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CHAPTER 52

A Porous Implant System (Porecon) for Facial Reconstruction and Augmentation

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Bone, cartilage, or synthetic materials may be used for facial reconstruction and augmentation. I should like to point out the possibilities offered by a modern synthetic material and discuss our results with implants of porous polyethylene (Porecon; Effner GmbH, Berlin, Federal Republic of Germany).

MATERIALS AND METHODS

Polyethylene is altogether one of the simplest synthetic compositions. It is a more or less branched, long-chained hydrocarbon. The material I use has no additives.

Rubin already achieved good long-term results with nonporous, compact polyethylene decades ago in the United States. In Porecon, however, the scanning electron microscope reveals at 2,600-fold magnification the fine ramification of an interconnecting open-pore system with a pore size of approximately 150 μm. These pores permit the ingrowth of connective tissue that is also supplied by capillary vessels. This finding has been repeatedly confirmed experimentally.

Ingrowth of bone has likewise been observed on implantation of the material in an osseous bed. The growth of bone into the pores of a synthetic material can by no means be taken for granted but represents a particular advantage of porous polyethylene. In contrast to polyethylene, Proplast implants from the same series of animal experiments did not display ingrowth of either connective tissue or bone. This is ascribed to the fact that the pore connections of Proplast do not have an adequately large diameter.

With polyethylene, the shape of the implant also remains constant postoperatively, which was demonstrated experimentally using the edge of an implanted cube. Proplast, on the other hand, was fragmented in the implant bed by the host tissue; parts of the synthetic material appeared in medullary spaces.[2] Further studies have shown that there is apparently much less danger of infection with porous polyethylene than with silicone. Other advantages are the easy workability of the synthetic material with a scalpel and scissors and the unproblematic sterilization with, for instance, ethylene oxide. Resorption of porous polyethylene has never been unequivocally demonstrated. I have not observed any resorption of this material in either animal experiments or clinical practice.

The good workability of the material has led to the development of manifold implants for diverse defects of the skull and the soft parts of the face. Thus there are implants of the calotte, forehead, cheek, chin, and auricle (Fig. 52-1).

In the area of the nose, however, caution is indicated; in my opinion, the tip of the nose is not suited for the implantation of synthetic materials in view of its exposure to too many micromovements. Porecon implants can, however, be used at the bony bridge of the nose.

Irrespective of the implant bed, such an implant must always be covered by an adequate amount of healthy skin. The coronal incision is particularly appropriate for exposure in the correction of frontal defects. It requires no suturing over the implant, which is favorable for the ingrowth and healing as well as for the cosmetic results.

A smooth surface can be achieved more readily with a synthetic implant than with costal cartilage or bone (Figs. 52-2A and B).

Our patients have shown no signs of resorption even after a postoperative follow-up of 5 years.

In 1982, we inserted a Porecon frame into the skin covering the auricle to replace necrotic cartilage in a case of purulent perichondritis. The result is still satisfactory and stable after 7 years. No resorption has been observed.

Delicate three-dimensional frames have been developed for the correction of microtia. Implantation has been successfully performed with the fan-flap technique, which involves encasing the synthetic frame in fascia of the temporal muscle prior to coverage with a skin transplant (Figs. 52-3A and B).[3]

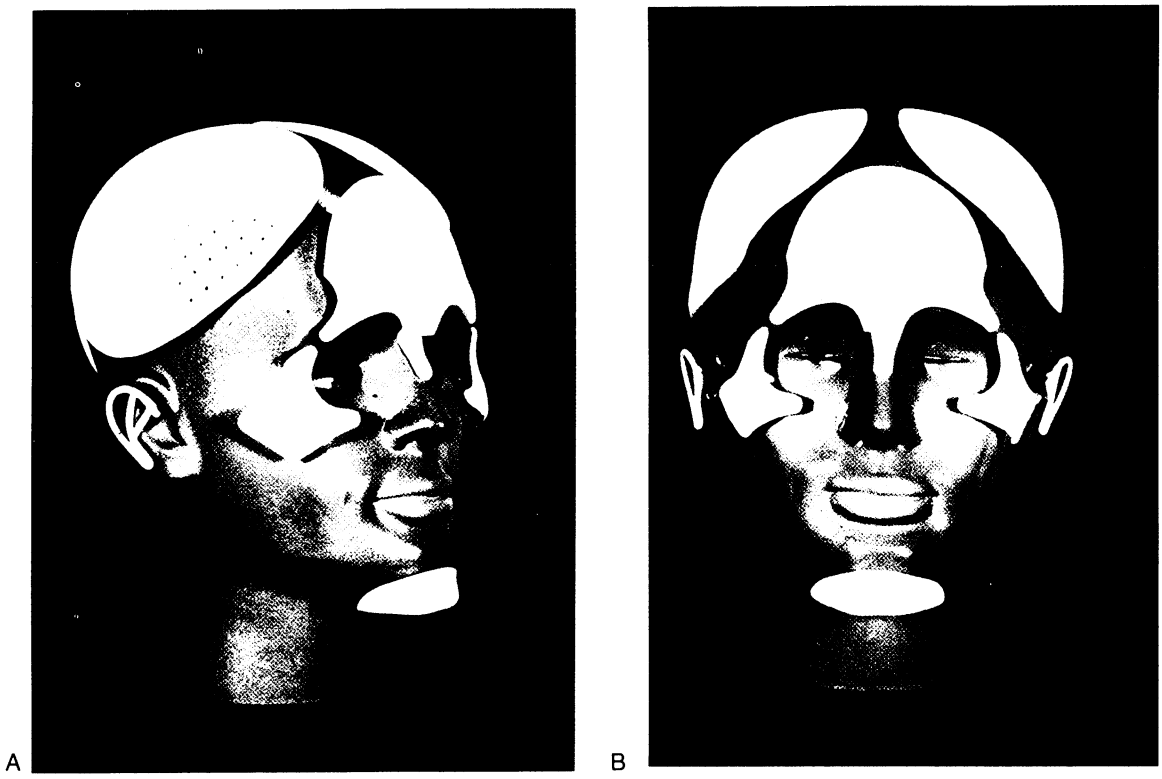

Figure 52–1. Different Porecon facial implants out of porous polyethylene. These parts can be easily cut to desired size and shape.

Figure 52–2. Patient with frontal defect after operation of a mucocele before (*A*) and 4 years after surgical correction with Porecon implant (*B*). Note smooth surface, with no resorption.

Figure 52–3. Patient with microtia on the right before (*A*) and 3 years after correction with Porecon implant and fan flap (*B*).

We are presently working on a tracheal prosthesis composed of porous polyethylene and silicone. The fact that we have clearly exceeded a 1-year survival time with this implant in repeated animal experiments opens up prospects of it soon being applied for tracheal replacement in humans as well.

RESULTS

We have so far applied 26 Porecon implants for facial reconstruction, primarily for correction of microtia and frontal defects. These implants have shown good to very good long-term results (maximal follow-up of 7 years). A cheek implant had to be removed again because of the implants' hypermobility.

DISCUSSION

With synthetic implants, the risk of possible rejection is offset by the advantage of avoiding a second intervention in the patient.

Porecon implants offer the further advantage of not having to expect resorption, which, at least with conserved cartilage transplants, cannot be ruled out entirely.

Because porous polyethylene is easily workable, can be well sterilized, and does not promote infections, we regard it as an extremely interesting implant material for facial reconstruction and augmentation. The good long-term results confirm this positive assessment.

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