Elekta

Case study

Fiducial-free liver SBRT treatment made possible for patients on **Elekta Unity**

Institution

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Location

Australia

Medical staff

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See the difference with diagnostic image quality every time

Why MRgRT?

Liver represents an intriguing indication of application for Magnetic Resonance guided Radiation Therapy (MRgRT) SBRT due to the increasing use of MRI in the staging of primary and secondary hepatic lesions and the emergent role of SBRT in their management[1]

The development of radiotherapy guided by magnetic resonance images makes it possible to better visualize liver lesions and to apply high doses per fraction without the need for implanted fiducials.

Patient details

A 59-year-old female patient presented with cholangiocarcinoma (also known as bile duct cancer) in 2020. Cholangiocarcinoma is an uncommon cancer that forms in the bile ducts. Bile ducts connect the liver to the gallbladder and small intestine. The patient underwent surgery to remove the tumor, followed by chemotherapy.

Just over a year later a recurrent liver lesion was noted on a Positron Emission Tomograph (PET) scan.

The GenesisCare team

Why Elekta Unity?

The team at GenesisCare Sydney chose MRgRT to provide localized, high-dose treatment for this patient. The lesion was not clearly visible on diagnostic CT (image 1) and in close proximity to the duodenum, and other dose limiting structures such as healthy liver.

Elekta Unity enables unparalleled acquisition of diagnostic quality MR (1.5T) images before and in real-time during the treatment itself. (Image 2) As this lesion was not visible even on diagnostic CT, the patient could not have received a high-dose prescription with cone-beam computed tomography (CBCT) verification. Superior soft tissue contrast compared to CBCT-based RT, enabled a direct visualization of the lesion and surrounding anatomy, allowing for daily online adaptive strategies to improve target volume coverage while avoiding nearby critical structures. The combination of imaging with online deformable plan adaptation and stereotactic treatment delivery capabilities meant the team could confidently deliver a high and precise dose.

