CASCINATION

Top Cases 2021

Quality Ablation with CAS-One® IR

Quality Ablation with CAS-One® IR

Reproducible and standardised tumour treatments

CASCINATION

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Case 01

Tissue-sparing liver tumour treatments to support patient's quality of life

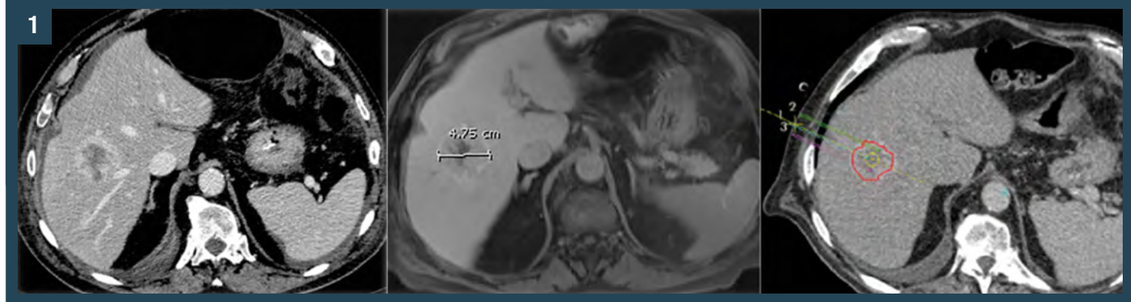
Read online and watch the video

Liver | MW | 79 y

Prof. Dr. Martin Hoffmann
St. Claraspital, Basel (Switzerland)

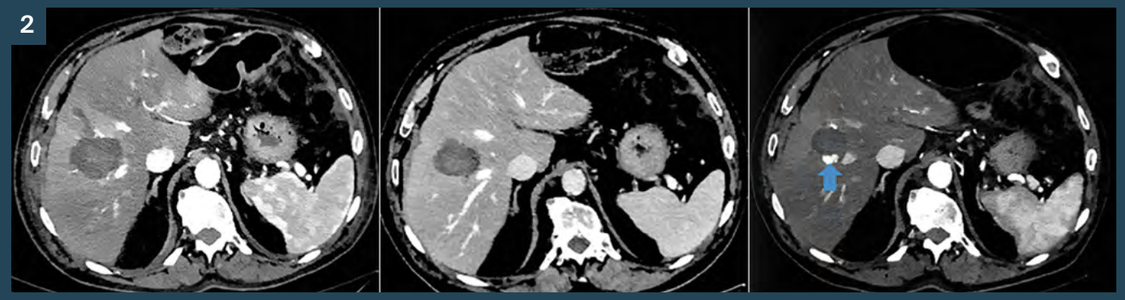
Patient presents with HCC (4.8 cm centrally located in the right Liver) 6 month after mesorectal excision of a colorectal adenocarcinoma (CRC). He underwent neoadjuvant radiochemotherapy and was assessed free of tumour for the CRC. He had no liver metastases in prior examinations. Multidisciplinary tumour board (MTB) decision opted for tissue sparing local treatment due to suspected subclinical multifocal HCC.

1



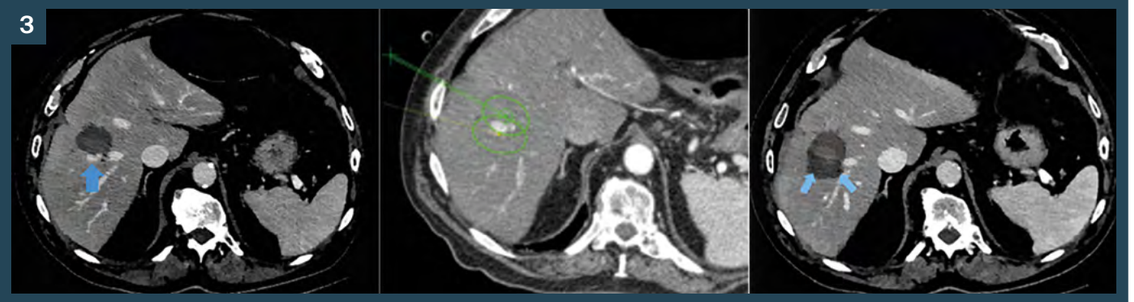
CRC after neoadj. Radio-Chemo and TME on CT, MRI showcasing a 4,8 cm Focal Lesion in Segment VIII, CAS-One Treatment Planning

2



Two days post first Ablation in 2018, 3 months after first Ablation, Local Recurrence (arrow) art. phase in 2019

3



Local Recurrence, ven. phase 2019, CAS-One Planning with no-touch technique, Ablation zone after second Ablation

The initial tumour bulk was covered by simultaneous microwave ablation with three antennas placed under CAS-One guidance. The overlapping ablation zones succeeded to cover the complete tumour in a confirmation CT-scan 72h post ablation. But the 6 month follow-up showed recurrent disease at the dorsal circumference of the ablation zone. This was treated with two overlapping microwave ablations in no-touch technique, again guided by CAS-One navigation. Patient was assessed disease free for the subsequent 1.5 years. He now returns with multifocal right sided hypervascular liver lesions (showcased on spectral CE-CT), confirmed as multifocal HCC disease. He is now treated with a combination of TACE and CAS-One guided ablations in a palliative setting, his quality of life is so far uncompromised (ECOG status 0-1). Treatment performed by Prof. Dr. Martin Hoffmann from St. Claraspital, Basel (Switzerland).

