

CT features of foreign body granulomas after cosmetic paraffin injection into the cervicofacial area

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PURPOSE

Cosmetic injection of paraffin into cervicofacial tissues has been practiced in the past, especially in Asia, resulting in foreign body granuloma (paraffinoma). The purpose of this study was to describe the computed tomography (CT) findings of cervicofacial paraffinomas.

MATERIALS AND METHODS

CT images of 5 patients (4 women and 1 man; age range, 54–80 years; mean age, 67.6 years), who had received direct paraffin injections into cervicofacial tissues, were reviewed retrospectively.

RESULTS

The lesions were bilateral and located in the subcutaneous fat layer of the cheek (n = 5), buccal space (n = 2), periorbital area (n = 1), periauricular area (n = 1), neck (n = 1), and nose (n = 1). The predominant CT features were speckled mass formation (n = 3), fat-density nodule (n = 5), high-density nodule (n = 5), nodular calcification (n = 5), and rim calcification (n = 4).

CONCLUSION

Paraffinomas in the cervicofacial region have specific CT features that are distinct from other soft tissue masses.

Key words: • face • neck • foreign bodies • computed tomography, X-ray

Paraffinoma, defined as a granulomatous foreign body reaction, is a well-recognized late complication of paraffin injection (1–8). Paraffin is a mixture of purified, saturated hydrocarbon extracted from crude oil. Direct injection of liquid paraffin has been used for soft tissue augmentation throughout the world during the first half of the 20th century (1). Although this practice was abandoned in many countries because of numerous complications, it continued to be performed by unqualified practitioners in the Far East until the 1980s (2, 3). Most patients are initially asymptomatic after injection of paraffin. Gradually, however, various complications including cellulitis, tissue necrosis, ulceration with sinus tracts, and foreign body granulomatous reaction develop (3, 4).

Paraffin has been injected into various parts of the body, and in particular into the female breasts for their augmentation (1–3) and into the male genital regions for enhancement of virility (5). Paraffin has also been injected into the cervicofacial area to flatten wrinkles and to produce an artificial augmentation of cheek volume for cosmetic purposes (6, 7).

Although there are several previous reports of the radiological findings of breast paraffinomas (1, 3, 4, 8), to our knowledge, the imaging features of paraffinomas in the cervicofacial area have not been previously reported. The purpose of this study was to describe the computed tomography (CT) findings of paraffinomas in the cervicofacial area.

Materials and methods

This study is based on a retrospective review of the hospital information system and the radiology information system in our institution from September 2003 to July 2008. We identified 10 patients with possible granulomatous reaction to foreign body, which was injected for cosmetic reasons, who underwent CT of the cervicofacial area. A history of paraffin injection was confirmed by the patient at a second visit or by means of telephone interview. Five patients were excluded from the study either because they could not be reached (n = 3) or did not remember the kind of injected material (n = 2). The remaining 5 patients who admitted that they had received direct paraffin injections composed the study population. There were 4 women and 1 man with ages ranging from 54 to 80 years (mean age, 67.6 ± 10.4 years). The time interval between the injection and the imaging study ranged from 20 to 45 years.

On physical examination, 4 patients were asymptomatic, and a patient had painless hard masses at the sites of injections. No patient had skin reactions, fistula formation, and enlarged cervical lymph nodes. The indications for the CT study in these patients were facial trauma (n = 2),

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Table 1. Clinical features of cervicofacial paraffinomas

Case	Age (years) and sex	Site(s) of lesion(s)	Symptoms	Time interval since injection	Imaging modalities used
1	64/F	Bilateral cheeks Bilateral sides of neck	None	33 years	CT
2	76/F	Bilateral cheeks Bilateral periorbital regions Bilateral periauricular regions	Painless masses	20 years	CT, US
3	54/F	Bilateral cheeks Bilateral buccal spaces Bilateral sides of the nose	None	30 years	CT
4	80/F	Bilateral cheeks	None	45 years	CT
5	64/M	Bilateral cheeks Bilateral buccal spaces	None	29 years	CT

vocal cord palsy (n = 1), thyroid mass (n = 1), and staging of skin cancer (n = 1). In a patient with skin cancer, partial excision of paraffinoma was performed because cancer had developed adjacent to paraffinoma. Details of the clinical condition of the patients are summarized in Table 1.

The entire study protocol was approved by our institutional review board, and all patients gave written consent.

