A Bar Dislocation in Postoperative Follow-Up Period in Nuss Operation: Case Report

Nuss Operasyonu Postoperatif Takip Döneminde Bir Bar Dislokasyonu

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ABSTRACT A major group of complications caused by minimally invasive repair of the pectus excavatum is those associated with the bar. Bar dislocation and rotation has been reported in the early postoperative period. In this case report, we presented a patient whose bar shifted to the mediastinum 19 months after being placed, in order to emphasize outgrowth and dislocation of the bar as a late complication. In Nuss operations, the placed bar may prove short for the patient due to rapid growth and may shift towards the mediastinum. This may put pressure on or damage the vital mediastinal structures. During follow-up, the degree of growth should be determined. If there is a rapid growth, the bar should be checked to see whether it is short or not. If the bar remains short, it should be removed before its 2-3 years waiting period ends. Following removal, a new and longer bar should be inserted if necessary.

Key Words: Funnel chest; complications; thoracic surgery, video-assisted

ÖZET Kunduracı göğsünün onarımında en az girişimsel nitelik taşıyan ameliyatın ardından gelişen komplikasyonların büyük bir grubu bar ile ilişkilidir. Ameliyat sonrası erken dönemde barın yer değiştirdiği ve döndüğü bildirilmiştir. Bu olgu sunumunda, yerleştirildikten 19 ay sonra barı mediastene kayan bir hasta sunulmuştur; sunumun amacı, bardaki büyümenin ve barın yer değiştirmesinin, geç komplikasyonlar arasında olduğunu vurgulamaktır. Nuss ameliyatında, yerleştirilen bar hızlı büyüme nedeniyle kısa kalabilir ve mediastene doğru kayabilir. Bu durumda yaşamsal mediastinal yapılara baskı uygulayabilir veya onlara zarar verebilir. Takip dönemlerinde büyüme derecesi de saptanmalıdır. Hızlı büyüme varsa, barın kısa olup olmadığı değerlendirilmelidir. Bar kısa kalırsa, 2-3 yıl bekleme dönemi bitmeden önce alınmalıdır. Bundan sonra gerekli olduğu takdirde, yeni ve daha uzun bir bar yerleştirilmelidir.

Anahtar Kelimeler: Çukur göğüs; komplikasyonlar; göğüs cerrahisi, video yardımlı

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Problems and complications that develop after the implementation of the minimally invasive technique for repair of pectus excavatum (MIRPE), which has become more common in the last decade, require solutions.[1] One of the major problems identified in this novel operation technique is the dislocation of the steel bar and bar displacement is reported to develop particularly within the first post-operative month at a rate of 9.5%.[2] Some technical arrangements are considered to prevent bar displacements that happen in the early postoperative periods.

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CASE REPORT

A 16-year-old male patient was operated for pectus excavatum on July 18, 2007. The patient had a Haller index of 3.75 and was implanted an 11-inch Lorenz bar and was discharged on postoperative day 5. The technique defined by Pilegaard et al. was used in the operation[3] in which the bar was stabilized using an absorbable stabilizer on the left. The right side of the bar was fixed on the costae below with two polydiaxone (PDS) sutures. The early postoperative postero-anterior (PA) radiograph of the patient was shown in Figure 1A. According to preoperative measurements, the patient was 160 cm tall; the body weight was46 kg, the body surface area was1.45 m^2, the body mass index (BMI) was 17.97 kg/m^2 and the ideal body weight was 57 kg. Since he was below his ideal body weight, the patient was assessed by physicians from the endocrinology and metabolism departments and nutrition and diet units. The evaluations showed that the patient did not have any systemic disease or hormonal disorder to account for his low weight; he was recommended to use a nutrition solution and was put on Biosorb Energie (Nutricia). The patient continued to use this supplementary nutrient for 1 year. The patient was put on a routine follow-up program for 18 months with 3-month intervals. During the follow-up, particularly in the last year, the patient grew rapidly. Thus, the patient's weight increased from 46 kg to 57 kg and his height from 160 cm to 175 cm. A re-calculation of the patient at this period showed that his body surface area was 169 m^2, BMI was 18.6 kg/m^2 and ideal body weight was 70 kg (within the normal range).

