Case Report

A Case of Multiple Calcification Foci under the Epidermis Observed on Facial CT

Takashi Kitahara*

Abstract: A 60-year-old female presented to our clinic with flushing and paresthesia of the face. Deep red facial color was noted, and facial skin paresthesia was confirmed. Multiple subcutaneous calcifications of 1-3 mm in diameter were observed by computed tomography (CT), extending from the forehead bilaterally to both cheeks. The patient had received dozens of subcutaneous injections over the last ~10 years as a regimen of cosmetic surgery to her face, and we concluded that a subcutaneously injected agent had caused the present calcifications.

Key words: calcification, facial epidermis, CT, cosmetic surgery, hydroxyapatite

Introduction

Soft tissue calcification has a variety of causes. Benign cases can be caused by trauma, connective tissue disorders, and metabolic disorders, while malignant cases are characterized by calcifications that can appear in a variety of malignant tumors. Iatrogenic cases also exist, as do cases caused by implants. The appearance, location, and pattern of calcifications determined by imaging procedures are important for distinguishing the differential diagnosis, although many challenges remain for clinicians in reaching a diagnosis based on imaging alone1-3. This is because there are many differential diagnoses, including collagen disease, hypercalcemia, inflammation, and neoplasm, etc, and some of them show resemblance radiologically. Herein, we report and discuss a case of multi-focal calcification under the facial epidermis due to subcutaneous injection of an agent into the facial skin for cosmetic purposes.

Case report

Case: A 60-year-old housewife.

Chief complaint: Forehead heaviness, heaviness of the head, tingling sensation in the face.

History: At age 3, she developed a severe rash on both hands after contact with Japanese wax tree. At age 10, she was treated for severe redness and swelling of both hands. From age 16, she underwent long-term treatment for chronic sinusitis. Starting in her 50s, she underwent repeated facial cosmetic surgery procedures, in which she received subcutaneous injections into her face several dozens of times.

Family history: No relevant history.

Kitahara Clinic, 59 Kamisugeta-cho, Hodogaya-ku, Yokohama 240-0051, Japan.

* To whom corresponding should be addressed.
History of present illness: Recently she experienced occasional flushing and light swelling of her face. After consulting a dermatologist, she began continuous treatment with steroid cream and oral anti-allergy medication. These treatments proved ineffective, and she subsequently consulted our clinic for face and head examinations.

Present condition: Blood analysis showed red blood cell and white blood cell counts within the normal range, and no signs of liver or kidney dysfunction. She had normal heart and breath sounds, a regular pulse, blood pressure of 140/82, and no abnormalities on chest X-ray imaging.

CT findings: Multiple calcifications were observed in the facial subcutaneous tissue, extending from the forehead bilaterally to the cheeks (Figure 1), although no soft tissue tumors or bony destructive lesions were observed.

Discussion

Calcifications in the subcutaneous tissue can be caused by the injection or implantation of various agents\(^1,4-8\). Tissue damage rendered by these agents acts as a pathological focus, changing local CO\(_2\) concentrations and alkalinization, and causing calcium deposition. These changes seem unrelated to the amount of calcium injected locally\(^3\), and in the case of calcium gluconate injections, calcium depositions reportedly develop in far greater amounts than the amount of calcium injected\(^5,9\).

Pathological tissue calcifications arise in the interstitium rather than intracellularly, and they can be broadly classified by type into dystrophic and metastatic calcifications\(^10\). The dystrophic pathology is characterized by calcium deposition which is localized to tissues, in the absence of abnormalities in blood calcium or phosphate concentrations. Affected patients often experience degeneration and necrosis of the affected tissue and cells, particularly in foci and scar tissue with

Fig. 1. In this non-contrast CT scan of the face, multiple subcutaneous calcifications can be seen extending in the axial direction from the incisors to the nasion.
Calcification under the Facial Epidermis

reduced desorption and absorption function. In contrast, metastatic calcifications are unrelated to tissue and cell damage, rather they are caused by excess or unstable calcium ion levels in the blood, due to factors including elevated blood phosphate levels, alkalosis, decreased blood magnesium, and decreased blood protein levels. The multiple localized calcifications in this patient appear as dystrophic calcifications.

Cross-sectional CT images are obtained by irradiating the body with X-ray fan beams through a slit, and then measuring $360^\circ$ X-ray transmittance data in the axial plane using specialized detectors. CT is characterized by its wide dynamic range and high-precision detection of X-ray absorption. Whereas an absorption difference of approximate 10% is necessary in traditional X-ray imaging, CT can detect extremely slight absorption differences of approximately 0.2%, and can thus easily visualize even small calcifications down to 2 mm. Accordingly, it was straightforward to detect the subcutaneous calcifications in this patient.

There was no detailed information available about the injections received by this patient, although the patient reported that the agent injected was a hydroxyapatite-like agent. The origin of the subcutaneous calcifications was thus concluded to be hydroxyapatite injection. In the broad sense, three types of substances are utilized in Japan to shape and extend facial areas: collagen, hyaluronic acid, and hydroxyapatite. Allergic reactions to collagen of bovine, porcine, and human origin have been reported. Hyaluronic acid is composed of N-acetylglucosamine- and glucuronic acid-containing polymers linked by glycosidic bonds, and up to 20 types of hyaluronic acid exist, as the substance’s cross-link number varies by product. Hyaluronic acid can thus also cause allergic reactions depending on the specific product used in combination with the patient’s physiology. Hydroxyapatite $\text{Ca}_5(\text{PO}_4)_3(\text{OH})_3$ is utilized to smooth wrinkles. When it is injected, fibroblasts enter the interstitium to create neoplastic collagen. Residual hydroxyapatite is believed to cause ossification, which can develop into calcifications.

Conclusion

We observed multiple calcification foci by CT under the facial skin of a patient who consulted our clinic with the chief complaints of flushing and paresthesia of the face. We attributed these foci to hydroxyapatite, injected during facial cosmetic surgery.

A summary of this paper was presented at the 55th Meeting of the Kanagawa Radiological Society.

References

5) Harris V, Ramamurthy RS, Pildes RS. Late onset of subcutaneous calcifications after intravenous injections of


[Received August 18 2016 : Accepted September 28, 2016]