Thoracoscopy revealed that the exostosis originated from the costochondral junction of the left fourth rib and protruded into the thoracic cavity. Exploratory thoracoscopy showed that the exostosis had scratched the adjacent pericardium and visceral pleura. A 5.5-cm long rib segment including the exostosis was excised. This report describes that the thoracoscopic findings of an asymptomatic costal exostosis originate from the costochondral junction, demonstrating that this condition may cause more extensive thoracic organ injury than expected.

**INTRODUCTION**

A costal exostosis is an unusual condition in which a benign growth protrudes from the bone, usually from the outer contour, and is characteristically capped by cartilage. It is generally asymptomatic, but intrathoracic complications have been reported. This report describes the thoracoscopic findings of an asymptomatic costal exostosis incidentally detected on chest radiography, and discusses the indications for surgical intervention.

**CASE REPORT**

A 21-year old male presented to a nearby hospital with chest discomfort. There was no history of trauma or illness. A chest X-ray revealed a 15-mm diameter nodule in the left mid-lung area, with no pneumothorax or pleural effusion. A chest computed tomography (CT) scan revealed an exostosis originating from the inner aspect of the anterior left fourth rib, with a long bony spicule projecting inwards towards the lung (Fig. 1). Radiological findings did not indicate osteoclastic or osteoblastic changes and, therefore, did not suggest a need for histological examination. However, because the costal exostosis had a sharp point and protruded into the thoracic cavity, we performed an exploratory examination to prevent lethal visceral injury as described in other reports [1–3]. Exploratory video-assisted left thoracoscopy in the right lateral decubitus position was performed via the sixth intercostal space in the left anterior axillary line under general anaesthesia, with unilateral ventilation. The adjacent pericardium and visceral pleura were thickened, possibly caused by scratch (Supplementary Video 1). A 5.5-cm segment of the left fourth rib including the exostosis was resected through an additional 4-cm long mini-thoracotomy incision, to prevent organ injury and recurrent exostosis. The chest wall defect was not repaired.

**DISCUSSION**

Exostosis is classified as solitary or multiple. Multiple cartilaginous exostoses are a hereditary disorder that occurs in infants and children. Solitary exostosis may occur in infants, and occasionally in adults. Solitary exostosis most commonly occurs at the lower metaphysis of the femur or the upper metaphysis of the tibia [1]. Costal exostosis may originate from a rib in the region of the costochondral junction, or near the vertebral end. Costal exostosis is commonly asymptomatic, but may present as a swelling of the chest wall or cause pain. A few cases of hemothorax complicating a costal exostosis have been reported, due to injury of the pleura, diaphragm, heart and possibly lung [4].

Costal exostosis may be difficult to recognize on the chest X-ray. The chest CT scan is usually useful for diagnosis. Treatment is not usually proposed in asymptomatic patients, but surgical removal of the exostosis should be recommended in selected patients, such as the patient described in this report, in whom a potential risk of lethal thoracic organ injury was identified by thoracoscopy. In our patient, the sharp tip scratched the...
pericardium during cardiac pulsations and the left lung during respiratory movements. Costal exostoses in the region of the costochondral junction carry a potential risk of more extensive organ injury than expected if marked respiratory movements, such as when coughing, synchronize with the cardiac pulsations. Previous reports of visceral injuries caused by exostoses showed longitudinal lacerations of the pericardium or diaphragm located caudal to the exostosis [1–3]. These findings suggest that exostoses cause injuries associated with both lateral movements due to cardiac pulsations and longitudinal movements by the diaphragm during respiration. Exostosis originating from the dorsal chest wall near the vertebral body can be managed conservatively.

If the aim of surgical intervention is simply to prevent lethal visceral injury, thoracoscopic resection of the tip of the exostosis, without an additional skin incision, may be optimal. However, if the aim is to prevent recurrence of the exostosis and reduce the risk of malignancy, extensive rib resection adjacent to the exostosis is required. The risk of malignant transformation of a costal exostosis is 1–2% [5].

In conclusion, thoracoscopic findings of an asymptomatic costal exostosis suggested that it was causing more extensive thoracic organ injury than expected. While the tip was sharp and protruded into the thoracic cavity, surgical resection was recommended.

SUPPLEMENTARY MATERIAL

Supplementary material is available at ICVTS online.

Conflict of interest: none declared.

REFERENCES