Abstract: Indocyanine Green Angiography Use in Breast Reconstruction: A National Analysis of Outcomes and Cost in 110,320 Patients

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capacity of customized, 3D printed bioactive ceramic (3DBC) scaffolds with dipyridamole (DIPY), an adenosine A2A receptor (A2AR) indirect agonist known to enhance bone formation, at the ramus of the rabbit mandible.

METHODS: Critical-sized bony defects (10mm height, 10mm length, full thickness) were created at the inferior aspect of the right mandibular rami of rabbits, adjacent to the angular process (n=15). Each defect was replaced by a custom-to-defect, 3DBC printed porous scaffold composed of β-tricalcium phosphate. Scaffolds were either uncoated (control), collagen-coated (COLL), or collagen coated and immersed in 100μM dipyridamole (DIPY). At t=8 weeks, animals were euthanized and the rami retrieved. Bone growth was assessed exclusively within scaffold pores, and evaluated by microCT/advanced reconstruction computer software. MicroCT quantification was calculated in segments as a function of distance from proximal to distal scaffold insertion. Bone morphology was assessed by histology. One-way ANOVA analysis was performed to compare group means, and 95% confidence intervals (CI) were included.

RESULTS: Qualitative analysis did not show an inflammatory response. On 3D analysis, the control and COLL groups (12.3±8.3% and 6.9±8.3% bone occupancy of free space, respectively) had less bone growth, while the most bone growth was in the DIPY group (26.9±10.7%), a statistically significant difference (p<0.03 DIPY vs. control and p<0.01 DIPY vs. COLL). Evaluation of scaffold presence resulted in a significantly higher presence of material for the COLL group relative to the DIPY group (p<0.015), whereas the control group presented intermediate values (non-significant relative to both COLL and DIPY). A general linear mixed model was performed for bone growth as a function of distance from the most proximal (deepest) aspect scaffold insertion site to the most superficial (distal at the mandibular border) aspect, for which DIPY-treated scaffolds demonstrated the most bone growth at the thinnest region of ramus bone at the proximal defect. Highly cellular and vascularized intramembranous-like bone healing was observed in all groups.

CONCLUSION: COL-DIPY significantly increased the 3DBC scaffold’s ability to regenerate bone. Irrespective of treatment group, all scaffolds demonstrated bone regeneration with predominant focal growth at bone-scaffold interfaces.

Indocyanine Green Angiography Use in Breast Reconstruction: A National Analysis of Outcomes and Cost in 110,320 Patients

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INTRODUCTION: Indocyanine Green (ICG) angiography was first used in breast reconstruction in 2007 and has gained popularity due to its ability to assess the viability of both mastectomy skin and tissue flaps. We aim to analyze trends, disparities and outcomes associated with the use of ICG in breast reconstruction.

METHODS: Using 2012 - 2014 data from the National Inpatient Sample, breast reconstruction cases that were performed with or without the use of ICG angiography (International Classification of Diseases: Ninth Revision code 17.71). Trends over time in ICG use were assessed using the Cochran-Armitage test. Outcomes of interest included reconstruction modality, debridement rates, hospital charges and length of stay (LOS). Hospital charges and LOS were assessed using a generalized linear model with log link and gamma distribution.

RESULTS: Overall, 110,320 patients underwent breast reconstruction over the study period: 107,005 (97.0 percent) without the use of ICG and 3,315 (3.0 percent) with the use of ICG. ICG use increased over time: 750 patients (1.9 percent) underwent breast reconstruction with ICG in 2012, increasing to 1,275 patients (3.7 percent) in 2013 (p<0.001). Black and Hispanic patients were more likely than White patients to undergo ICG use (p<0.001). Smokers (p=0.018), hypertensive (p=0.046), obese patients (p<0.001) and those with a higher comorbidity index (p<0.001) were more likely to undergo ICG use. Large bed size hospitals (p<0.001), teaching hospitals (p<0.001) and Southern region (p<0.001) had significantly greater use of ICG. It was more frequently used in...
autologous reconstruction as compared with tissue expander reconstruction (4.5 percent versus 2.1 percent; p<0.001). There were significantly more debridements performed in cases where ICG was used (5.6 percent versus 3.2 percent; p<0.001). Use of ICG added a mean charge of $9,080 per reconstruction ($79,242 vs. $70,162; p<0.001); however, it also resulted in a decreased LOS (2.37 days versus 2.47 days; p<0.001).

CONCLUSION: The use of Indocyanine Green angiography in breast reconstruction has increased in recent years and is associated with higher debridement rates. Significant hospital, patient and ethnic disparities exist in Indocyanine Green angiography use. Although length of stay was significantly reduced statistically, it bears minimal clinical significance and clinicians may utilize this information regarding resource utilization in the setting of Indocyanine Green angiography use versus need for future additional unplanned procedures, given the significant increase in charges.

Development of a Breast Reconstruction Training Environment

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INTRODUCTION: Breast reconstruction following mastectomy remains an essential component of the holistic approach to treating women affected with breast cancer. The training of plastic surgery residents in this domain can prove to be a challenging task due to limited access to non-patient models. Advanced and increased simulation-based training is one way to teach residents necessary skills, improve outcome of surgery and create a dynamic teaching environment. Moreover, the introduction of the competency based training programs has raised the need for simulators as objective assessment tools in order to gauge residents’ performance and assess for acquisition of competence.

METHODS: A modified Delphi technique was used to survey plastics surgeons with an expertise in breast reconstruction from 6 university centers with plastic surgery residency programs. A list of the most challenging steps in teaching alloplastic breast reconstruction was obtained. Using various commercially available silicon materials, a benchtop post-mastectomy breast reconstruction simulator was created by casting and molding techniques. The model was built in order to accommodate both sub-pectoral and pre-pectoral implant based reconstructions. Senior plastic surgeons with an expertise in breast reconstruction were recruited and asked to perform a sub-pectoral, implant based breast reconstruction on the simulator. Following the procedure, participants were asked to complete a 22-point questionnaire using a 5-point Likert scale to grade the simulator on its physical attributes, realism of experience, realism of material and overall experience.

RESULTS: Nine relevant anatomical components were successfully included in the simulator, notably, rib cage, intercostal muscles, pectoralis minor muscles, dissectible pectoralis major muscle, acellular dermal matrix sheet and a three-layer skin envelope. A pneumothorax indicator was also incorporated. The simulator was designed to be completely reusable with no disposable components necessary for each use. Face and content validation results based on the evaluations performed by expert plastic surgeons showed excellent results among parameters evaluated, with an overall mean score of 4.52 on 5 (90.4%).

CONCLUSION: Given the realism offered by the simulator as well as its reusability, this project has the potential to revolutionize the way in which breast reconstruction is taught and mastered by plastic surgery residents with the ultimate goal to improve patient outcomes and ensure patient safety.

3D Domestic Printer Use in Rhinoplasty

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INTRODUCTION: Systematic nasal analysis is critical to establish the goals of rhinoplasty, and there are numerous methods that plastic surgeons adopt