

Contrast-Induced Sialadenitis: An Under-Recognized Adverse Reaction in Radiology and Clinical Practice

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ABSTRACT

Contrast-induced sialadenitis (CIS), a rare inflammatory reaction of the salivary glands, occurs after exposure to iodinated contrast media (ICM). This self-limiting condition typically manifests as glandular swelling and pain, with variable severity, from hours to days post-contrast administration. Its etiology includes inflammatory edema, ductal obstruction, and pseudoallergic or idiosyncratic reactions. Non-ionic, low-osmolar agents such as Iohexol and Iodixanol are frequently implicated. Risk factors include iodine allergy, renal dysfunction, and inadequate premedication. Diagnostic imaging via CT or ultrasound reveals characteristic findings such as glandular enlargement, periglandular fat stranding, and heterogeneous enhancement, aiding differentiation from other causes like infection or neoplasms. This case series presents three patients who developed sialadenitis following contrast-enhanced CT scans. Presentations ranged from mild, localized submandibular swelling to rapid-onset bilateral glandular inflammation involving the parotid and submandibular glands. All cases highlight the need for prompt recognition and adherence to preventive measures, including premedication with corticosteroids and hydration, especially in high-risk patients. Management is largely supportive, involving corticosteroids, antihistamines, and NSAIDs, with severe cases requiring closer monitoring. By raising awareness of this underreported condition, this article underscores the importance of early recognition and differentiation from other conditions by radiologists, emphasizing their role in timely diagnosis and management. It also calls for further research to optimize prevention and management strategies.

KEYWORDS

computed tomography; X-ray; contrast media; sialadenitis

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Received: 4 January 2025

Accepted: 18 February 2025

Published online: 4 April 2025

Acta Medica (Hradec Králové) 2024; 67(4): 133–136

<https://doi.org/10.14712/18059694.2025.10>

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INTRODUCTION

Sialadenitis is an inflammation of the salivary glands characterized by their enlargement and, often, pain. Sialadenitis has multiple potential etiologies, which can be categorized as follows: obstructive, infectious, autoimmune, granulomatous, and post-treatment (1). The most common cause of sialadenitis is the formation of an obstructing calculus in the floor of the mouth, most commonly affecting the submandibular gland, followed by the parotid and sublingual glands (1). In contrast, bacterial or viral sialadenitis predominantly affects parotid glands. Post-treatment etiologies include radiation-, contrast-, and anesthesia-induced salivary gland enlargement (1). Sialadenitis is diagnosed clinically and confirmed with imaging. According to the American College of Radiology Appropriateness Criteria, non-pulsatile, non-parotid masses typically require initial imaging with contrast-enhanced CT or MRI of the neck, while parotid masses are usually evaluated with ultrasound. Differential diagnoses include sialolithiasis, sialocele, reactive lymph node, salivary abscess, osteomyelitis, and neoplasm (2).

Contrast-induced sialadenitis is a rare adverse reaction to iodinated or other contrast agents, primarily discussed in case reports (3). Such reactions may develop from 30 minutes to one week after contrast administration. The most commonly implicated agents include iodine-containing iopromide, iohexol, ioversol, iodixanol, iopamidol, and diatrizoate compounds (4). The proposed pathogenesis of iodinated contrast medium (ICM)-induced sialadenitis also known as “iodide mumps”, may include inflammatory edema leading to salivary duct obstruction (5).

Case reports indicate that ICM-induced sialadenitis can develop following coronary or cerebral angiography, coronary angioplasty, fistulograms, and contrast-enhanced CT scans of the brain, thorax, and abdomen (6). This case series describes three patients who developed neck edema suggestive of sialadenitis within hours to days after exposure to contrast agents during CT examinations.

CASE REPORTS

CASE 1

A 68-year-old woman presented with neck pain and swelling two days after a contrast-enhanced computed tomography (CT) scan of the abdomen and pelvis performed for epigastric pain. The patient had a documented iodine allergy and was prescribed a premedication protocol, which she only partially followed, taking a single dose of prednisone and diphenhydramine one hour before the scan. On physical examination, bilateral submandibular gland swelling was noted, with no associated dysphagia, dyspnea, or systemic illness.

A non-contrast CT scan of the neck confirmed the diagnosis of bilateral submandibular sialadenitis, showing diffuse edema and periglandular fat stranding, consistent with an inflammatory process (Figure 1). This case emphasizes the critical importance of strict adherence to

premedication protocols in patients with known iodine allergies and underscores that sialadenitis can present as a delayed reaction to iodinated contrast exposure.

