Available online at www.medicinescience.org

CASE REPORT

Medicine Science International Medical Journal

Medicine Science 2026;15(1):544-8

# Radiographic manifestation of Ithmid Kohl

**Medine Simsek, Dilara Nil Gunacar, Taha Emre Kose**

*Recep Tayyip Erdoğan University, Faculty of Dentistry, Department of Dentomaxillofacial Radiology, Rize, Türkiye*

Received 29 July 2025; Accepted 25 August 2025
Available online 27 February 2026 with doi: 10.5455/medscience.2025.07.210



**Abstract**

Panoramic radiography (PR) is a fundamental imaging modality in dental diagnostics, providing comprehensive visualization of teeth and jaws. However, radiopaque materials—particularly metals—can introduce significant artifacts, obscuring critical anatomical landmarks in the maxillofacial region and diminishing diagnostic accuracy. The timely identification and management of such artifacts are essential to maintain image integrity and ensure accurate clinical evaluation. This report presents two rare cases of incidental radiopaque findings (ithmid kohl) in the orbital region detected via PR. Through clinical assessment and radiographic interpretation, these opacities were correctly identified, highlighting the importance of clinician awareness regarding uncommon radiopaque appearances. These cases underscore the diagnostic value of PR not only in dental evaluation but also in the incidental detection of non-dental pathologies. Moreover, they demonstrate how recognizing atypical radiopacities can aid in differential diagnosis and prevent misinterpretation, ultimately contributing to improved patient outcomes.

**Keywords:** Artifact, dentistry, radiography, foreign bodies

## Introduction

Panoramic radiography (PR) is a widely adopted imaging technique in dental diagnostics, offering a broad and detailed visualization of the maxillofacial region. When properly executed, PR enables accurate assessment of dental and jaw structures. However, the presence of radiopaque materials—particularly metals—can introduce artifacts that obscure critical anatomical details, especially in the head and neck area. These artifacts, often identifiable by their location and appearance, can compromise image quality, leading to diagnostic uncertainty or misinterpretation. In many instances, the occurrence of such artifacts is preventable through proper patient positioning and removal of external objects prior to imaging. Given that radiopaque foreign bodies can partially or entirely impair the evaluability of a radiograph, clinician awareness and artifact prevention are essential to preserve diagnostic reliability and ensure accurate clinical outcomes [1].

Although PR is commonly employed as a first-line imaging modality for the detection and localization of foreign objects, additional imaging techniques—including plain radiographs, computed tomography (CT), magnetic resonance imaging (MRI), ultrasonography (USG), and electromagnetic metal detectors—may be required to precisely determine the nature and exact localization of suspected foreign bodies, particularly in complex or unclear cases [2].

Foreign objects in the maxillofacial region may become embedded in bone, adjacent soft tissues, the maxillary sinus (antral cavity), or, in rare cases, even migrate into the respiratory tract. Owing to the complex anatomy of this region, such foreign bodies can be located in a wide range of sites. Typically small and inert, these objects often elicit minimal or no inflammatory response. However, when retained for prolonged periods, they may give rise to persistent symptoms and delayed complications. Potential adverse outcomes include localized infection, peripheral nerve injury, pseudoaneurysm formation, and synovitis. Moreover, hypersensitivity reactions, such as eczematous dermatitis, have been reported in individuals with metal allergies. In rare instances, dysplastic changes have also been observed in association with long-standing metallic foreign bodies [2].

Historically, the principal source of kohl—also known as

**CITATION**
Simsek M, Gunacar DN, Kose TE. Radiographic manifestation of Ithmid Kohl. Med Science. 2026;15(1)544-8.

**Corresponding Author:** Medine Simsek, Recep Tayyip Erdoğan University, Faculty of Dentistry, Department of Dentomaxillofacial Radiology, Rize, Türkiye
Email: medine.simsek@erdogan.edu.tr

DOI: 10.5455/medscience.2025.07.210

surma—has been stibnite, a black-colored mineral composed of antimony trisulfide ($Sb_2S_3$), traditionally referred to as Ithmid. Stibnite was either used in its natural form or combined with additives such as camphor, menthol, almond seed oil, and wood essence to enhance its properties. Applicators were crafted from diverse materials, including wood, bone, and glass. Over time, stibnite was largely replaced by galena (lead sulfide), which shares similar metallic luster and dark pigmentation. Kohl holds a rich cultural and linguistic history, reflected in its many names: the ancient Egyptians termed it collyrium, while the Greeks and Romans called it kollurion. In Arab and Egyptian traditions, it is commonly known as Kohl or Kahal, and in the Indian-Pakistani subcontinent, it is referred to as Anjan, Sauviranjan, Shurma, or Surmi [3].

