CASE REPORT

Gunshot Pellet Migration to the Right Ventricle: a Case Report and Literature Review

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Abstract The diagnosis and management of injuries of the heart or the great vessels continues to be a major surgical challenge in the past and now. This case study introduces the conservative management of a patient who developed a venous bullet embolus after being shot in the lower extremities. In this case report, we aim to review some of the literature on bullet emboli and to raise awareness of its existence. It was concluded that for bullets left in the limbs, bullet position in relation with peripheral vessels should be evaluated carefully to treat and avoid the bullets moving along with the bloodstream.

Keywords Gunshot · Right ventricle · Penetrating injuries · Bullet embolus

Introduction

The diagnosis and management of injuries of the heart or the great vessels continues to be a major surgical challenge in the past and now [1, 2]. This case study introduced the conservative management of a patient who developed a venous bullet embolus after being shot in the lower extremities with a

gunshot. Such a complication could cause significant morbidity and mortality unless detected early and prevented. In this case report, we aimed to review some of the literature on bullet emboli and to raise awareness of its existence.

Case Report

A 25-year-old male presented to our emergency room having been the victim of a shooting 16 h before. Local debridement of the wound was done immediately after injury in the first clinical hospital. A dose of 1500 IU tetanus antitoxin was injected conventionally before referral to our hospital. He was shot by a shotgun with pellets about 10 m from the rear. The bullets hit the hips and both lower limbs. There was pain and bleeding locally in the wounds of the shooting points. Several veins of the left lower limbs were injured and bleeding voluminously. The range of motion of both hips and knees was limited. There was no loss of consciousness, palpitations, chest pain, hemoptysis, chest tightness, or difficulty breathing.

Signs of Physical Examination Several wounds about 0.3 × 0.3 cm in size were widely scattered in the hips and both lower limbs. The wounds in the left lower limb had been sutured in the first clinical hospital, and there was no bleeding. Dried blood, redness, and swelling were seen around the wounds. No other positive signs were found on the physical examination.

Auxiliary Examination X-ray showed multiple metal foreign bodies seen in the chest, perineum, hips, and both lower limbs (At the 10th thoracic vertebral level, there were two circular high density shadows of diameter about 0.4 cm) (Fig. 1 and Fig. 3). On CT, it could be

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Fig. 1 X-ray showed there were two metal foreign bodies seen in the chest (At the 10th thoracic vertebral level, there were two circular high-density shadows of diameter about 0.4 cm)

seen as a small patchy high density shadow in anterior mediastinum. It was about 3.5–4.0 cm from foreign body shadow to skin of the chest. Foreign body shadow was located suspiciously at the front of the right ventricle (Fig. 2). Color ultrasound done 3 days after injury showed a mass of enhanced echogenicity was seen near apex of the right ventricle, with obvious echogenic shadow behind the mass. The size of the mass was about 0.6 cm × 0.3 cm (Fig. 2).

The most plausible explanation for the intra-cardiac pellet was intra-vascular migration from the lower limbs vein to the heart via inferior vena cava. We treated the wounds conservatively to prevent infection and to relieve swelling after admission. Under observation for 10 days in hospital, the patient was asymptomatic. Then, repeated chest X-rays showed the two pellets in the right side of the heart consistently. An echocardiogram on day 10 confirmed normal ventricular and

valvular function with the pellets still in the right ventricle. The patient was asymptomatic throughout the admission and was discharged after 10 days. Out-patient review with X-rays at 4 weeks and 3 months after discharge showed the pellets remaining within the right ventricle.

Discussion

A bullet embolus should be looked for in any patient who has a gunshot wound without an exit wound. When the signs and symptoms do not correlate with those expected from the suspected course of the bullets and when radiological examination shows that bullets' location deviates from the path of penetration, bullet emboli might have accessed the vascular system by erosion into the vessel lumen [3]. Eighty percent was arterial in nature with only 20 % being venous, therefore emphasizing the rare nature of this case report [4]. Venous embolization was from the large peripheral veins, vena cava, or liver, to the right ventricle [5]. There was no entry wound in the chest at heart level in this case. Therefore, it could be ruled out that the bullet was shot directly into the heart. For bullets left in the limbs, bullet position relative to the peripheral vessels should be evaluated carefully to treat and avoid the bullets moving along with bloodstream [6].

Treatment of emboli in the heart is controversial. Documented complications of retained intra-vascular emboli included pleural effusion, pericardial effusion, pulmonary infarction, endocarditis, and cerebral infarction [2]. Clearly, embolization resulting in limb or cerebral ischaemia required removal promptly [2, 3]. However,

Fig. 2 **a** CT: It could be seen small patchy high-dense shadow in the anterior mediastinum. It was about 3.5–4.0 cm from foreign body shadow to the skin of the chest. **b** Color ultrasound 3 days after injury: A mass of

enhanced echo was seen near apex of the right ventricle, with obvious echo shadow behind the mass. The size of the mass was about 0.6 cm × 0.3 cm

asymptomatic emboli posed a problem. They could be left in situ if extrication was difficult technically, but removal should be attempted if there was a high risk of complications [3]. If the bullets migrated distally to other parts of the heart or blood vessels, surgery should be done immediately during the follow-up period. The patient should be told that they should not do “upside down” or “flip” which might cause heart foreign body migration. This case was symptomatic till 3 months after discharge, and since removal of the emboli in the heart was difficult technically, it was decided to treat this patient conservatively with regular follow-up.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interests.

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