



3D COSTUME-MADE IMPLANTS FOR PECTUS EXCAVATUM

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Introduction: Pectus excavatum is the most common congenital thoracic deformity. It is characterized by a sternum depression with a decreased anteroposterior diameter of the thorax. It can be median or lateral, symmetrical, or asymmetrical. The occurrence of this deformity varies between 1/300 and 1/1000 births with a family history in about a third of the cases. Cardiac or respiratory functional consequences are generally null. This deformity is often poorly accepted physically and psychologically by the patient, reflected by a modified self-confidence. Psychological consequences are often important from adolescence onwards, disturbing self-image, social relationships, and sometimes indirectly sporting activities.

The classic surgical treatment has been the Ravitch technique. Dr. Donald Nuss introduced in 1987 his less invasive technique and posteriorly Dr. Carles Bardají an extrathoracic approach (Taulinoplasty or Pectus Up). All of them have their benefits and possible complications which are not frequent but, when present, are sometimes very troublesome. For that reason, we are open to search new techniques that could accomplish a good aesthetic result with a minimal physical consequence if a complication occurs.

Methods: Dr. Jean Pierre Chauvin, plastic surgeon from Toulouse, developed in 2010 a 3D custom-made silicone implant technique that consists of filling the "hole" in the chest without touching the ribs. Each implant is unique and customized for each patient with a CT acquisition of the entire chest, with the arms along the body on the back, so it is designed to adapt to the patient's own anatomy. The steps are: 1. Segmentation of all tissues and production of a virtual copy of the patient's body; 2. Design of the virtual implant that adapts perfectly to the recipient site; 3. Machining of a prototype, a perfect copy of the implant, for the development of a mold and 4. Final manufacturing of the Medical polymerized silicone rubber implant from the mold.

Results: Between December 2018 and October 2021, we have treated 10 patients (2 female and 8 males) with this implant technique. We perform a preoperative drawing on the patient's skin to mark the exact position of the implant, performing a 5-7cm vertical median incision to prepare the locus to the size of the implant for a perfect stability. The implant is deeply slipped into the locus under the pectoral muscle, so that it is completely invisible, closing the wall. Age was between 20 and 44 years (median of 29,4 y), six of them asymmetric. The Haller index varied from 2,5 to 7,5 (median of 3.7). Two patients had previous operations: One two times (Nuss & Ravitch) and other one (Ravitch). Mean operating time was 65 minutes and two skin complications were recorded. Mean stay of 2,5 days and minimal pain, treated by anti-inflammatory without need of opiates. All of them had excellent aesthetic result.

Discussion: Potentially, due to the simplicity and reproducibility of the technique, it would be possible to treat any type of pectus excavatum. The limit is marked by the reconstruction of the

preoperative CT images. However, 3D prostheses adapt to a specific defect over time, which is why we believe it necessary for the patient to have stabilized their thoracic defect and we do not expect a modification of it. For this reason, we consider an adult patient as an ideal candidate. Another of the best indications is those patients with previously performed invasive correction techniques and who have failed due to an unwanted aesthetic result.

Conclusion: At present, our surgical trend leads us to perform less invasive surgical techniques when the patient does not require a modification of the structure of chest, especially in patients with asymmetric pectus and adulthood