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A Case of Sternal Cleft

Sternal Kleft Olgusu

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Abstract

Sternal cleft is a rare natal abnormality resulting from complete or partial failure of the sternal bars to fuse. It may occur with abdominal and/or thoracic malformations. Clinical features may vary depending on the associated disorders. Early repair may yield better results. Herein, we present a three-month-old girl with sternal cleft operated.

Key words: *Sternum, cleft, abnormality.*

Özet

Sternal kleft sternal çubukların tamamen veya kısmi birleşme yetersizliğinden oluşan nadir doğumsal bir anomalidir. Abdominal ve/veya torasik malformasyonlarla beraber olabilir. Klinik özellikler eşlik eden bozukluklara bağlıdır. Erken onarım daha iyi sonuçlar verir. Cerrahi tedavi uyguladığımız sternal kleftli üç aylık kız çocuğu olgusunu sunuyoruz.

Anahtar Sözcükler: *Sternum, kleft, anomali.*

Sternal cleft (SC) is a rare congenital abnormality which occurs partial or complete failed fusion of the sternal bars and is also known as bifid sternum. It is caused by the dysjunction of the sternal bands, which normally develops during the first trimester (1). Females are much more affected. A normally positioned intrathoracic heart, normal diaphragm, and normal skin coverage can be present, despite the sternal SC. It is also associated with defects of abdominal wall, diaphragm, pericardium, cervicofacial hemangiomas and heart. The deformity dramatically becomes prominent with expiration, coughing, crying or Valsalva's maneuver (2). It almost invariably involves the upper sternum in most cases. Its shape varies from a narrow "U" to a broad "V". Heart pulsation and lung expansion are usually visible at the upper edge of the defect. Classification of the anomaly is based on some of the particular features. The correction of different varieties may require different surgical techniques. Clinical symptoms of sternal clefts include cyanosis, dyspnea, and arrhythmia, respiratory and other circulatory difficulties. Prenatal diagnosis is feasible by ultrasonography.

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CASE

A three-month-old girl was admitted with central depression over the chest wall during the respiratory movements. The beating heart was since the birth. The two hemithoraces were approaching during the inspiration and separating during the expiration. This condition was prominent when crying. U-shaped margins of the sternum from the middle to lower part were found to be palpable. Chest x-ray showed superior mediastinal widening with an increased distance between clavicles (Figure 1), echocardiography and abdominal ultrasonography were normal. The parents did not approve computerized tomography before operation. The physical examination of the abdomen and chest did not show any other thoracic or abdominal malformation, but only a subtotal sternal cleft. At the age of one year, the pericardium was initially dissected from the sternal bands and a vertical wedge osteotomy was performed at the bridge between the sternal bands. This made the closure easy. The dissection was on the sternal cartilages. The periosteum of each sternal bar was incised on its lateral border. The two separated parts of the sternum were approximated gradually by absorbable sutures over the underlying mediastinal structures. This position was maintained for five minutes to secure any hemodynamic compromise. Sutures were tied and the wedge osteotomy part was sutured at the top. The muscular flaps were approximated to cover the defect. Paradoxical movements disappeared (Figure 2). The patient remained stable and recovery was uneventful. She was discharged after five days. The patient had an uncomplicated course and her sternal appearance was normal at the six-month follow-up visit.

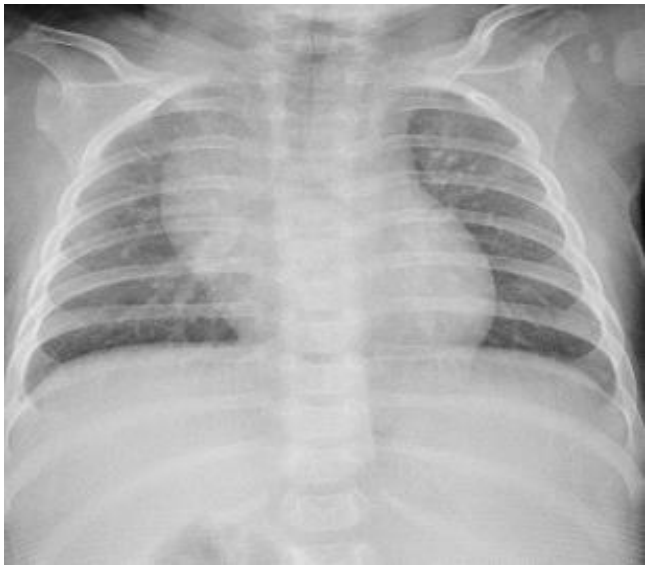

Figure 1: *Chest x-ray showing superior mediastinal widening with an increased distance between clavicles*