His control PA graph revealed that the patient had outgrown the current bar (Figure 1B). His thorax computed tomography scan showed that the right edge of the bar had escaped from the costae and was displaced to the pleural space, leaning upon the heart (Figure 2A, 2B, 2C). The patient was re-operated on March 11, 2009 using a minimally invasive technique and the 11-inch bar was replaced with a 12-inch one (Figure 3). Considering that 3 years, which is the time recommended for the bar to be kept in place in patients operated with the Nuss technique, had not ended yet and that bar removal might cause an early recurrence, a longer bar was implanted in the second operation so that the 3-year period could be completed. The patient was discharged five days after surgical intervention and he currently has no complaints. The patient is on a routine follow-up and his bar will be removed when the 3-year period is completed. So far, there has been no problem in the follow-up of the patient following the insertion of the second bar.

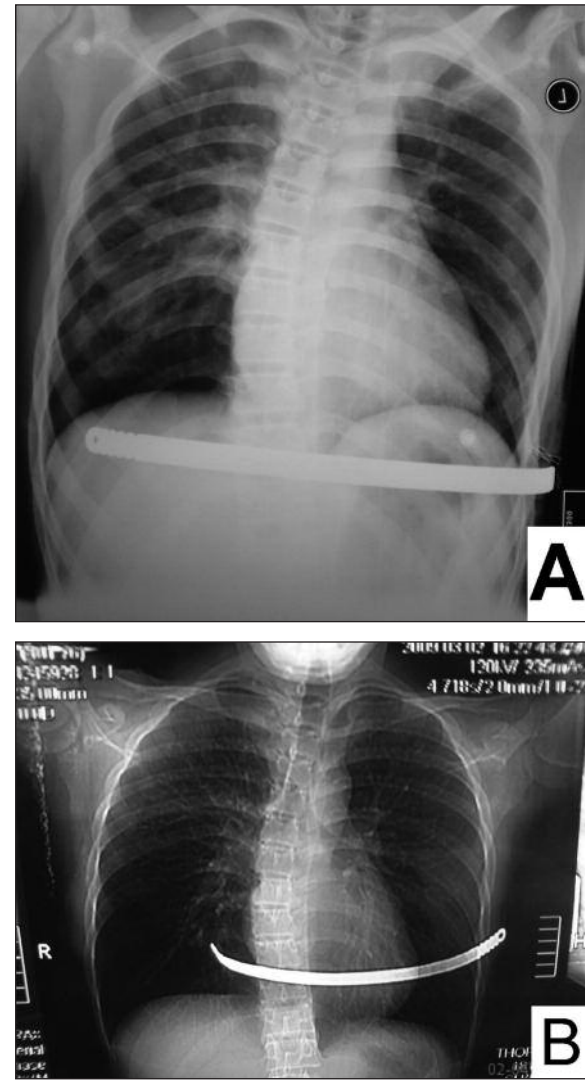

FIGURE 1A, B: Posteroanterior graphic appearances. A: After first operation, B: Before second operation. Being absorbable, the stabilizer is not visible in the x-ray.

