Total Rib Resection Via Uniportal Thoracoscopic Approach

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In this report, we present a case specifying the availability of uniportal thoracoscopic resection of a total rib safely without the need for conventional thoracotomy. The favorable outcome of this case suggests that the uniportal thoracoscopic technique described here is a safe and successful approach for resection of costal lesions with good cosmetic results. To our knowledge, this is the first case reporting the entire rib resection via uniportal thoracoscopic approach.

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Fibrous dysplasia is a rare chronic sporadic disease accounting for 0.8% of primary bone tumors. It is characterized by proliferation of immature bone structure that results from replacement by fibrous tissue [1]. It is the most frequently detected benign lesion of the rib. The disease can in some cases be located only in a single bone, although the majority of cases have multiple osteal origins [2].

Different surgical techniques have been described, but the main objective is en bloc excision of the lesions with clear margins. Open resection of the segment including the lesion is the most preferred conventional technique in terms of surgical treatment of the disease. It is widely known that the conventional approach consists of a skin incision larger than the rib area to be resected and leaves a relatively large and aesthetically unfavorable scar. In addition to disadvantageous aesthetic results, the open technique can lead to increased postoperative pain and prolonged hospital stay. Despite the widespread popularity and common use of videothoracoscopy in almost all types of surgical approaches ranging from complex anatomical lung resections to pleural biopsies, the use of video-assisted thoracoscopic surgery (VATS) in chest wall and rib resection is rarely reported in the literature. Recently, the VATS technique ha sshifted towards a uniportal approach. The use of uniportal VATS is also extremely limited in costal and chest wall resections.

In this report, we present a case specifying the availability of uniportal thoracoscopic resection of a total rib safely without the need of conventional thoracotomy. The favorable outcome of this case suggests that the uniportal thoracoscopic technique described here is a safe and successful approach for resection of costal lesions with good cosmetic results. To our knowledge, this is the first case reporting the entire rib resection via uniportal VATS.

A 66-year-old man was admitted to our outpatient clinic with complaints of chest pain lasting for more than 6 months. On physical examination, there was a palpable lesion on the anterior axillary line of the sixth rib, also visible on inspection. Chest roentgenogram and computed tomography of the thorax revealed an expansile mass of 4.5 cm in diameter that occupied almost the entire length of the sixth rib (Fig 1). Bone scintigraphy showed a 4.5-cm diameter expansile lesion presenting an osteoblastic hyperactivity extending throughout the entire rib. We could not detect any abnormalities in the patient's biochemistry and blood count. Pulmonary function tests showed results within the normal limits, confirming that there was no respiratory pathology.

The patient was offered to undergo a total rib resection via uniportal VATS for both diagnostic and curative objectives simultaneously.

The patient was placed in the right lateral decubitus position under general anesthesia and double lumen intubation was performed to achieve unilateral ventilation. A single 3.5-cm incision was placed 3 cm lateral to the sternal line on the sixth rib for maintaining proper exposure. A 10-mm 30-degree thoracoscope (Karl Storz endoscope; Karl Storz, Tuttlingen, Germany) was placed in the anterior side of the incision and working instruments in the posterior side. Both the operator and assistant stood on the anterior side of patient. First, we designated the lesion site, and then periosteal tissues were disected in the anterior part of the rib (Fig 2A). The intercostal vessels were coagulated and cut with an electrocautery. The anterior end of the rib was then resected using an endoscopic rib cutter. The upper and lower borders of the rib, where the lesion was located, were transected with a harmonic scalpel (Ethicon Endo-Surgery, Cincinnati, OH) (Fig 2B). The posterior end of the rib was resected similarly to the anterior site in order to maintain a clear surgical margin (Fig 2C). The segment involving the lesion was excised on each side by preserving margin safety bilaterally. After completing the resection, the specimen was removed from the thoracic cavity through the access incision (Fig 2D). The intercostal space that occured after the resection was closed by approaching the upper and lower ribs with No. 2 polyglactin absorbable sutures. One 28-French chest tube was inserted via the incision site and then the incision was closed (Fig 3).

The duration of the operation was 75 min (Video). The patient was extubated in the operating room.

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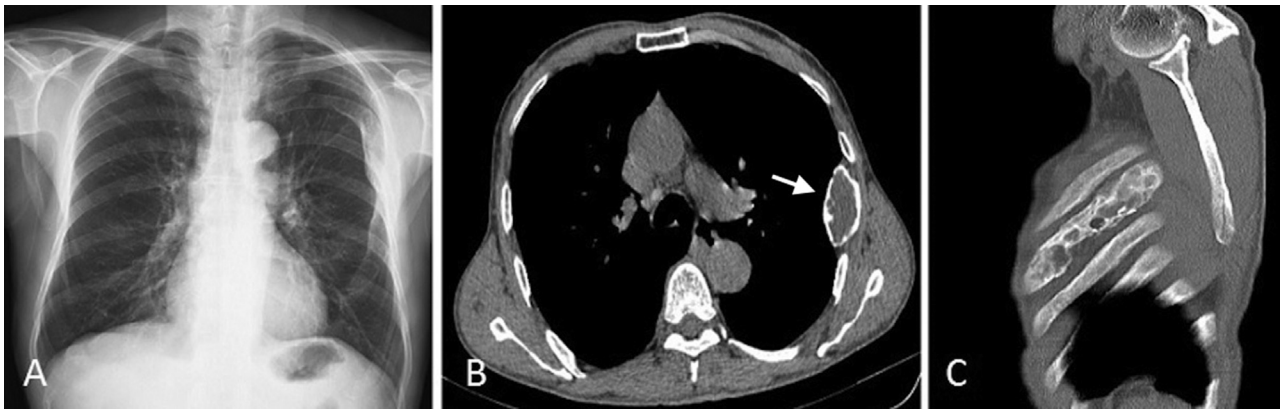

Fig 1. Preoperative radiographic images of the lesion. (A) Chest radiograph shows an expansile mass of 4.5 cm in diameter. (B) Axial computed tomography image shows an expansile lytic lesion (arrow). (C) Sagittal computed tomography image demonstrates an expansile mass that occupies almost the entire length of the sixth rib.

