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Open Access Journal of Dental Sciences
ISSN: 2573-8771

Reconstructing the Face, Revealing the Identity

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Editorial

Volume 4 Issue 1

Received Date: January 22, 2019

Published Date: January 28, 2019

DOI: 10.23880/oajds-16000215

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Abbreviations: CARES: Computer Assisted Recovery Enhancement System; REFACE: Reality Enhancement Facial Approximation by Computational Estimation; DENSE: Displacement Encoding with Stimulated Echo; CT: Computed Tomography; MRI: Magnetic Resonance Imaging; CBCT: Cone Beam Computed Tomography.

Editorial

It was a great surprise to the 21st Century when it experienced the marvel of the digital world in recreating the face of the Pharaoh Tutankhamun, the young Egyptian King whose mummy was discovered from his tomb. Reconstruction of a destroyed human face has always been a guide to understand the antemortem characteristics for the identification of the victim. Forensic Facial Reconstruction is a technique in forensic investigations to rebuild a face onto a skull to recreate the antemortem appearance of the individual. Being a combination of both scientific method and artistic skills, it has enormous significance in Forensic Odontology and Anthropology [1].

The first documented work on facial reconstruction was by the German physiologist and anatomist Welcker (1883) who estimated the average facial tissue depth by examining the cadavers and inserting a small surgical blade into various anthropometric landmarks on the face and then measured the depth of penetration. First successful use of forensic facial reconstruction was done by medico legal experts in United States of America in 1916 [2,3].

Currently two basic techniques are used in forensic facial reconstruction-Two Dimensional (2D) and Three Dimensional (3D) facial reconstruction. 2D facial reconstruction is used to recreate face from the skull with the use of soft tissue depth estimates. Various computer software programs like CARES (Computer Assisted Recovery Enhancement System) and REFACE (Reality Enhancement Facial Approximation by Computational Estimation) are used for 2D reconstruction. In 3D Manual method, facial reconstruction is done by using clay, plastic or wax directly on the victim's skull or more often a replica of the skull which has to be identified. 3D computerized facial reconstruction is commonly done by using either a set of anatomical landmarks placed on the face template or DENSE (Displacement Encoding with Stimulated Echo) method based on a spatial volumetric template from both the face and skull. Nowadays, the data used are commonly obtained using Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Ultrasonography. CT scanners can image both the internal hard-tissue structures and the external cutaneous covering allowing a complete assessment of facial morphology. Cone Beam CT has added advantage as it can identify the presence of restorations and prostheses, root canal filling materials, and denture clasps and wires for enforcement in both dry and soft-tissue-attached skulls during their forensic analysis and are thus useful in reconstruction of face [4-7].

In ancient time, people used to create idols of Kings with similar facial features. Later trained sculptors made sculptures of renowned persons with better accuracy. The latest technology has increased the accuracy level to a much greater extent. Digital software equipped with statistical functions is now capable of recreation of a face with very high resemblance to the actual one. Lee (2012) established 81% accuracy with the help of CBCT whereas Miranda (2018) estimated the accuracy between 63% and 74% [8,9].

Forensic facial reconstruction is a highly sophisticated tool to reveal the hidden evidence present in human remains. A damaged body of a victim may not seem to be expressive to the naked eyes but the reconstruction can provide the forensic scientists with valuable information about the identity, cause of death and other circumstantial evidence. As the technology is rapidly advancing day by day, achieving highest accuracy and best profiling in forensic facial reconstruction is just a matter of time [10].

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