Initial condition

- HCC, T2 N0 M0, Stage 2
- MRI taken in 2018 shows a 48mm focal lesion in Segment VIII
- Biopsy confirmed differentiated trabecular and pseudo-glandular growing HCC Edmonson G2. Right lobe biopsy confirms tumour free histology
- Type two Diabetes, Kidney failure in 2018, hypertensive cardiopathy, COPD, prostate adenoma, sigma diverticulosis, adiposities, HTP both sides

Treatment

- MWA performed in July 2018 with 3 overlapping ablation zones due to large tumour size. A three-day post ablation contrast scan confirmed successful ablation
- Follow up CT scan in December 2018 showed a small hyperdense reoccurring lesion at the dorsal border of the ablation zone
- CT scan in June 2019 shows tumour reoccurrence. Treated with MWA, two needles using the “no touch” technique. Two-day post ablation scan confirmed successful ablation
- Follow up scan in November 2020 shows multiple hyper vascularized lesions in the right liver lobe, suspected HCC. Treated with a TACE with partial success in two lesions and complete success in the other lesions. Post TACE follow up scan scheduled in three months

Result

- Two cases of Quality Ablation supporting a tissue sparing treatment strategy to preserve the quality of life of a patient with various comorbidities.

Case 02

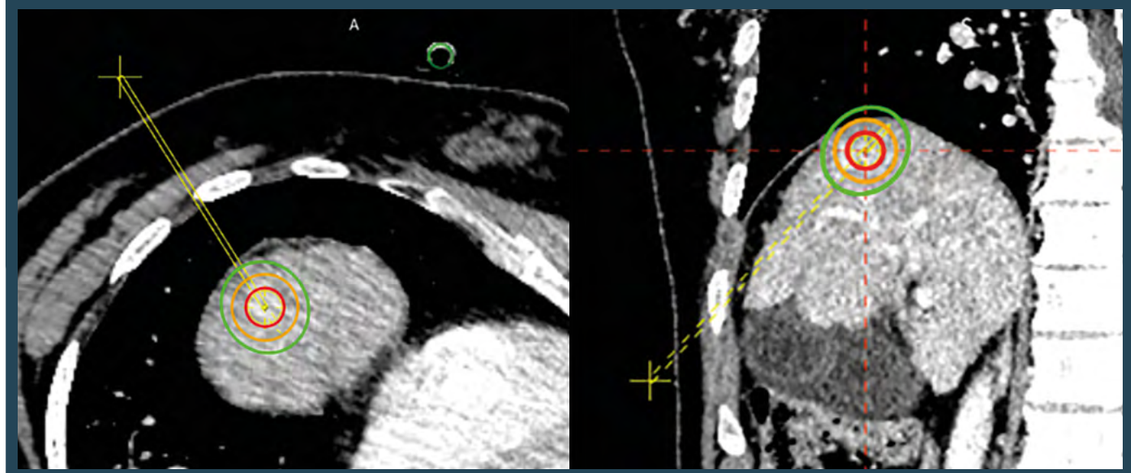
Radiofrequency ablation of HCC close to the liver dome

Read online

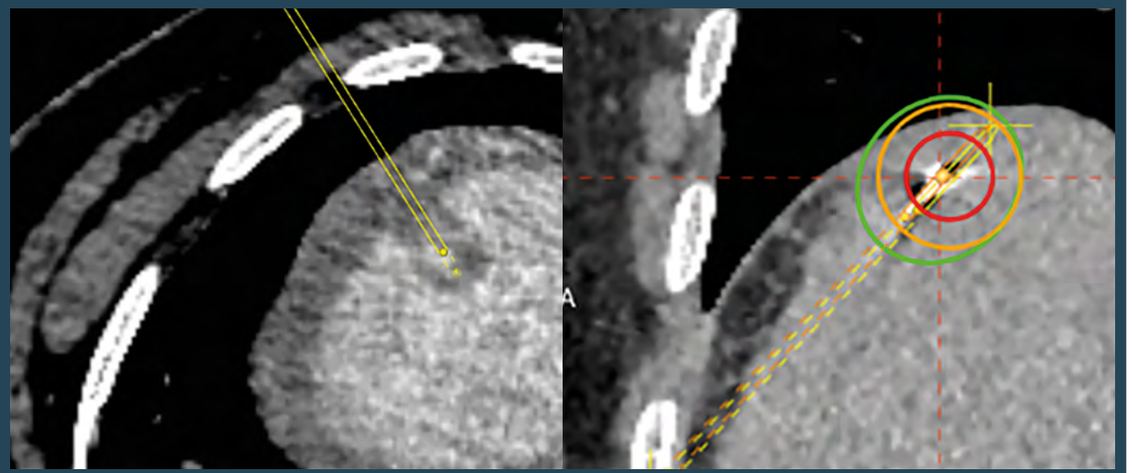
Liver | RF | 53 y

Dr. Mohnish Palanisamy
Global Hospital, Chennai (India)

Due to the unfavorable location of the HCC in Segment VIII, the MDT didn't see a surgical resection fit as treatment option. Therefore, a percutaneous ablation was chosen to treat this patient with a curative intent. As the lesion is high up in the Liver, without the guidance of CAS-One IR this case would be way more complex, with higher risk of complications.



