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ORIGINAL

J.F. Hönig

Correction of Poland's syndrome in a male with solid chest wall implants

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Abstract In the past, breast implantation for men was limited to transsexuals. Recently, more men have requested an adequate chest wall symmetry and an increase of chest size, particularly in the area of the pectoralis major muscle. This has lead to the development of pectoralis implants. This paper describes the surgical technique and possible complications of the correction of the chest wall deformity in Poland's syndrome with solid silicone implants. These implants can either be custom made, using a moulage technique, or can be obtained as pre-fabricated, manufactured implants, which can be modified on the operating table. This method, with the appropriate indications, gives good predictable long term results.

Key words Poland's syndrome · Chest wall · Solid implants

Introduction

Severe Poland's syndrome is rare. Ravitch [8, 9] accumulated considerable experience with this condition and clarified many of the issues related to diagnosis and treatment. Patients with Poland's syndrome usually consult a physician because of social embarrassment experienced when revealing the upper torso at sporting events. Most commonly, Poland's syndrome patients present a discernible skeletal and pectoralis major muscle deficiency, usually in the middle third of the chest wall, and a loss of the lateral pectoralis sweep. The breast involvement in Poland's syndrome varies in extent, as do the associated lesions: hypoplasia, aplasia, and more rarely, amastia. Agenesis of a sternocostal head of the pectorals major muscle is virtually constant and the pectoralis minor is more or less involved as are the upper dentate areas of the serratus anterior muscle. There may also be a localized depression due to hypoplasia or agenesis of one or more ribs between the second and the sixth rib. Finally, malformations of the fingers (brachio-mesophalangy, syndactyly) are common, and may or may not be associated with other and more serious lesions of the hand: "omitted hand", club hand, etc. The malformation is unilateral. An associated nipple or breast deformity is present except in the most minor presentation of Poland's syndrome (Fig. 1). Minor deformities can be corrected by use of customized or prefabricated solid silicone implants (Fig. 2).

Because an adequate chest wall is very important psychologically for males (a well-developed chest denotes fitness, strength, and power), we want to share our experience with solid implants in the correction of Poland's syndrome.

J.F. Hönig
Department of Craniofacial and Plastic Surgery,
University Hospital and Medical School, Goettingen,
Robert-Koch-Strasse 40, D-37075 Goettingen, Germany

Embryology

The anomaly of Poland's syndrome appears at the 46th day of embryonic development, since it is known that the middle phalanx and the pectoralis major develop at the same time. This corresponds to the period of development of the mammary ridges, which appear at the sixth week. Development of the sternocostal head of the pectorals major, the pectorals minor, and most of the intrinsic muscle of the hand depend on the metamer D1, which explains why the anomalies are associated, whereas the clavicular head of the pectoralis major, like the latissimus dorsi, depends on metamer C6, and therefore is spared.

Assessment

The skeletal evaluation initially consists of having the patient standing in front of a three way mirror to observe the symmetries of the shoulder, rib arches, and sternum. To observe the muscular structure, the surgeon starts to inspect the pectoralis muscles and to palpate them on relaxation and on forced contraction. The pectoralis muscle has clavicular, sternal and costal components, which combine and coalesce to form the tendon inserting into the humer-

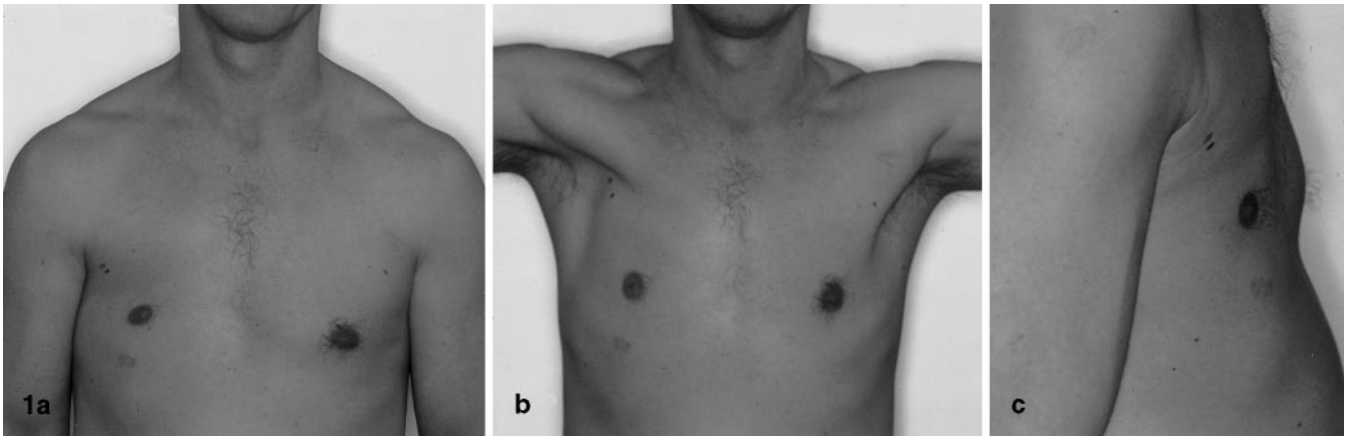

Fig. 1a-c Preoperative appearance of a 47-year-old man presenting with minor presentation of Poland's syndrome. He underwent a pectoralis implant to correct chest wall deformity. In the middle third of the chest wall, the pectoralis major muscle deficiency becomes obvious, with a displacement of the nipple. **a** Frontal view. Note the soft tissue deficiency. **c** Lateral view. Note the pectoralis muscle deficiency of the right side, compared to the left. **b** Frontal view with elevated arms. Note the missing sternocostal head of the pectoralis major muscle

