

CASE REPORT

Nail Gun Injury: An Unusual Presentation as Tracheal Foreign Body

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ABSTRACT

Foreign bodies in trachea usually result from accidental slippage of an oral object while external penetrating injuries arising from high velocity projectile from a nail gun are rare. Here, we report a case in which a high velocity nail from a nail gun penetrated the sternum during the nailing and benignly presented to us as a foreign body in the trachea.

Keywords: Foreign body, Nail gun, Trachea.

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INTRODUCTION

Nail guns are pneumatically driven, high-velocity devices that are often used by wood workers to fire nails into the wood. With a speed of 1,400 feet per second, a nail can penetrate stressed concrete of even up to 10 cm thickness.² Nail gun-related injuries are an occupational hazard with potentially lethal outcomes. Here, we report an interesting case of nail gun injury with rare presentation.

CASE REPORT

A 20-year-old young male who was woodworker by occupation presented with history of accidental entry of a nail which he was aiming somewhere in the wood via a gun machine. Unknowingly, the direction of the gun was towards the patient when he was using this for some particular site. This leads to impaction of foreign body into the patient's body via penetration of sternum. Patient experienced some pain at time of impaction but after this, he was asymptomatic. Before coming to our institution, patient underwent exploration of wound at the site of entry by some nearby doctor but it was unyieldful (Fig. 1A). After about 15 days of this attempt,

patient presented to us with foreign body *in situ*. We got X-ray (both anteroposterior and lateral view) done along with the computed tomography (CT) scan. In X-ray, nail was confirmed which was lying vertically and obliquely at the level of D2 to D3 (Figs 1B and C). In CT scan, nail was visible at similar level and additionally we got to know that part of nail was impacted in tissues but most of it was intratracheal and not encroaching any vital structure (Fig. 1D). Rigid endoscopic removal was done under general anesthesia (Fig. 2A). Foreign body removed from trachea at the level of just above carina (Fig. 2B). Some force was required to remove foreign body as it was partly impacted. Minor mucosal injury occurred during removal but no significant bleeding occurred. Recovery from general anesthesia was uneventful and patient was well in postoperative period.

