

THE REPAIR OF PECTUS EXCAVATUM WITH "TURNOVER" TECHNIQUE

Levent ELBEYLİ*, Hayri ERKOL**, Necdet AYBASTI***, Nursan TAHTACI****

Anahtar Terimler: Pektus ekskavatum, "sternal turnover"

Key Words: Pectus excavatum, Sternal turnover

SUMMARY

From 1991 to May 1992 we corrected 6 male patients of pectus excavatum at Diyarbakır Military Hospital and Gaziantep University Hospital. Patients' ages ranged from 14 to 20 years. The youngest patient was Marfan syndrome. He had a lens dislocation in his left eye. The remaining five patients were only pectus excavatum. Musculoskeletal abnormalities and cardiac diseases were not identified. Surgical correction was performed using a uniform technique for bilateral subperichondrial resection of the deformed costal cartilages and transverse sternotomy. Sternal graft rotated 180 degrees and connected to the manubrium with wire and silk sutures. We also preserved upper intercostal bundles and bilateral internal mammary arteries. All repairs were completed with a low complication (Pneumothorax, 1; seroma, 1). Short-term results were satisfactory.

ÖZET

Pektus Ekskavatumun "Sternal Turnover" Tekniği ile Düzeltilmesi

1991 ile Mayıs 1992 arasında Diyarbakır Asker hastanesi ve Gaziantep Tıp Fakültesi Hastanesinde Pectus excavatumlu 6 hasta ameliyat edildi. Hastaların yaşı 14 ile 20 arasında değişmekteydi. En genç hastamız Marfan Sendromu idi. Sol gözünde lens dislokasyonu mevcuttu. Diğer 5 hasta pur pectus excavatum olarak değerlendirildi. İskelet ve konjenital kardiyak patoloji saptanmadı. Tüm hastalara aynı cerrahi girişim olarak, deforme kıkırdak kostaların subperikondrial rezeksiyonu ve transvers sternotomi uygulandı. Sternal greft 180 derece çevrilerek manubrium sterniye tel ve ipek sütürlerle tespit edildi. İnterkostal yapıları ve internal mammaryal arterleri koruduk. Komplikasyon oldukça düşüktü (Pnömotoraks,1; seroma,1). Erken dönem takip sonuçları tatminkar olarak değerlendirildi.

INTRODUCTION

Pectus Excavatum (funnel chest), known since Hipocrat's time, characterized

* Gaziantep University Faculty of Medicine Thoracic Surgery Assistant Professor.

** Gaziantep University Faculty of Medicine General Surgery Assistant Professor.

*** Gaziantep University Faculty of Medicine General Surgery Associated Professor.

**** Gaziantep University Faculty of Medicine Anesthesiology Assistant Professor.

with sternum and depression of low costal cartilages is the most common front chest deformity(1). Until the 20 th century no attempt had been made to repair it, but after identification of physiological and psychological effects, surgical repair methods started being tested. External traction became the first repair method, but today its remains as a special interest. The indication of the repair of pectus excavatum on children and adults are controversial. Some author see the repair of pectus excavatum as a cosmetic prosedure, some other clinicians proved that defoꝛmity restricted cardiorespiratory functions and improvements were experienced on restrictions(2). The technique, three major methods are applied in the process of repair of pectus excavatum. 1-Repair without using special support and fixation. 2-The use of external support. 3-The use of internal support and fixation(3).

Having used no support, we applied the method in which in sternum was overturned with transverse incision to our patients.

