Abstract

Pectus carinatum may rarely be associated with kyphosis. However, the correlation between both conditions is not well reported. Therefore, there are no reports for combined correction of both deformities in the same patient. Moreover, studies estimating the kyphosis prevalence in patients with pectus carinatum are lacking. To our knowledge, this is the first paper to present such a case. We report an 18-year-old boy with both pectus carinatum and kyphosis that were surgically corrected in a combined procedure. The indication of surgery is cosmetic, and the postoperative recovery included pneumothorax but was otherwise uneventful and satisfactory.

Keywords: Combined pectus with scoliosis • Abramson’s procedure • Minimally invasive correction of pectus
Two incisions on the anterior axillary line at the sixth intercostal space were made bilaterally. Two ribs were shaved and surrounded by metal wires. The bar stabilizer was fixed to the wires on both sides. Afterwards, the guide was introduced under the skin, followed by the measured bar fixed to the stabilizer using metal wires and screws. The operation continued for 3 h with a total blood loss of 1100 cc during the surgery.

After the operation, the patient was transferred to intensive care unit for close monitoring with a pain score of 8. The next day, he developed a small left side pneumothorax, which was drained; the chest tube was removed on the third day and the pain score was 3. The patient stayed for 5 days before discharge.

The postoperative radiograph showed satisfactory correction of the deformity with the new Cobb’s angle measuring 45°. Moreover, the modified Nuss bar is planned to be removed within 3 years.

On follow-up, the results were satisfactory (Fig. 2).

**DISCUSSION**

PC is a protrusion abnormality of the anterior chest wall due to overgrowth of the costal cartilages.

The pathophysiology of PC is controversial; however, the most accepted theory is the defective growth of costal cartilage. This deformity is usually asymptomatic but can present with exertional dyspnoea, decreased endurance and increased respiratory tract infections.

It may present as an isolated anomaly or associated with another skeletal anomaly, other syndromes or congenital heart diseases [1].

The first-line therapy of PC is non-surgical correction with bracing. Other surgical options are performed for cosmetic reasons or for treating cardiopulmonary complications and preventing progressive postural deformities.

Surgical intervention was done traditionally by the Ravitch technique. Currently, minimal access repair of pectus carinatum is the favoured surgical option; specifically, the Abramson technique [2].

Scheuermann (juvenile) kyphosis is a progressive structural deformity of the thoracic spine that occurs in early adolescence and continues to progress with growth. It is defined by anterior wedging of at least 5° of 3 or more adjacent thoracic vertebral bodies. It is more common in males, leading to back pain [3].

Correcting severe cases usually requires bracing and possibly surgery. Typically, orthopaedic surgeons delay surgery until the child reaches his full height and the surgery is often recommended when the curve is >70° [3].

The adopted surgical approaches include anterior, posterior or combined approaches. Compared to the combined approach, the posterior-only approach reduces blood loss and avoids the risk of thoracotomy. However, it has higher rates of pseudoarthrosis [4].
The surgical correction of PC via Abramson procedure and for kyphosis via posterior approach, separately, has excellent long-term outcomes and one-stage procedure means less surgery and less pain.

The combined correction of PC and kyphosis in this report had shown satisfying results with almost complete correction of deformities without significant complications.

**CONCLUSION**

PC and kyphosis are uncommon anomalies, presenting in combination is an extremely rare occasion; for which combined correction was not reported earlier in the literature. In this report, a child with both deformities had undergone a successful combined surgical correction of PC using the Abramson procedure and kyphosis using Ponte osteotomy. Results were pleasant with an uneventful postoperative course.

**Conflict of interest:** none declared.

**Reviewer information**

Interactive CardioVascular and Thoracic Surgery thanks Toru Bando, Madhuri Rao and the other anonymous reviewers for their contribution to the peer review process of this article.

**REFERENCES**

[1] McHam B, Winkler L. Pectus carinatum. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing, 2021. https://www.ncbi.nlm.nih.gov/books/NBK541121/

[2] Muntean A, Stoica I, Saxena A. Pigeon chest: comparative analysis of surgical techniques in MARPC. World J Pediatr 2018;14:18–25.

[3] Yaman O, Dalbayrak S. Kyphosis and review of the literature. Turk Neurosurg 2014;24:455–65.

[4] Padilla A, Nájera J, Alvarez S, Villazón F. Surgical treatment of Scheuermann's disease by the posterior approach. Coluna/Columna 2015;14:14–17.