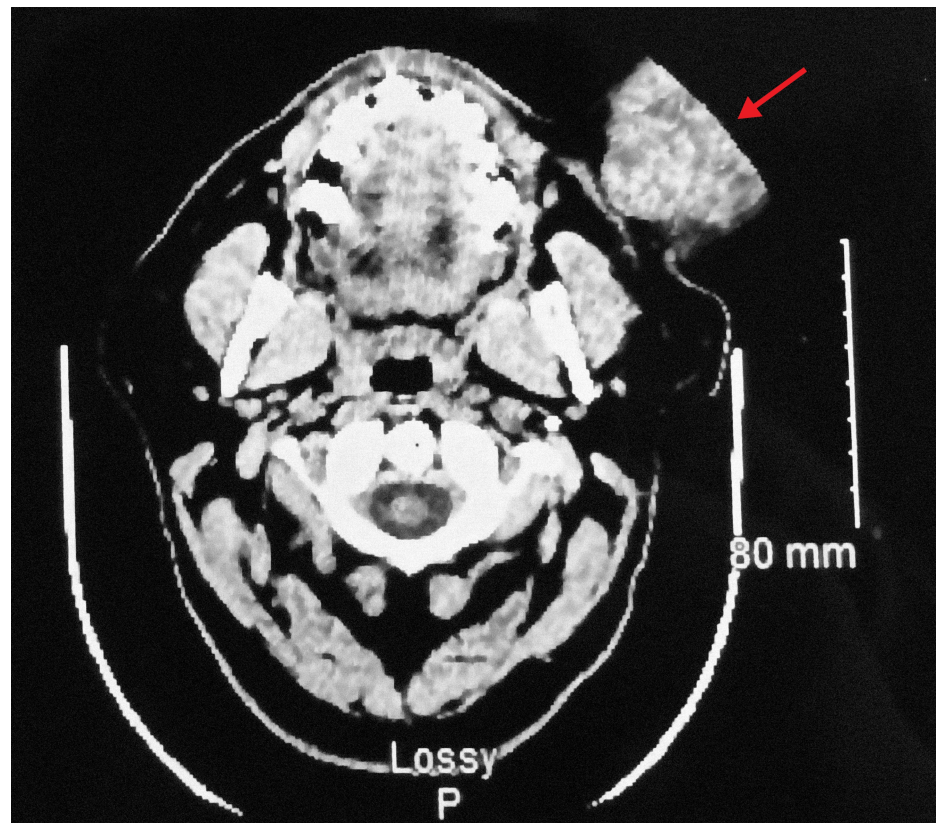


FIGURE 3: Axial computed tomography of the neck demonstrating the exophytic left cheek mass.

Axial contrast-enhanced computed tomography (CT) of the neck performed at presentation (day 1). The arrow indicates the exophytic soft-tissue mass projecting from the left cheek (the primary lesion). The lesion is well circumscribed, with a broad cutaneous base and no invasion of the underlying musculature or deep fascial planes, and it exceeds 5 cm in greatest axial dimension. Scale bar, 80 mm.