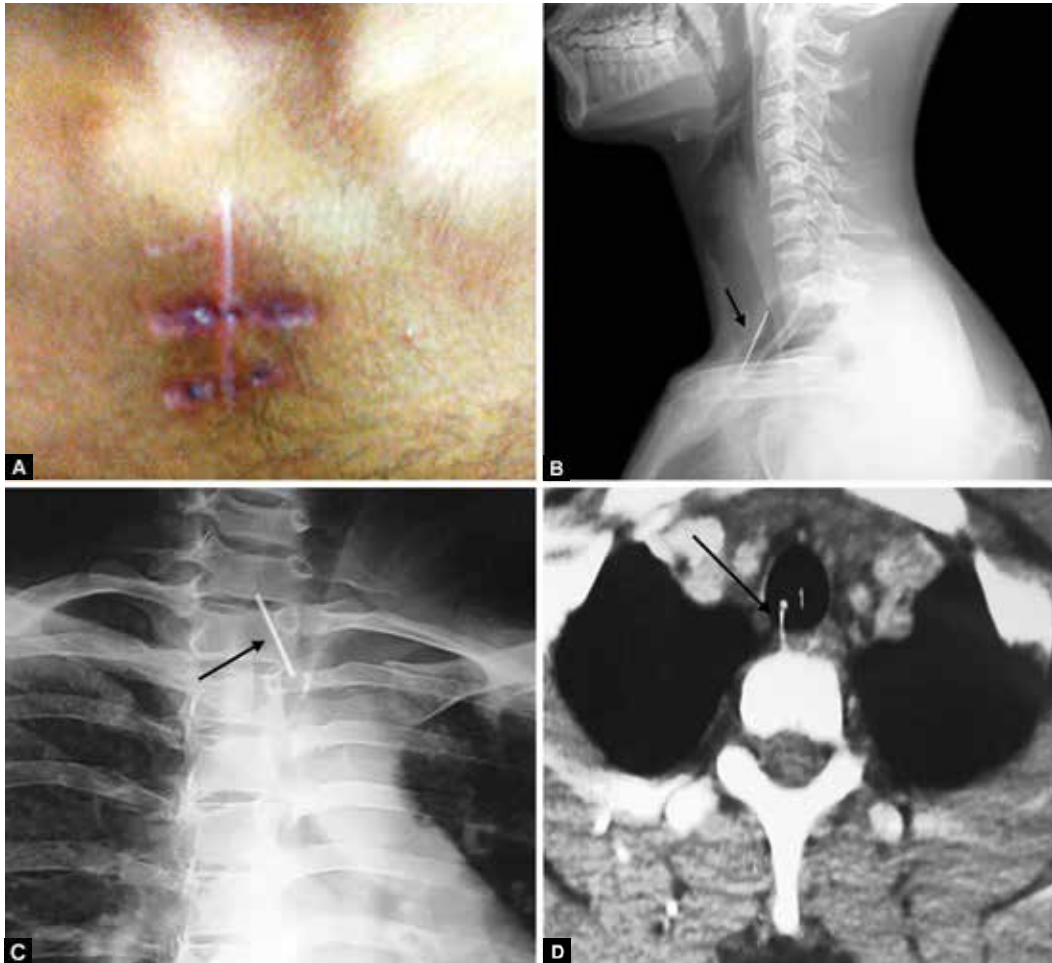
DISCUSSION

Tracheal foreign bodies usually present as a surgical emergency as patients are usually symptomatic and may present with cough, change in voice, respiratory distress or stridor and if not immediately taken care may result in fatal outcome. Even nonobstructive foreign body sets up a local reaction, such as edema of surrounding tissue and granulation tissue formation and may lead to respiratory distress. Our case was different as patient was carrying foreign body in his trachea for 15 days without any symptom and mode of entry of the foreign body is external penetration of sternum by a misdirected nail fired by a nail gun. Sixty five percent of nail gun injuries involves the hand.³ Other common sites including the head, neck, chest, abdomen, vertebral column, spinal cord, and extremities, have been documented in the literature, with case reports of fatalities being report sporadically.³⁻⁵ We have reviewed the literature and to our best of knowledge no case report of nail gun injury was reported till date with such presentation as in our case. In our case, patient was totally asymptomatic, external wound exploration was failed at a satellite hospital and foreign body was removed endoscopically in our institute. There is report of pin as a foreign body trachea in literature but mode of entry was oral.⁶ History is important to know nature of foreign body, its location and mode of entry as in our case in which it is through the penetrating wound. In case of a nail gun injury, history needs to be taken with

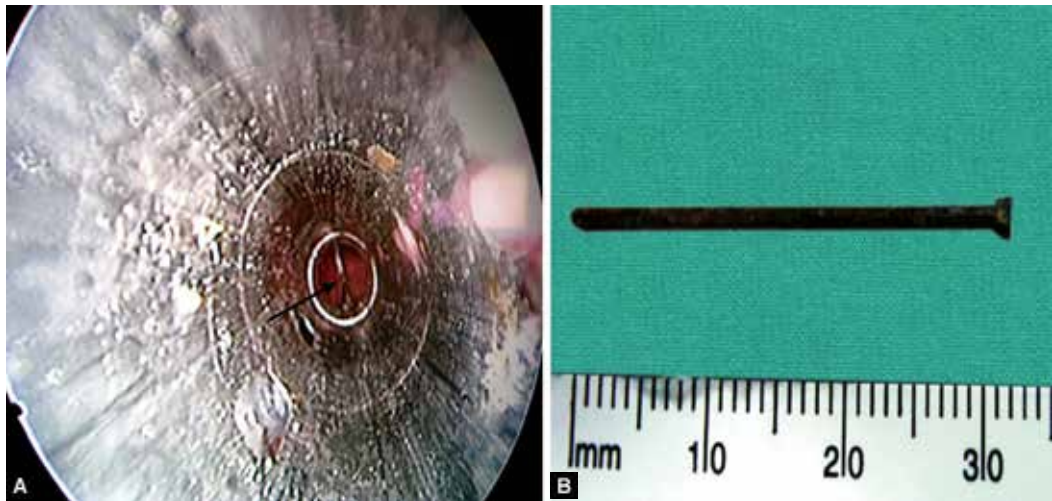
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Figs 1A to D: (A) The scar mark of the wound exploration done outside, (B) X-ray lateral view neck showing nail lying at level d2 to d3, (C) X-ray anteroposterior view neck showing nail at level d2 to d3 and (D) CT scan showing that nail was lying mostly intratracheally



Figs 2A and B: (A) Rigid bronchoscopy showing the nail and (B) b-foreign body (nail) after removal

special attention paid to the type of nail used (Barbed *vs* non-barbed) as the copper barbs which projects from the main shaft may engage the soft tissues on withdrawal.⁷ X-ray of the soft tissues of the neck (anteroposterior and lateral views) is important to diagnose and to locate a foreign body in suspected cases and in most cases, it is the only investigation required. In our case, as the mode of entry is through external entry point so we got

CT scan done in addition, to see the relation of foreign body with the surrounding structures and to know how much part of the foreign body is impacted in the tissue. Tracheostomy is of utmost important to secure the airway in patients presenting with stridor due to foreign body in the larynx or trachea. This will also prevent slipping of foreign body further into the bronchus. In our case, patient was not tracheostomized as he was asymptomatic

and foreign body was impacted in the tissues, so chances of slippage were less. Rigid endoscopy was preferred for foreign body removal as this allows easy manipulation, good visualization and safe control of airway along with cost effectiveness.⁸ There are complications reported with rigid endoscopic removal of foreign body from airway like simple respiratory infections, subcutaneous emphysema, bronchial irritation, pneumonitis, bronchospasm, pneumothorax, cardiac arrest and even death.^{8,9} These complications can be minimized with an experienced surgeon with a good anesthetic support. As a preventive effort the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) issued a nail gun safety guide in September 2011 that details practical steps to prevent injuries including use of tools with sequential triggers, training prior to use, and use of appropriate protective equipment, such as eye protection.¹⁰ Ocular nail gun injuries occur when a nail propelled at high velocity penetrates the globe and penetrating ocular trauma resulting from nails can have disastrous visual consequences,¹ but despite of these efforts, easy availability of this tool is still labeling related injuries a serious occupational hazard.

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