

THE USE OF RUMMEL'S ALUMINIUM BRIDGE IN THE SURGICAL TREATMENT OF PECTUS EXCAVATUM

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Pectus excavatum is a congenital and progressive deformity of the thoracic cage. Many names such as funnel-chest, trichterbrust, koilosternia, chonechondrosternon, shoemaker's chest and *pectus excavatum* have been used to describe it.

The first article about *pectus excavatum* was written by Bauhinus in 1594. He made a correct observation about the correlation between the deformity and respiration, which nobody attended until Brown made the same observation three and a half centuries later.¹ He noted that on deep inspiration, the deformity became greater. This could only be explained by the presence of a short substernal ligament and the subsequent abnormal pulling of the diaphragm. Previous surgical attempts had failed to correct *pectus excavatum*,² and the failure had been largely due to treatment which left the short substernal ligament intact. Brown, when he corrected the deformity, cut this ligament and obtained the first satisfactory result.¹ Sweet, who had given up performing surgery on patients with *pectus excavatum* after several failures, also obtained satisfactory results by using Brown's technique.³ Since then many variations of the technique have been adopted, but the principles of Brown remain.

Ten patients with *pectus excavatum* were operated on at Hacettepe Medical School, from May 1962, to July 1966. Seven of these were girls and three were boys, of ages ranging from 2.5 to 19 years. Three had severe deformities, one moderate to severe, and six moderate. The criteria used in classifying the deformity depends on lateral x-rays of the chest. Using the normal distance between the sternum and the spinal column, divided into three equal parts, as a basis (Figure 1), we consider a concavity in the area between A and B, mild; from B to C, moderate; and between C and D, severe. None of the patients had cardiovascular or respiratory disturbances. The

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chief complaint was cosmetic in all cases and indications for surgery were based on this consideration. According to Ravitch indications for surgery are three: cosmetic, orthopedic and physiologic.³

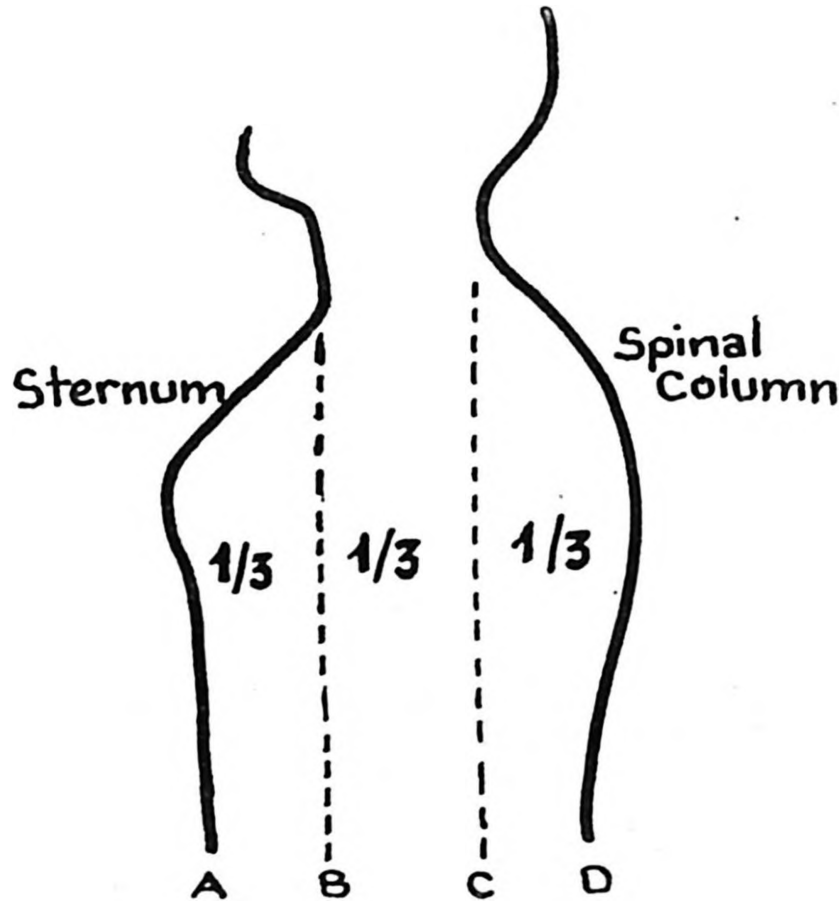


Figure 1. Criteria used in classifying degree of deformity of pectus excavatum.