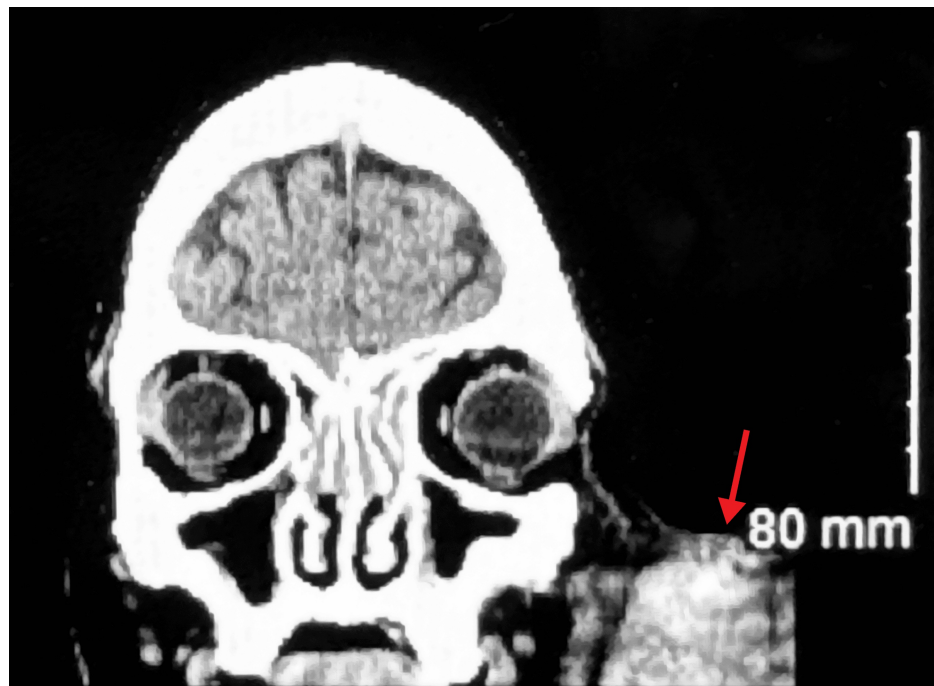


FIGURE 4: Coronal computed tomography of the face demonstrating the left cheek mass.

Coronal contrast-enhanced computed tomography (CT) of the head and face performed at presentation (day 1). The arrow indicates the superior margin of a large, well-circumscribed, exophytic soft-tissue mass arising from the left cheek and extending inferolateral to the left orbit. The mass is homogeneous and does not involve the underlying facial skeleton. Scale bar, 80 mm.

On day 3, core-needle biopsy of a left neck lymph node was performed, and new neck swelling developed after the procedure. The biopsy, reported on day 7, showed reactive lymphadenitis with scattered eosinophils and no definitive evidence of lymphoma or carcinoma.

Whole-body FDG PET-CT from the skull base to mid-thigh on day 11 showed a large, exophytic, intensely hypermetabolic left cheek mass, which was read as consistent with lymphoma or other malignancy (Figures 5, 6). The report also described progression of mediastinal and bilateral hilar hypermetabolic lymphadenopathy, mild cervical lymphadenopathy, progression of a hypermetabolic right thyroid lesion, indeterminate ground-glass and clustered nodular opacities in the right upper lobe with increased metabolic activity, and a small, nonspecific left upper lobe pulmonary nodule.



FIGURE 5: Whole-body 18F-fluorodeoxyglucose positron emission tomography maximum intensity projection.

Coronal maximum intensity projection from whole-body 18F-fluorodeoxyglucose (FDG) positron emission tomography-computed tomography (PET-CT) performed on day 11, displayed on an inverted grayscale in which darker regions indicate greater uptake. The arrow indicates the intensely hypermetabolic left facial mass (the primary lesion). The additional foci in the lower neck, mediastinum, and hila correspond to the lymphadenopathy described in the text and are separate from the facial lesion. Uptake in the brain, heart, renal collecting systems, and urinary bladder is physiologic.

