Porous Polyethylene and Proplast: Their Behavior in a Bony Implant Bed
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Porous high-density polyethylene (PHDPE) has been used to reconstruct cartilaginous structures and should also be suitable for bony structures. It was compared with Proplast in a study of guinea pigs having 7-mm defects made in the calotte and 5 × 2 × 2-mm defects in the lower jaw. The defects were filled with implants of corresponding size, and a subperiosteal implant was placed on the nasal dorsum. Fifty-five Proplast implants and 55 PHDPE implants were compared.

The PHDPE implants stimulated new bone formation substantially better than did the Proplast ones. Ossification exceeded 50% in 14 of 19 PHDPE implants at 3 months, and 7 showed more than 75% ossification. No Proplast case showed more than 25% ossification even after 6 months.

Fig 6–22. (top)—Porous high-density polyethylene 3 months after implantation in the calotte. Bony encasement of the edge without loss of form. Close contact of the surfaces (*i*, implant; *b*, bone).

Fig 6–23. (bottom)—Proplast 3 months after implantation in the calotte: structural deterioration of the synthetic material (*i*, implant). The material appears in bone marrow cavities (*x*).

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Bony ingrowth was more marked from the narrow side of the implant. Both ossification of pores and advancing tongue-shaped areas of bony tissue were involved in anchorage of both types of implant. Bony encasement of the edge of the defect with PHDPE implants at 3 months (Fig 6–22) contrasted with structural deterioration of Proplast (Fig 6–23).

Porous polyethylene appears to be more stable than Proplast when used to fill bony defects in guinea pigs. Both materials are relatively safe as far as infection. Porous polyethylene has been used clinically to correct facial skull defects. Patients with defects of the forehead and eye socket have obtained subjectively and objectively satisfactory results.

▶ In the quest for nonautogenous materials that could save operative time and expense as well as save the patient morbidity from the donor site, porous high-density polyethylene seems to be worth careful clinical use and observation. If found to be successful, there may be an attractive application in the

multiple stages of reconstruction throughout the growth and maturation of children who have craniofacial anomalies that warrant surgery.—R.J.H.