Trajectory Planning (axial/sagittal planes)



Needle validation, coronal view | Ablation validation, axial view

Initial condition
- Patient was under close surveillance due to chronic liver disease (Child Pugh A), treated years ago
- A HCC lesion was detected in a routine screening
- Patient doesn't have any symptoms nor any comorbidities

Treatment
- Ablation was chosen as per the BCLC guidelines. Even thought the patient did not have comorbidities for surgical treatment.
- However, Surgical resection of Segment VIII would be technically challenging when compared to ablative options
- CT-guidance with CAS-One IR was chosen due to the off-plane and caudal-cranial trajectory (15 cm.) to the small lesion (2 cm.) in Segment VIII close to the diaphragm. The aim was to do this with a single shot approach
- The lesion was not visible on ultrasound and freehand manipulation of the needle could be time consuming, which results in more radiation exposure for physician and patient
- Treatment plan: percutaneous ablation combined with chemotherapy (Sorafenib)

Result
- Lesion treated with 10 minutes of RF Ablation, showing no residual
- Patient will be reassessed with follow up imaging (4-6 weeks prior to procedure)
- The Patient is really glad to have minimally invasive Quality Ablation by the Interventional Radiology Department compared to surgical liver resection, where quality of life is key

Case 03

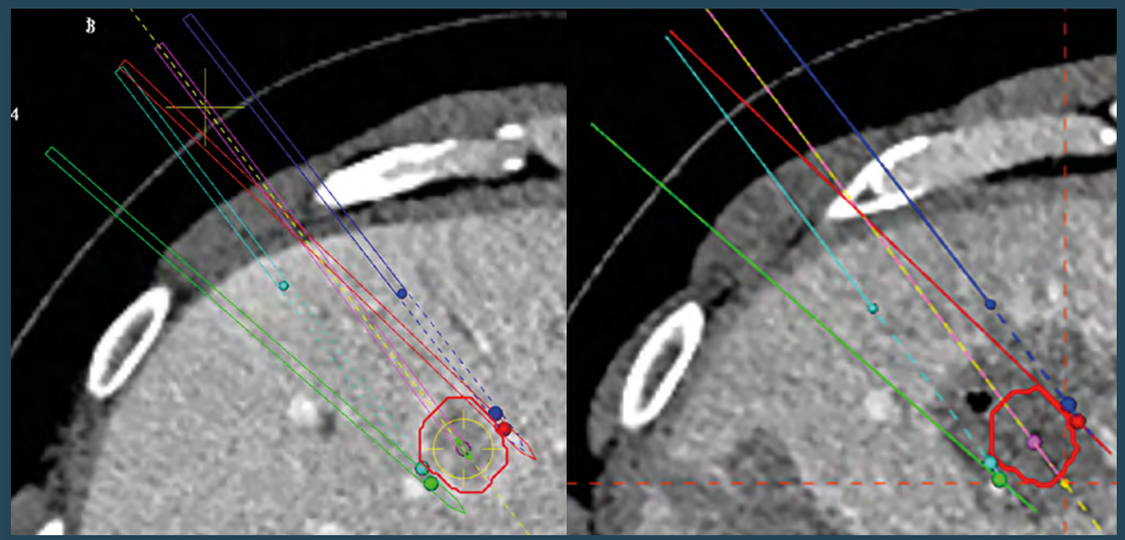
Combined IRE and MWA for two local HCC recurrences in seg. IVa + VIII