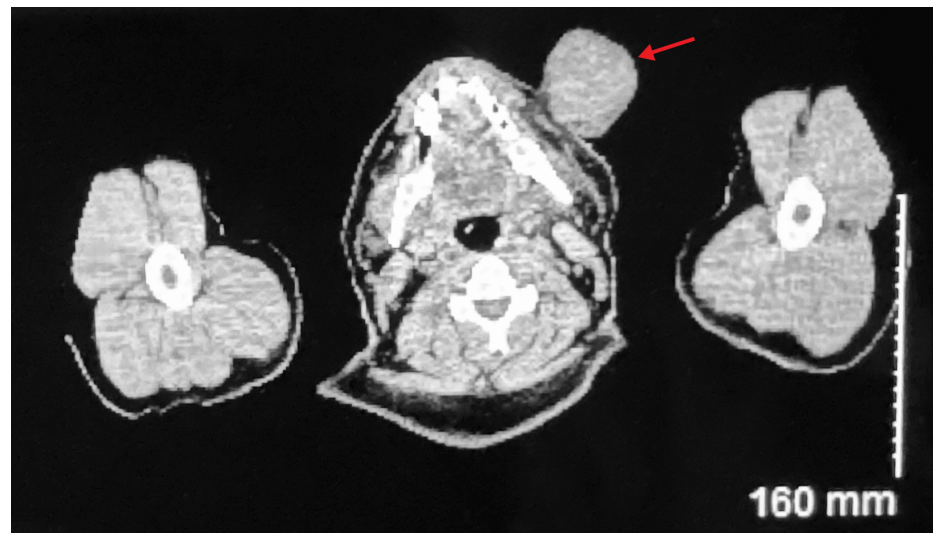


FIGURE 6: Axial computed tomography from the positron emission tomography-computed tomography study demonstrating the left cheek mass.

Axial computed tomography (CT) image from the whole-body positron emission tomography-computed tomography (PET-CT) study performed on day 11, at the level of the second cervical vertebra. The arrow indicates the exophytic soft-tissue mass projecting from the left cheek, corresponding to the hypermetabolic focus in Figure 5. The mass is homogeneous, well-circumscribed, and arises from a broad cutaneous base without invasion of the underlying musculature or deep fascial planes. Both upper extremities are elevated out of the imaged field, as is standard for whole-body PET-CT acquisition, and are seen in cross-section. Scale bar, 160 mm.

A punch biopsy of the overlying cheek skin was obtained on day 15. Initial examination identified mild actinic keratosis with chronic inflammatory infiltrates. Dedicated dermatopathology review showed dermal fibrosis with a chronic granulomatous response, hemosiderin deposition, focal giant-cell reaction, and reactive and reparative epidermal changes; together with the clinical history, these findings were felt to suggest trauma, including a previously ruptured cyst or follicle. The dermatopathologist considered the eosinophils in the earlier lymph node specimen nonspecific, with a differential diagnosis that included allergic states, parasitic infection, Kimura disease, angiolymphoid hyperplasia with eosinophilia, drug reaction with eosinophilia and systemic symptoms (DRESS) syndrome, immunoglobulin G4 (IgG4)-related disease, and lymphoproliferative, histiocytic, or mast-cell disorders; features specific for Kimura disease or Castleman disease were not identified.

On day 56, approximately eight weeks after presentation, the mass was excised with intraoperative facial nerve monitoring, and the facial nerve was intact at the end of the procedure. No lymph nodes were sampled during the operation. A biological graft (Stravix, Smith+Nephew, Fort Worth, TX) was placed over the defect and secured with a bolster dressing.

On postoperative day 2, he returned to the ED with generalized malaise and received an intravenous corticosteroid injection, followed by an oral corticosteroid taper. He also developed a rash attributed to postoperative doxycycline, which was discontinued. Because these corticosteroids were given after the specimen had been excised, they had no bearing on the histopathologic diagnosis. The bolster was removed on postoperative day 6.

Final surgical pathology, reported on postoperative day 6, showed a large pilomatrixoma with rupture and an exuberant foreign-body-type reaction. The surgical margins were free of tumor, and there was no evidence of malignancy.

Definitive reconstruction with a cervicofacial rotation flap was deferred because of ongoing sun exposure. At follow-up three months after excision, the site had healed with a contracted stellate scar and showed no clinical evidence of residual or recurrent mass (Figure 7). Further characterization of the mediastinal and hilar lymphadenopathy, the thyroid lesion, and the pulmonary opacities was not available for this report. The clinical timeline is summarized in Figure 8.



FIGURE 7: Postoperative photograph of the left cheek at follow-up after excision.