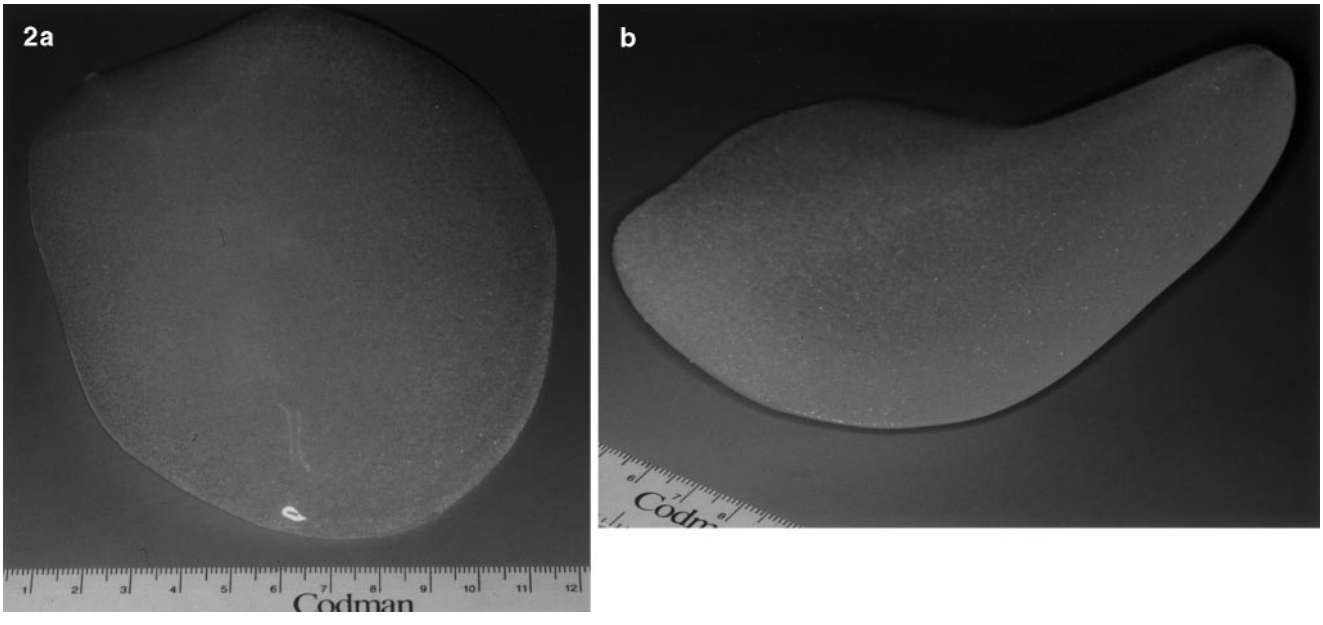

Fig. 2a, b Individually manufactured solid silicone implant. Frontal view (smooth) (**a**) and back view (textured) (**b**) of an individually manufactured solid silicone implant to mimic the shape of the pectorals major muscle in Poland's syndrome

us. The costal head often is asymmetrical, and it should be noted that the medial extension of the sternal head is not only variable, but may be quite asymmetrical. Finally, the status of the skin and subcutaneous tissue including fat or adipose tissue is assessed. In Poland's syndrome, the skin may be tightly stretched over the thorax and not very mobile on the underlying plane. This factor must be properly assessed. lf the skin cover is not supple enough, it will not allow stretching in a single stage and it will be necessary to resort to custom expansion. When associated with a muscle deficit, the lack of thickness will raise the additional indication for lining by a muscle layer, to better isolate the implant from the superficial layers. Certain measurements must be performed, starting from the areola, since this will determine the choice of implant (volume and diameter) and the route of access.

Moulage preparation

For Poland's syndrome (absence of pectorals muscle), a moulage is made of the chest defect in order to make the soft, solid, custom-made implant [1, 2] (Fig. 3). Moulage kits are available from almost all companies manufacturing breast implants. The moulage is sent to the company where a custom implant is fabricated. The implants are usually manufactured as smooth implants in solid silicone of ISO grade 4 or 5 (Fig. 2). The implant can be

Fig. 3a-d Preoperative moulage preparation with a paper mache kit of a patient with Poland's syndrome to correct the missing pectoralis muscle defect

modified on the operating table as required using large scissors. A moulage can be useful for carving pre-fabricated implants on the operating table. The surgeon can modify the solid pre-fabricated implant more precisely by copying the shape of the moulage.