Read online and watch the video

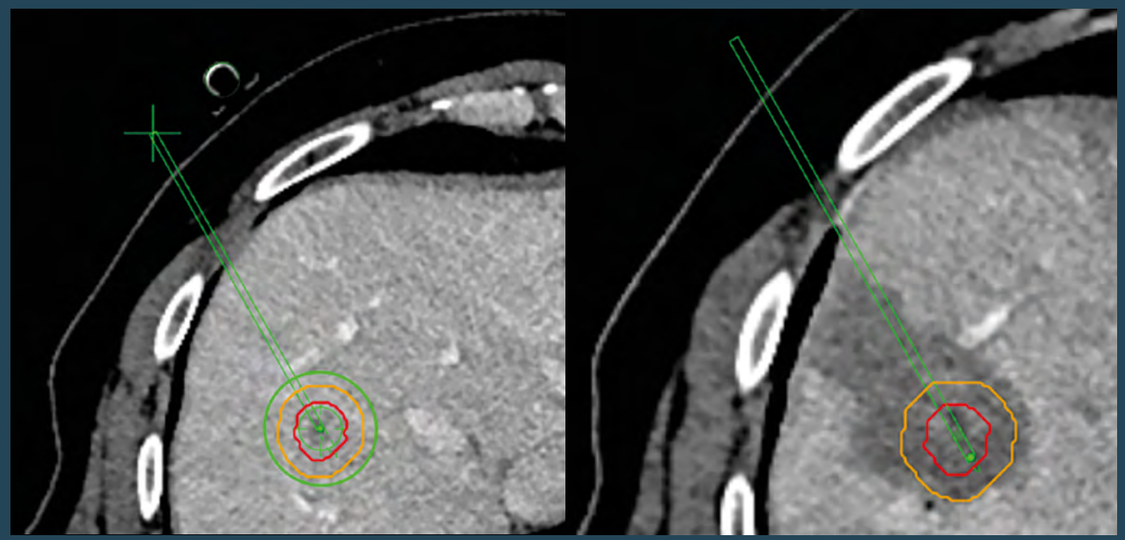
Liver | MW | IRE | 59 y

Dr. Lukas Lürken
University Hospital Regensburg (Germany)

Multimodal Quality Ablation treatment of two HCC recurrences in liver segments IVa & VIII with Irreversible Electroporation and Microwave Ablation in one continuous session.



IRE planning scan and post-ablation scan



MWA planning scan and post-ablation scan

Initial condition
- 10/2017: Diagnosis HCC
- 11/2017: R0-resection in Seg. VI
- Pathology: HCC G1/BCLC A
- 2018: Followed by Antiviral Hep-C-therapy that showed the patient maintained good liver function and no transplantation was necessary
- 02/2020: HCC recurrence, atypical resection Seg. III & II
- 02/2021: MRI shows HCC suspect recurrence in Seg. IVa (1,6 x 1,1 cm) and Seg. VIII (0,7 x 0,5 cm)
- Tumour board decision: Radiologic Interventional Oncology-Treatment

Treatment
- Due to the proximity to the bile duct and portal venous vessel inclusion in Seg. IVa, a decision for stereotactic navigated IRE procedure with 4 planned needle trajectories was taken
- A 5th trajectory to take a biopsy prior to treatment was planned
- CAS-One IR guided Microwave Ablation in Seg. VIII during the same session

Result
In this case, the use of stereotactic navigation was mandatory:
- IRE requires precise needle placement taking anatomical structures in account. With the help of CAS-One IR, planning and placement of the probes was possible in one step
- Implementing multimodal treatment (IRE/MWA/Biopsy) options in one session is a great advantage and prevents further sessions
- Initial post-ablation scan shows technical success in both lesions
- A total of 6 needles were planned, navigated and validated
- Total procedure time: 2:30h

Case 04

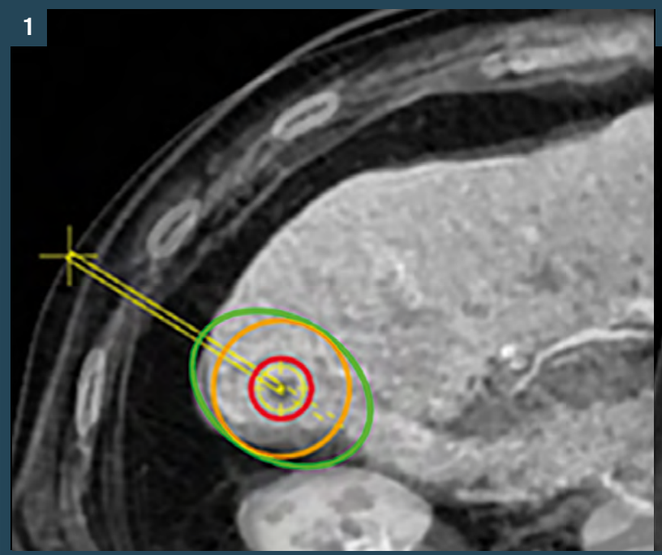
Fused microwave ablation of an 'invisible' lesion in segment VI

Read online and watch the video

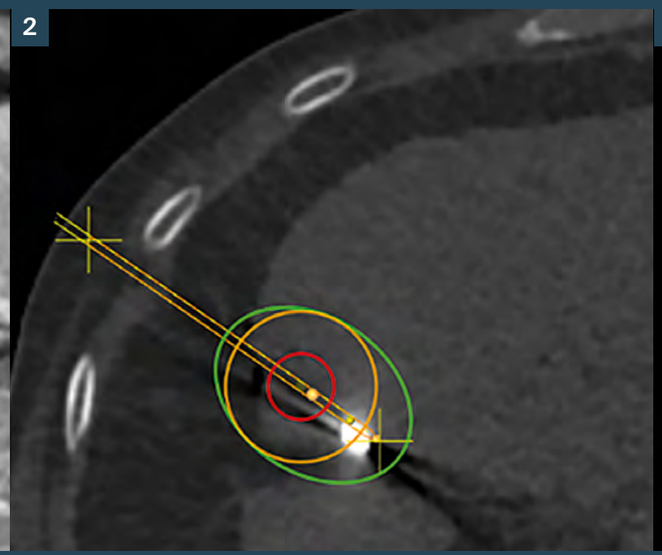
Liver | MW | Biopsy | ♂ 77y

Dr. Hans Martin Gissler, Dr. Christophe Hälg, Dr. Tim Ohletz and Dr. Irene Winzeler-Jörger
Kantonsspital Aarau (Switzerland)

