Enhancing The Process of Bone Augmentations in Craniofacial Region

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Abstract

The most popular synthetic polymers for craniofacial reconstruction are highly porous polymer matrices such as Polyethylene (PE), polyurethane, polyetheretherketone, and polysulfone. All are biocompatible polymers that are stable in the body, of which PE(MEDPOR) is the most popular which play an important role in facilitating the attachment of cells and the spread, propagation, and formation of new tissue/fluids around the bone defects. Despite the aforementioned reports of porous PE, one of the most common clinical complications1,2 associated with the use of porous PE implants is the formation of fibro-vascular ingrowth around(in form of capsule) and into it`s porous which provide late resistance to infection as documented, reaches up to 6-13 %3, 4.

Aim& objectives: We proposed that, if we coat PE with calcium sulfate–hydroxylapatite (CS–HA), this would allow PE acted as an osteoconductive bone graft which enhance bone regeneration rather than formation of fibro-vascularcapsule.

Material &Methods: In vitro, PE disc were fabricated with pore size ranges from 100 to 400 µm, the pore volume is >35%, and the density is 0.46–0.54 g/cm3. The calcium sulphate hydroxyapatite (CS–HA) cement was used as a thin layer coating the outer surfaces of PE disc. Human bone marrow mesenchymal stem cells were studies using cell viability assay & Scanning Electron microscopy(SEM). In vivo, the coated and non-coated PE disc were implanted at calvarial bone defects of 20 Rats. Cone beam computerized tomography(CBCT), histology, and histomorphomtery were used to assess bone regeneration inside the pores.

Results: (CS–HA) coating of the scaffold not only improved attachment but also increased the proliferation of human bone marrow mesenchymal stem cells in vitro. In vivo, histological analysis showed that the coated PE`s study groups had active bone remodelling at the border of the defect. These my infer that coated polyethylene acted as an osteoconductive bone graft. Furthermore, bone formation inside the pores of the coated polyethylene was also noted, which would enhance the process of osteointegration.

Biography

RANDA is currently working as Assistant Professor/and researcher in oral and maxillofacial surgery dept. at Dental faculty, King Saud University Saudi Arabia. She Randa received his Doctoral degree or PhD on Bone bioengineering/oral and maxillofacial surgery from the University of Glasgow 2014. She Randa completed her Masters in oral and maxillofacial surgery from the University of Glasgow 2010. She then worked at the Institute medical school/ Stem cell research unite, & served as Assistant Professor in department of oral and maxillofacial surgery, Dental faculty, King Saud University. She Randa has authored several publications in various journals and books. Her publications reflect her research interests in Regenerative medicine/ bone bioengineering and advancement of oral/dental health care. She Randa is also a reviewer of the International Journal of oral and maxillofacial surgery. She Randa is serving as a member or fellow in Association of Saudi society of oral and maxillofacial surgeon, And royal collage of surgeon in Edinburgh. She is currently in charge of ongoing post graduate doctorate program in oral and maxillofacial surgery (Research part) in Dental faculty, KSU. She Randa is awarded or honored by American scientific publisher for best publication 2017, and she has got King Saud award of excellence 2015.