Glass Particles in the Nasal Cavity for 30 Years and Squamous Cell Carcinoma: Is There a Relationship?

Case Report

Selçuk Yıldız, Perçin Serhat Yergin, Ayşegül Verim, Lütfü Şeneldir

Department of Otorhinolaryngology, Head and Neck Surgery, Haydarpaşa Numune Training and Research Hospital, University of Health Sciences, İstanbul, Turkey

Abstract

Nasal cavity tumors constitute a very small part of head and neck malignancies. Although paranasal sinus tumors due to the presence of backward foreign bodies, neoplasms of nasal cavity associated with a foreign body are extremely rare. In this article, we presented a rare case of carcinoma in the right nasal cavity which includes glass particles inside it, and the role of glass particles in carcinogenesis was discussed. The patient was a 55-year-old male with history of a car accident 30 years ago. During right medial maxillectomy via a right lateral rhinotomy approach, three pieces of glass beads, approximately 0.5 cm in size, were removed from the inside of the mass. The patient had also under gone postoperative radiotherapy. No complication emerged during the postoperative recovery period. The patient had been followed up with no finding of local recurrence for 12 months.

Keywords: Carcinogen, foreign body, glass particles, nasal cavity, neoplasm

ORCID ID of the authors:

S.Y. 0000-0002-2820-8888;
P.S.Y. 0000-0003-0257-8124;
A.V. 0000-0002-6649-0837;
L.Ş. 0000-0003-1744-1710.

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Corresponding Author:
Selçuk Yıldız;
selcukyildiz60@hotmail.com

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Introduction

The nasal cavity and paranasal sinus tumors constitute 0.3% of all malignant tumors and 3% of all head and neck cancers. The most common localizations of paranasal sinus tumors are maxillary sinus and nasal cavity respectively (1). The most common pathological diagnosis is squamous cell carcinoma (SCC). The most important factors responsible for the development of SCC are infections such as papilloma virus and exposure to occupational carcinogens like nickel, leather dust, wood shavings, and chromium. Besides these factors, chronic inflammation is also blamed although there is no consensus (2-5). Foreign bodies may play a role in the carcinogenesis depending on chronic inflammation (6, 7). Thanks to microinvasive technics like endoscopy, the rate of the comorbidities related to surgical interventions and surgical stres was declined and they enabled early diagnosis and treatment of foreign bodies. Foreign bodies in the nasal cavities are infrequent. The aim of this article is to present a rare case of SCC in the right

nasal cavity which includes glass particles inside it and to discuss the role of glass particles in carcinogenesis.

Case Presentation

A 55-year-old man had referred to our clinic with symptoms of nasal obstruction, foul-smelling nasal secretion, and right-sided facial pain. He described a long time history of nasal obstruction and foul-sniffing discharge. His medical history was insignificant except for the use of antihypertensive drugs for his cardiovascular problems, a car accident 30 years ago that caused the loss of his left eye ball, and a scar tissue formation over his nasal dorsum.

Endoscopic examination revealed a fragile mass easily bleeding in bilateral nasal cavities, which completely obstructed the right nasal cavity and partially obstructed the left nasal cavity.

Sampling of the lesion in the right nasal cavity was performed in the outpatient clinic and the histopathologic result was SCC. The preoperative computed tomography displayed a solid enlarged mass occupying the whole right nasal cavity and extending to the contralateral side at the medial nasal region. The medial wall of the maxillary sinus and inferior and medial walls of the orbit were intact. Signs related to sinusitis were observed in the right maxillary, frontal and, ethmoid sinuses (Figure 1 and 2). Magnetic resonance imaging (MRI) of the paranasal sinuses and positron emission tomography with computed tomography of the whole body were performed to assess metastases. The mass was extending to the left nasal cavity without any relevance of the regional skin, lymph nodes, intracranial invasion, and distant metastases.

