

Tsutsumi Reiko (Orcid ID: 0000-0001-9762-4722)

Thyroid-shaped iododerma on the neck

Reiko Tsutsumi, Yuichi Yoshida, Hiroyuki Goto, Osamu Yamamoto

Division of Dermatology, Department of Medicine of Sensory and Motor Organs,

Faculty of Medicine, Tottori University, 36 Nishi-cho, Yonago 683-8504, Japan.

Corresponding author details

Reiko Tsutsumi

Division of Dermatology, Department of Medicine of Sensory and Motor Organs,

Faculty of Medicine, Tottori University, 36 Nishi-cho, Yonago 683-8504, Japan.

TEL +81-859-38-6597

FAX +81-859-38-6599

E-mail: r-ttm@tottori-u.ac.jp

Funding sources: none.

Conflicts of interest: none declared.

Key words

iododerma; halogenoderma; case report; potassium iodide; patch test; lymphocyte

stimulation test; Graves' disease; hyperthyroidism; thyroidectomy

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process which may lead to differences between this version and the [Version of Record](#). Please cite this article as doi: [10.1111/cod.13991](https://doi.org/10.1111/cod.13991)

This article is protected by copyright. All rights reserved.

We describe a case of thyroid-shaped iododerma on the neck in a patient with Graves' disease.

Case Report

A 57-year-old man with Graves' disease presented with a three-day history of itchy erythema on his neck. About 2 weeks before, he had started taking 100 mg/day of potassium iodide in preparation for thyroidectomy. Physical examination revealed well-circumscribed erythema with tiny pustules on the neck (Fig. A-C). The contour of eruption corresponded to the shape of an enlarged (inflamed) thyroid gland visualized by computed tomography scan (Fig. D). Laboratory data showed elevated serum level of triiodothyronine and normal renal function. We suspected localized iododerma. After discontinuation of potassium iodide in addition to topical application of betamethasone butyrate propionate, the eruption subsided. He underwent thyroidectomy, and then serum level of triiodothyronine decreased. The result of a lymphocyte stimulation test (LST) for potassium iodide was positive with a stimulation index of 348% (normal <180%). A patch test with potassium iodide (20% pet.) on the neck caused erythema on D3 (Fig. E) and on D4 (not shown). The erythema resolved on D7. In contrast, the result of a patch test on normal skin of the upper arm was negative. An oral challenge test (10 days with 100 mg/day of potassium iodide) after thyroidectomy was negative.

Discussion

Iodine, one of the essential elements, is used for treatment of hyperthyroidism and as a contrast agent.¹ Iododerma is a rare halogenoderma that develops after exposure to iodine-containing compounds.² Not only the common type of acneiform eruption but also various types including erythematous lesions have been reported.² The lesions generally develop on the skin with the highest concentration in sebaceous glands: face, neck, back, and upper extremities.² Histopathological findings are nonspecific mixed cellular infiltration in the dermis and subcutaneous tissue.^{2, 3} Although the mechanism of iododerma remains unclear, a few theories have been proposed.^{4, 5} Rosenberg et al.⁴ suggested that iodides act as haptens and provoke a delayed type of allergic reaction. Lauret et al.⁵ reported that delayed clearance and high serum iodide levels were related to the eruption. The symptoms of our patient had unique features that could not be explained only by the past theories. First, the eruption arose only on the neck with a shape identical to that of the thyroid gland. Second, the results of LST and patch tests suggested the existence of specifically sensitized T cells localized on the neck skin. The character is similar to that of fixed drug eruption. However, an oral challenge test after thyroidectomy was negative. As the reason, we hypothesize that high integration of iodide on the neck skin through the thyroid gland played a role in the unique eruption. In vivo, iodine exists

Accepted Article

in the ionic form as iodide.¹ After absorption through the intestinal tract, the majority accumulates in the thyroid for synthesis of thyroid hormones (triiodothyronine and thyroxine).¹ Those hormones are known to have lipophilic nature and traverse the basolateral membrane of thyroid follicular cells and then be released into the bloodstream¹. Circulating iodide exists in an organic form of thyroid hormones coupled with the binding protein.¹ In Graves' disease, thyroid hormone synthesis and secretion are stimulated by autoantibodies and local blood flow is increased.⁶ In such a condition, a certain amount of iodide-synthesized thyroid hormones possibly stagnates in local hematogenous circulation and/or interstitial fluid around the thyroid. Thus, iodide can reach the skin covering the thyroid gland through capillary transport and/or through pilosebaceous glands. Furthermore, thyroid inflammation might act as co-factor for cutaneous inflammation. Complex mechanisms would contribute to the development of iododerma. Clinicians should consider the possibility of iododerma due to physiologically accumulated components to the thyroid gland.

References

1. Agency for Toxic Substances and Disease. Toxicological profile for iodine. <https://www.atsdr.cdc.gov/toxprofiles/tp158.pdf>. Accessed September 1, 2021.