MATERIALS AND METHODS

Between 1991 and 1992 six patients with pectus excavatum were operated at Diyarbakır Military Hospital and the Hospital of Gaziantep University. The oldest patient was 20 and the youngest was 14. All of them were male. A fourteen year old patient defined as Marfan syndrome was identified to have lens dislocatin. No additional cardiovascular pathology was detected. The remaining 5 patients were defined as only pectus excavatum (figure 1,2).One patient had a story of hereditary defoꝛmity. Atrial tachycardia was identifed in the 14 years old patient. Three patients appeared to have clockwise rotation in ECG. In six patients, vital capacity and FEVI(foꝛced exprium volum in 1 th second) were determined to be little less than expected. In the early period after the operation, no significant increase was observed. In patients midsternal incision was used. Pectoral muscles were separated from sternum and costal cartilages in both sides with electrocoagulator. Both sides of 3 rd, 4th, 5th, 6th and 7th costal cartilages were taken out after they were sapareted. The xiphoid divided from the sternum. Sternum was separated at its back part. Then, it was cut below the 2nd costa. Turnover Sternum was fixed with wire and silk sutures. Intercostal structures and internal mammarial arteries were preserved. A hemovac drain was placed in retrosternal area. It is removed when the drainage is 15 ml for an eight-hour shift(fig.3,4).



Figure 1: Lateral view shows deformity (Preoperative)

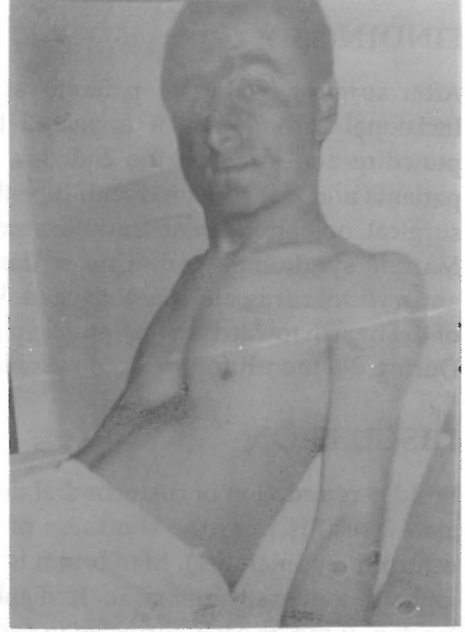


Figure 2: Before operation; figure shows Pectus excavatum.



Figure 3: Same case as in figure 1. (postoperative)

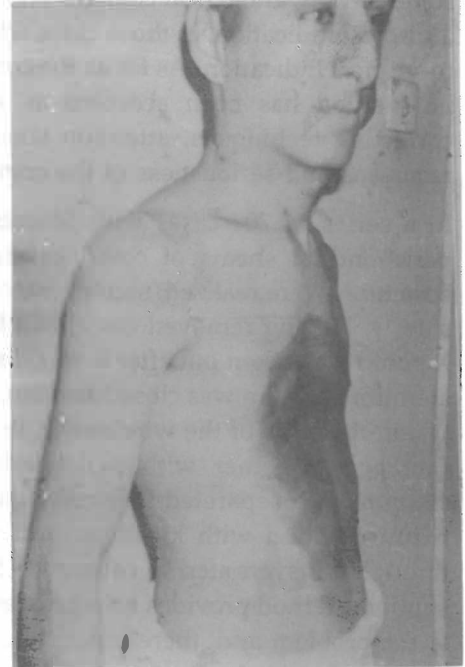


Figure 4: Deformity was corrected. Same patient one month later.

FINDINGS

After surgical operation, patients' stay at the hospital ranged 7 to 13 days. Incisional seroma which appeared in one patient, was treated with local puncture and swab on the 2nd day, pneumothorax developed in one of our patients and it was treated with tube thoracostomy. In the early period after the surgical operation, ventricular extrasistols were observed in the child with Marfan syndrome, and it was transformed into sinus rhythm through antiarythmic drug and nasal oxygen. We think that it resulted from the rotation of the hearth towards the potential space formed due to the corrected deformity. During 3-6 month follow up no problems was observed.

DISCUSSION

Besides retardation of costocondral development, pectus excavatum, (as Brown states) results from the shortness of retrosternal ligament, and diaphragmatic centrum tendineum(4). Manibrium is usually in normal position. In some cases xiphoid touches vertebra(5). If diaphragmatic results from the shortness of tendon, it can be easily corrected in early infant period. Later, more sophisticated surgical applications which also correct bone deformity are needed(1,5).

