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Original Research Article

Management of the Foreign Bodies in Chest Wall: Our Experience about 11 Cases.

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Abstract: The aim of this retrospective study is to summarize the management of foreign bodies in chest wall. In the past 2 years 11 patients were admitted because of foreign bodies in chest wall. They were diagnose by chest X-ray, computed tomography or ultrasonography. They all received surgical removal of foreign bodies. No complications developed postoperatively and the duration of hospital stay and recovery was short. The computed tomography and ultrasonography are alternative methods which provide safe and non-invasive diagnosis and localization for foreign bodies in chest wall. Surgical removal offers the best outcome in foreign bodies in chest wall.
Keywords: Foreign body, Surgery, Chest wall.

INTRODUCTION

Retained foreign bodies in the gastrointestinal tract, tracheobronchial tree, peritoneal cavity and other locations have been the subject of many reports and reviews[1-3]. In contrast, foreign bodies in chest wall have been rarely mentioned in this association, usually as case reports, and there is no consensus with regard to treatment. Sometimes, foreign bodies in chest wall may be challenging and difficult cases in emergency room and cardiothoracic surgery. The individualized treatment depends on the type of foreign body and its location. Timely diagnosis and surgical removal of foreign bodies may prevent the infection and migration [4].Management of foreign bodies is atypical and requires a radiographic or ultrasonographic series to locate the object in the chest wall. So, one of the most difficult decisions that a clinician makes is diagnosis and location for a foreign body. In this article, we will discuss diagnosis and surgical techniques for removing foreign bodies in the chest wall.

PATIENTS AND METHODS

Approval for this study was obtained from Guilin Medical Hospital Ethics Review Board, and individual consent was waived. Between June 2013 and December 2014, 11 patients with foreign bodies in chest wall we readmitted to our Institution. Their data were reviewed for patient demographics, preoperative diagnosis, kind of the foreign bodies, etiology, timing of the procedure (elective versus emergency), type of the guide and complications.

Children were treated with general anesthesia. In adult patients, the surgical field was anesthetized using 2% lidocaine with 1/100,000 epinephrine. The operation were under the guidance of ultrasound in six patients, and with a simple incision in 5 cases. Two cases were under the guidance of computed tomography (CT). Localization of foreign body was done in relation to skin depth and surrounding muscle and bone. Once localization was achieved, an incision was made directly over the fixed foreign body, or along the original wound, an incision n was made. Finally, by minimal blunt dissection, the foreign body was released from the surrounding tissue and removed from the chest wall. Wounds were repaired using vertical sutures. All patients received oral antibiotics for 3-5 days after the procedure. The patients also need a tetanus shot to prevent a potentially deadly infection of the nervous system.

RESULTS

All the causes are traumatic (traffic accidents and injury).Interval between injury and symptoms appearance to hospital ranged from 2 hours to 1 year.

All foreign bodies in chest wall were successfully removed in 11 cases. Fifteen foreign bodies successfully removed were approximately 5–35 mm in diameter, including five small pieces of glass, four stones, and five metal objects, one bamboo stick. The biggest object was a 35-mm bamboo stick, which was inserted into the back chest wall after injury. Chest plain radiographs were obtained from all patients before the operation. Three cases were negative even though foreign bodies were actually present in the chest wall. The clinical features of patients see the table 1.

There were no complications and no deaths related to the procedure. All patients are stable after surgery recovery. In cardiothoracic surgery, the two patients' hospitalization was 2, 4 days, respectively. The follow-up lasted from 1.5 year to 3 years in these patients. Of these, 10 patients were doing well at their latest follow-up, although one was later admitted to another hospital and did not show for follow-up.

Table 1. The Clinical Features of Foreign Bodies in Chest Wall

	Gender	Age	Foreign body	History	US or CT guide
Case 1	Female	21	Glass	Traffic Accident	US
Case 2	Male	17	Metal	Injury	CT
Case 3	Male	37	Stone	Injury	US
Case 4	Male	42	Stone	injury	None
Case 5	Male	20	Glass	Traffic Accident	US
Case 6	Male	5	Metal	Injury	CT
Case 7	Male	15	Wooden pieces	Injury	US
Case 8	Female	61	Stone	Injury	US
Case 9	Male	30	Bamboo	Traffic Accident	None
Case 10	Male	24	Metal	Injury	US
Case 11	Male	23	Stone	Traffic Accident	None

US: ultrasonography; CT: computed tomography

DISCUSSION

Foreign bodies are typically dealt with in the emergency room, cardiothoracic surgery and radiology department. Patients with skin and soft tissue wounds in chest wall commonly present to emergency room for evaluation and treatment. The vital in the assessment of these wounds is careful examination for retained foreign bodies, because they are often missed on the initial evaluation[5]**.**Foreign bodies in the chest wall have some case reports in the literature [6,7]. Foreign bodies in chest wall can cause infection and damage to surrounding tissues. Some authors have shown that a foreign body, such as needle and glass, can cause serious complications such as empyema, cardiac tamponade or aneurysm, even if a patient has remained asymptomatic for many years[8].