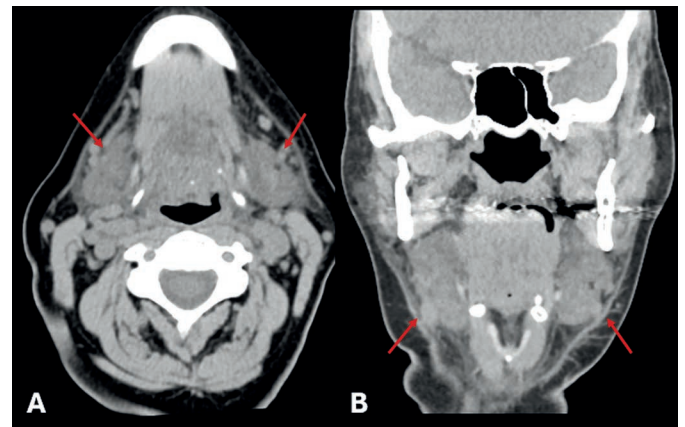


Fig. 1 Computed tomography (CT) of the neck non-contrast, axial (A) and coronal (B) images. Edema/swelling of the submandibular glands (red arrows), with associated periglandular fat stranding and reactive thickening of the platysma muscles.

CASE 2

A 61-year-old woman presented with mild submental edema and throat discomfort within 24 hours of a contrast-enhanced CT scan of the abdomen. She denied any known allergies to iodine or contrast agents and had not received premedication. Her symptoms were mild, localized, and without systemic manifestations. On physical examination, mild submandibular gland swelling was noted.

Subsequent CT imaging of the neck revealed early-stage sialadenitis, characterized by mild glandular swelling and adjacent fat stranding (Figure 2). This case illustrates the variable severity of contrast-induced sialadenitis, highlighting the role of early recognition and imaging in differentiating it from other causes of glandular swelling, such as infectious or autoimmune conditions.

CASE 3

A 69-year-old woman presented with bilateral neck pain and swelling within six hours of undergoing a CT angiogram of the head and neck as for preoperative evaluation for embolization of a frontal arteriovenous malformation. Her symptoms, which were rapid in onset and more severe than in previous cases, included prominent bilateral swelling of the submandibular and parotid glands.

CT imaging revealed marked glandular enlargement with heterogeneous enhancement, significant vascular prominence, and fat stranding, findings consistent with acute sialadenitis (Figure 3). This case underscores the variable severity of contrast-induced sialadenitis and highlights the importance of considering glandular inflammation in the differential diagnosis of acute neck swelling following contrast imaging. The rapid onset of symptoms after iodinated contrast administration suggests a possible idiosyncratic or hypersensitivity reaction.

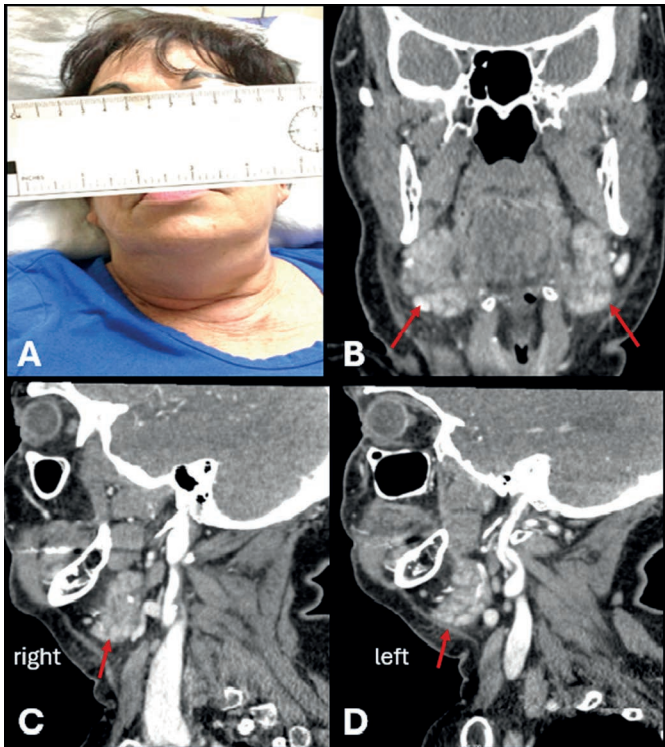


Fig. 2 Frontal photograph (A) showing cervical swelling, predominantly in the submandibular regions. Contrast-enhanced CT of the neck, coronal (B) and sagittal (C, D) images. Swelling of the submandibular glands (red arrows) with heterogeneous hyperenhancement, associated with fat stranding in the surrounding planes and reactive thickening of the platysma muscles.

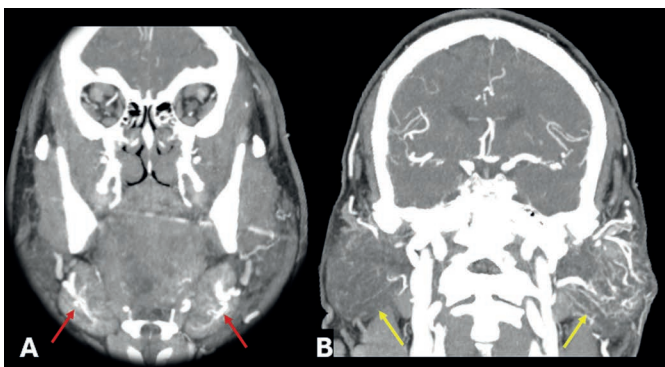


Fig. 3 Craniocervical CT angiography (CTA), coronal maximum intensity projection (MIP) images. Marked enlargement with diffuse vascular prominence of the submandibular glands (A, red arrows) and parotid glands (B, yellow arrow), particularly pronounced in the left parotid gland, with findings consistent with an acute inflammatory process.