Operation was carried out under general anesthesia with orotracheal intubation. Complete resection of the mass with right medial maxillectomy was performed via a right lateral rhinotomy approach. During the operation, we observed that the mass, which originated from right lateral nasal wall, infiltrated the nasal septum and extended into both nasal cavities. The right maxillary sinus, right inferior and medial orbital walls and mucosa of the left nasal cavity were intact. During the operation, 3 pieces of glass beads, approximately 0.5 cm in size, were removed from the inside of the mass (Figure 3 and 4). The intraoperative frozen section examination showed that the surgical margins were tumor-free. The mass was diagnosed as a poorly differentiated SCC with a pathological stage T2 N0 M0 according to the tumor node metastasis system published by the American Joint Committee on Cancer (2012). Our patient had also under gone postoperative radiotherapy. No complication emerged

Figure 1. Preoperative computed tomography scan: soft tissue fills the nasal cavity in coronal section

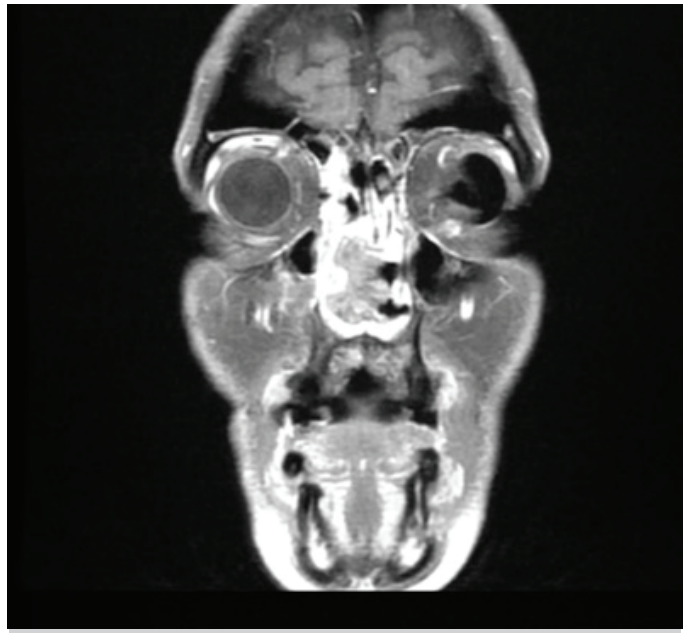

Figure 2. Preoperative magnetic resonance imaging: soft tissue seen in the nasal cavity on T1 weighted coronal section

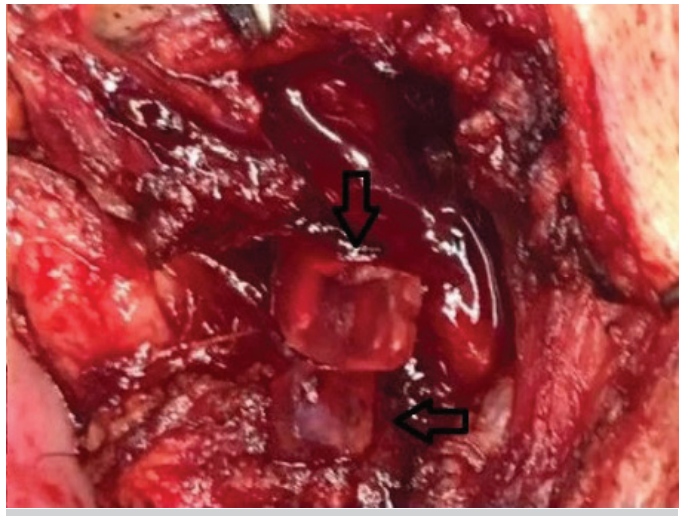

Figure 3. Photo taken during surgery: glass particles located in the tumor, marked with arrows

during the postoperative recovery period. The patient had been followed up with no finding of local recurrence for 12 months. On the MRI finding, six months after the surgery, a soft tissue mass without contrast enhancement which fills the cavity of the right maxillary sinus interpreted as mucosal thickness due to postoperative and post-radiotherapy changes (Figure 5). T2 weighted MRI, 12 months after the surgery revealed bilateral mucosal thickening in maxillary sinuses (Figure 6).

