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A MODIFIED METHOD OF CORRECTION FOR PECTUS EXCAVATUM

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Summary: *A modified technique for surgical correction of Pectus Excavatum is reported. The technique has been applied on 42 patients affected by various degrees of the deformity.*

The method does not require external suspension devices nor permanent internal prosthesis, simplifies the procedure and is esthetically valid.

Key Words: *Pectus excavatum; surgical correction.*

Un metodo modificato di correzione per il pectus excavatum

Riassunto - Riportiamo una tecnica modificata di correzione del pectus excavatum. La tecnica è stata applicata in 42 pazienti affetti da vari gradi della malattia.

Il metodo da noi proposto non richiede supporti esterni o materiale interno permanente di fissaggio. Si tratta inoltre di una procedura semplice che dà risultati esteticamente favorevoli.

Parole chiave: Pectus excavatum; correzione chirurgica.

Introduction

Surgical correction of Pectus Excavatum began in the 20th. century when Ludwig Meyer proposed his surgical technique in 1911 (12).

Many other techniques were also described during subsequent years by other surgeons (2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14).

The range of different methods and variations proposed to correct the defect can be explained in two ways: either no one technique is sufficiently superior to all the others, or different surgeons have different attitudes regarding the correct surgical approach.

We have divided the methods available into 3 groups based on the rational mechanism used in correcting the defect:

1) operation where no supporting materials or immobilizing devices are used (6, 8, 11);
2) methods employing an external support (9, 11, 15);
3) procedures which employ internal supports or immobilizing devices (1, 4, 5, 7, 11, 14).

Considering the disadvantages of the first group procedures:

- laborious surgical techniques,
- duration of the operation,

and the second group procedures:

- complex and long post-operative period,
- poorly accepted psychologically by the patients,

we concentrate our attention on the third group procedures.

Our effort was to reduce some of the disadvantages inherent in the current third group techniques as:

- esthetics,
- infections,
- hospitalization time,
- early post-operative limitations.

Technique

In choosing the surgical technique we took into consideration:

- safety,
- esthetic aspects,
- simplicity,
- economy,
- probability of achieving the desidered results.

Our proposed technique takes two essential aspects into consideration:

(1) *TECHNICAL*: characterized by

a) appliable to any age group,
b) time saving technique,
c) complete and immediate return to a normal activity,
d) complete elimination of the support material,
e) esthetically acceptable,
f) short hospitalization time,
g) adaptable to any anatomical variation of «pectus excavatum» and its relapses.

(2) *INDICATIONS*

Indications for surgery are just as important as the surgical technique itself; we therefore consider them to be

inseparable to achieve the desired result.

In our department the following undergo surgical correction:

a) All symptomatic patients.

b) Pre-school age children having deep and/or progressive deformities.

c) Newborns with persistent deformity during forced expiration.

d) Patients with serious psycological involvement due to the deformity.

The procedure that we propose in this paper includes some elements of procedures described and used by other authors.

In practice the operation that we perform is divided into the following phases:

a) adequate mobilization of the sternum,

b) bilateral removal of the involved costal cartilages,

c) maintenance of the sternum in its new, correct position with removable materials.

(3) *OPERATION*

The operation consists of the following steps.

(I) An incision is made bilaterally along the submammary folds (fig. 1).

We found it to be satisfactory because:

- it guarantees surgical access to the sternum even if the 1st. and 2nd. ribs are involved;
- it is esthetically better than a longitudinal incision;
- there is less chance of keloid formation.

(II) The condrosternal plate is exposed by forming two muscle flaps (superiorly the Pectoralis Maior, inferiorly the Rectus muscles) by isolating the xifoid process and by creating a tunnel between the posterior surface of the sternum and the pericardium after dividing the sterno-pericardiac ligaments (fig. 2).

(III) The IV, V, VI and sometime the III and even the II costal cartilagen are resected while the perichondrium is conserved.

The resection is extended laterally:

- to reach the chondro-costal junction in adults;
- when the deformity is asimmetric (fig. 2).

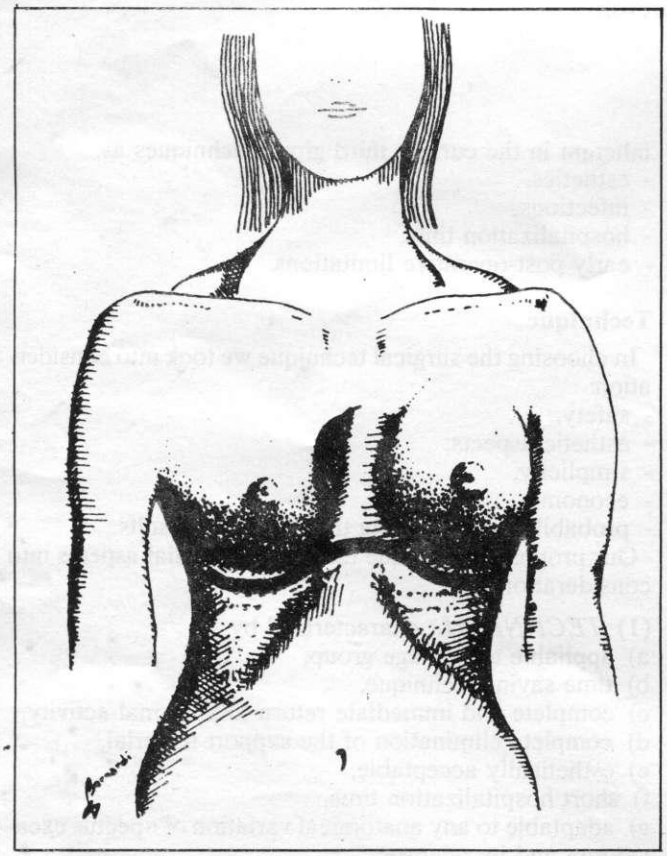

Figure 1 - Bilateral skin incision along the submammary folds with central mild convexity.