Photograph of the same patient described in Figure 1, obtained at follow-up approximately three months after excision of the left cheek mass. The excision site shows a healing, contracted stellate scar with central puckering, with no residual or recurrent mass, prior to planned definitive reconstruction with a cervicofacial rotational flap.

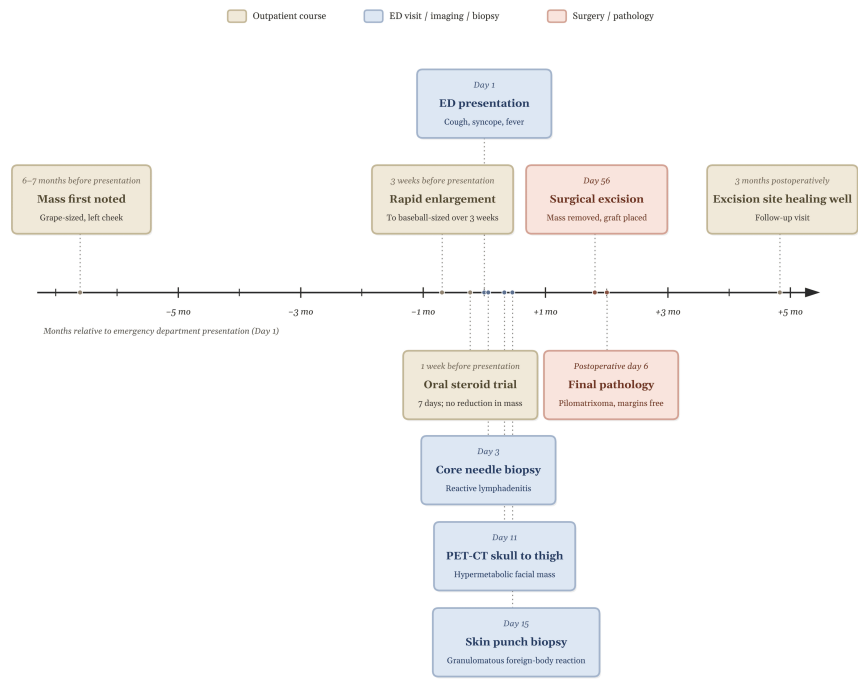


FIGURE 8: Clinical timeline of the diagnostic evaluation and surgical management.

Timeline from initial recognition of the left cheek mass in July 2025 through the most recent follow-up, three months after excision, with events labeled relative to presentation to the emergency department (day 1). Events are color-coded by phase of care: outpatient course; emergency department (ED) evaluation with imaging and biopsy; and surgery with pathology. Depicted milestones include rapid enlargement of the mass, a seven-day oral corticosteroid trial without reduction in mass size, ED presentation, core-needle lymph node biopsy showing reactive lymphadenitis, whole-body positron emission tomography-computed tomography (PET-CT) demonstrating a hypermetabolic facial mass, skin punch biopsy showing a granulomatous foreign-body reaction, surgical excision with graft placement, and final pathology confirming pilomatixoma with tumor-free margins.

The figure was created using Adobe Illustrator 2026 (Adobe Inc., San Jose, CA, USA).

Discussion

Literature search

A focused literature search of PubMed/MEDLINE was performed on June 9, 2026, with no date restrictions (inception through June 2026). Articles in any language were eligible if an English-language abstract was available. Disease terms (pilomatixoma, pilomatricoma, calcifying epithelioma of Malherbe, and pilomatix carcinoma), supplemented by Medical Subject Headings (MeSH), were combined using Boolean operators with terms for six predefined themes: giant lesions; presentation in adults; mimicry of malignancy on FDG-PET or on fine-needle or core-needle sampling; ruptured and perforating variants with foreign-body reaction; concurrent lymphadenopathy; and pilomatix carcinoma. Titles and abstracts were screened for relevance to the clinical features of the present case, and the reference lists of retrieved articles were searched manually. This was a narrative review and is not intended to be exhaustive.

