Three dimensional custom-made PEEK cranioplasty

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ABSTRACT

Background: An optimal reconstruction of calvarial skull defects is a challenge for neurosurgeons, and the strategy used to achieve the best result remains debatable. Therefore, we conducted this study to compare the esthetic and functional outcome of custom-made three-dimensional (3D) cranioprostheses to handmade bone cement in reconstructing calvarial skull defects.

Methods: We included 66 patients above 10 years of age with calvarial skull defects and undergoing reconstruction: 33 were enrolled in the custom-made 3D implants group and 33 in the handmade implants group in the period from August 2017 to December 2020 in the neurosurgery department of Fayoum University Hospital.

Results: Complete success of the esthetic end-point was insignificantly higher in the custom-made 3D prostheses group based on the doctor's and patients' assessment (60.6% vs. 42.4%; 33.3% vs. 9.1%, $P > 0.05$), respectively. Complete success of the functional end-point was significantly higher in the custom-made 3D group compared to the handmade cement bone group according to the doctor's and patients' assessment (60.6% vs. 0%; 21.2% vs. 0%, $P < 0.05$). □ere were no late complications noted in the custom-made 3D prosthesis group, whereas 50% of the handmade bone group had late complications ($P < 0.05$). Full improvement of the symptoms of the "syndrome of trephined" was achieved in the 3D custom-made group compared to the handmade bone cement group (20%
vs. 0%).

Conclusion: Cranioplasty using three dimensional customs made PEEK prosthesis is a reliable method which saves operative time, lowers cost and provides less complications if compared with other cranioplasty techniques.

Custom-made 3D cranioprostheses are better than handmade bone cement in reconstructing calvarial defects in terms of esthetic and functional outcome as well as complications.