Historically, kohl was applied to the eyes not only for aesthetic purposes but also as a protective measure against ocular discomfort and the harsh effects of sunlight. In ancient Egypt, its use extended beyond cosmetics, symbolizing health, spirituality, and social status. Despite shifts in religion, language, and culture, the tradition of kohl application has endured through the centuries. While its use today is largely cosmetic, the continued popularity of kohl raises significant public health concerns due to its composition. Commercially available kohl products often contain high concentrations of lead and other heavy metals. Analytical studies have identified compounds such as galena (PbS), minium ($Pb_3O_4$), amorphous carbon, magnetite ($Fe_3O_4$), and zinc oxide (ZnO) in kohl preparations [4].

Chronic use may result in systemic absorption of lead, particularly when applied to the mucocutaneous junction of the eyelids, potentially leading to plumbism (lead poisoning). Lead accumulates in the brain and bone marrow, manifesting as anemia, neurotoxicity, convulsions, and in severe cases, encephalopathy [5]. Infants and young children are especially vulnerable, both through direct application or indirect exposure—such as through maternal use or contaminated fingers contacting the mouth. In pediatric populations, elevated blood lead levels can result in permanent neurological damage, developmental delays, seizures, coma, and even death [6]. Notably, infants born to mothers who regularly use kohl have been found to exhibit significantly higher blood lead levels than those whose mothers do not [7].

For the first time in the literature, these two case reports present incidental detection of radiopaque Kohl remnants in the orbital region, identified on both PR and CT scans, highlighting a previously undocumented source of artifact that may impact diagnostic interpretation.

## Case Presentation

### Case 1

A 38-year-old, systemically healthy female patient presented to the Oral and Maxillofacial Radiology Department at Recep Tayip Erdoğan University Faculty of Dentistry, reporting tooth pain localized to the upper right region. Clinical examination revealed a deep cavity extending to the pulp in the right maxillary second molar, identified as the source of the pain. A PR (Planmeca, Helsinki, Finland) was taken, revealing radiopacities in both orbital regions, characterized by a combination of linear and pinpoint forms (Figure 1).

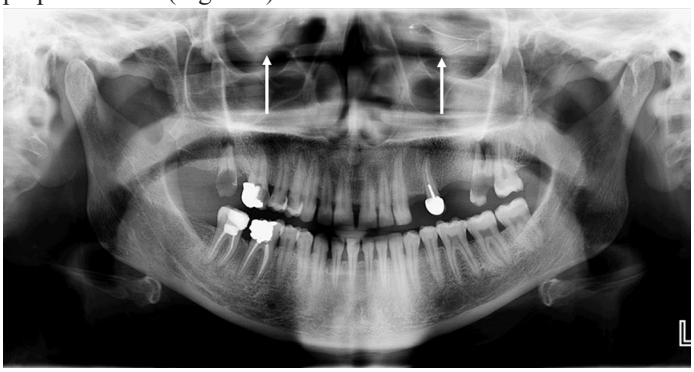

**Figure 1.** PR of Case 1 showing radiopacity associated with kohl in the bilateral orbital regions (indicated by white arrows)

Due to the incidental radiographic findings, the patient's medical history was thoroughly reviewed. Inquiries were made regarding any prior procedures involving the eyes or surrounding tissues, as well as a history of trauma or foreign bodies in the region. The patient disclosed that she had been using kohl, brought from Saudi Arabia by a relative, for cosmetic purposes over the past five years. The substance was applied regularly, approximately five days per week, with the kohl remaining on her eyelids throughout the day. The kohl was kept in a transparent glass container and mixed with olive oil before application to the eyelash line. When asked about the ingredients, the patient was unable to provide specific details, as the product was not labeled. The patient confirmed that kohl had been applied on the day the radiograph was taken.

