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Chest wall deformities in children

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Summary

There are a variety of chest wall deformities in children but the majority are the pectus excavatum variety. Pectus carinatum occurs about one sixth as often as pectus excavatum. The correction of both deformities is surgical. We use a transverse incision in all cases and we elevate all soft tissue layers intact as a single flap. All cartilages, 2 through 7 are removed by preserving the perichondrum and intercostal muscles. An anterior osteotomy is performed in the upper sternum where it begins to decline. A stainless steel bar is pleaced beneath the sternum. Complications are fairly minimal. Our results have been excellent in 85 % of cases, good in 13 % and poor in 2 %.

Key words: Chest wall deformities, pectus excavatum, pectus carinatum.

There are a varietry of chest wall deformities in children but the majority are of the pectus excavatum variety. Pectus carinatum occurs about one-sixth as often as pectus excavatum. The deformity was described in the European literature in the late Sixteenth Century but the era of surgical treatment is only sixty years old.

The cause is unknown but it must have some genetic basis. In the United States it is rare in negroes. 43 % of our 200 patients had a positive family history. It is thought to be due to an overgrowth of the catilages which result in sternal displacement. The deformity is progressive and secondary rib deformities are common in patients who have late surgery.

Pectus excavatum is frequently present at birth and usually is noted sometimes during infancy. It does progress and at puberty this progression can be very significant. It is five times more common in males then females and may be associated with Marfan's Syndrome as well as some other syndromes. Less commony it may be seen in Hurler's Syndrome. The smptoms are variable and may be altered by the patient's self image. Shortness of breath, easy fatigability, and dyspnea on exertion are fairly common. On physical examination one may see a slight scoliosis or detect a faint precordial murmur.

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Usually only minimal laboratory studies are indicated. We now do a one cut CT Scan to quantitate the deformity, as described by Haller [1]. Invasive studies are purely investigational although these would reveal physiologic abnormalities. Beiser [2] has confirmed the reduced cardiac output with exercise. Angiocardiograms confirm the right ventricular outflow tract compression and pressure tracings similar to those of constrictive pericarditis. Cahill [3] has used the cycle ergometer to demonstrate the increased oxygen need and diminished work capacity in these patients, and also has shown that the effects are reversible by surgery. The patients in Beiser's Series also improve postoperatively. EKG abnormalities consists of depressed ST segments and right axis deviation.

Pectus carinatum usually is not noticeable until age seven or eight years and it usually progresses at puberty, even to a greater extent than pectus excavatum. There may be some element of emphysema but the physiologic derangements must be very minimal. Chest pain is not an uncommon symptom although this may be psychologically inspired.

The correction of both deformities is surgical. It is certainly justified on so called "cosmetic" reasons because of the terrific impact of the condition on the self image and the personality of the patient. It is a major undertaking although usual-

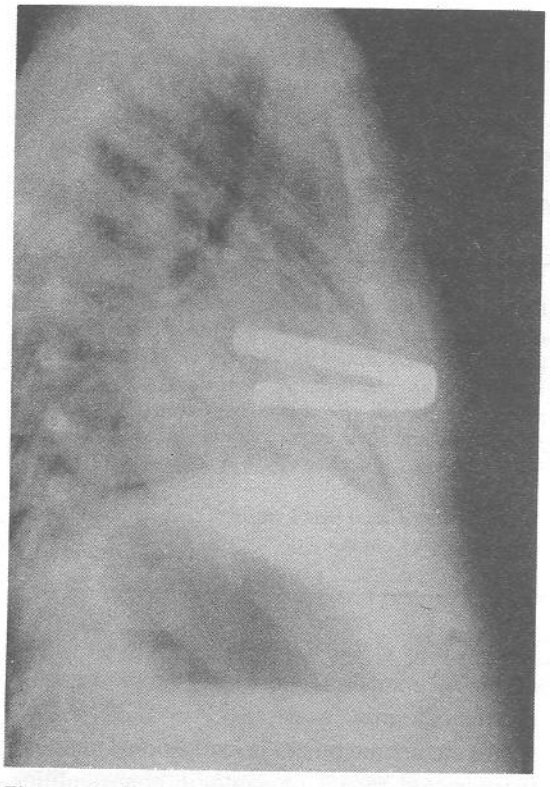

Figure 1. Postoperative repair with STRIB

ly well tolerated. It's negative aspects must be discussed with the family and with older patients.

The technical aspects of the procedure are important. We use a transverse incision in all cases and we elevate all soft tissue layers intact as a single flap. Excellent exposure is obtained for removal of the entire length of cartilages 2 through 7. The perichondrum is preserved, although we sometimes divide the porichondrum and intercostal muscles on the right especially Nos. 4, 5 and 6. This is done only if these are tense after the sternum is elevated. An anterior osteotomy is performed in the upper sternum where it begins to decline. A stainless steel bar is bent to mimic the contour of the chest wall and is placed beneath the sternum, resting on the ribs laterally. (Figure 1). The bar is secured to the ribs and sternum with a heavy absorbable suture and this bar is usually removed as a brief outpatient operative procedure one year later. An F-18 drain is placed under the upper flap and is attached to 25 cm's of suction for 48 hours postoperatively. Absorbable sutures are used for wound closure. Prophylactic Nafcillin is given for 72 hours. We virtually never transfuse a patient, using the electrocautery for dissection and hemostasis.

Complications are fairly minimal. Pneumothorax occurs in slightly less then 10 % and frequently requires no treatment. Some postoperative discomfort associated with the bar may be noted but is usually tolerable. Some patients have difficulty sleeping even when there is no associated pain and this is poorly understood.

Our results have been excellent in 85 % of cases, good in 13 % and poor in 2 %. We have reoperated only 2 of our 200 patients. We have reoperated 9 other patients originally operated elsewhere with good results. This can be a formidable undertaking however. It is our feeling that pectus excavatum is a physiologic problem and that all youngsters with significant deformities deserve a surgical correction.

References

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