Surgery

The implants are inserted with the patient supine under general anesthesia with both arms held above the head at an angle of 15 degree behind the acromioclavicular joint and secured on screens. This maneuver moves the pectorals muscle anteriorly and exposes the axilla were the incision is made for insertion of the implant. The incision in the axilla should be approximately 5 to 6 cm in length and placed in the mid, hair-bearing area of the axilla. The incision should be marked preoperatively and the arm moved, abducted and raised above the head in order to position the incision correctly and make it as inconspicuous as possible. The surgical incision is deepened through the subcutaneous tissue to the lateral chest wall at the perichondrium and periosteal level. A blunt instrument then is inserted with a large speculum in order to dissect the pocket. Enlargement of the inferior pocket must be cautiously undertaken to prevent detachment of the muscle. To facilitate the insertion of the implant after contouring it on the table, the implant is rolled like a "Roulade" ("beef olive"), and then inserted through the incision. Then it is unfolded with a large speculum, while lying under the subcutaneous tissue. Rough handling of the implant should be avoided as should manipulation of the posterior part of the pectoralis muscle in an effort to insert a large implant. A small suction drain is placed alongside the implant. A postoperative compression dressing applies firm, but gentle pressure. Anti-inflammatory medication is given for two days (Fig. 4).

Complications

Over the past five years, seven patients with Poland's syndrome have been treated and inserted solid implants were inserted to achieve an adequate chest wall symmetry.

Initially a seroma was present seven to ten days postoperatively in about one-third of cases. In one case persistent seroma required both the removal and reinsertion of the implants, two or three months later. However, by using the

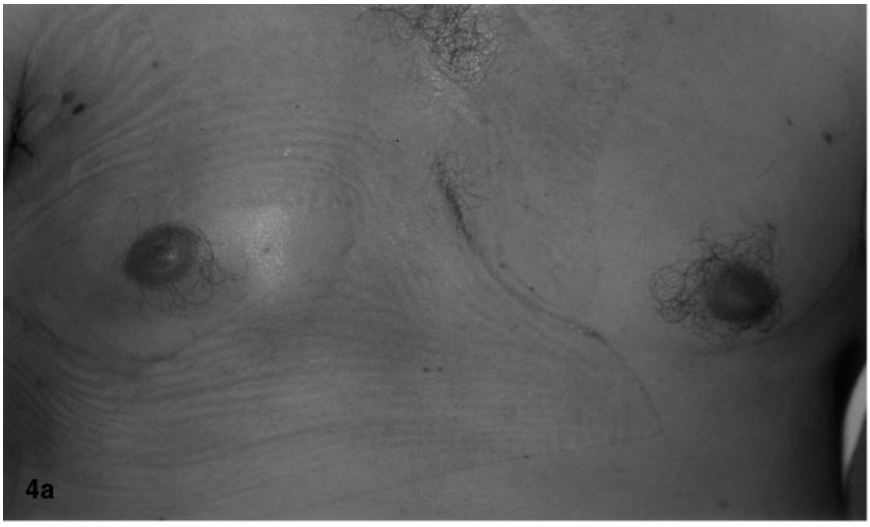

Fig. 4a,b The postoperative view demonstrates the more satisfactory appearance achieved with a subcutaneous solid silicone pectoralis implant. **a** Frontal view. Note the improvement of the middle third of the chest wall. **b** Lateral view

new positioning technique, careful use of the pocket markers as well as additional oral anti-pneumatory medication, the incidence of seromas has dropped. In one case the implant was too low, it needed to be removed and to be reinserted several months later, after the taping techniques were unsuccessful. Following reinsertion, taping of the inferior border was again employed for about eight weeks to prevent inferior displacement of the implant. Infections have not been observed around the implant nor have long-term capsular contractions or distortions of the implant.

Discussion

Solid, customized, and pre-fabricated silicone implants are very useful for the correction of Poland's syndrome. The implants can either be customized using a moulage technique or are pre-fabricated, manufactured implants, which can be modified on the operation table to repair the contour deformity [5, 7]. A pectoralis implant cannot correct the loss of the lateral sweep of the muscle, but can repair the anterior chest wall skeletal and muscular deformity [6]. Only if there is a sternal rotation and very prominent projection, should costal cartilage be considered for thoracic repair [3]. Latissimus dorsi muscle transposition should be considered if the pectus sweep to the humerus is the most significant aesthetic deficit; however, this is rare. The back scar and failure of the operative procedure due to muscle contraction detract from its appeal [4]. The complication of seromas, which had commonly occurred in earlier treatment of patients requiring breast implants has been significantly reduced by improved on-table positioning, less traumatic techniques, and further refinement of techniques using specialized instruments, dissectors, and the endoscope. The use of steroidal and nonsteroidal anti-inflammatory drugs contributes to the decreased rate of seroma formation. The long-term results of implantation seem very satisfactory.

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