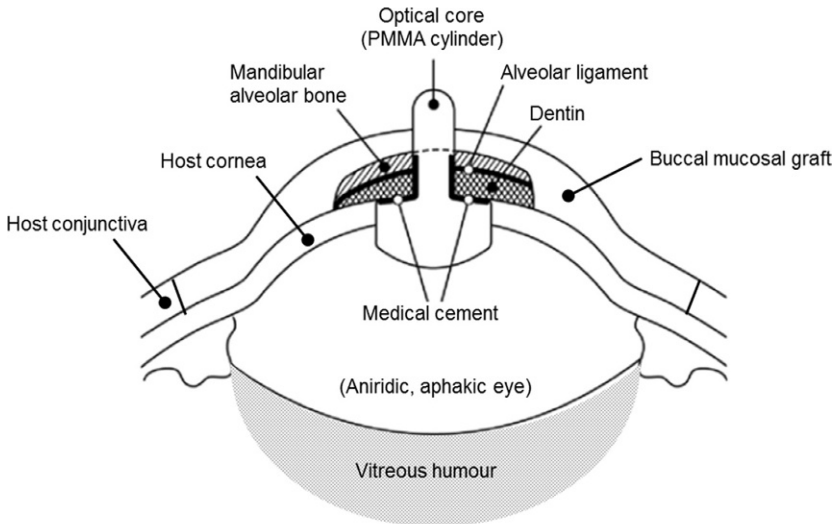

FIG. 13.3 Schematic view of Strampelli's keratoprosthesis in which autologous tissues harvested from the patient are used to fabricate the "skirt" (vertical orientation: top—front of the eye; bottom—back of the eye). *Image adapted from Baino, F., 2015. How can bioactive glasses be useful in ocular surgery? J. Biomed. Mater. Res. A 103, 1259–1275 © Wiley.*

Ridge Maintenance Implant (ERMI) used in periodontal surgery (Stanley et al., 1997). These melt-derived commercial products have a relatively limited diffusion as they suffer from the inherent drawback of having a fixed size and geometry, while surgeons often claim to cut or shape the implant to match better the patient's anatomy, which is impossible with rigid glass devices. However, a promising application of monolithic bioactive glass is the production of custom-made implants for orbital surgery. Thompson (2011) reported the clinical trials on 30 patients suffering from severe orbital floor fractures for which conventional treatment with bone or cartilage autograft was ineffective. Thus, the anatomy of the orbital defect was acquired and reconstructed by making use of axial computed tomography, and a rapid prototyping machine was used to produce molds for casting 45S5 Bioglass implants matching the defect geometry. All patients had satisfactory cosmetic and functional rehabilitation at a 5-year follow-up and regained full movement of their eyes.

A similar approach was described in a series of clinical studies carried out in Finland from the late 1980s to the early 2000s using solid plates of S53P4 ($53SiO_2$-$23Na_2O$-$20CaO$-$4P_2O_5$ wt%) glass (trade named as BoneAlive) (Suominen and Kinnunen, 1996; Kinnunen et al., 2000; Aitasalo et al., 2001; Peltola et al., 2008). Implants were all 1-mm thick and produced by casting into round, kidney- or hearth-shaped steel molds of three different sizes. Results showed that S53P4 glass was able to stimulate the growth of new orbital bone and was very slowly resorbable over time without eliciting problems of mechanical support in situ (Fig. 13.4). If the glass implant size and shape were