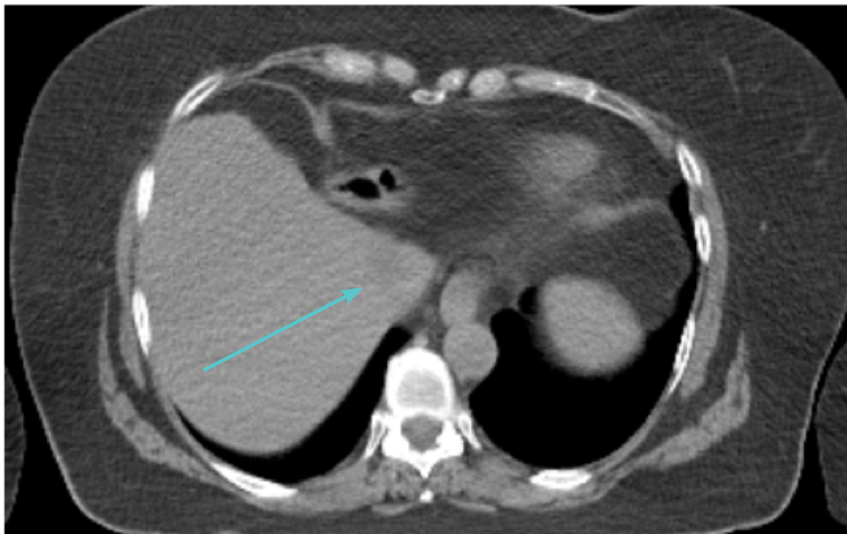

Image 1: Diagnostic CT

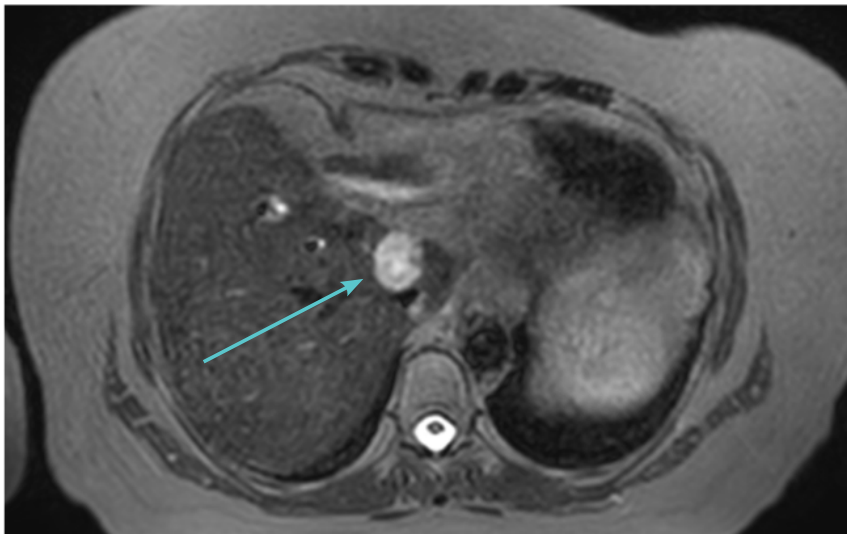

Image 2: T2 navigated 3D MR image acquired on Elekta Unity

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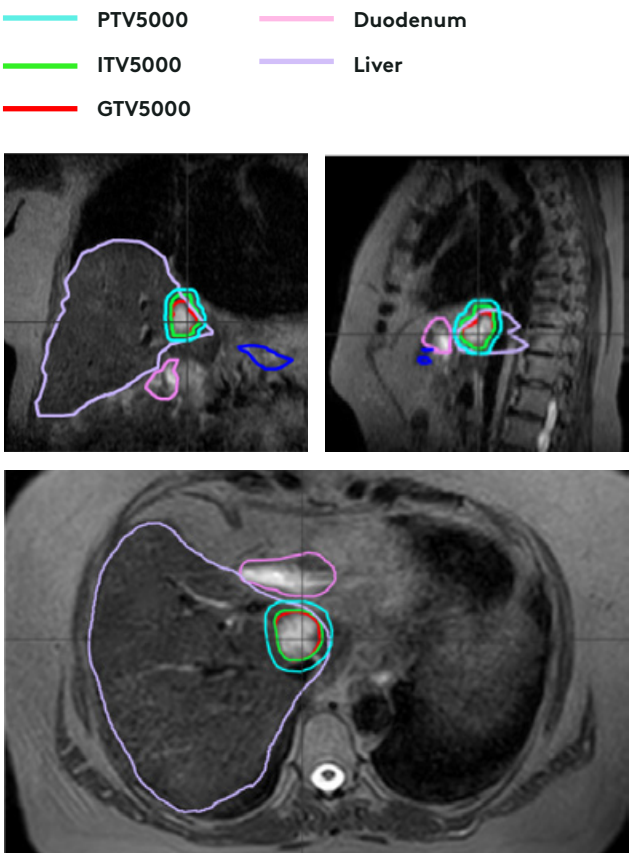
Treatment Details

MRgRT SBRT to recurrent lesion in liver

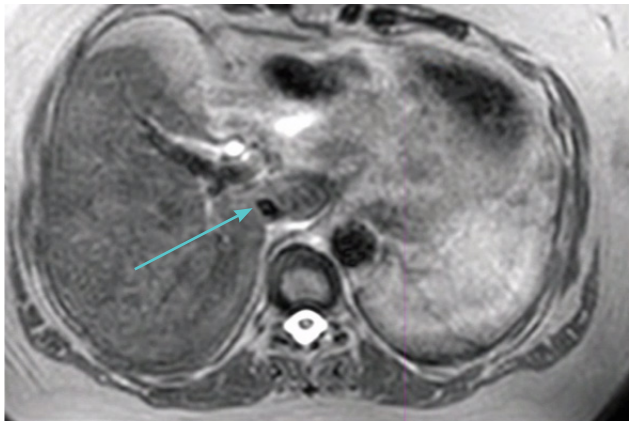
- Prescription - 50 Gy / 5 Fx
- T2 nav 3D Tra MRI sequence
- Deformable adaptive workflow
- Continuous motion monitoring structure was PTV



Results

A complete response was seen at the patient's nine-month follow-up, confirming no evidence of the liver disease. Treatment was completed with zero toxicities (grade 1 fatigue resolved one week post radiation therapy).

1.5T Elekta Unity MR During treatment



1.5T Elekta Unity MR 9 months post treatment

Be future proof for tomorrow

Current literature suggests that liver MRgRT SBRT treatment can reduce toxicity by providing optimal healthy liver and kidney sparing, especially for the most peripheral lesions.[1]

Opportunities for less treatment sessions (hypofractionation), increased dose to the target lesions, and reduced dose to surrounding healthy tissue could be outcome changing for these patients. The future possibility to assess response of the tumour using radiomics, may also determine the way radiation is prescribed to the Liver.

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As a leader in precision radiation therapy, Elekta is committed to ensuring every patient has access to the best cancer care possible.

We openly collaborate with customers to advance sustainable, outcome-driven and cost-efficient solutions to meet evolving patient needs, improve lives and bring hope to everyone dealing with cancer.

To us, it's personal, and our global team of 4,700 employees combine passion, science, and imagination to profoundly change cancer care.

We don't just build technology, we build hope.

Elekta

Hope for everyone dealing with cancer.

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Elekta Unity is CE marked and 510(k) cleared. Not commercially available in all markets.

References

[1] Corradini, S., Alongi, F., Andratschke, N. et al. MR-guidance in clinical reality: current treatment challenges and future perspectives. Radiat Oncol 14, 92 (2019). https://doi.org/10.1186/s13014-019-1308-y