DISCUSSION

Contrast-induced sialadenitis is a self-limiting inflammatory reaction resulting caused by iodinated contrast media accumulation in the salivary glands (7, 8). First described in 1956, it remains underreported despite the widespread use of ICM. Its pathogenesis may involve ductal obstruction, local inflammatory edema, or pseudoallergic reactions (9). Iodine accumulation in the salivary gland ducts may lead to obstruction and inflammation, which underpins the pathological basis of the condition (8). Addition-

ally, idiosyncratic or pseudoallergic mechanisms have been proposed, with evidence suggesting that impaired iodine clearance in individuals with renal dysfunction may contribute to its development (6). Pseudoallergic reactions mimic true allergic responses but occur through non-IgE-mediated pathways, including direct mast cell degranulation or complement activation. Idiosyncratic reactions, in contrast, are unpredictable and patient-specific, not following typical immunological hypersensitivity mechanisms. These distinctions are essential for understanding contrast-induced sialadenitis and optimizing management strategies.

Non-ionic, low-osmolar iodinated contrast agents, including Iohexol (Omnipaque), Iodixanol (Visipaque), and Iopromide (Ultravist), have been more frequently associated with sialadenitis (3). These agents, although safer than high-osmolar contrast media, can still lead to iodine accumulation and subsequent inflammation (7). Symptoms typically appear within hours to days after ICM administration, ranging from painless glandular swelling to tenderness and erythema. Although bilateral submandibular and parotid gland involvement is common, unilateral cases have also been reported (3). This variability highlights the importance of maintaining a high index of suspicion in the appropriate clinical context.

CT and ultrasound imaging crucial for diagnosis. CT findings include glandular enlargement, fat stranding, and heterogeneous enhancement, while Doppler ultrasound can demonstrate increased vascularity and ductal dilation. These modalities aid in confirming the diagnosis and ruling out other conditions, such as neoplasms, obstructive sialadenitis, or abscesses (1).

The European Society of Urogenital Radiology (ESUR) guidelines (10) recommend premedication with corticosteroids and antihistamines for patients at risk of hypersensitivity reactions to ICM; however, they acknowledge that premedication does not completely eliminate the risk of such reactions, including CIS.

Furthermore, no formally established corticosteroid regimen exists for the prevention of CIS. Current premedication strategies are primarily derived from protocols used for general contrast hypersensitivity reactions. To address this gap, further research is needed to determine the most effective corticosteroid regimen specifically for CIS prevention.

In accordance with ESUR guidelines, even full premedication does not completely prevent adverse reactions. Therefore, preventive strategies should focus on risk minimization, particularly in patients with a history of hypersensitivity reactions. These strategies include premedication with corticosteroids and antihistamines to mitigate pseudoallergic reactions, maintaining adequate hydration before and after contrast administration to enhance iodine clearance from salivary tissues, and reducing the contrast dose to the lowest amount necessary for diagnostic accuracy.

The efficacy of corticosteroids in preventing CIS remains uncertain, as their use is primarily supported by clinical experience and indirect evidence from hypersensitivity reactions to iodinated contrast agents. Prospective studies are needed to determine an optimal preventive approach for CIS.

Some authors suggest that these complications may represent clinical manifestations of an underlying iodine or iodide allergy. Considering this possibility, laboratory testing for hypersensitivity in individuals without a known history of iodine allergy could be valuable. Detecting latent hypersensitivity could guide preventive measures and enable tailored risk mitigation strategies for patients undergoing contrast-enhanced imaging.

Furthermore, increased iodine uptake in major salivary glands has been observed in individuals treated with radioactive iodine (^{131}I), and a potential link between thyroid function and iodine uptake has been suggested (11). Hypothyroidism is known to alter iodine metabolism and may lead to increased iodine retention in various tissues, including the salivary glands. This raises the question of whether hypothyroidism could serve as a precipitating factor for contrast-induced sialadenitis, also referred to as “iodine mumps”. Although direct evidence remains limited, this possibility warrants further investigation. Given these potential implications, screening for thyroid dysfunction in patients with a history of iodine-related reactions could be incorporated into a comprehensive risk assessment strategy.

Management is generally supportive, as the condition resolves spontaneously within days to weeks. Symptomatic management includes corticosteroids, antihistamines, and nonsteroidal anti-inflammatory drugs (NSAIDs). In severe cases, particularly those with airway compromise, hospitalization and close monitoring may be necessary. Early recognition and intervention are essential to alleviating symptoms and prevent complications (4).

CONCLUSION

These cases emphasize the importance of recognizing contrast-induced sialadenitis as a potential adverse re-

action to iodinated contrast administration. Radiologists play a critical role in its early diagnosis and in assisting clinicians with effective management. Although self-limiting, contrast-induced sialadenitis can cause significant patient distress and diagnostic uncertainty due to its under-recognized nature. By increasing awareness, this article underscores the need for further research to improve our understanding of its pathophysiology and to optimize preventive and therapeutic strategies.

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