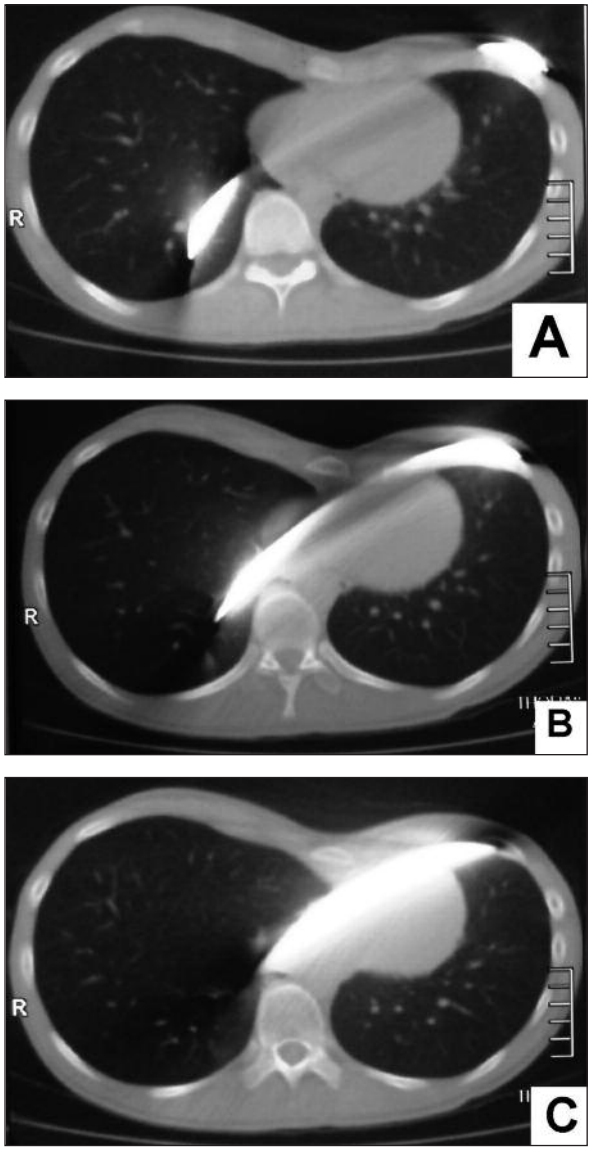

FIGURE 2A, B, C: Computed tomography scans of the thorax with bar.

DISCUSSION

After the introduction of MIRPE, the dislocation of the pectus bar was the most frequent complication.[4] Complications that arise in the early period include pneumothorax, wound infection, seroma, multiple rib fracture, hemothorax, thoracic outlet-like syndrome, cardiac perforation, diaphragmatic hernia, bleeding from pulmonary vessels, laceration of the internal mammarian artery (IMA), bleeding from intercostal vessels, sternoclavicular dislocation, piercing of the liver with the trocar, breakage of wires used to secure the lateral stabilizer plate, intraoperative rupture of the intercostal muscle, pericardial tears without clinical significance, pericarditis with pericardial effusions, serious mediastinal infections, and inferior vena cava obstruction.[5,6]

Complications that may arise in the later period include ossification around the bar, traumatic pericardial effusion and hemorrhage, bar rotation and bleeding of IMA origin, cardiac tamponade resulting from laceration to the ascending aorta, recurrence of PE deformity almost to its full extent as soon as the bar removal, death because of fatal arrhythmia associated with congenital heart disease, and migration of bar into the left ventricle.[4,7-9]

The presented case developed a complication, which was not reported as late complication in the literature. Our case did not show a marked growth in the first 6 months following bar placement, but grew very rapidly in the ensuing months. Approximately 6 months after being put on a nutritional supplement due to low weight, the patient experienced a rapid increase in height and weight. Consequently, the patient gained 11 kg and grew 15 cm from month 6 to 18 postoperation and the right edge of the bar (where a bar stabilizer was not used), which was not fastened fell towards the pleural space. So, the present 11-inch bar was replaced with a 12-inch one using MIRPE. The pa-

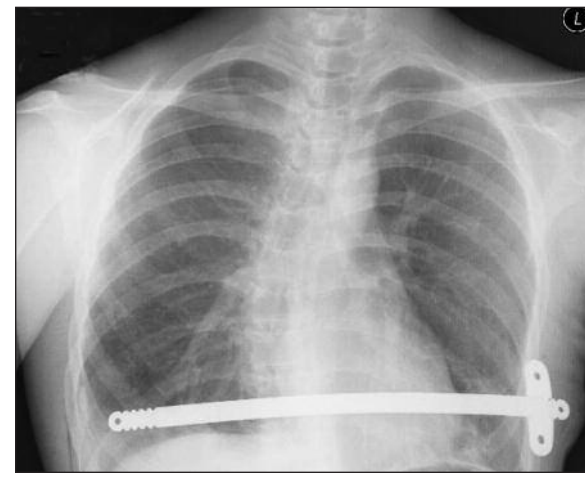

FIGURE 3: Posteroanterior x-ray five days after the second operation. A non-absorbable stabilizer is visible on the left.

tient did not experience any problems after the operation and is currently in month 30 of his follow-up.

Regularly measuring the width of the rib cage together with the height and weight in pectus excavatum cases operated during adolescence, a period marked by rapid growth, will contribute to the reliability of the follow-up, because rapid growth may result in shortening of the bar and the unfastened edge of the unilaterally stabilized bar may escape the costae, falling into the hemithorax within pleural distance. Concerning this condition, Nuss emphasized that the bar might have to be removed earlier, stating that "If a patient grows more than 6 inches (13 cm) after bar insertion and becomes symptomatic with lateral chest pain, then he needs to be evaluated to see whether early bar removal is required".[10]

This report confirms the necessity to measure certain physical features including height, weight, and rib cage periphery regularly in order to detect early complications in patients at the stage of rapid growth that underwent bar insertion. The risk that the bar edge may shorten and fall towards the pleural space should be considered and if required the bar should either be replaced or removed earlier.

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