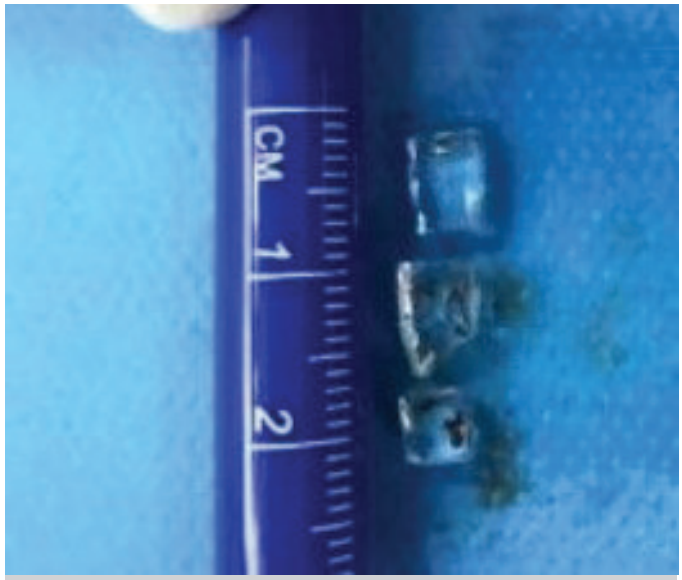

Figure 4. Photo taken during surgery: glass particles after resection

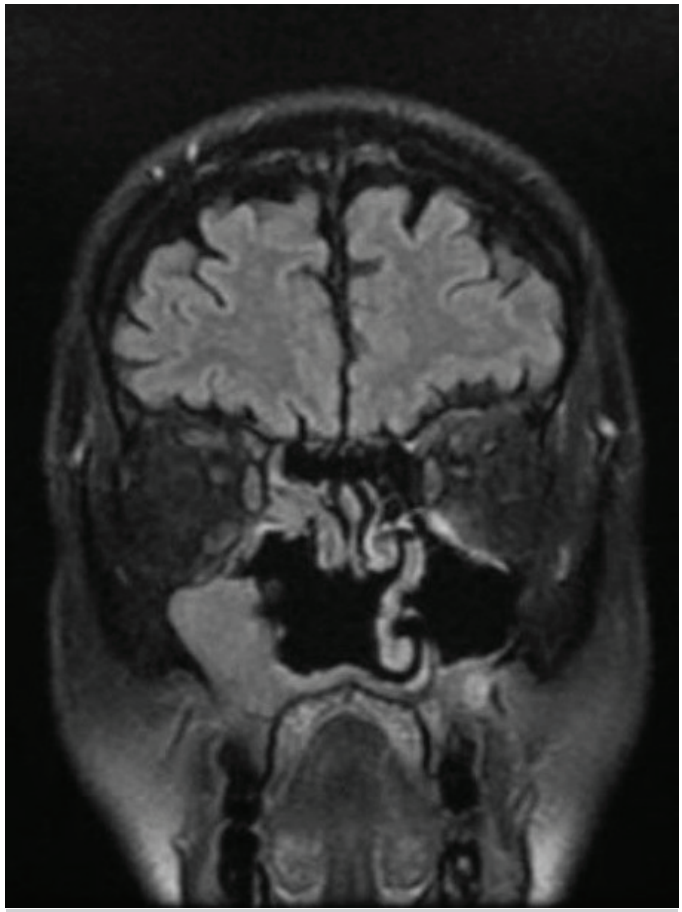

Figure 5. Magnetic resonance imaging at postoperative 6th month: mucosal thickness in the cavity of the right maxillary sinus seen on T1 weighted coronal section

Discussion

Chronic inflammation is one of the most important causes of the development and progress of tumors. Inflammation is a certain malignency-causing ingredient as revealed by accumulated basic, clinical and epidemiological works. It is frequently induced by infectious agents (5). It develops due to the infiltration of the active phagocytes/lymphocytes followed by the stimulation of the stroma reaction, which is induced by the cells related to angiogenes particularly fibroblasts and causes DNA damage and genetic mutation in the normal cells. The underlying pathogenesis in common is to induce and/or maintain inflammation (5). This process leads to uncontrolled cell proliferation, which explains the inflammation-dependent carcinogenesis (5).