Table 1 includes the case-level reports identified by this search in which a pilomatixoma or pilomatix carcinoma was clinically, cytologically, or radiologically suspected to be malignant, or was accompanied by lymphadenopathy, and which provided enough clinical detail for comparison. Benign and malignant cases are shown separately. The table is descriptive; because the source reports differ in what they recorded, the data are not suitable for pooled or statistical comparison.

Study	Age/sex	Site	Size (cm)	Tissue sampling before excision	FDG-PET	Lymph nodes: findings, biopsy, result	Final diagnosis	Follow-up
Pilomatixoma								
Lozzi et			11 × 6	Incisional biopsy:		Enlarged left laterocervical node (1.4	Giant	

al., 2007 [8]	52/M	Left clavicle	base; 5.5 high	pilomatricoma	Not performed	cm) on CT; excised: reactive lymphadenitis	ulcerated pilomatricoma	15 mo, NED
Bhatt et al., 2012 [9]	56/M	Right preauricular	NR	FNA: poorly differentiated carcinoma (lesion presumed a node)	Intense uptake; SUVmax: NR	None; the avid focus was the tumor	Pilomatricoma	NR
Tay et al., 2014 [12]	61/F	Left cheek	2.5	FNA: SCC	Avid; SUVmax: NR	Avid ipsilateral level II node; excised: reactive	Pilomatricoma	NR
Namiki et al., 2017 [13]	31/M	Left lower leg	4.5 × 4.0	Biopsy: matrical tumor, malignant potential uncertain	SUVmax: 5.8	Inguinal (SUVmax: 2.3) and external iliac (2.7) nodes; inguinal biopsy: no metastasis	Ulcerated giant pilomatricoma	6 mo, NED
Bax et al., 2018 [10]	21/F	Scalp (second lesion on neck)	1.2	FNA: poorly differentiated carcinoma	SUVmax: 9.1	None	Pilomatricoma (both lesions)	NR
Otunla & Bradley, 2020 [11]	50/F	Left pretibial	3 × 1 × 3	US-guided biopsy: initially SCC, revised to probable pilomatricoma	SUVmax: 10.4; primary only	None	Pilomatricoma, no mitoses	NR
Tavares et al., 2022 [14]	38/M	Right preauricular	4.5 × 3.5	FNA: epithelial neoplasm with trichilemmal keratinization	Not performed	None on examination or US	Recurrent giant pilomatricoma	3 mo, NED
Choi et al., 2023 [7]	69/M	Scalp	10.0 × 6.0 × 4.0	Incisional biopsy: pilomatricoma	Findings resembling nodal metastasis; SUVmax: NR	Not sampled; lymph node dissection avoided	Giant pilomatricoma	NR
Alcázar García et al., 2025 [15]	36/F	Right cheek	4.8 × 4.6 × 4.0	Excisional biopsy (5 mm margin)	Not performed	None reported	Proliferating giant pilomatricoma	6 mo, NED
Roa Álvarez et al., 2026 [16]	19/M	Posterior neck	≈2.0 (US)	None reported	Not performed	Pilomatricoma debris with granulomatous inflammation in adjacent node tissue	Bullous pilomatricoma	6 mo, NED
Urechescu et al., 2026 [17]	29/M	Left anterior neck	≈6	Core-needle biopsy: pilomatricoma	Not performed	None	Giant pilomatricoma	12 mo, NED
Pilomatric carcinoma								
Vadrucci et al., 2016 [18]	76/M	Frontal scalp	NR	Incisional biopsy: pilomatric carcinoma	Intense uptake in mass and lung nodules; SUVmax: NR	None; pulmonary metastases confirmed	Pilomatric carcinoma with lung metastases	Died at 3 mo
Lohiya et al., 2018 [19]	60/M	Left cheek	9 × 7 × 5	Punch biopsy: atypical benign pilomatric neoplasm, carcinoma not excluded	Not performed	Abnormal-appearing, nonenlarged nodes on CT; two excised: negative on frozen section	Pilomatric carcinoma	Lost to follow-up
Present case								
Present case	45/M	Left cheek	>5 (CT)	Core-needle biopsy of neck node: reactive; punch biopsy of skin: granulomatous foreign-body reaction	Intensely avid; read as lymphoma or other malignancy; SUVmax: not available	Avid cervical, mediastinal, and bilateral hilar nodes; mediastinal disease first documented >5 years earlier; neck node: reactive with eosinophils; none sampled at excision	Ruptured giant pilomatricoma with exuberant foreign-body reaction	3 mo, no recurrence; reconstruction pending

