

3D PRINTED LIVER MODEL FOR PREOPERATIVE PLANNING OF PARTIAL HEPATECTOMY

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Background

Liver resection is the only curative treatment option for colorectal metastases to the liver. High complication and cancer recurrence rates dictate the need for adequate preoperative planning. 3D printing technology has been gaining momentum in the recent years and shows potential in optimising preoperative anatomical planning for hepatectomy.

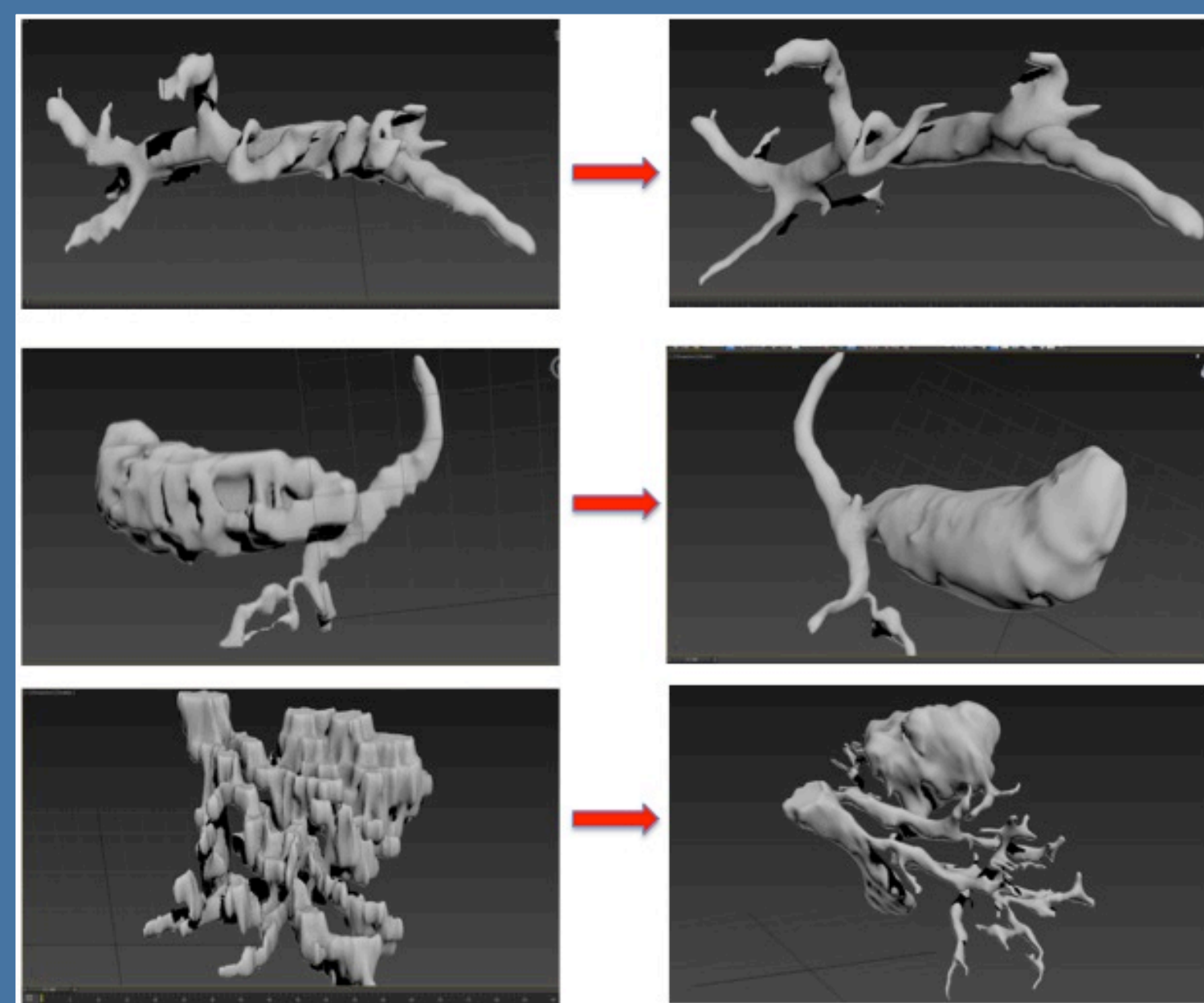
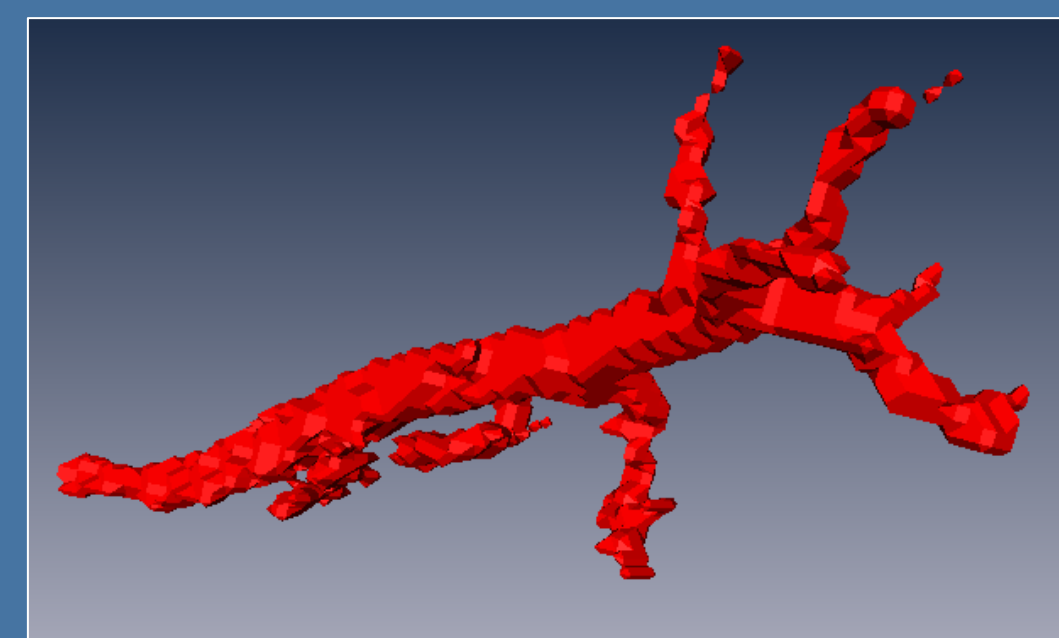
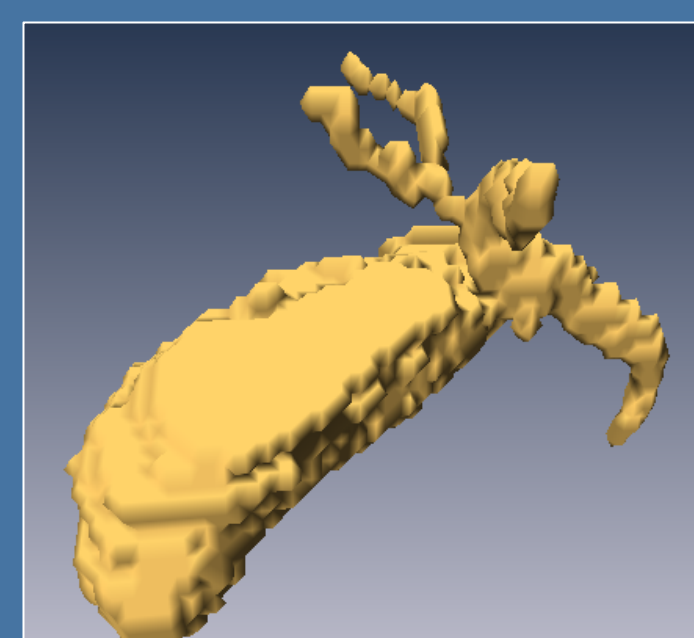
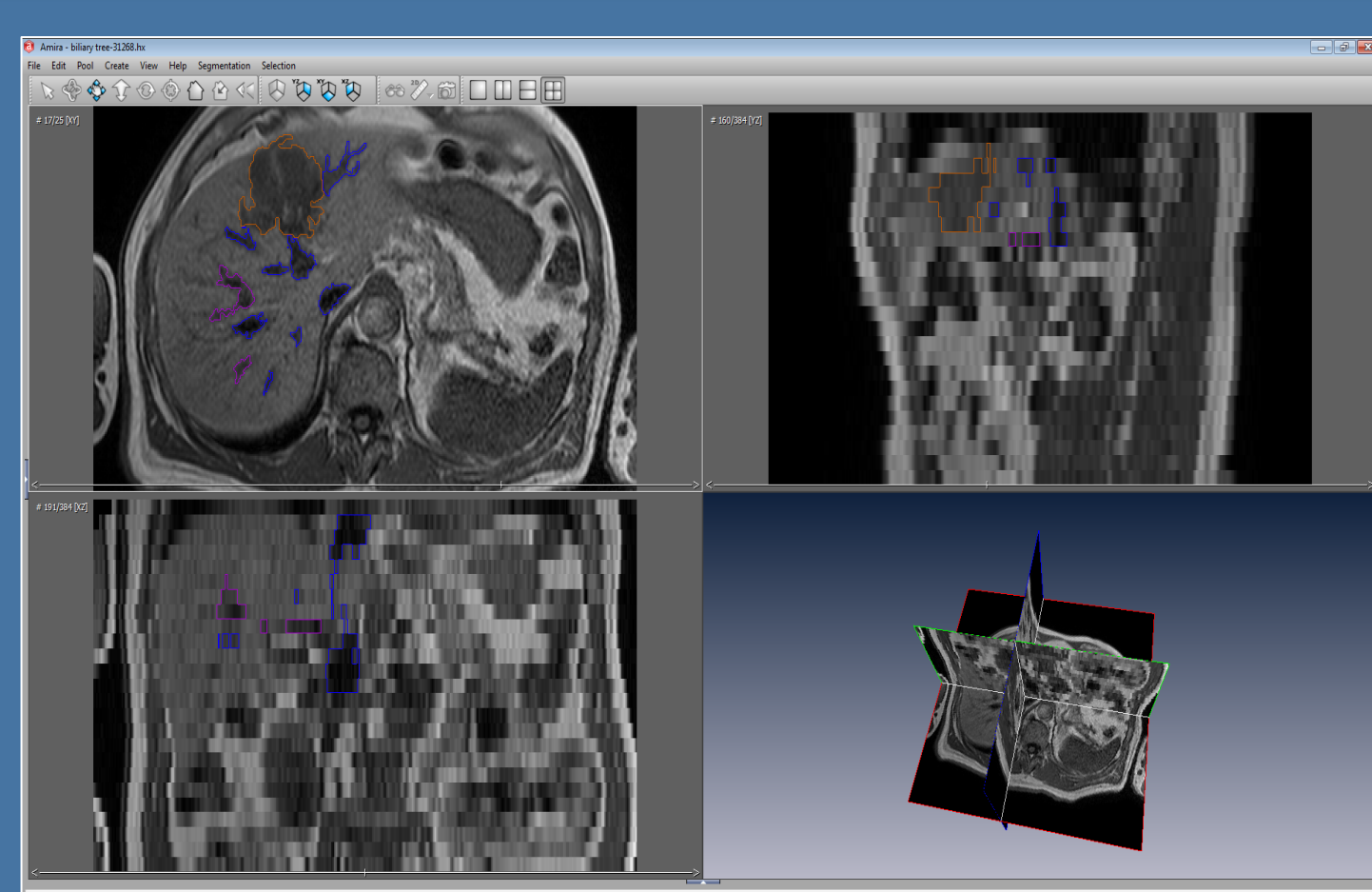
Aim

