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A Parametric Study of the Mechanics of Different Skin Flap Techniques

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ABSTRACT

In modern day plastic and reconstructive surgeries numerous skin flap designs have been developed and are used to close open wounds. Skin flaps are developed with the intention of imposing minimal tension in skin closure. Excessive tension can lead to poor blood flow that result in post-surgery complications such as necrosis. Currently there is no standard in choosing a skin flap design and a surgeon's choice is based personal experience. A comparison of the mechanical loading in these various designs has not yet been done. We have developed a parametric study, using finite element analysis, of two advancement skin flaps designs. The study focuses on the stress in the design as the defect size is increased. The defect size is increased by scaled by scaling the overall boundary condition to size. From this study, we have found that the stresses of a skin flap on a planar surface are dependent on the defect size. In addition, the choice of skin flap can significantly impact the stresses.

KEYWORDS

Finite Element, Skin Mechanics, Reconstructive Surgery