Mahoney feels that the best age for surgery is five years of age.⁴ We believe that any patient over two years of age with a moderate to marked degree of deformity, should be operated on. The main hazard of this condition is psychological and the earlier the operation is performed the better the result. Nevertheless the operation must definitely be performed before school age when the patient might rapidly develop feelings of inferiority.

Surgical Technique : For boys we use a vertical midline incision; for girls our choice is sub-mammary transverse incision. Third through ninth rib cartilages are resected subperichondrially and bilaterally. Posterior attachments of the sternum are also freed. At the second and third intercostal space level, transverse osteotomy is performed and the sternum is elevated after the substernal ligament is cut.

One of the most important points for satisfactory results after surgery, depends on the type of elevation and fixation. Various methods have been described to keep the sternum in the new position until it holds by itself. Elevation by use of towel clips with traction is no longer in general use. Peters uses wire strut to stabilize the sternum.⁵ May prefers to use stainless steel wire mesh under the sternum.⁶ Humphreys uses a different technique with multiple transverse osteotomies. He feels that for stabilization and elevation only retention sutures over buttons are needed.⁷ We have used Kirschner wire, elastic bands with traction, etc. However we now prefer to use Rummel's aluminium bridge; a bridge with two flat and one elliptically shaped perforated parts. The flat parts rest bilaterally on the thoracic cage in which there is no surgical involvement. The elliptic part corresponds to the surgical field and as many wire sutures as desired may connect the sternum and the bridge. The degree of elevation may be controlled by turning these wires. One of the better aspects of the Rummel's bridge is its stability. It is external; it may be removed at any time and gives the patient the best chance to be ambulatory. In the last three cases we have used this technique with satisfactory results. Figure 2 a and b shows Rummel's aluminium bridge in use.