Imaging was performed on the five patients with CT (n = 5) and ultrasonography (US) (n = 1). CT scans were obtained using a 16 detector-row CT scanner (MX8000 Infinite; Philips Medical Systems, Best, The Netherlands) with the following parameters: 3-mm section thickness, pitch of 1.5, 4×1.5-mm collimation, 120 kV and 200 mAs. The scanning range was planned from the level of the maxillary sinus to the tracheal bifurcation (n = 3) or from the level of the frontal sinus to the mandible (n = 2). Only unenhanced (n

= 3) or enhanced (n = 2) CT scans were obtained. US was performed using a 5–15 MHz linear array transducer of an iU 22 ultrasound unit (Philips Medical Systems, Bothell, Washington, USA).

CT images were retrospectively analyzed by two radiologists (DHG. and DYY) independently, and decisions on the findings were reached by consensus. CT images were evaluated for the following characteristics: the distribution and depth of the lesions, speckled mass formation, fat-density nodule, high-density nodule, calcification (nodular or rim), extension into the adjacent structures (skin or muscle), and cervical lymphadenopathy.

Results

All paraffinomas were bilateral and confined to the subcutaneous layer without extension into adjacent tissue. The lesions were located in the cheek (n = 5), buccal space (n = 2), periorbital area (n = 1), periauricular area (n = 1), neck (n = 1), and nose (n = 1).

CT features of paraffinoma were as follows: speckled mass formation (n = 3), fat-density nodule (n = 5), high-density nodule (n = 5), nodular calcification (n = 5), and rim calcification (n = 4). All CT scans showed paraffin-containing cysts, manifested as multiple well-defined variably sized fat-density nodules scattered through the tissue. In addition, calcifications associated with fat-density or high-density nodules were also demonstrated in all patients. In 4 patients the calcifications were nodular and rim-like; 1 patient had only nodular calcifications (Figs. 1a, 2a, and 2b). However, abnormality in the adjacent skin or muscle or cervical lymphadenopathy was not seen in any of the cases. Specific CT features of the lesions are listed in Table 2.

US in a patient revealed multiple small anechoic nodules with posterior shadowing and peripheral hyperechoic rim in the subcutaneous fat layer (Fig. 1b). Anatomic details of the face or neck tissue could not be assessed due to increased echogenicity of the subcutaneous tissue and marked posterior acoustic shadowing.

Specimen of paraffinoma obtained by surgical resection was available for pathologic review in a patient. Histopathologically, the striking feature was the presence of multiple lipoid vacuolated spaces of varying sizes with surrounding multinucleated giant cells, scattered throughout the background of dense fibrous tissue. Various amounts of calcium deposition were present within the vacuoles (Fig. 1c). A fat-density nodule on CT images and an anechoic nodule on US images

Table 2. CT features of cervicofacial paraffinomas (n = 5)

CT findings	Number of patients displaying this feature (percentage)
Speckled mass formation	3 (60)
Fat-density nodule	5 (100)
High-density nodule	5 (100)
Nodular calcification	5 (100)
Rim calcification	4 (80)
Changes of adjacent skin or muscle	0 (0)
Lymph node enlargement	0 (0)