To create a graspable, 3D printed model of a liver based on patient's own radiology data to aid in preoperative planning of partial hepatectomy.

Methods

1. MRI liver + CT angio data of patient diagnosed with a resectable primary cancer of liver obtained

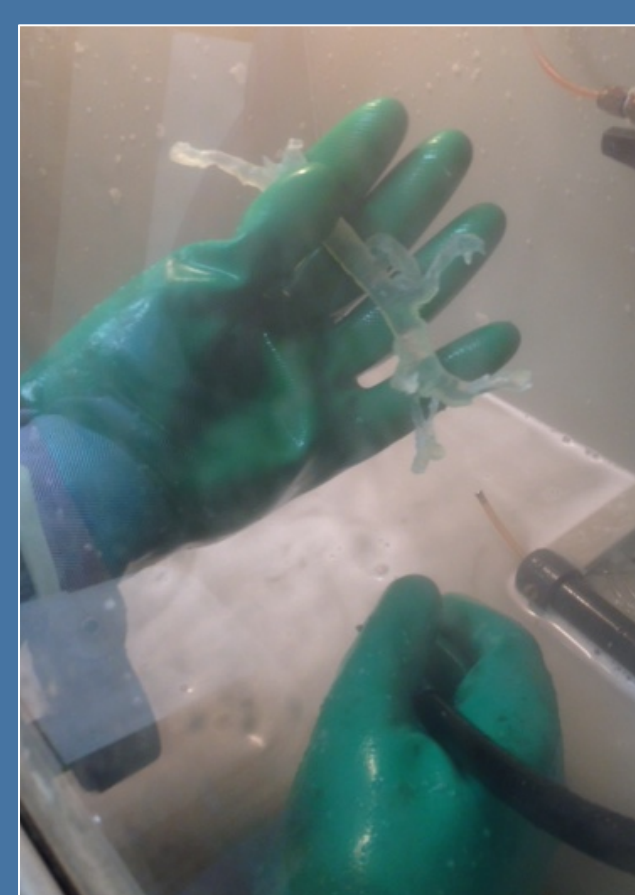
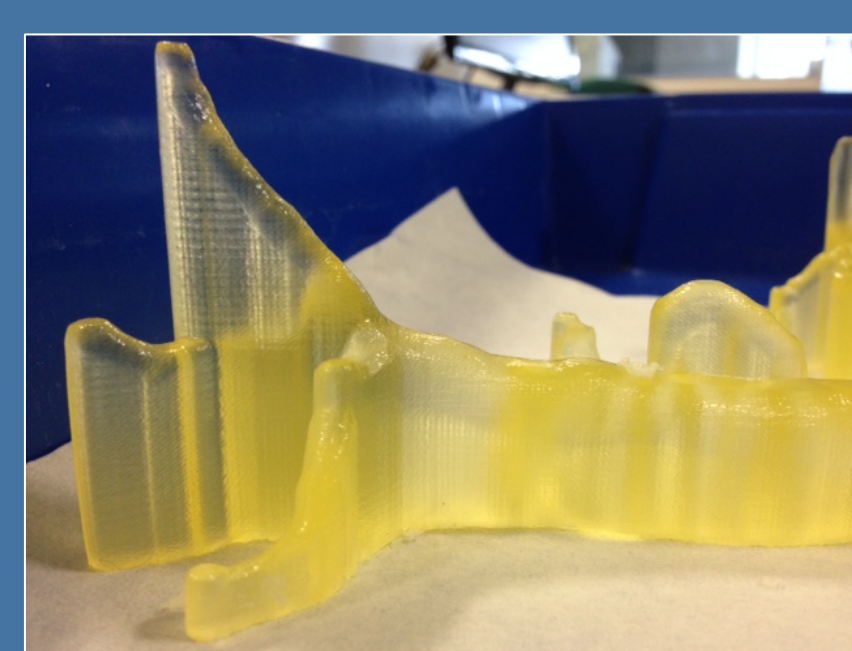
2. Manual Segmentation and automatic surface extraction using Amira visualisation software



3. Mesh editing of extracted surfaces in a 3ds Max design software to overcome data errors and artifacts

4. Conversion to .STL format

5. 3D printing and post manufacturing processing



Results

- Graspable 3D models in two different materials
- Good anatomical detail
- Representation of spatial relationship between tumour and surrounding structures
- Allows manipulation and exploration from various angles



Conclusion

- Graspable, patient specific 3D printed model possible
- Can provides accurate visualisation of anatomical structures and their spatial relationship
- Has a potential in surgical rehearsal and could improve planning of resection planes
- Exploration of adequate imaging techniques, liver specific volumetric software and segmentation algorithms needed to optimise manufacturing time and process as well as minimise artefacts and overcome the need for mesh editing