50 Years Ago in CORR

The Use of Plaster of Paris to Fill Defects in Bone

Leonard F. Peltier, MD CORR 1961;21:1–31

Bone defects may result from a variety of causes, including bone loss from open fractures, infections, and tumors. According to Bick [1], the filling of defects with various substances, including animal bone, was, at least, vaguely described in Hindu, Egyptian, and Greek sources. Perhaps one of the earliest descriptions in modern times was that by Jobi Meekren, a Dutch surgeon, who, in 1682, attempted to fill the skull defect of a soldier using fragments of a dog's skull [2]. (Davison and Smith commented, "In those early days

of superstition when the Church ruled all it surveyed, Jobi Meekren was forced to remove the implanted bone under the ban of excommunication from the Church which refused to recognize such a monumental work and referred to it as 'an unchristian' method of treatment.") Many others, including Ollier, Duhamel, and Syme experimented with various sorts of grafts to fill defects, but according to Sir Arthur Keith [4], "The modern practice of bone grafting was invented by Macewen in the Infirmary of Glasgow in 1880." While most authors used

autografts (bone from the patients) or allografts (bone from other humans), surgeons attempted to fill defects with other materials quite early on.

In 1961, Peltier [5] described his many animal and clinical experiments using plaster of Paris (a hemihydrate of calcium sulfate) to fill bone defects. According to him, several dozen individuals had experimented with this material to fill defects in experimental animals or humans, beginning with Dreesmann in 1892 [3]. Based on his animal experiments, Peltier concluded that plaster of Paris was easily

Fig. 19 The illustration shows the radiographs of a 10-year-old boy with a pathologic fracture through a bone cyst. Sequential radiographs show infilling of the defect after the implantation of plaster of Paris pellets. (Reprinted with permission and © Lippincott Williams & Wilkins from Peltier LF. The Use of Plaster of Paris to Fill Defects in Bone. *Clin Orthop*. 1961;21:1–31.

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sterilized and completely resorbed within a few weeks to a few months, but that it did not stimulate osteogenesis. Nonetheless, he noted, “Reconstitution of the bony defect occurs regularly” (Fig. 19) and believed it a reasonable material for filling defects. In considering Peltier’s finding that the material did not stimulate osteogenesis, one wonders why he (and others) believed it important to fill these defects with anything in the absence of temporary structural support. Medical grade forms of calcium sulfate hemihydrates continue to be used clinically to fill bone defects, sometimes in combination with demineralized bone matrix (that would

stimulate osteogenesis) or antibiotics. For his extensive work with an approach that was uncommon at the time, Dr. Peltier won the first Nicolas Andry Award of the Association of Bone and Joint Surgeons.

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