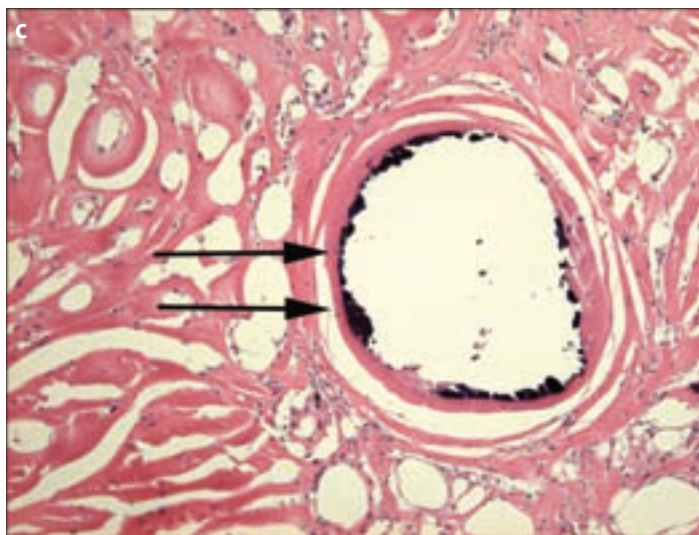
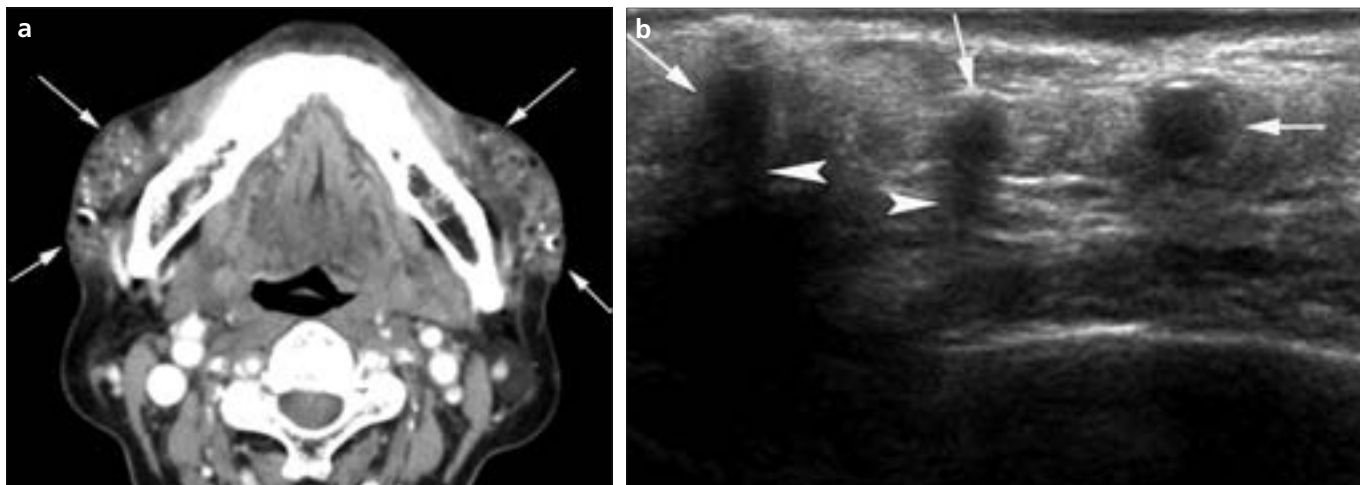


Figure 1. a-c. A 76-year-old woman with history of paraffin injection 20 years earlier who presented with painless masses in bilateral cheeks (Case 2). Contrast-enhanced CT scan (a) shows heterogeneous density solid masses in the subcutaneous fat layer of bilateral cheeks (arrows). Multiple low density oil droplets with nodular and curvilinear calcifications are seen within the masses. Longitudinal sonogram of left cheek (b) shows multiple anechoic masses (arrows) with posterior acoustic shadowing (arrowheads), most likely representing oil-containing cysts with calcification identified on CT images. Photomicrograph of the resected specimen from the left cheek (c) shows numerous oil-depletion vacuoles of varying sizes that are scattered throughout a background of prominent fibrosis; note areas of calcification (arrows) within vacuoles (hematoxylin-eosin stain; original magnification, x200).

