The Use of 3D Reconstruction and Virtual Reality to Support Prospective Bariatric Surgery Patients

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ABSTRACT

This study investigates the development of realistic simulation models in a virtual reality (VR) environment to depict the post-operative shape and appearance of bariatric surgery patients. The objective is to assist patients in visualising their long-term weight loss, fostering a positive body image. Comprehensive literature reviews were conducted to determine lipid distribution across different body parts and the appearance of skin folds after bariatric surgery[1,2,3,4]. These findings were integrated into a deformable simulation model capable of replicating the post-operative body shape and skin appearance accurately[5,6]. The research seeks to make a significant contribution to the fields of medical and health informatics, highlighting the potential of VR as a valuable tool in psychological therapies in healthcare[7]. Future work involves evaluating the impact of this VR-based approach on the patients' self-esteem and satisfaction with the surgery outcomes.

INTRODUCTION

Bariatric surgery has become an increasingly popular and effective intervention for obesity, yielding significant long-term weight loss in patients[8]. However, adjusting to a new body image post-surgery presents psychological challenges that can influence self-esteem, body satisfaction, and overall success of the weight loss journey[9]. Leveraging the advances in virtual reality (VR) technology, this research aims to develop a highly accurate simulation model of the post-operative physical appearance of bariatric surgery patients to aid in building body images[10].

The role of VR in healthcare has been an emerging area of interest, with its potential to facilitate rehabilitation, reduce anxiety, and improve patient education[9]. In the context of bariatric surgery, VR can be a powerful tool to help patients visualize and adapt to their new body image, thereby building confidence[10].

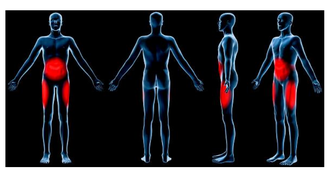


Fig 1. *Lipid distribution in the body*

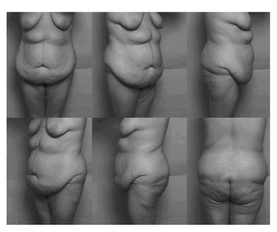


Fig 2. *Body appearance after bariatric surgery*

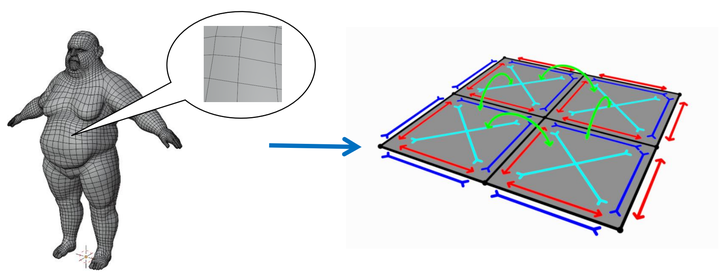
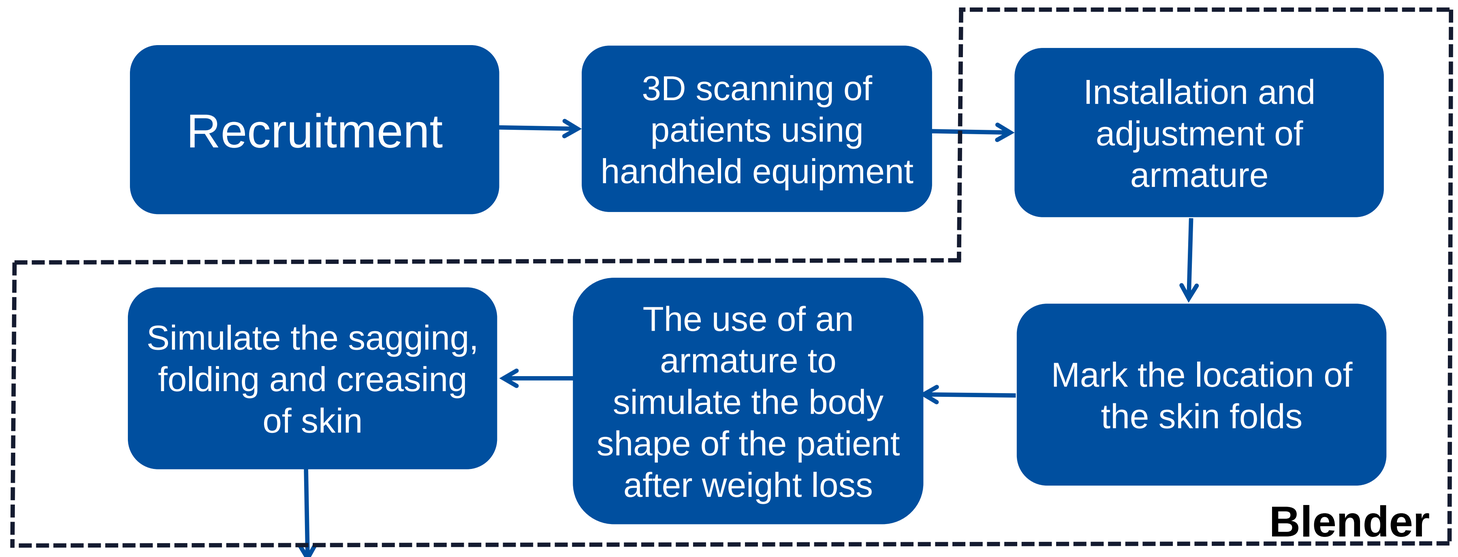


Fig 3. *Mass-spring models for 3D modelling: Tension springs (blue), compression springs (red), shear springs (cyan), and angular bending springs (green).*

METHOD



PRELIMINARY RESULTS

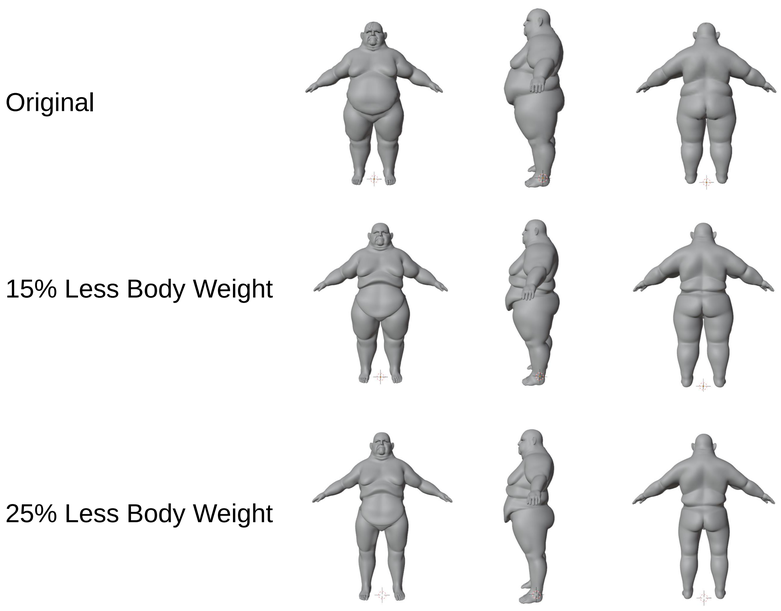


Fig 4. *Original and post-bariatric surgery body image*

Fig 5. *Virtual Reality Rooms with 3D image*

FUTURE PLAN

- Complete pilot study testing the new approaches on various data sets and a range of new virtual environments
- Use this study to explore more deformable models to simulate the body image of patients after bariatric surgery.
- Based on this method, continue to develop a more automated method to simulate the body image of patients after bariatric surgery.
- Conduct new patient study (after MRes project)

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