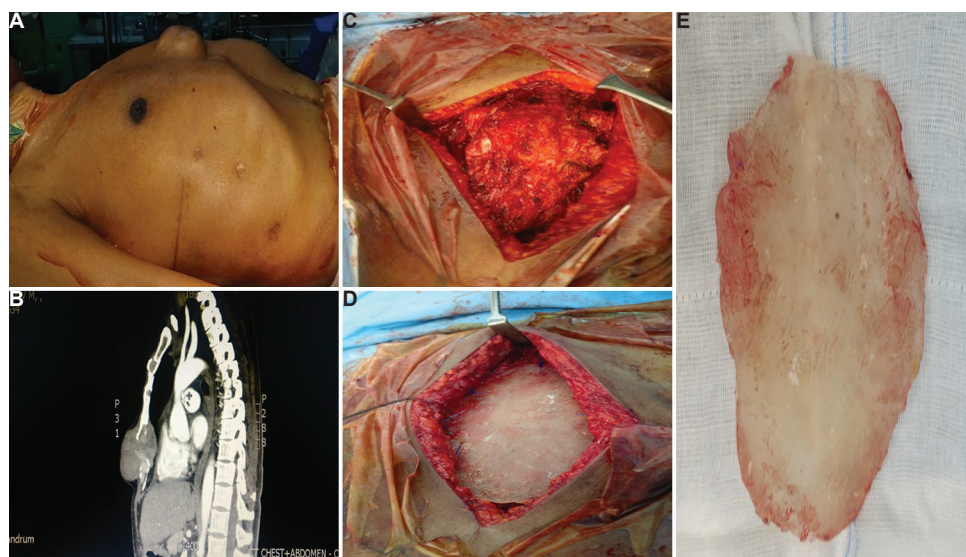




## An innovative technique of sternum reconstruction using handmade polymethyl methacrylate model in the treatment of cancers



**Figure.** (A) The patient with sternal chondrosarcoma presented with large swelling in front of chest (red arrow). (B) Preoperative computed tomographic angiogram showing globular tumour at lower end of sternum (yellow arrow). (C) Intraoperative photograph showing sternum detached all around from the chest wall at costochondral junction. (D) Intraoperative photograph showing artificial sternum attached to the chest wall by sutures. (E) Polymethyl methacrylate handmade model made into shape of sternum before implanting to the patient.

A 60 yr old male<sup>†</sup> presented to the department of Vascular Surgery, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Kerala, India, with chondrosarcoma of sternum in February 2018. The handmade polymethyl methacrylate (PMMA) artificial bone was developed in the same department during the period of 2018-2019 for replacement of sternum (a long flat bone located in the central part of the chest wall) after its removal during his cancer surgery (Figure).

The model was handmade using the resected bone which was pressed on a white paper and an outline

drawn. PMMA powder was made into a paste and poured over the cut paper and allowed to set in like a cement. This artificial bone was transferred to the central chest wall in place of the sternum and the ribs were attached to it (Figure A-E), thus completing the procedure.

This handmade technique is first of its kind in India used for treating chondrosarcoma, a rare tumour of sternum, by replacing the patient's own bone with this PMMA model. The PMMA material is routinely used in cranioplasty surgeries, having

<sup>†</sup>Patient's consent obtained to publish clinical information and images.

a good biocompatibility, less expensive and easily mouldable. This technique does not require any three-dimensional printing or other sophisticated instruments. Considering the simplicity of the procedure, this can be used in other centres for treating patients with sternal malignancies in a cost-effective manner.

**Conflicts of Interest:** None.

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