

Patient-Specific three-dimensional printing models for planning the human shoulder orthopaedic surgeries

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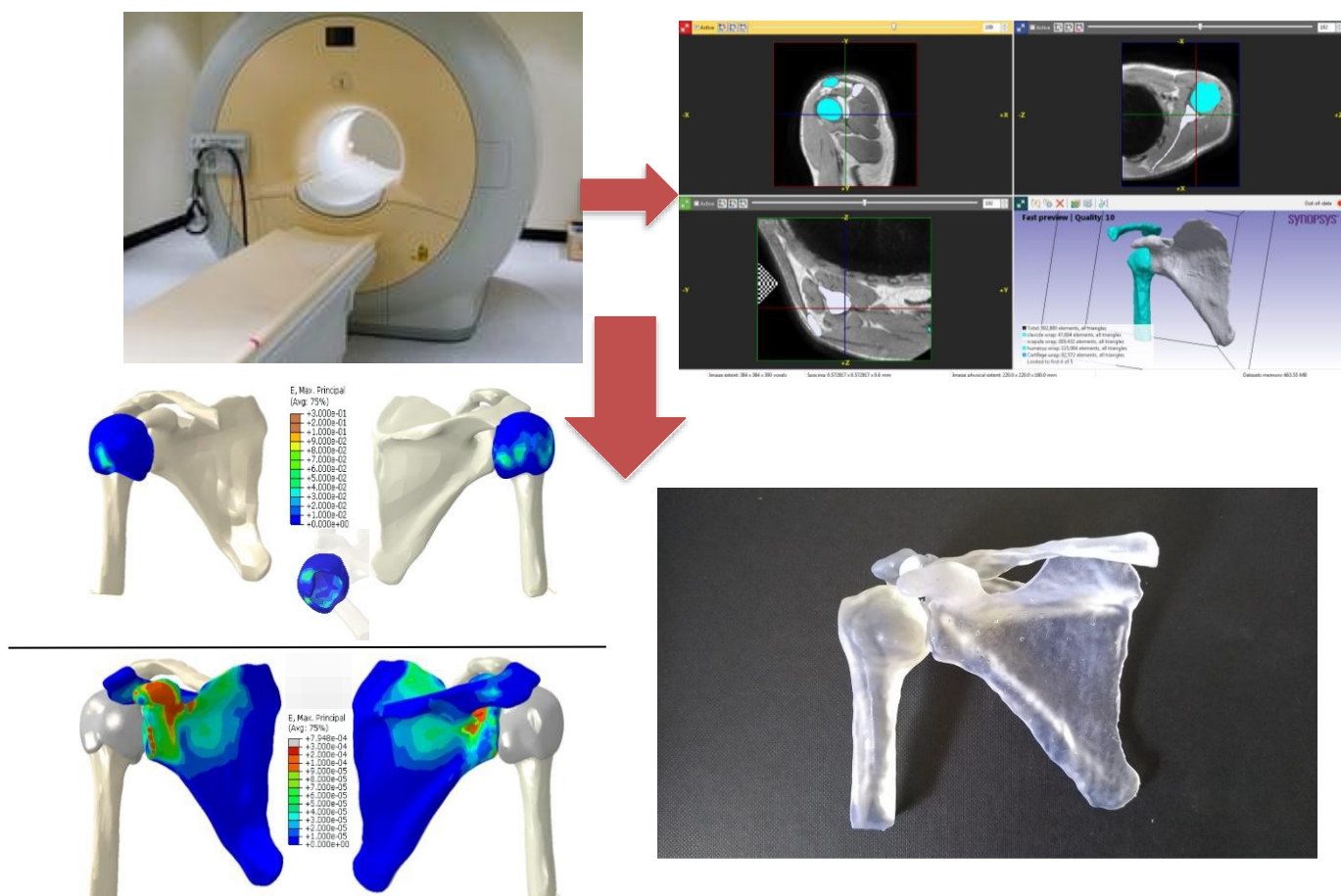
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Abstract

The human shoulder is a stable, complex and multi-functional anatomical joint within the human body. Its remarkable range of motion for abduction/adduction, rotation, and movements within the sagittal plane makes this important joint susceptible to several types of dislocations. While diagnosis usually starts with scanning techniques such as MRI/CT, three-dimensional printing could provide more detailed information about the patient for personalised treatment. In this study, after the MRI data was captured, the Bio-CAD image-based modelling technique [1] was used, using ScanIP software, and the anatomical structures were manufactured for pre-surgery planning using Fused Deposition Modelling (FDM) and Stereolithography (SLA). Besides this, the finite element model was developed to assess stability in different conditions. The use of three-dimensional (3D) printed models can aid in effective pre-operative planning, for example for analysing the shoulder dislocations, rotator cuff tears [2], or for any other pre-planned treatments. This helps to design detailed surgeries, improve the diagnosis, therapeutic strategies, and increase the awareness of the patients.



References

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- [2] Zheng, M., Qian, Z., Zou, Z., Peach, C. and Ren, L., 2019. Subject-specific finite element modeling of the human shoulder complex part 2: Quantitative evaluation of the effect of rotator cuff tear propagation on glenohumeral joint stability. *IEEE Access*, 7, pp.34068-34077.

Biography

Aysha Saeed is studying at the University of Exeter, College of Medicine and Health. She is currently in her final year of BSc Medical Sciences.

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