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DEVELOPMENT OF BONE GRAFT SUBSTITUTES USING EXTRACTED HUMAN TEETH

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SUMMARY

Introduction: Autogenous bone graft promotes osteogenesis, osteoinduction, osteoconduction, and rapid healing, and does not induce immune rejection. It is considered the gold standard for the reconstruction of bone defects. However, to overcome its limitations, such as high morbidity, potential resorption, limited availability and high cost, numerous alternatives were investigated for bone regeneration over the years. Many researchers have worked with human tooth as a possible bone graft substitute as tooth and bone are chemically similar. The main disadvantage of autogenous tooth for bone grafting is the need for chair side preparation which is inconvenient and time consuming. To eliminate this problem the Tata Memorial Hospital Tissue Bank developed allografts from extracted human teeth. **Materials and Methods:** Whole teeth were collected from donors who met the selection criteria after their consent. Serological tests were conducted to rule out any transmissible diseases. Whole teeth were used to prepare whole tooth allografts (WTA) and dentin allografts (DA) after separating the dentin. The whole teeth and dentin were processed in separate batches, lyophilized, packed in 0.5cc vials and gamma sterilized at 25kGy. The efficacy of WTA and DA was evaluated clinically, radiographically and histologically in comparison with freeze-dried bone allograft (FDBA) in alveolar ridge preservation. **Result:** Processing of 22 whole teeth resulted in the production of 32 vials and 20 dentins produced 23 vials of 0.5cc granules. Both WTA and DA were white and free flowing granules. WTA and DA consistently showed superior results which were statistically significant as compared to FDBA. Histological evidence of new bone formation by teeth allografts corroborated the better clinical and radiographical results. Between WTA and DA sites, there was no statistically significant difference. **Conclusion:** Human teeth have the potential to be used as a bone graft substitute in the repair and regeneration of bone. WTA is an excellent alternative to FDBA. It is a natural, biocompatible, versatile, predictable grafting material, cost-effective and readily available. Extracted whole teeth, a biomedical waste could be recycled into allografts to produce an innovative biomaterial. Tissue bankers could explore the option of banking whole tooth allografts.