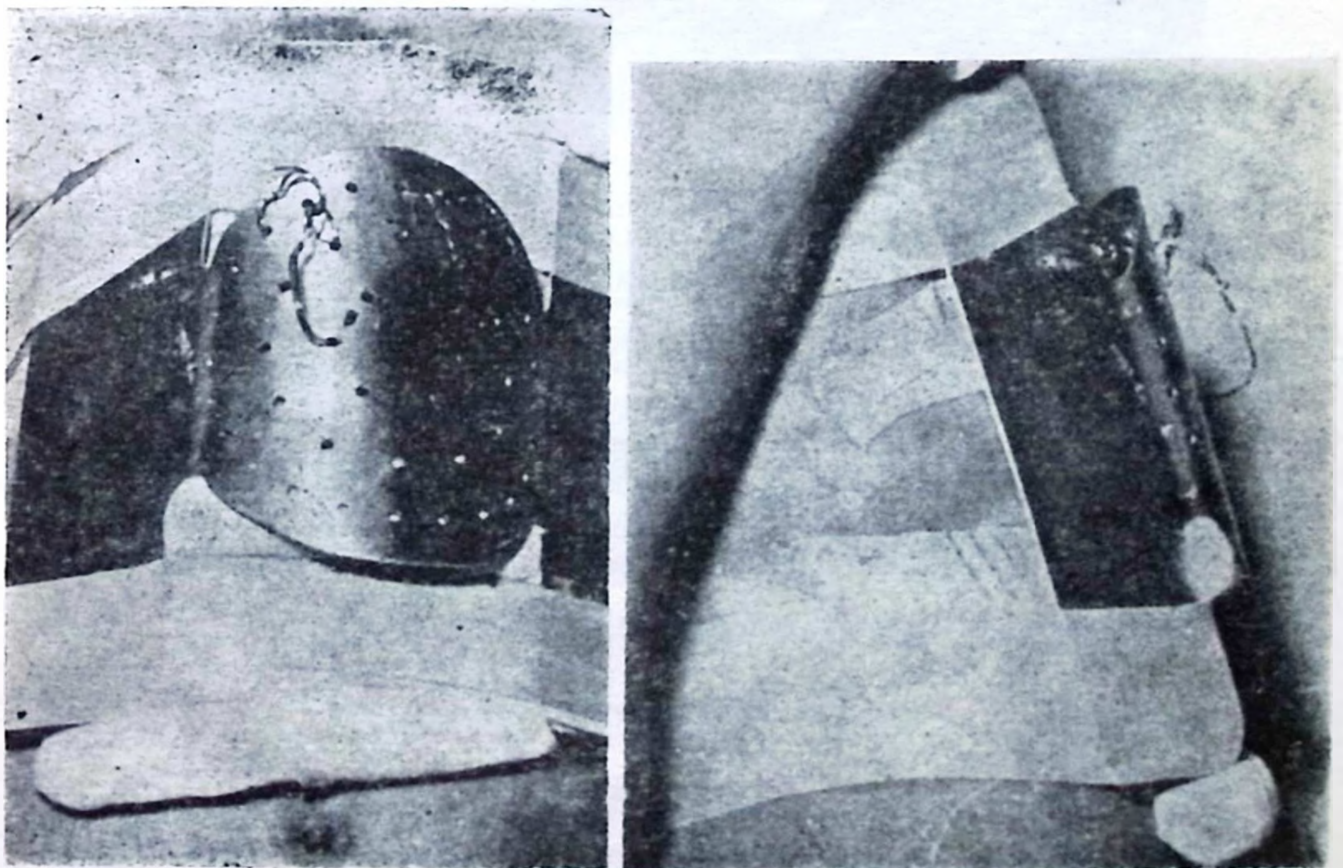


Figure 2 a and b. Rummel's aluminium bridge in use.

As a result of a previous study we used to think that it was necessary to drain the substernal space through the pleural cavity.⁸ Now we do not open the pleural space; no drainage through the chest is used. Instead we use a one or two Penrose drain, substernally. Pneumothorax was present in only one case postoperatively and was treated by underseal drainage. Atelectasis due to bronchial secretions and incisional infections are two other complications which are easily treated. The average hospitalization was 24 days with the shortest 12, and the longest 40 days.

Results

Out of ten cases, the results in seven, including the three performed using Rummel's bridge, were considered very good, i.e. the concavity was totally or almost totally corrected, and in three the results were fair with the concavity in the area between A and C (see Figure 1). Figure 3 shows a postoperative picture of a patient in which the deformity was completely corrected using Rummel's bridge.

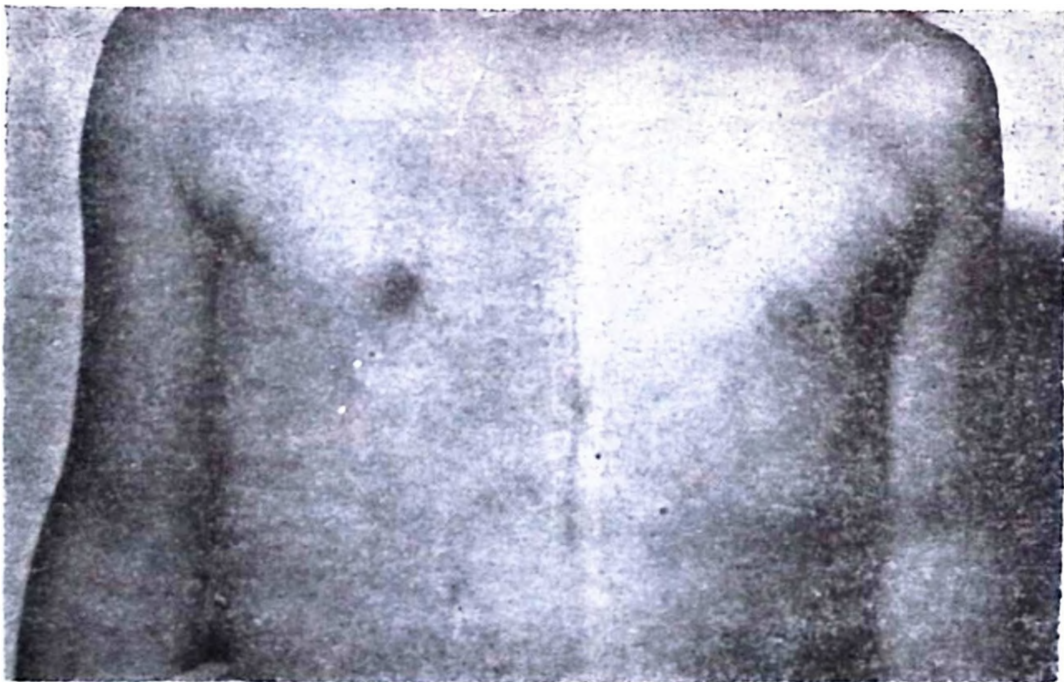


Figure 3. Deformity corrected using Rummel's bridge.

Summary

The cases of ten patients, operated on for *pectus excavatum* at Hacettepe Medical Center are discussed with the advantages of using Rummel's bridge for stabilization.

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