TABLE 1: Published case-level reports of pilomatrixoma and pilomatrical carcinoma presenting as a malignancy mimic, compared with the present case.

FDG, 18F-fluorodeoxyglucose; PET, positron emission tomography; SUVmax, maximum standardized uptake value; CT, computed tomography; FNA, fine-needle aspiration; SCC, squamous cell carcinoma; US, ultrasonography; NED, no evidence of disease; NR, not reported; F, female; M, male.

Within each group, cases are ordered by year of publication. Data were extracted from the full text where available and otherwise from the abstract; NR indicates a variable not reported in the accessible source rather than one that was clinically absent. The table is descriptive, and the data are not suitable for pooled or statistical comparison.

Why the lesion appeared malignant

Pilomatrixoma is frequently misdiagnosed even in its typical form. It was correctly identified on clinical examination in only 16% of cases in a review of 150 articles and was considered preoperatively in 37% of 1,235 patients in the largest institutional series [1,2]. In our patient, several uncommon features combined to make malignancy the leading concern. The lesion exceeded both the 4 cm and the 5 cm thresholds used to define giant pilomatrixoma [6-8], and it had enlarged rapidly and ulcerated. It arose in an adult; although pilomatrixoma is classically a pediatric tumor, the mean age in the Mayo Clinic series was 41 years, with a second peak between 50 and 75 years [2], and giant lesions have been described mainly in middle-aged and older adults [8]. It was intensely FDG-avid and was accompanied by hypermetabolic lymphadenopathy in a patient previously evaluated for lymphoma. His long history of smokeless tobacco use also raised the pretest probability of head and neck squamous cell carcinoma and shaped the initial workup. Smokeless tobacco has no established role in the development of pilomatrixoma, and we do not suggest one.

The closest published parallel is the giant cheek lesion reported by Alcázar García et al., which was likewise exophytic, ulcerated, and excised under suspicion of malignancy [15]. That lesion, however, followed trauma and proved to be a proliferating pilomatrixoma with numerous mitoses, whereas our patient denied trauma and his tumor showed rupture with an exuberant foreign-body reaction.

FDG avidity and the limits of metabolic and immunohistochemical grading

The FDG avidity of this lesion is most plausibly explained by its inflammatory component rather than by malignant proliferation. The excised tumor had ruptured and was surrounded by an exuberant foreign-body reaction, and the activated macrophages and multinucleated giant cells that make up such a reaction are glucose-avid. Foreign-body inflammation has been proposed as the source of uptake in other benign pilomatrixomas [9], although proliferating basaloid cells with mitotic activity may also contribute [13]. Because standardized uptake values were not available and the mechanism is inferred from the excised specimen rather than demonstrated directly, we present it as the most likely explanation rather than an established one.

FDG uptake also cannot distinguish benign from malignant pilomatrical tumors. Benign pilomatrixomas have shown maximum standardized uptake values (SUVmax) ranging from approximately 3.9 to 16.5 [11], and malignant and metastatic pilomatrical tumors are similarly avid [18,20]. Immunohistochemistry has the same limitation: in a comparison of 88 cutaneous tumors, no marker (β -catenin, CDX2, LEF-1, SATB2, Ber-EP4, or preferentially expressed antigen in melanoma (PRAME)) reliably separated pilomatrixoma from pilomatrix carcinoma, and the authors concluded that the diagnosis continues to rest on histopathologic examination [21]. In a calcifying adnexal lesion, FDG avidity should therefore not by itself be taken as evidence of malignancy.

