Use of Macrolane to Treat Pectus Excavatum

Raphael Sinna, MD, PhD, David Perignon, MD, Nizar Assaf, MD, and Pascal Berna, MD

Departments of Plastic, Reconstructive, and Aesthetic Surgery and Thoracic Surgery, University Hospital Amiens; and Unit of Research and Innovation for Surgical Expertise, Amiens Medical School, Amiens, France

The use of subcutaneous hyaluronic acid injection in cosmetic surgery is a popular and well-accepted technique. A new highly reticulated, nonanimal, stabilized hyaluronic acid has been recently developed for high-volume enhancement, especially breast augmentation. We describe this technique for funnel chest treatment. (Ann Thorac Surg 2012;93:e17–8) © 2012 by The Society of Thoracic Surgeons

Pectus excavatum (“funnel chest”) is a common congenital deformity of the anterior thoracic wall. It can be treated with several invasive surgical techniques, such as the well-known Ravitch and Nuss procedures [1]. However, the adoption of techniques borrowed from plastic surgery may enhance the treatment of this deformity. We recently presented a novel repair method that uses a standard perforator flap technique [2]. However, we also believe that lower-morbidity surgical techniques (especially those used in breast reconstruction [2]) are capable of resolving physical and psychological issues experienced by mild pectus excavatum patients who do not have functional problems. Hence, the use of prostheses [3] or fat grafting [4] enables the correction of mild deformities with fewer drawbacks.

The use of hyaluronic acid (HA) in facial cosmetic surgery is a popular, well-accepted technique [5, 6]. A new highly reticulated, nonanimal, stabilized HA has been recently developed for high-volume enhancement (especially in breast augmentation): Macrolane (Q-Med AB, Uppsala, Sweden) [7]. Here, we report on the use of Macrolane for the treatment of mild pectus excavatum.

Technique

Macrolane

The naturally occurring, highly hydrophilic polysaccharide HA is an essential, major component of the extracellular matrix in all mammalian connective tissues. It is composed of D-glucuronic and N-acetyl-D-glucosamine and is cross-linked for stability in tissues. The hydrophilicity of the biopolymer helps it to fill and correct larger volume defects. The fact that HA is neither tissue nor species specific is crucially important in minimizing the risk of potential immunologic reactions or transplantation rejection [8]. Hence, the injection of HA fillers is one of the most popular facial cosmetic procedures. Because HA degrades gradually, the problems associated with permanent fillers (such as the permanency of inappropriate injections or technical errors) are circumvented. If required, HA can be removed more rapidly by using hyaluronidase [6].

However, larger volumes are required for breast enhancement than for facial augmentation. Formulations used for breast enhancement have increased viscosity with a high resistance to deformation [7]. Macrolane is a new formulation of a nonanimal, stabilized HA-based gel that has been developed for breast enhancement, volume restoration, and contouring body surfaces. Two versions of Macrolane (with a volume restoration factor [VRF] of 20 and 30) have been Conformité Européenne (“European Conformity”)-marked. Whereas the VRF30 product is primarily intended for deep subcutaneous administration, the thinner VRF20 is suitable for more superficial subcutaneous injections.

Procedure

The patient is first placed in the standing position, to accurately draw contour lines and thus delineate the sternal deformity. Next, with the patient in the supine position, local anesthesia is induced with 1% lidocaine in sodium bicarbonate buffer. Once the anesthesia has taken effect, we perform an incision (1 mm to 2 mm) and start the injection using a blunt 16G cannula. If the patient’s skin is hairy, the incision can be performed at the most convenient site; if not, the incision is made in the inframammary fold. The Macrolane is injected in small quantities and under light pressure, while gently withdrawing the cannula. The filling is performed close against the bone and in the deep cutaneous plane. Once the filling procedure has been completed and the incision has been closed, light massage can help to spread the product evenly.

In most cases, VRF30 is required (two to four 20-mL syringes per procedure are needed). If, however, the layer of skin and subcutaneous fat is thin (approximately 1 cm), then VRF20 may be more suitable. Figures 1 and 2 illustrate the case of a 21-year-old man to show the benefit of a single procedure (two syringes of VRF 30) injected through a single incision.

There are no particular postoperative management features. The patient should be told not to massage the region or apply pressure to the sternum for a few days after the procedure.
Comment

We report the novel use of Macrolane for the treatment of mild pectus excavatum. We believe that this technique will develop as rapidly as nonsurgical techniques have developed for facial rejuvenation, because this 15-minute procedure under local anesthesia is able to correct a deformity and allows the patient to return to normal life without any major restrictions. The procedure can be repeated until the patient is completely satisfied. The potentially life-threatening complications that can occur with the classical technique are thus avoided.

We also believe that patients having undergone a Ravitch or Nuss procedure may subsequently benefit from Macrolane injections (especially for the correction of minor residual deformities).

This technique has two main drawbacks. First, because the product degrades naturally in the body, maintenance of the correction requires annual injections. However, that could be considered also as an advantage (as is the case for breast augmentation). Indeed, reassessment and repeat treatment enable the natural changes that occur in the body over time to be taken into account. Some patients may consider this preferable to permanent implants—regardless of the cost. Second, the procedure’s cost is a problem. In France, thoracoplasties are reimbursed by the health insurance system. However, injection of Macrolane (regardless of the site) is considered aesthetic surgery and must be paid for by the patient. To prompt reconsideration of reimbursement of this procedure by the French health insurance system, we plan to initiate (in 2012) a nationwide trial evaluating the cost effectiveness and medical benefit of Macrolane injection for pectus excavatum.

In conclusion, we report the novel treatment of pectus excavatum by injection of Macrolane, and we believe that the procedure will open up a new range of treatment options for this deformity.

References