Prosthesis, foreign bodies penetrating into the body during accidents and wars may cause chronic inflammation and lead to inflammation-related carcinogenesis (8). It was reported that tumor development may emerge even 20 years after the penetration of the foreign body in the organism (8). A patient with breast malignancy following breast augmentation with liquid silicone injection after sixteen years was reported in a recent paper (9). The carcinogenic effect may change depending on the shape, dimension of the implanted foreign body, roughness of the surface, electrostatic load and inflammatory properties of the host (10). In their animal experiment, Boone (6) and Boone and Jacobs (7) used glass particles and plastic plaques to investigate the carcinogenic effect of foreign bodies. In one of these animal studies, each of nine subjects were subcutaneously inoculated with

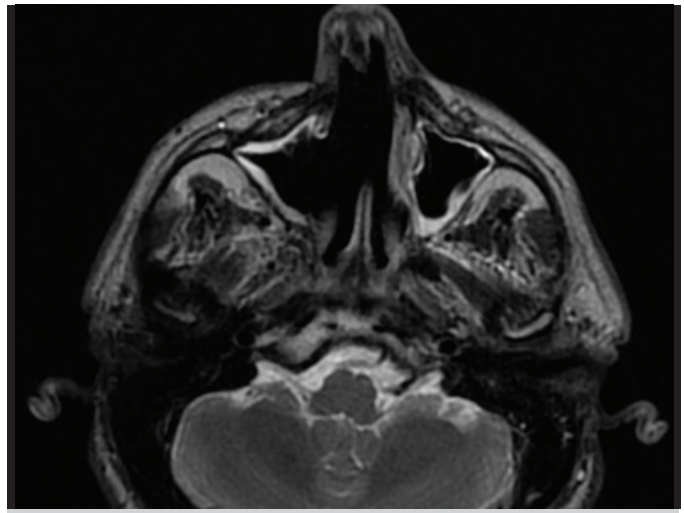

Figure 6. Magnetic resonance imaging at postoperative 12th month: bilateral maxillary sinusitis seen on T2 weighted axial section

an average of 15,400 Balb/3T3 cells attached to two glass particles. After eight weeks, all the subjects had developed large bloody masses that microscopically diagnosed to be hemangioendotheliomas. The inoculation of Balb/3T3 cells alone or particles alone produced no masses (6). Except for this animal study, we did not find any other report about malignancy cases related glass grains in the English literature. In this case report, we described the case of a right nasal cavity tumor which may have been caused by glass particles that had penetrated the nasal cavity in a car crash 30 years ago.

Conclusion

Although there are foreign body-related tumor cases and nasal cavity/paranasal sinus tumor cases in the literature, the presented case is interesting because of the nature of the foreign body and its location. A literature search showed that even biocompatible materials may cause inflammation-dependent carcinogenesis. In addition, foreign bodies may cause additional comorbidities like an infection. In such cases, detailed examination for the presence of foreign body and removal immediately when detected may be useful for the prevention of carcinogenesis and infections.

Informed Consent: The informed consent was obtained from the patient.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.Y., P.S.Y., A.V., L.Ş., Concept: S.Y., P.S.Y., A.V., L.Ş., Design: S.Y., P.S.Y., A.V., L.Ş., Data Collection and/or Processing: S.Y., P.S.Y., A.V., L.Ş., Analysis and/or Interpretation: S.Y., P.S.Y., A.V., L.Ş., Literature Search: S.Y., P.S.Y., A.V., L.Ş., Writing: S.Y., P.S.Y., A.V., L.Ş.

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Main Points

- Glass particles are among the rarest of foreign bodies reported in English literature to cause carcinogenesis.
- An experimental study about the development of malignancy due to glass particles have been reported.
- Detailed examination for the presence of foreign body and removal immediately when detected may be useful for the prevention of carcinogenesis and infections.

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