Interpreting the lymphadenopathy

The lymphadenopathy was the most difficult element of the case. Enlarged or FDG-avid nodes accompanying a pilomatrixoma have been reported, but in each case, they were few, lay within the drainage basin of the primary tumor, and showed no malignancy when sampled (Table 1). Tay et al. described a cheek pilomatrixoma with a single FDG-avid ipsilateral level II node that was reactive on excision [12]; Namiki et al. described a leg tumor with mildly avid inguinal and external iliac nodes (SUVmax: 2.3 and 2.7), the inguinal node showing no metastasis [13]; and Lozzi et al. excised an enlarged laterocervical node beside a giant clavicular tumor and found reactive lymphadenitis, which they attributed, together with the tumor's rapid growth, to its inflammatory process [8]. Uptake in such nodes has been attributed to the same inflammatory mechanism proposed for the tumor itself [10]. The only report of tumor material within a node is that of Roa Álvarez et al., who found pilomatricoma debris with granulomatous inflammation in lymph node tissue adjacent to a bullous pilomatricoma of the neck [16]. Our patient's nodal disease differed in extent, involving the mediastinal and bilateral hilar stations as well as the neck.

The cervical nodes, which lie within the drainage basin of the cheek, may have been at least partly reactive to

the inflamed tumor; the core biopsy of a left neck node showed reactive lymphadenitis without tumor material. For the mediastinal and hilar disease, however, the history favors a separate, coexisting process. Mediastinal lymphadenopathy had first been documented more than five years before the cheek mass appeared, when it presented with cough and syncope, was biopsied without evidence of malignancy, and resolved with corticosteroids. The 2026 presentation repeated that pattern: the ED visit was prompted by cough-induced syncope rather than by the facial mass, and the corticosteroid course that preceded it improved the neck swelling and cough but did not shrink the mass. These stations also lie outside the lymphatic drainage of the cheek. Because a tumor that had not yet appeared cannot account for the earlier episode, we do not attribute the mediastinal and hilar disease to the pilomatrixoma.

What that process is remains unresolved. Relapsing, corticosteroid-responsive mediastinal and bilateral hilar lymphadenopathy with a biopsy-negative earlier episode is most suggestive of a systemic granulomatous disease such as sarcoidosis. The nodal eosinophilia is atypical for sarcoidosis and leaves the dermatopathologist's broader differential open, including Kimura disease, angiolymphoid hyperplasia with eosinophilia, DRESS, IgG4-related disease, and lymphoproliferative, histiocytic, or mast-cell disorders. Serum angiotensin-converting enzyme and endobronchial ultrasound-guided sampling of the mediastinal and hilar nodes would be the logical next steps. The right thyroid lesion and right upper lobe opacities seen on PET-CT were likewise not characterized, and their relationship to either process is unknown. Whatever their cause, the practical lesson is the same: hypermetabolic lymphadenopathy, whether regional or distant, does not by itself establish that a coexisting skin mass is malignant.

Reaching the diagnosis

In the present case, sampling of the regional lymph nodes was nondiagnostic for the primary lesion. Reactive lymphadenitis can be falsely reassuring or, when hypermetabolic, falsely alarming, and it cannot explain a coexisting mass. The first tissue to point away from malignancy came from the lesion itself: the punch biopsy showed a chronic granulomatous and foreign-body giant-cell reaction with hemosiderin deposition and reparative change, findings that are consistent in retrospect with a ruptured pilomatrixoma, although diagnostic tumor tissue was not sampled. Complete excision then established the diagnosis and excluded malignancy. A limited biopsy could not have done this on its own, because pilomatrix carcinoma may also contain a prominent granulomatous foreign-body reaction and punch specimens can miss malignant foci [19].