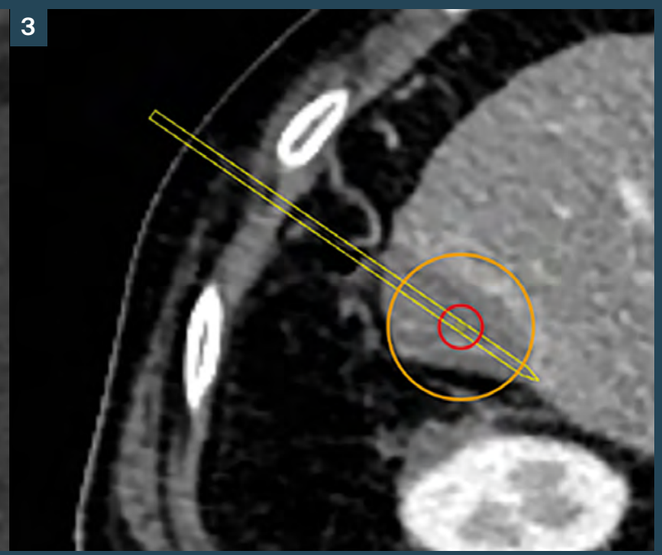
CAS-One IR multi-modality fusion enabled a Microwave Ablation of an HCC suspected lesion. A biopsy was also performed using CT guidance, since the lesion was not visible on ultrasound.



Planning scan with fused MRI (50/50 view)



Needle verification scan



CE-Control Scan after the ablation

Initial condition
- Patient with a history of cryptogene liver cirrhosis, Child A, MELD 8, arterial hypertonia and diabetes mellitus type 2
- During routine monitoring in May 2020, there was a suspicious lesion detected in a sonogram in Segment VI
- This was followed by an MRI in June 2020, which showed a malignant (HCC) suspected lesion
- In a follow up sonogram intended to biopsy the lesion, it could not be detected, declared 'invisible', and therefore was not biopsied
- However, the tumour board decided to perform a percutaneous ablation treatment with curative intend and to get the biopsy during the intervention

Treatment
- For this lesion that is invisible on CE-CT as well, ablation and biopsy was not possible because of the lack of anatomical landmarks
- Treatment was conducted with the support of CAS-One IR and its ability to fuse MRI (and CT) images
- Patient was treated with MWA after taking a biopsy over the same track

Result
- Quality Ablation with CAS-One IR showcases a complete ablation on post-ablation scan with a sufficient safety margin
- Follow-up sonogram one day post-ablation does not show any abnormalities
- The biopsy of the lesion revealed chronic, partially active hepatitis with cirrhosis without malignancy
- Control MRI in 6 months is indicated, but not yet conducted

Case 05

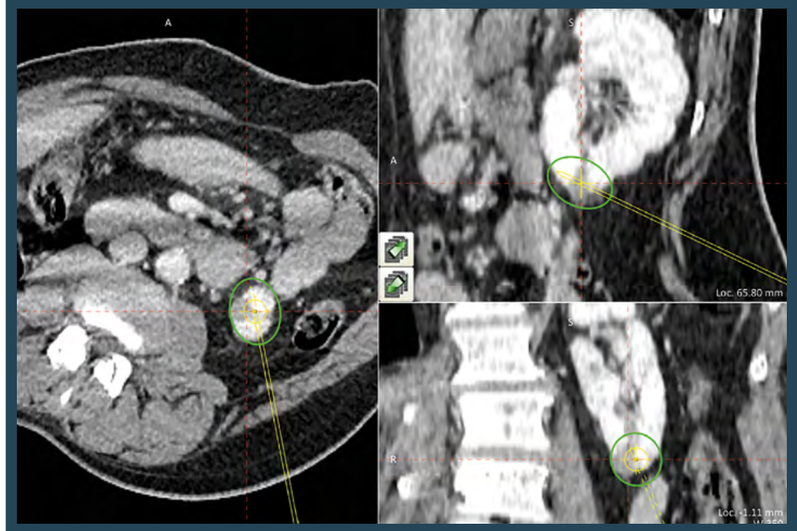
Tissue sparing microwave and cryoablation of a kidney

Read online and watch the video

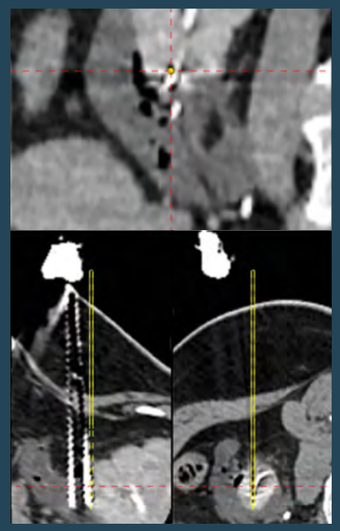
Kidney | MW | Cryo | 58 y

Dr. Nando Mertineit
Inselspital Bern (Switzerland)