The symptom may vary depending on the location of the foreign body in chest wall. Identification of a foreign body in chest wall may be difficult, depending on the type and location of the injury and the timing and mechanism of injury. In some cases, the physician may be able to feel the object with his or her hands while gently press on the chest wall during the physical examination. Usually, imaging modalities include chest radiography, ultrasonography and CT. Some patients require sedation before their image examination, especially in children. The majority of foreign bodies, including metal and bone, can be seen on the plain chest radiograph. Chest plain radiographs are not sensitive for detection of non-radiopaque foreign body in soft tissue [9].Both glass and wood can be radiolucent and difficult to see on radiograph images. Glass accounts for up to 50% of missed foreign bodies using physical examination and radiographs, and chest plain radiographs could only find 7.4% sensitive at identifying wood foreign bodies [10].Some foreign bodies, such as glass or wood, are often missed on physical examination and conventional chest radiography. The increased use of ultrasonography in the emergency room presents an opportunity to better identify retained soft tissue foreign bodies in chest wall. Ultrasonography is highly specific and moderately sensitive in the identification of retained soft tissue foreign bodies. Ultrasonography would be especially useful in some cases: when a radiolucent foreign body is suspected; if a clinical suspicion for a foreign body remains high despite negative radiographs, high-risk cases such as infected foreign bodies when there is suspicion for organic foreign bodies (wood, bamboo) with a high risk of inflammation and infection. Some reports led to false-positives include granulomas, small foreign bodies potentially not seen at operation, calcifications, and soft tissue gas [11]. Although the resolution improves with the use of high-frequency linear transducers, the limited depth of penetration reduces the ability to detect for deeper soft tissue foreign bodies. In previously studies, US could locate soft tissue foreign bodies at less than 2 cm depth from the skin surface [12].Given its high specificity increased availability, lack of ionizing radiation and low cost, were commend considering using ultrasonography as

first-line imaging when a foreign body of unknown origin is suspected.

Not all foreign bodies are discovered during the patient's first visit. Several signs (empyema and swelling) reveal the presence of a retained foreign body in chest wall wound [13]. Evaluation and treatment will depend on the type of foreign body in chest wall and how it was introduced. The patients may need surgical intervention in cases of perforation or abscess formation. Duration of presentation or intervention may vary between hours to years. Previously studies showed that 38% of soft tissue foreign bodies were neglected in initial clinical examinations in emergency rooms, and 25% of all soft tissue foreign bodies are presented weeks, months, and even years after a penetrating injury [14].There are many indications for foreign bodies removal based on possible complications such as migration, infection, persistent local pain and psychological issues. Delayed treatment may lead to complications including infection, delayed wound healing, inflammation and loss of function [5].But there are some different opinions. Some authors believe that the incidence of late infection is low (2-3%) and vascular embolization rare and more common with fragments than bullets [15]. For example, the risk of embolization – "migrating bullet" – is more common in published clinical cases in the specialized surgical literature than it is in real life. One study reported a rate of 0.3% in 7,500 cases with arterial injuries; and rarer still in the overall wound population [16]. The decision is not always easy. Whether the removal should be planned or not will depend on many factors, especially the experience of the surgeon and the possible morbidity and lethality of the surgery itself compared to the relatively low incidence of serious complications. In some cases, it is potentially more harmful to remove the foreign body, such as when it is located near vital structures like nerves and blood vessels, so the procedure must be weighed against the risk posed by a particular foreign body.

There are a number of ways to remove foreign bodies in chest wall. In most cases, we choose to perform surgery using ultrasound guidance. Ultrasound provides real-time imaging, making it a good tool for guiding removal procedures [17].Ultrasonography is a reliable and accessible technique for the detection, localization, and guided removal of radiopaque and radiolucent foreign bodies, accurate assessment of foreign bodies depends on use of a high frequency transducer as well as an experienced operator who is familiar with the ultrasonographic appearance of foreign bodies and false positive sources of foreign bodies such as calcification, scar tissue, fresh hematomas, or air trapped in the soft tissues. In our institution, compact and portable ultrasound examination could be performed within minutes at the bedside to evaluate for foreign body in chest wall. CT has also been used to identify foreign bodies; however, CT provides only limited soft tissue contrast. Although CT has more sensitivity than chest plain X -ray, it is not as sensitive as ultrasonography or MRI [4]. Additionally, the cost, use of radiation and availability make the use of CT less than optimal in the clinical setting. Therefore, we used CT to locate foreign bodies in 2 cases.

We advocated that foreign bodies in the pleura should be removed whenever possible. This is particularly applicable to foreign bodies in the close proximity to heart, major vessels, or esophagus. Removal is necessary in cases of non-metallic foreign bodies, as well as in cases of large metallic objects or objects with sharp edges. Small, blunt and peripherally located foreign bodies may be left behind, if difficulty at extraction are anticipated [18].In most cases, the patients suspected of having a foreign body in chest wall undergo surgery under general anesthesia or local anesthesia. Depending on where the object is, the surgeon may need thoracotomy to remove it when it involved the pleura. Different approaches have been used for removal of foreign bodies like video assisted thoracoscopy and minithoracotomy [17]. Presence of big and sharp object in pleural cavity is an indication for its removal due to the possibility of repeated injury to lung and major vessels, leading to pneumothorax and bleeding. Video assisted thoracoscopic removal of foreign bodies is a safe and established procedure, although it needs an expensive equipment and expertise. Our cases were all not involve pleural cavity.

The chest plain radiographs and/or ultrasonography are necessary after surgical removal. Follow-up imaging may be necessary to ensure that no foreign bodies remain in the body and to check for the presence of any side effects such as infection.

CONCLUSIONS

Prompt removal of the foreign body will ensure that it does not migrate or suffer infection. While foreign body removal procedures are safe and effective, CT and ultrasonography are alternative methods which provide safe and less invasive diagnosis and localization for foreign bodies in chest wall. Surgical removal under the guidance of ultrasound offers the good outcome in most foreign body cases in chest wall.

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