Further investigation into the potential contents of the kohl revealed that it may contain lead. As a result, the patient was questioned about the clinical signs of lead toxicity, such as abdominal pain, constipation, headaches, memory problems, fatigue, irritability, numbness in the extremities, and unusual tastes in the mouth. No such symptoms were reported.

The patient was informed about the potential presence of lead in the kohl and its associated health risks, including the possibility of long-term effects. She was subsequently referred to the appropriate medical departments for further evaluation and treatment of her dental concerns.

### Case 2

A 29-year-old male patient with a medical history of gastritis and spondylolisthesis presented to the Department of Oral and Maxillofacial Radiology at Recep Tayip Erdoğan University Faculty of Dentistry, reporting pain in the temporomandibular joint (TMJ) area. Clinical examination revealed trigger points in the bilateral masseter and lateral pterygoid muscles. Radiological evaluation, including PR (Planmeca, Helsinki, Finland), revealed incidental bilateral, multiple punctate radiopacities in the orbital region (Figure 2).

DOI: 10.5455/medscience.2025.07.210

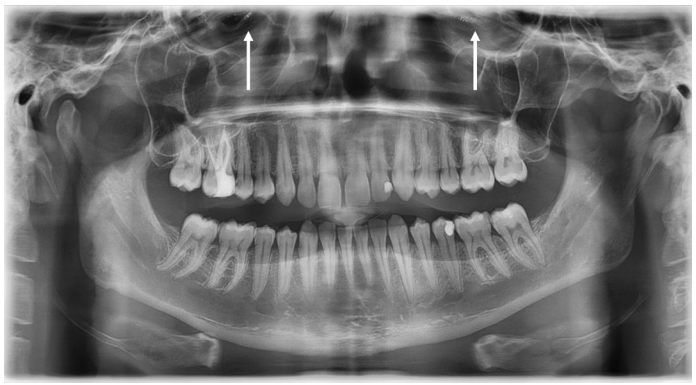

**Figure 2.** PR of Case 2 demonstrating punctate radiopacities in the bilateral orbital regions (indicated by white arrows)

The patient's medical history was thoroughly reviewed, with particular attention to any history of trauma, surgery, or the presence of foreign bodies. To further investigate the radiopacities, previous radiographic images were retrieved. The CT scans taken seven years earlier for the evaluation of the paranasal sinuses, assessed in the bone window, revealed multiple punctate radiopacities located in the soft tissue at the ciliary level in both orbital regions (Figure 3).

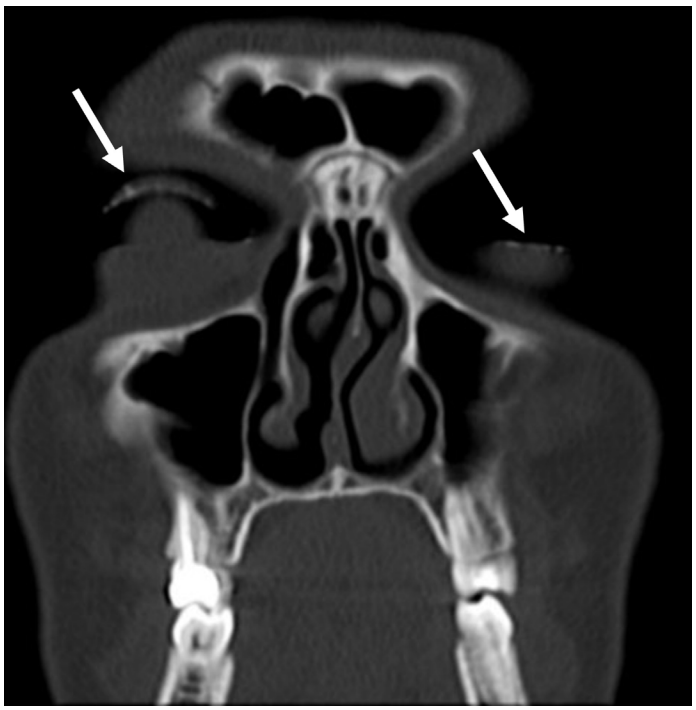

**Figure 3.** Coronal section of the CT scan at the bone window level for Case 2 reveals punctate radiopacities located in the soft tissues of the bilateral orbital regions (indicated by white arrows)