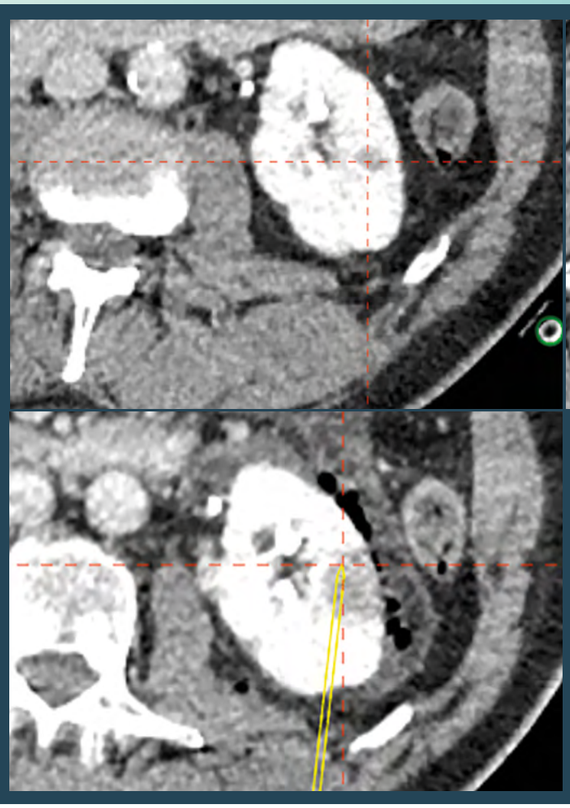
Tissue sparing local Quality Ablation treatment of a patient with a previous nephrectomy: Combination of microwave and cryoablations in two sessions to destroy all lesions.

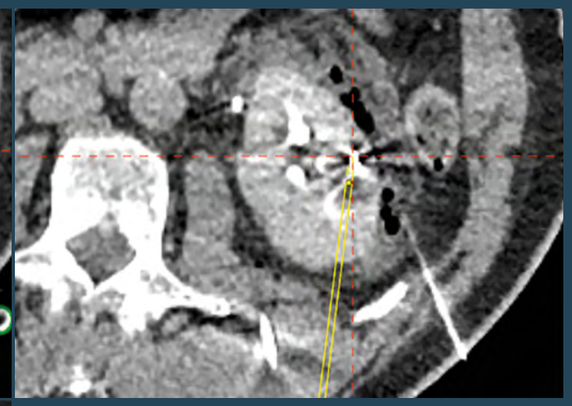


Planning of the microwave ablation of the 3 lesions in the kidney pole.



Placement of microwave applictor and catheter for hydrodissection to avoid harming of nearby bowel.





Lesion in planning scan, treatment (with iceball active and hydrodissection) and scan after cryoablation of lesion

Initial condition

- Patient with a nephrectomy (right side) after multiple lesions showing papillary renal cell carcinoma Typ I, focally Typ II, pT1a (m), pNX, L0, V0, Pn0, G2, R0
- Suspicion of family renal cell carcinoma while missing variants in genes VHL, MET, FH, SDHB, SDHC, SDHD, FLCN and PTEN (genetic examination Inselspital 04/2017)
- Arteriel hypertension
- MRI scan of 2019 shows several lesions in the left kidney which increase slightly in volume in the follow up scan in December 2020

Treatment

- Local treatment was chosen as the patient has only one kidney left and as there are several lesions, it is required to spare as much healthy tissue as possible
- For the stereotactical high precision placement of the needles, CAS-One IR is used
- MWA is performed for 3 lesions close together in the kidney lower pole, follow up sonogram shows no suspected focal contrast enhancement, the other lesions seen in the MRI scan cannot be differentiated
- In another session the last 3 lesions are treated with cryoablation

Result

- The last CT images shows good coverage of the lesions, with cryoablation leaving most of the kidney tissue healthy
- A day after the treatment the patient could go home. The overall parameters of the kidney were inconspicuous, he was afebrile, without any complaints
- A follow up MRI scan planned