Postoperative analgesia was planned as tramadol hydrochloride infusion (300 mg daily) using the patient-controlled analgesia device. The pain of the patient was assessed with a visual analogue scale (VAS), and the patient described it as 3 (on a 0–10 scale, where 0 = no pain and 10 = unbearable pain) at postoperative hour 24. The thoracic drain was removed on the second postoperative day and the patient was discharged on the same day. Histopathologic evaluation revealed that the lesion was fibrous dysplasia.

Comment

Fibrous dysplasias are benign tumors of which more than 50% are located on the ribs. Even though the majority of the tumors are benign, malignant transformation has been reported in 0.4% to 4% of tumors [3, 4]. Like all the other benign neoplasms, the main principle for surgical approach consists of wide resection of the involved ribs with clear margins. The majority of patients with fibrous dysplasia do not have any symptoms and are diagnosed incidentally. Symptomatic patients present with pain due to an obvious deformity or possible pathologic fracture [4].

Minimally invasive approaches generally soften the surgical trauma by reducing the severity of the inflammatory response. VATS allows resection of ribs via a smaller incision without separating the ribs and damaging muscle tissue. This leads to a reduction in the intensity and the duration of postoperative pain, allowing patients to return to full recovery more quickly [5, 6]. In addition, VATS is an advantageous method over traditional surgical techniques through a faster postoperative recovery period and shorter length of hospital stay [5]. As in previous studies, our patient reported a VAS score of 3. Our patient had a better cosmetic result and was discharged on postoperative day 2.

Despite the expanding indications and advantages for VATS in thoracic surgery, the reports presenting the

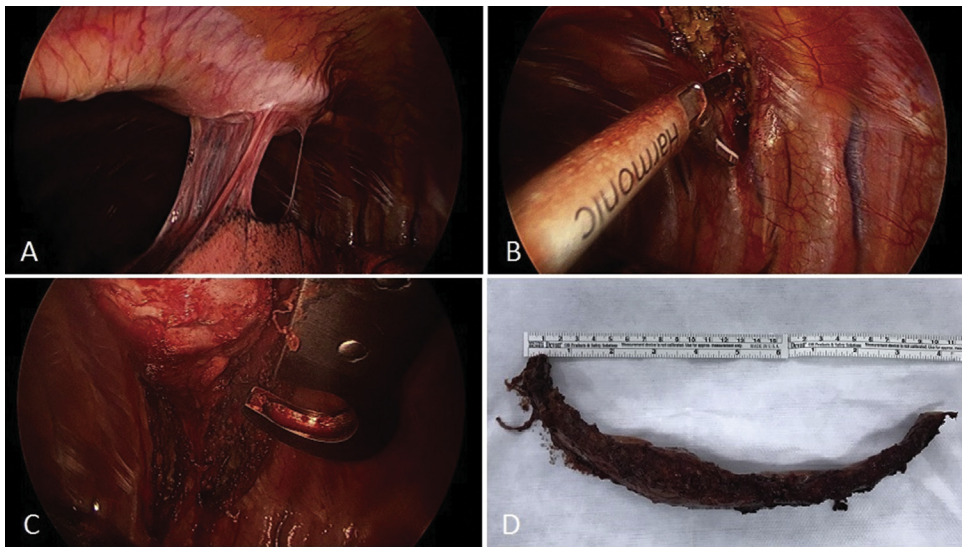

Fig 2. (A) Perioperative picture of the lesion. (B) Dissection of the surrounding tissue by harmonic scalpel. (C) An endoscopic rib cutter was used for cutting the anterior and posterior edges. (D) The removed specimen.

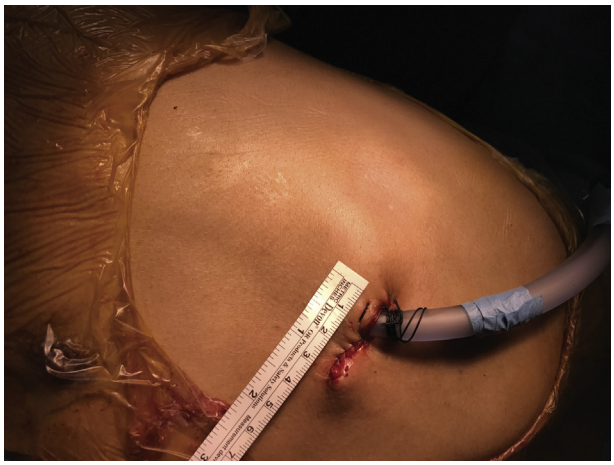

Fig 3. Postoperative image of the 3-cm uniportal VATS incision.

availability of minimally invasive techniques are limited [7, 8]. These reports show satisfactory postoperative results with minimally invasive approaches, as in our case. None of these studies, however, have mentioned the total removal of the rib via uniportal VATS.

This technique can be performed safely in isolated benign lesions or tumors of the ribs. We believe that such a procedure reduces the pain, scarring, and duration of hospital stay associated with an open procedure. To our knowledge, this is the first case indicating the resection of the entire rib by uniportal thoracoscopic surgery.

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