The patient disclosed regular use of kohl for religious purposes, applying it around the eyes three times a week. However, on the day the dental imaging was obtained, it was noted that the patient had no kohl, and clinical examination confirmed their absence on both eyelids. The kohl was purchased from a local spice shop in a glass bottle and mixed with olive oil before application. In an effort to confirm the source of the radiopacities, the patient was asked to bring the kohl to the clinic. The kohl powder was mixed with pure olive oil in a 1:1 ratio until a homogeneous consistency was achieved, as described by the patient. This mixture was then applied to a paper using an applicator (Figure 4). A periapical radiograph was obtained using the VistaScan system with the following parameters: 65 kVp, 6 mA, 40 cm source-to-object distance, and an exposure time of 0.08 seconds. The resulting image (Figure 5) confirmed that the radiopacities observed in the PR were caused by the kohl.

The patient was queried about potential symptoms of lead toxicity, such as abdominal pain, constipation, headaches, memory problems, fatigue, irritability, numbness in the extremities, or unusual taste sensations, but no such symptoms were reported. As in Case 1, the patient was informed of the potential lead content in kohl and the associated health risks. He was subsequently referred to the appropriate medical departments for further evaluation and dental treatment.

**Figure 4.** Image showing a kohl-applied paper placed on a phosphor plate for radiographic examination

DOI: 10.5455/medscience.2025.07.210

**Figure 5.** Radiographic image of the paper with kohl application

## Discussion

A comprehensive literature review conducted to identify the range of metallic foreign bodies that can create radiopaque artifacts on PRs in routine clinical practice uncovered a diverse array of unexpected sources. These sources include, but are not limited to, removed earrings, which can produce characteristic "ghost" images on the contralateral side; dental restorative materials; body piercings; hearing aids; acupuncture needles; rare iatrogenic objects; gunshot pellets; shrapnel; foreign bodies in the nasal and external auditory canals of infants; vascular clips post-surgery; and ritualistic subcutaneous implants [1].

Gold wires utilized in plastic surgery or acupuncture procedures can generate radiographic artifacts, which may complicate image interpretation. Therefore, it is crucial for clinicians to be well-acquainted with the potential presence and distinctive imaging characteristics of such materials. A comprehensive medical history, particularly one that includes inquiries about these specific procedures, is essential in preventing misinterpretation or diagnostic challenges that may arise due to artifact overlap with normal anatomical or pathological structures [1].

Foreign bodies in radiographic imaging can originate from a variety of materials, each displaying distinct radiographic characteristics that are influenced by their composition and the anatomical location. For instance, a rare case report described a patient referred for PR, where bilateral, horizontally oriented radiopaque lines were observed, extending vertically across the entire image in the anterior vertebra. Upon further investigation, it was revealed that the patient had been wearing a synthetic wig as a result of hair loss induced by chemotherapy during breast cancer treatment [8].

Rare radiological findings resulting from cultural or religious practices can be observed in individuals from specific regions of the world. A notable example of such cultural practices includes "susuks" or talismanic needles, commonly found in Southeast Asia. These metallic pins, typically 5-10 mm in length and 0.5 mm in diameter, are made from silver, gold, or their alloys, and are often left permanently in the body of the individual as part of a cultural or spiritual tradition [9]. Similarly, the use of kohl in the Middle East holds both medical and cultural significance. Traditionally, kohl was used for medical purposes, such as halting bleeding and maintaining hygiene post-circumcision, in addition to its role as a social and religious symbol. Among various ethnic and religious groups in the Middle East, particularly in Saudi Arabia during the Hajj season, kohl is not only a valued gift among Muslims but also a practice supported by prophetic sayings, establishing its religious importance [10].

In addition to its application around the eyes, kohl is also commonly applied to the scalp, chest, and umbilical regions of newborns in Saudi Arabia, often mixed with other solvents. It is widely believed within the local population that such applications strengthen the abdominal wall, prevent umbilical hernias, and facilitate the faster closure of the anterior fontanelle [11].