Tissue sampling was preferred to fine-needle aspiration (FNA) at both sites. For the lymph node, a core specimen preserves nodal architecture, which is needed when lymphoma is in the differential. For the mass, aspiration cytology of pilomatrixoma is a recognized pitfall: an aspirate containing mainly immature basaloid cells without ghost cells can be read as carcinoma, as occurred in three of the reports in Table 1 [9,10,12], and even an ultrasound-guided biopsy was initially read as squamous cell carcinoma in a fourth [11]. FNA can be diagnostic when the characteristic components are present [4], but an aspirate of the inflammatory reaction around this ruptured tumor would have added little. Tissue from the primary lesion has repeatedly prevented overtreatment: core-needle biopsy supported the diagnosis before excision of a giant cervical pilomatrixoma [17], and incisional biopsy allowed Choi et al. to avoid radical surgery and lymph node dissection [7]. When imaging and nodal sampling are alarming but inconclusive, tissue from the primary lesion, with a low threshold for excisional biopsy, answers the question that regional sampling cannot.

Excluding pilomatrix carcinoma

The extent of the workup was appropriate because the malignant counterpart of this tumor can present in the same way. Pilomatrix carcinoma has been reported as a $9 \times 7 \times 5$ cm ulcerated cheek mass requiring wide excision and cervicofacial flap reconstruction [19], and it can metastasize to regional nodes, lungs, and other sites and follow a fatal course [18,20,22]. Because neither PET nor immunohistochemistry separates the two, the distinction rests on histopathologic examination of the whole lesion. Features favoring carcinoma include infiltrative growth with a desmoplastic stroma, marked cytologic atypia, frequent or atypical mitoses, necrosis, and lymphovascular or perineural invasion [15,18,19], whereas mild atypia and some mitotic activity alone have been described in benign lesions [8,9,13]. In our patient, final pathology showed a ruptured pilomatrixoma with tumor-free margins and no evidence of malignancy.

Limitations

This report has several limitations. Standardized uptake values, laboratory results from the initial presentation, gross specimen dimensions, the closest margin distance, and an itemized description of the histopathologic features were not available to the authors, and gross and microscopic images of the specimen could not be obtained for publication. The lesion size reported here is therefore based on CT rather than on the excised specimen. The mediastinal and hilar lymphadenopathy, the right thyroid lesion, and the right upper lobe opacities were not further characterized, so their attribution to a separate process rests on the clinical history rather than on tissue diagnosis. Follow-up extends to three months after excision. This is reasonable for a completely excised benign lesion, in which recurrence is uncommon [2], but it is short relative to the malignant mimics discussed here, and definitive reconstruction is still pending. Finally, the literature review drew on a single database and is not exhaustive.

Conclusions

A giant pilomatrixoma of the face can closely resemble malignancy, both clinically and on FDG-PET, and when it coincides with hypermetabolic lymphadenopathy, it may mimic metastatic carcinoma or lymphoma. In this patient, excision confirmed a ruptured pilomatrixoma with an exuberant foreign-body reaction, tumor-free margins, and no evidence of malignancy. Rupture-associated inflammation is the most likely, though unproven, explanation for the lesion's FDG avidity, and the mediastinal and hilar lymphadenopathy, which predated the mass by more than five years, is best regarded as a separate and unresolved process rather than a consequence of the tumor. FDG avidity is not synonymous with malignancy, and histopathological examination of the primary lesion is essential when imaging and clinical findings are discordant.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Jacob Surma, Theresa A. Schneider, Aleksandra Jovicic

Acquisition, analysis, or interpretation of data: Jacob Surma, Theresa A. Schneider, Aleksandra Jovicic

Drafting of the manuscript: Jacob Surma

Critical review of the manuscript for important intellectual content: Theresa A. Schneider, Aleksandra Jovicic

Supervision: Aleksandra Jovicic

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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