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Case Report
Trauma

Air gun pellet remaining in the maxillary sinus for 50 years: a relevant risk factor for the patient?

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T. V. Kühnel, C. Tudor, F. W. Neukam, E. Nkenke, P. Stockmann: Air gun pellet remaining in the maxillary sinus for 50 years: a relevant risk factor for the patient?. Int. J. Oral Maxillofac. Surg. 2010; 39: 407–411.

Abstract. The authors report the case of a 62-year-old man referred to the department of oral and maxillofacial surgery because of a clinical suspicion of palate carcinoma. Incidentally, diagnostic radiology showed a metallic foreign body in the left maxillary sinus. Anamnestic data revealed that a shot from an air gun accidentally hit the patient's left cheek in 1957. The lead-containing air gun pellet was removed by endoscopic antrostomy and the diagnosis of squamous cell carcinoma was confirmed by histopathological examination. 50 years after the pellet's impact, toxicological blood analysis showed no increased blood lead level. It remains unclear whether the air gun pellet has a potential toxicological effect or is related to the development of the patient's oral carcinoma. In this context the article reviews the literature and discusses the necessity of removing metal-containing foreign bodies, the role of lead in chronic toxicity and its possible carcinogenic effect in humans.

Keywords: air gun pellet; oral carcinoma; foreign body; lead toxicity; carcinogen.

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Foreign bodies in the paranasal sinuses are rare. Typically, air gun injuries occur in adolescent males[6]. Most are associated with trauma in the maxillofacial region followed by dislodgement of teeth or surgical intervention for dental problems[15,32]. Infrequently, gunshot injuries are responsible for foreign particles in the paranasal sinuses. Maxillofacial gunshot injuries are rare and generally presented in case reports (Table 1). Air gun pellet injury may cause major damage to soft tissue or bone or other severe problems. Some metals, embedded in body tissue, can be a source of potential exposure to toxic effects[20,30]. Little is known about the health effects of lead-containing air gun pellets after internalisation in body cavities. There is ambiguity in the literature about whether to remove metal-containing foreign bodies, particularly air gun pellets, or to leave them in situ. Microinvasive techniques (e.g. endoscopy) have reduced the surgical stress and comorbidity of surgical intervention, so the decision to remove foreign bodies is now made earlier and more often. The aim should be the prevention of long-term sequelae for the patient.

This article reports a 62-year-old patient who had an air gun pellet in his maxillary sinus for almost 50 years and finally, developed oral cancer and dysplastic transformation of several regions in the oropharynx. The literature is reviewed, indications and techniques for pellet removal are described and the risk of lead as a potential carcinogen is discussed.

Case report

A 62-year-old man was admitted for evaluation of tumour development on the right soft palate. He had been employed by the military several years ago and presented with a history of chronic tobacco

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Table 1. Summary of reports on low-velocity gun injuries in paranasal sinuses.

References	Age/gender	Type of pellet	Sinus	Signs of infection, toxicity, tumor	Surgical approach	Period in situ	Outcome
Ogale et al.[34]	3 year/female	air gun	sphenoid	chemosis, eye congestion	transnasal	unknown	uneventful
Murthy et al.[32]	1 year/male	air gun	ethmoid	Unknown	endoscopic failed/extern.ethmoidectomy	unknown	uneventful
ÓConnell et al.[33]	1. 12 year/male	air gun	1. maxillary	Unknown	1. Caldwell.Luc	unknown	1. uneventful
	2. 16 year/male		2. maxillary		2. Caldwell.Luc		2. unknown
	3. 14 year/male		3. sphenoid		3. transethmoidal		3. eye damage
Lubianca Neto et al.[27]	15 year/female	air gun dart	ethmoid/sphenoid	visual problems, ocular pain	no removal	34 months	moderate visual loss
Mahajan and Shah[29]	6 year/female	air gun	maxillary	asymptomatic sinusitis	no removal	unknown	chronic sinusitis
Strek et al.[39]	15 year/male	air gun	sphenoid		endoscopic		uneventful
Badran et al.[3]	17 year/male	air gun	ethmoid	brief epistaxis	endoscopic	1-2 hours	uneventful
Hyckel et al.[22]	unknown	air gun	maxillary	Unknown	endoscopic	unknown	unknown
Cohen et al.[11]	unknown	low-velocity	maxillary 2 cases	Unknown	unknown	unknown	unknown
Chhetri and Shapiro[10]	10 year/female	BB gun	ethmoid	Unknown	endoscopic	unknown	unknown
Akhtar et al.[2]	41 year/male	missile	sphenoid	Unknown	transmaxillary	unknown	unknown
Lee et al.[26]	6-63year/	low-velocity	maxillary:27	vascular injuries:4	removed:16	unknown	death:3
	33male,2female		ethmoid:20	ocular injuries	not removed:5		eye injury:9 (blindness:3)
			frontal:6		unknown:14		nerve injury:15
			sphenoid:5				sinusitis:4
Brinson et al.[7]	1. 8 year/female	air gun	1. maxillary	1. hypesthesia	1. endoscopic	1. 2 weeks	1. uneventful
	2. 15 year/male	BB gun	2. ethmoid	2. headache,	2. antrostomy,	2. 3 weeks	2. uneventful
	3. 8 year/male	BB gun	3. sphenoid	epistaxis	ethmoidectomy,	3. several	3. enucleation
				3. no light perception, headache	sphenoid sinustomy, stereotactic guidance 3. sphenoidotomy, stereotactic guidance	weeks	
Donald and Gadre[15]	19 year/female	air gun	ethmoid	neuralgia-like symptoms	endoscopic	unknown	uneventful

use and arterial hypertension. Clinical examination showed an exophytic tumour mass on the right soft palate expanding to the midline (Fig. 1). Tumour staging was started with plain X-rays of the oral maxillofacial region. A foreign body was seen in the left maxillary antrum (Fig. 2). The following computed tomography (CT) scan, performed for tumour staging, revealed the metallic foreign body on the most backward floor of the left maxillary sinus (Fig. 3). A small defect was found in the posterior maxillary wall. The patient had no history of rhinorrhoea, hypesthesia or other neurological symptoms. The man remembered an air gun shot to his left cheek when he was 12 years old, but no medical assistance was obtained at the time. The projectile was thought to have left the soft tissue wound, which the patient had covered by a patch, and further wound healing had been uneventful. 50 years later, laboratory blood examination showed a blood lead level of 80 μg/l (reference value 90 μg/l).

The authors decided to remove the air gun pellet under general anaesthesia simultaneously with tumour biopsy and panendoscopic examination of the aerodigestive tract, the usual tumour staging procedure in their hospital. The pellet was removed safely by endoscopic antrostomy (Fig. 4). Histopathological examination of the surrounding soft tissue showed a cystic structure including oncocytic cells without essential atypical changes. Wound healing within the operation field was uneventful and the patient was discharged. Histopathological assessment of the palatal tumour mass revealed a low differentiated squamous cell carcinoma of the soft palate. Further tissue biopsies of different regions of the oropharynx resulted in the diagnosis of a carcinoma in situ. Radiotherapy and chemotherapy were initiated, because the tumour was inoperable.

Discussion

Most air gun injuries are caused by careless use[6,33]. In the present case, the injury happened accidentally at the age of 12 years while the patient was loading an air gun rifle. In most cases, pellets do not exit the body and, if left in the soft tissue, they may cause complications by damaging vessels and surrounding structures[11]. In the present case, the pellet had passed through the sinus wall and lodged in the antrum for 50 years with no signs of neurological symptoms, infection of the maxillary sinus or other rhinological problems. Air gun pellets may act as a focus