Figura 1 - Incisione cutanea bilaterale lungo i solchi sottomammari con modesta convessità centrale.

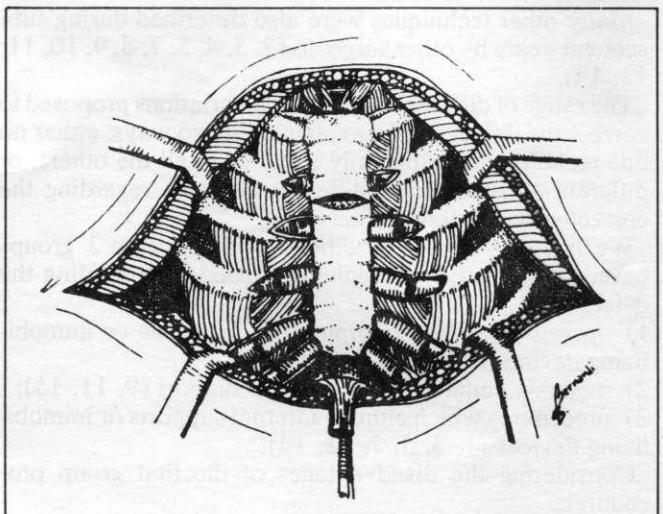

Figure 2 - Exposure of the condrosternal plate and resection of the costal cartilage while the pericondrium is conserved. On the left side the condrocostal resection is, specially in the man, limited to a small cuneiform piece to avoid an undesiderable heart iperpusatility on the chest wall.

Figura 2 - Esposizione della piastra condrosternale e resezione della cartilagine costale con conservazione del pericondrio. Sul lato sinistro la resezione condrocostale è, specie nell'uomo, limitata a un piccolo pezzo cuneiforme per evitare un'iperpulsatilità cardiaca sulla parete toracica.

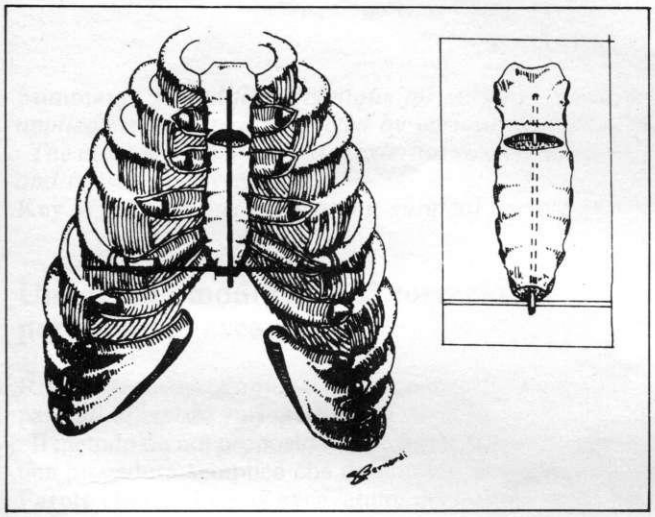

Figure 3 - The fixation of Kirschner wires holds the condrosternal plate in a correct position.

Figura 3 - La fissazione dei fili di Kirschner mantiene la piastra condrosternale in posizione corretta.

(IV) Absorbable suture fixation of a transverse Kirschner wire is made on costal, the most prominent convexity of the periostium. This wire holds in a correct position a second Kirschner wire inserted longitudinally into the sternal spongiosa (fig. 3).
(V) The sternum is remodelled by curretage of the chondrosternal margines (fig. 3).
(VI) Single or multiple cuneiform osteotomies are performed in order to correct the sternal deformities (fig. 2).
(VII) The support wires are removed after 10 weeks.

These essential points ensure:
1) rapid, simple technique,
2) positive result,
3) early mobilization and complete rehabilitation,
4) no prosthetic material exposure,
5) no permanent heterogeneous material.

The supporting wire can be removed in the out-patient clinic using a local anesthesia after a chest X-ray examination to check for any displacement of the wires from their original position.

Results and conclusion

Consecutive 42 patients have been operated upon in our Department.

The patients ranging 4 to 44 years of age were affected by various degrees of pectus excavatum.

The esthetic result has always been excellent. There were no hospital deaths or complications.

Though is not our goal in this paper to report the surgical results, they have been clinically evaluated by:
1) antero-posterior and lateral chest X-ray,
2) computerised axial tomographic scan (since 1979),
3) spirometric test,
4) measuraments of the sagittal diameter of the thorax.

These test were routinarily performed pre-operatively and post-operatively after 6 or 12 months.

According to the advantages described we believe that our surgical technique offer a further contribution regarding the surgical correction of pectus excavatum.

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