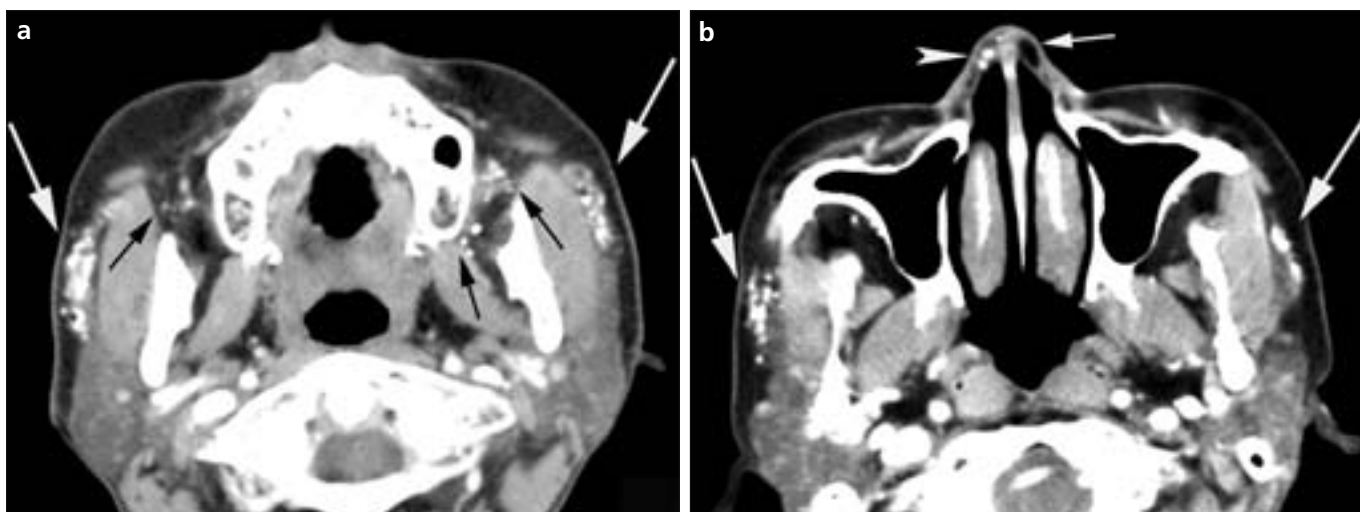


Figure 2. a, b. A 54-year-old asymptomatic woman with history of paraffin injection 30 years earlier (Case 3). Contrast-enhanced CT scans show low density oil droplets with nodular and curvilinear calcifications in the subcutaneous fat layer of bilateral cheeks (large arrows) and nose (small arrow and arrowhead, b). Note other calcifications in bilateral buccal spaces (black arrows, a).

were correlated with a lipid vacuolated space histologically. Histologic features were suggestive of a granulomatous reaction to exogenous oil ma-

terial. Therefore, clinical history of the patient in conjunction with histologic findings supported the diagnosis of paraffinoma.

Discussion

The clinical diagnosis of paraffinoma can be difficult in the absence of clinical history of previous paraffin injec-

tion. Paraffinomas are usually present as bilateral hard masses in the face or neck, which can sometimes be painful. These lesions can be misdiagnosed as cysts, tumors, fat necrosis, or calcified lymph nodes.

The histopathologic findings of paraffinoma have been described in several articles (3, 6, 8, 9). The histological features include chronic granulomatous inflammation with foreign body multinucleated giant cells and numerous vacuolated spaces containing paraffin oil and/or calcification, resulting in the so-called "Swiss cheese" appearance, as demonstrated in our study. Interstitial infiltration by plasma cells and fibroblastic reaction are consistently present.

In this study, paraffinomas had characteristic imaging features on CT that correlated well with histopathologic findings. The lesions were located most commonly in the subcutaneous fat of the bilateral cheeks. The predominant CT features were speckled mass formation, fat-density nodule, high-density nodule, nodular calcification, and rim calcification. These CT findings in our series seem to correspond with those reported previously.

Several previous reports have described the mammographic, US, and magnetic resonance imaging (MRI) findings of paraffinomas associated with the injection of paraffin into the breast tissue for augmentation. The spectrum of mammographic findings of paraffinoma includes multiple rounded opaque masses, bizarre architectural distortion, and streaky opacities indistinguishable from carcinoma. Ring or rounded and flocculent or amorphous calcifications may be present within the breast and axilla (1, 3, 10). On US, paraffinoma has been described as diffuse echogenic noise with a so-called snowstorm appearance or multiple, round hypoechoic nodules with calcifications (1, 3, 11). As a result of prominent acoustic shadowing associated with the fibrotic changes, US may be of limited value in the diagnosis of paraffinoma. On MRI, paraffinoma has been described as comprising two components: a paraffin-containing round component that is typically hypointense on both T1-

and T2-weighted images and a fibrous component that shows intermediate intensity on T1- and hypointensity on T2-weighted images (10). Although paraffin is expected to be bright on T1-weighted images, it is thought that the signal intensity of retained paraffin is low on T1-weighted images because it has undergone a transformation to a semi-solid state (12).

There have been several previous reports of granulomatous reactions after injections of other cosmetic fillers; liquid silicone had been the most widely used for cervicofacial injection. Silicone-induced granuloma is characterized pathologically by numerous round to oval cystic spaces, prominent surrounding fibrosis, and foamy infiltrate of multinucleated giant cells. The cystic spaces are relatively small and uniform. Calcifications are in the form of irregular microcalcifications, and small ring-like or large eggshell calcifications (13–15). These histologic findings of foreign body granulomas induced by liquid silicone might be confused with those of paraffinoma. However, liquid silicone oil is relatively hyperdense; its CT attenuation is approximately 130 HU (16). Based on our cases, the injected paraffin had a uniformly fat-density appearance, thus it is easy to differentiate the two conditions by CT imaging.

This study has some limitations, the foremost being the lack of histopathologic confirmation in four of five cases. However, from the medical history and the typical CT findings, the condition is easy to diagnose, and should obviate the need for biopsy. In addition, most patients in this study were asymptomatic and paraffinomas were incidentally detected on CT performed for a variety of reasons; this entailed the use of various CT scanning parameters, including differing fields of view and scanning ranges. Contrast enhancement was also variable: 3 studies were unenhanced and 2 used enhanced scan only.

In conclusion, cervicofacial paraffinoma has a typical distribution, shape, and density on CT images. Knowledge of the appearance of these patterns and a careful investigation of history of the patient may allow the correct diagnosis and avoid unnecessary biopsy.

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