



Case Report

Chondrosarcoma of Manubrium: Innovative Chest Wall Reconstruction


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A 42-year-old male presented a protruding mass in manubrium with progressive growing for 4 months. Physical examination revealed a firm, non-movable, well-defined 5 cm mass in sternum. Computed tomography and magnetic resonance showed a manubrial mass (45 mm × 39 mm × 34 mm) with cortical breach and adjacent soft tissue calcification. Bone scintigraphy revealed an increased focal uptake in an osteoblastic mass in manubrium. These radiological findings suggested a chondrosarcoma. An incisional biopsy established a diagnosis of low grade chondrosarcoma.

Anterior bloc-resection of the chest wall with 2 cm surgical margins was performed through a midline T-shaped skin incision. The manubrium, 1–3° costal cartilages of the right and left sides, and sternoclavicular joints bilaterally were removed. The affected area of the right pectoralis major muscle and the biopsy scar were also resected. A sternal titanium plate and pre-curved sternal staples (Trionyx System[®]) was used to reconstruction the chest wall and 3 wedge anchors (Stryker[®]) attached both clavicles to a multi-perforated sternal implant (Fig. 1A). The defect resulted was covered with left pectoralis major muscle flap. The histological examination of specimen confirmed the diagnosis of a grade 2 chondrosarcoma with microscopically tumor-free surgical margins (R0) (Fig. 1B). The patient was discharged without complication on postoperative day 5 (Fig. 1C) and the upper extremities mobility was conserved (Fig. 1D). He is running and doing weight training since the first postoperative month. Eight months after surgery, the patient keeps up a stable fixation of the sternoclavicular joint, and there is no evidence of local tumor recurrence.

Primary neoplasms of the sternum are very rare, less than 1% of primary bone tumors.¹ Most are malignant neoplasms, and chondrosarcoma is the most common,² as in our case. The 5-year survival rate of chondrosarcoma is 64–92%.^{2–4} They are resistant to chemotherapy and radiotherapy. Radical resection with surgical margins R0 is the gold standard for treatment.² A high-grade tumor, size >10 cm and incomplete resection (R1) are negative predictors. In our case, the tumor was a grade 2 of chondrosarcoma, the size was <5 cm and complete surgical resection was performed (R0). If manubrium is affected by a neoplasm, sternoclavicular joint will also be involved. These cases represent a challenging procedure to preserve respiratory function and to keep the sternoclavicular articulation function. There are different techniques and materials for chest wall reconstruction: non-rigid materials, rigid materials, autologous tissue or allografts. In our case, the reconstruction of the rigid wall of the chest is performed using a sternal plate plus rib attachments and a wedge anchor for both sternoclavicular joints. The ideal prosthesis by sternoclavicular articulation is no universally accepted. Our device is inserted in clavicle head like a screw and it is affixed at a sternal implant by non-absorbable suture. The advantages of our technique are as follows: reduction operative time, high versatility, easy to model in situ, perfect adaptability (different sizes) and multi-perforated sternal plate for clavicle attachment point or muscle reinsertion. This reconstruction procedure is a safe and cost-effective method with good orthopedic and oncological outcomes. We report our results with this thoracic implant and a new sternoclavicular fixation system.

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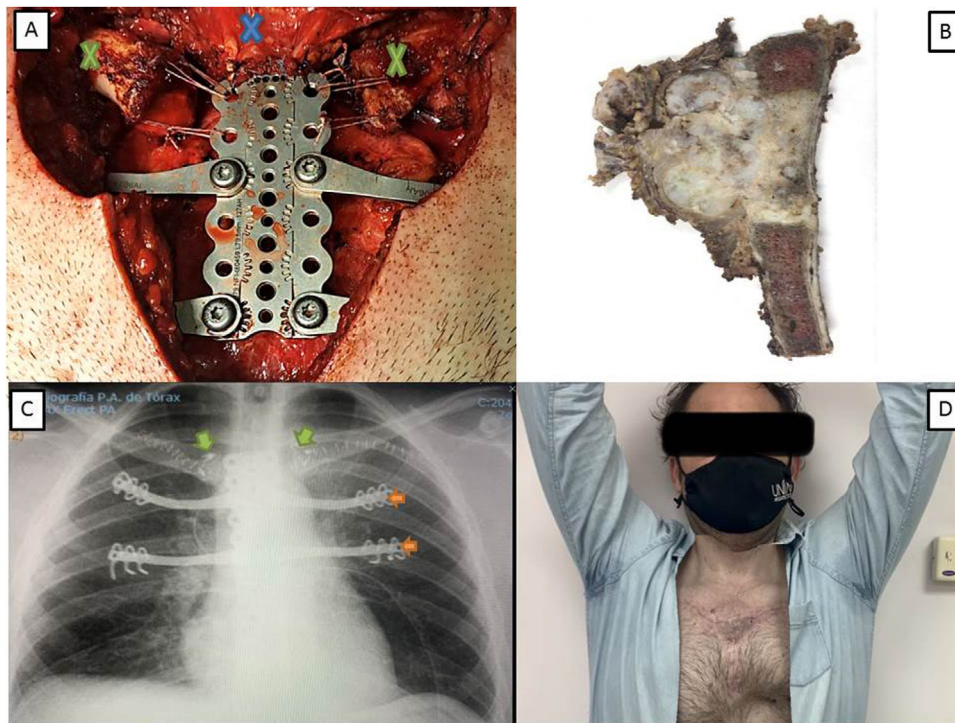


Fig. 1. (A) Sternal reconstruction with Trionyx Rib Fixation System® and sternoclavicular joint fixation with wedge anchor (Stryker®) (green cross: clavicles; blue cross: sternocleidomastoid muscle attached to titanium sternal plate). (B) Gross specimen of the manubrium shows tumor growth. (C) The post-operative chest X-ray shows the costal arches fixations (orange arrows) and the 3 wedge anchors in both clavicles (green arrows). (D) Outcomes at the first postoperative month: position with arms in abduction without functional limitation.

Conflict of Interests

The authors state that they have no conflict of interests.

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