As the result of the pressure caused by deformity exert upon toracic organs, some physiopathological changes take place(2,6). Removing the pressure causes a surgical indication, in those cases without symptoms, cosmetic cause may lead to surgical indication. As far as the correction of pectus excavatum is concerned, no method has been accepted as a universal method. In the selection of correcting techniques, attention should be paid to the rate and frequency of recurrences and seriousness of the complications(1).

In a series of 704 cases with Shamberger and Welch pectus excavatum, the perichondrial sheaths of costal cartilages and the preservation of intercostal structures were realized; sternal osteomy and silk sutures were fixed in the front side(1). Having removed costal cartilages, Lester did sternal osteomy in 1945. Xiphoid was taken out after it was dissected, wire was passed through the tip of sternum and skin was closed and thus, sternum was supported with a metal bar taking the ends of the wire out(4). In 1949 Ravitch took out all deformed costal cartilages together with perichondrium and, xiphoid was separated from sternum. He separated intercostal sutures from sternum and applied the fixture method with kirschner and wire suture which was brought forward through transvers sternal osteomy(1,5,7). Qelnitz and Hecker claim that internal support method provides no significant contribution and it causes complications to the problem and therefore it shouldn't be used. In 1954 and 1956 Jutets and Jung used sternal turnover technique Wada, too, published large series on this technique in Japan. Sternum as free graft, is rotated 180 degrees. In this method, Taguchi, finally showed the positive effects of the preservation of

internal mammarial arteries in terms of complications which might happen. Despite its complications and risks in terms of infection, this method as a radical method in children and adults, seems to make an alternative(1,4). Finally, the action of inserting silastic mold as subcutaneous into the area where deformity exist has been applied for cosmetic purpose it doesn't result in enlargement in thoracic volume; there is no correction in respiratory mechanism. The pressure on the heart continues(2,8). The use of silastic mold for the purpose of cosmetics, in persistent chest deformities in adults, for instance, recurrens or irregular chest wall is stated(9). Although the inserting of subcutaneous, as a conservation method is easy and advantageous for administration. It was wholly useful and satisfactory.

Results obtained from our cases were evaluated; because stability was attained no artificial support material was used. Its functional results were observed very well, major complications were not seen. This technique was seen as a method which can be used in adults with pectus excavatum.

REFERENCES

- 1- Shamberger RC, Welch KJ. Surgical repair of pectus excavatum. *Journal of Pediatric Surgery* 1988;23, 615-622.
- 2- Wynn SR, Driscoll DJ, Ostrom NK, Staats BA, O'connel EJ, Mottram CD, Telander RL. Exercise cardiorespiratory function in adolescents with pectus excavatum. Observations before and after operation. *J Thorac Cardiovasc Surg* 1990;99,41-47.
- 3- Sanger PW, Robicsek F, The repair of recurrent pectus excavatum. *Journal of Thoracic and Cardiovascular Surgery* 1968;56,141-43.
- 4- Lester CW.:The surgical treatment of funnel chest. *Annals of surgery* 1946,1003-22.
- 5- Welch KJ.:Satisfactory Surgical correction of pectus excavatum deformity in childhood. A limited opportunity. *J. Thoracic Surg.* 1958;36,697-713.
- 6- Park JM, Varma SK.:Pectus excavatum in children:Diagnostic significance for mitral valve prolapse. *Indian J Pediatr* 1990;57,219-222.
- 7- Cahill JL, Lees GM, and Robertson HT. A summary of preoperative and postoperative cardiorespiratory performance in patients undergoing pectus excavatum and carinatum repair. *Journal of Pediatric Surgery* 1984;19,430-33.
- 8- Allen RG, Douglas M.:Cosmetic improvement of thoracic wall defects using a rapid setting silastic mold:A special Technique. *Journal of Pediatric Surgery* 1979;14,745-49.
- 9- Dahan M, Berjaud J, Vernhet JC.:Technique operative du pectus excavatum methodes (Radicales). *Ann Chir Plast Esthet* 1990;35, 485-88.