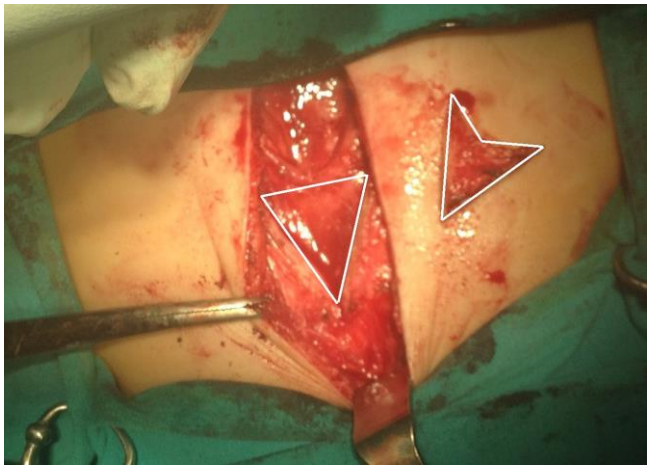

Figure 2: *Approximated sternal parts and the wedge osteotomy part*

DISCUSSION

Sternal cleft may occur alone or with abdominal and thoracic defects. Its etiology is unknown, although many etiological factors have been proposed (1-4). The formation of sternum occurs from two mesenchymal bars and in the first trimester of gestation. Sternal cleft may be partial or total, according to the failure of the development process. The diagnosis of sternal cleft is easily done at birth by inspection and palpation (5,6). There are four main types of sternal clefts: superior SC, the most common type, involving the manubrium and the upper sternum, subtotal SC, involving the manubrium and most of the sternum, leaving only a narrow bridge at the xiphoid, total SC, the sternal halves are completely separated, the least common type. Inferior SC usually occurs in the Cantrell pentalogy. It also involves abdominal, diaphragmatic and cardiac defects (7).

The main reasons to correct SC are to protect mediastinal structures for trauma, to prevent probable infections of the underlying structures, to halt paradoxical respiratory movements of the chest, to improve the venous return, and to repair umbilical hernia and rectus muscle diastases simultaneously. Surgical planning depends on the age, the type of the defect and any associated anomalies (8). Operative correction is preferable during the neonatal period, as the flexibility of the chest is maximal and compression of the underlying structures is minimal. Surgery within the first months of life is simple, as the chest wall is most compliant. For the late diagnosed patients, chondrotomies are required at older ages and prosthetic material in the adulthood to increase the chest wall dimensions and flexibility (7,9). Simultaneous repair of cardiac and aortic malformations is also feasible (4,10).

In conclusion, sternal cleft should be treated after the definite diagnosis is established. Surgical repair of SC

improves respiratory movements, protects the mediastinal structures from direct probable injuries and allow an improved quality of life, even the operative indication is cosmetic. Delaying the operation may yield less satisfactory results.

CONFLICTS OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Concept - A.Ş., M.O., A.E., F.M.; Planning and Design - A.Ş., M.O., A.E., F.M.; Supervision - A.Ş., M.O., A.E., F.M.; Funding -; Materials -; Data Collection and/or Processing -; Analysis and/or Interpretation -; Literature Review -; Writing -; Critical Review -.

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REFERENCES

1. Eijgelaar A, Bijtel J H. Congenital cleft sternum. Thorax 1970; 25:490-8. [CrossRef]
2. Fokin AA. Cleft sternum and sternal foramen. Chest Surg Clin North Am 2000; 10:261-76.
3. Günay E, Simşek Z, Güneren G, Celikyay F. A rare case of isolated complete congenital sternal cleft. Anadolu Kardiyol Derg 2010; 10:E30. [CrossRef]
4. Mazzie JP, Lepore J, Price AP, Driscoll W, Bohrer S, Perlmutter S, et al. Superior sternal cleft associated with PHACES syndrome: postnatal sonographic findings. J Ultras Med 2003; 22:315-9.
5. de Campos JR, Filomeno LT, Fernandez A, Ruiz RL, Minamoto H, Werebe Ede C, et al. Repair of congenital sternal cleft in infants and adolescents. Ann Thorac Surg 1998; 66:1151-4. [CrossRef]
6. Yavuzer S, Kara M. Primary repair of a sternal cleft in an infant with autogenous tissues. Interact Cardiovasc Thorac Surg 2003; 2:541–3. [CrossRef]
7. Zamfir C, Zamfirescu A, Tanase C, Bascat I. Sternal cleft-A rare congenital malformation. J Ped Surg Case Reports 2014; 2:97-100. [CrossRef]
8. Acastello E, Majluf R, Garrido P, Barbosa LM, Peredo A: Sternal cleft: a surgical opportunity. J Pediatr Surg 2003; 38:178-83. [CrossRef]
9. Sarper A, Oz N, Arslan G, Demircan A. Complete congenital sternal cleft associated with pectus excavatum. Tex Heart Inst J 2002; 29:206-9.
10. Saha AK, Sardar SK, Sur A. Congenital sternal cleft along with persistent left-sided superior vena cava: a rare presentation. Case Rep Pediatr 2013; 2013:192478. [CrossRef]