Case 06

Radiofrequency ablation as bridging strategy for liver transplantation

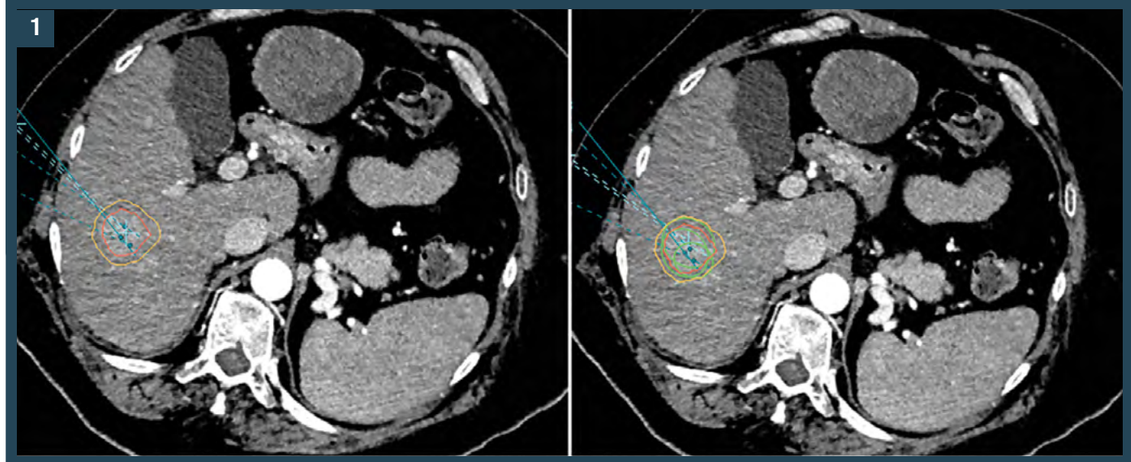
Read online

Liver | RF | 60 y

Dr. Nadeem Shaida
Addenbrooke's Hospital, Cambridge (UK)

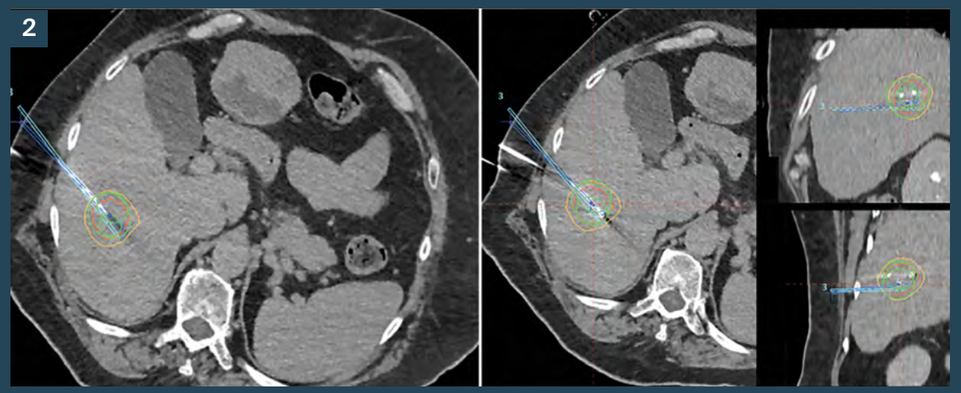
Quality Ablation with CAS-One IR enabled to provide the patient with ablation as a tissue sparing treatment option. Moreover the intervention fostered to stop growth and further spread of the tumour to adjecent organs or vessels. This allowed to continue the treatment strategy and keep the patient on the waiting list for liver transplant surgery.

1



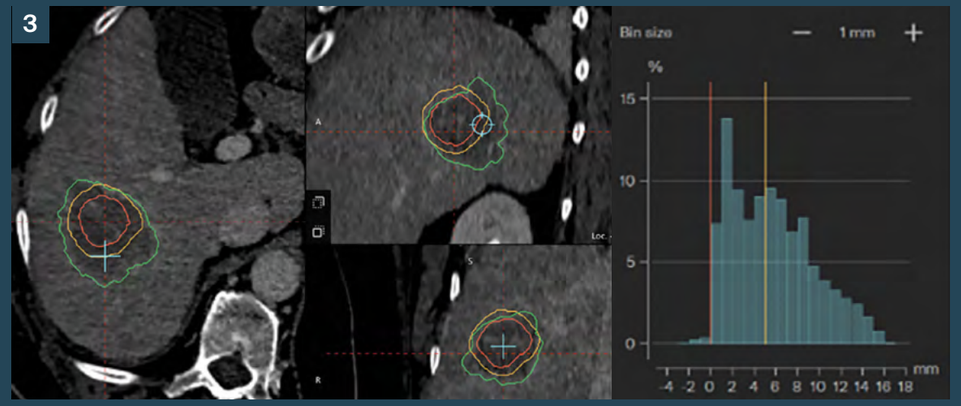
Segmented image of the lesion (left) and planning of overlapping ablation zone (right)

2



Validation of needle position after placement

3



Assessment of the ablation zone using AblaSure (axial view)

Initial condition

- Patient weight: 116 kg
- Patient has a history of smoking and alcohol consumption
- Diagnosed with Liver cirrhosis, COPD and type two diabetes
- 44mm HCC lesion in Liver Segment VI diagnosed in May 2020
- Multiple Hepatic TAE performed In Aug 2020, Nov 2020 and Jan 2021. Unsuccessful and resulted in relapse
- The now 3.9mm Tumour in segment V/VI of the Liver to be treated with Ablation Therapy
- Additionally, the patient is awaiting assessment for liver transplant surgery
- Ablation is planned with the aim to prevent growth and spread of the tumour prior to transplant

Treatment

- 3 Needle RFA treatment planned with overlapping ablation zones
- Freehand, percutaneous ablation would not be a viable treatment option due to the large size of the lesion and the difficulty in planning overlapping treatments
- Treatment with CAS-One IR allowed for safe and precise planning and treatment of this large lesion with the use of three overlapping ablation zones
- Post ablation verification of the treatment was done using AblaSure for quantitative margin assessment