Abnormal conjunctival pigmentation can be linked to a variety of pathological conditions, including melanosis, retained foreign bodies, systemic diseases, melanocytic tumors, as well as the topical or systemic use of certain medications and exposure to various chemicals. Another potential cause of conjunctival pigmentation is the use of kohl. A case documented in the literature highlighted black pigmentation of the lacrimal sac due to kohl use, which mimicked malignant melanoma, despite the absence of an actual mass. If the surgeon is unaware of this possibility, the pigmentation induced by kohl could be mistakenly interpreted as a malignant lesion during surgery [12].

Kohl can also appear on PRs, as demonstrated in our cases. In the present study, this was further confirmed by obtaining periapical radiographs using the kohl material directly from the patients. The resulting radiopaque image was attributed to the lead content in the kohl. It is important to note that commercially produced kohl contains substantial levels of lead. The excessive accumulation of lead in the body can have severe consequences, affecting the brain and bone marrow, and leading to critical health conditions such as seizures, anemia, encephalopathy, coma, and even death. In light of the systemic effects of lead from kohl and the radiopaque appearance it causes in radiographic images, it is essential for clinicians to inquire about the use of kohl during medical history-taking, particularly in societies where its use is

DOI: 10.5455/medscience.2025.07.210

prevalent. In accordance with Goethe's words "Man erblickt nur, was man schon weiss und versteht (means One recognizes only what one already knows and understands)", dentists need to learn this in order to be able to identify a phenomenon that is not often encountered in the literature when encountered [13].

## Conclusion

PR is a routinely utilized imaging modality in dental diagnostics, offering a comprehensive overview of maxillofacial structures. However, the presence of radiopaque foreign bodies can introduce significant artifacts that obscure anatomical landmarks, potentially hindering accurate image interpretation and diagnostic decision-making. Recognizing the origin and nature of such artifacts is therefore critical for clinicians, as it directly impacts the reliability of differential diagnoses and prevents misidentification of pathological findings.

**Conflict of Interests**
***The authors declare that there is no conflict of interest in the study.***

**Financial Disclosure**
***The authors declare that they have received no financial support for the study.***

**Patient Informed Consent**
***Written informed consent was obtained from all patients. Signed consent forms were obtained on 3 October 2023 and 14 March 2025.***

## References

1. Brauer HU, Bartols A, Hellmann D, Boldt J. Unexpected metallic foreign bodies on panoramic scans–a narrative review. Rofo. 2023;195:809-18.
2. Omezli MM, Torul D, Sivrikaya EC. The prevalence of foreign bodies in jaw bones on panoramic radiography. Indian J Dent. 2015;6:185.
3. Dharkar EP. Tracing the Genesis of Kajalshalaka (Kohl Stick). J of Multidiscip Stud in Arch. 2023;11:1157-68.
4. Hardy AD, Farrant AJ, Rollinson G, et al. A study of the chemical composition of traditional eye cosmetics ("kohls") used in Qatar and Yemen. J Cosmet Sci. 2008;59:399-418.
5. Mohta A. Kajal (Kohl)–A dangerous cosmetic. Oman J Ophthalmol. 2010;3:100-1.
6. McMichael JR, Stoff BK. Surma eye cosmetic in Afghanistan: a potential source of lead toxicity in children. Eur J Pediatr. 2018;177:265-8.
7. Al-Hazzaa SA, Krahn PM. Kohl: A hazardous eyeliner. Int Ophthalmol. 1995;19:83–8.
8. Köse TE. Dental radiography: Wig artefact. Br Dent J. 2014;216:654.
9. Varghese E, Samson RS, Nagraj SK, Chandrappa PR. Susuk or charm needle: A strange object detected on orthodontic diagnostic radiographs. Case Rep. 2017;2017:bcr2017222497.
10. Al-Ashban RM, Aslam M, Shah AH. Kohl (surma): A toxic traditional eye cosmetic study in Saudi Arabia. Public Health. 2004;118:292-8.
11. Gupta M, Khan SS. Kohl contamination of the umbilicus causing X-ray opacity: A case report. Ann Saudi Med. 1990;10:567-8.
12. Hidayat A, Weatherhead R, Al-Rajhi A, Johnson F. Conjunctival and lacrimal sac pigmentation by kohl (eyeliner). Br J Ophthalmol. 1997;81:415.
13. White SC, Pharoah MJ. Principles of Oral Radiology. In: White SC, Pharoah MJ, eds. Oral Radiology. 7th edition. Elsevier/Mosby; 2014.