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# 3D RECONSTRUCTION OF SYNDACTYLIZED HAND IN AUTODESK RECAP PHOTO WITH ARDUINO

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**ABSTRACT** Syndactyly is one of the most common congenital malformations of the hand and is a result of a failed separation of adjacent digits. These digits are common among congenital limb malformations that affect 1 out of 2,000-3,000 people at birth. A reconstructive surgery would be needed to separate the digital skin, reconstruct the web space between fingers, and cover the separated digits with soft tissues. Finding the optimal shape and size for a dorsal flap in the web commissure reconstruction is important to avoid web creep. Conducting a numerical study with known mechanical properties, such as Young's Modulus of the dorsal flap that varies with age, gender, and ethnicity, can help understand why web creep occurs and how to prevent it. To the authors' best knowledge, however, no numerical study has been conducted on the effect of the size and shape of the flap on the outcome quantitatively. This leads to analyzing the stress of the dorsal flap using a finite element analysis (FEA) that can be further investigated with 3D hand models of syndactyly digits. Results will vary depending on the given mechanical properties, type of syndactyly, and a determined found dorsal flap model to fully cover the patient's separation of digits through reconstructive surgery. Gathering a range of data on patients with this defect is unattainable at this current stage and the results will be discussed as what is expected from our analysis.

*Keywords: Syndactyly; web reconstruction; finite element analysis (FEA); dorsal flap*

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