2. Hessler MJ, Clark MR, Zacur JL, Rizzo JM, Hristov AC. An acneiform eruption secondary to iododerma. *JAAD case reports*. 2018; 4(5): 468-470.
3. Soria C, Allegue F, España A, Rocamora A, Harto A, Ledo A. Vegetating iododerma with underlying systemic diseases: report of three cases. *JAAD*. 1990; 22(3): 418-422.
4. Rosenberg FR, Einbinder J, Walzer RA, Nelson CT. Vegetating iododerma. An immunologic mechanism. *Arch Dermatol*. 1972; 105(6): 900-905.
5. Lauret P, Godin M, Bravard P. Vegetating iodides after an intravenous pyelogram. *Dermatologica* 1985; 171(6): 463-468.
6. Ross DS, Burch HB, Cooper DS, et al. 2016 American Thyroid Association Guidelines for Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis. *Thyroid*. 2016; 26(10):1343-1421.

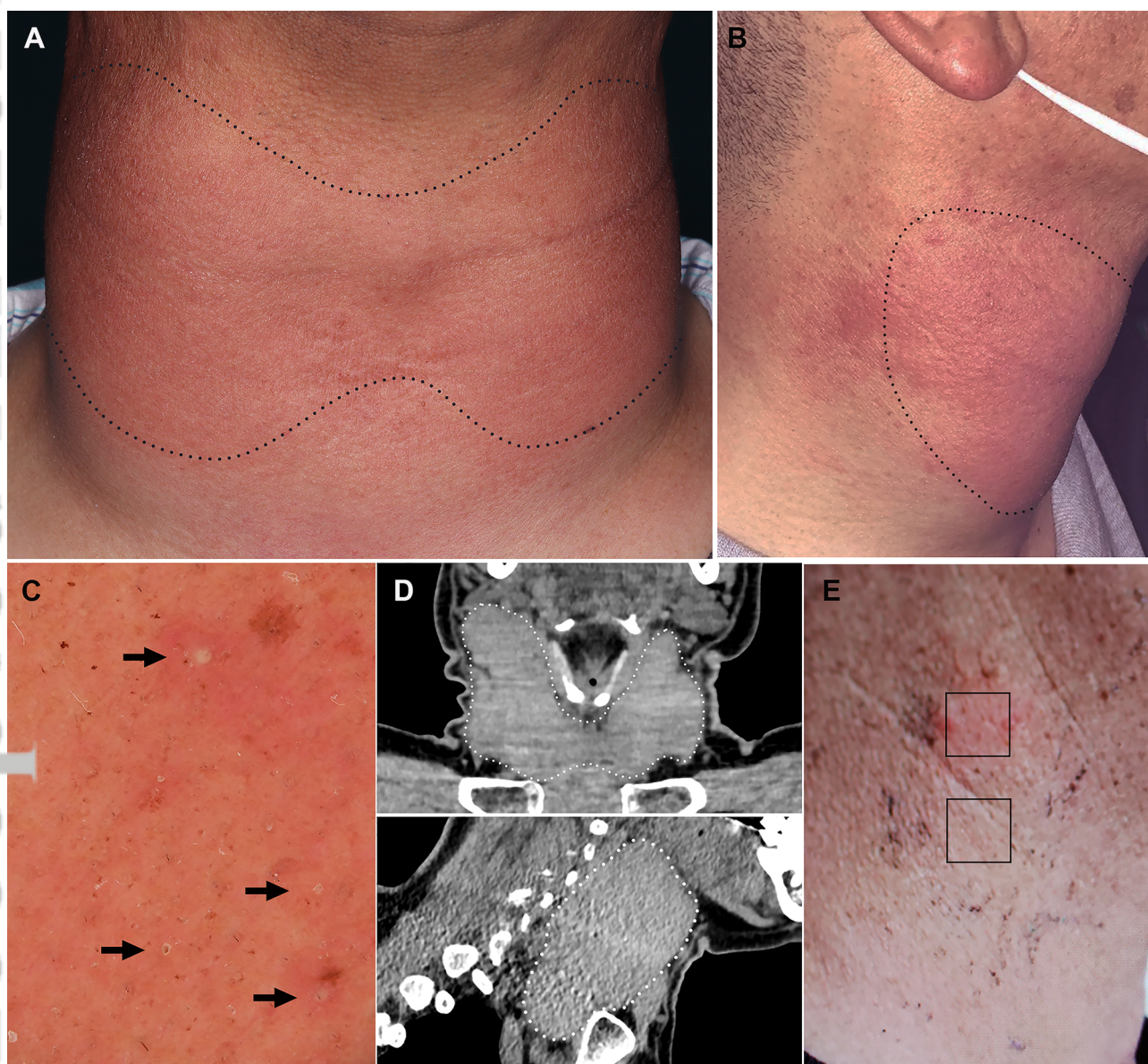
Figure legends

(A and B) Physical examination reveals thyroid-shaped erythema (dotted line).

(C) Dermoscopic examination shows tiny pustules (arrows).

(D) Computed tomography scan shows a markedly enlarged (inflamed) thyroid gland (dotted line, upside: coronal section, downside: sagittal section).

(E) A patch test on the neck shows positive reaction on D3 (upper square: potassium iodide [20% pet.], lower square: negative control [pet.]).



COD_13991_0701Fig(300ppi).tif