Result

- The current oncological strategy can be continued
- Quality Ablation with CAS-One IR enabled to provide the patient with ablation as a tissue sparing treatment option for this large lesion
- The successful outcome of the treatment will prevent growth and spread of the tumour, improving the prospects for undergoing transplant surgery with the aim to improve long term survival

Case 07

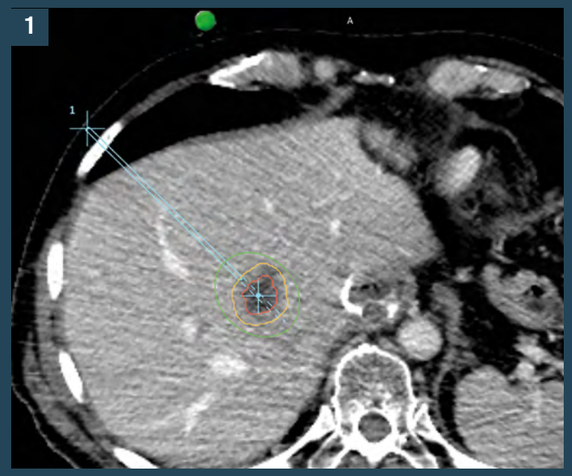
Ablation and re-ablation of esophageal carcinoma after intraoperative margin assessment

Read online and watch the video

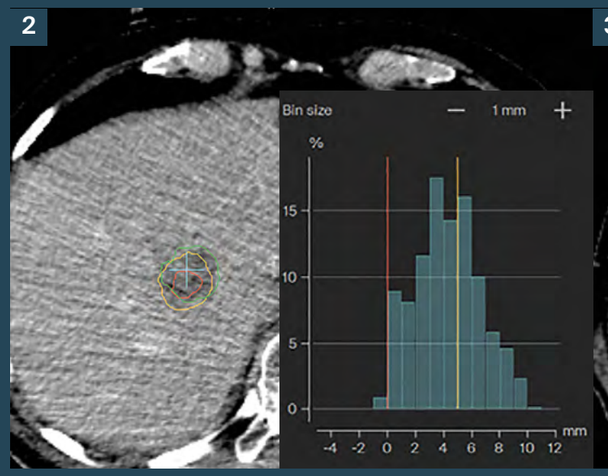
Prof. Dr. Thiery Chapelle & Dr. Bart Op de Beeck
Antwerp University Hospital, Antwerp, Belgium

Liver | MW | ♂ 55 y

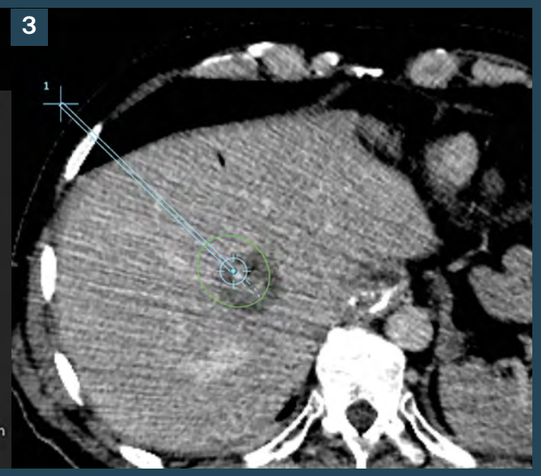
Combined treatment of esophageal carcinoma with chemo and radiation therapy according to the CROSS regimen accompanied by local treatment of a delicate lesion with image-guided microwave ablation. After use of newly available intraoperative margin assessment feature in the Quality Ablation workflow, decision for immediate re-ablation to also cover the the remnants was taken.



Pre-intervention planning scan with tumour (red), planned safety margin (yellow) and planned ablation zone (green)



Post-intervention CT used for quantitive margin assessment with AblaSure.



Planning scan of the re-ablation to also cover the remnant shown in the above picture.

Initial condition
- 09/2020 - Poorly differentiated esophageal carcinoma – preferred/preference squamous cell carcinoma – cT3N2M0
- 10/2020 - Start of chemo and radiation therapy according to the CROSS regimen
- 12/2020 - Thoracoscopic-robotic and laparoscopic esophageal resection (cT2N3Mx - G3 L1V0 Pn0 R0 7/33 lymph nodes)
- 06/2021 - Solitary liver metastasis segment IVa (PET positive), most likely possibly from the esophageal carcinoma

Treatment
- 22 mm lesion close to the portal vein and the common bile duct bifurcation, as well as the hepatic veins
- Treating locally and minimal invasive is key for the poor prognosis after a metastasized esophageal carcinnoma
- Therefore, Quality Ablation for precise positioning with CAS-One IR
- MWA with a low energy was applied to create a nice spherical ablation zone and to reduce the chance on damaging the bifurcation
- Intra-operative margin assessment with AblaSure showed possible tumour remnants and not achieved safety margin. Immediate re-ablation was performed with a volume, covering the underablated area

Result
- Intra-operative margin assessment fostered decision for immediate re-ablation
- Follow up MRI-imaging will be conducted two months after the procedure in 09/2021
- The patient will remain under close surveillance to be able to treat locally when needed. Given the difficult prognosis for esophageal cancer, treatment has no curative intent

Case 08

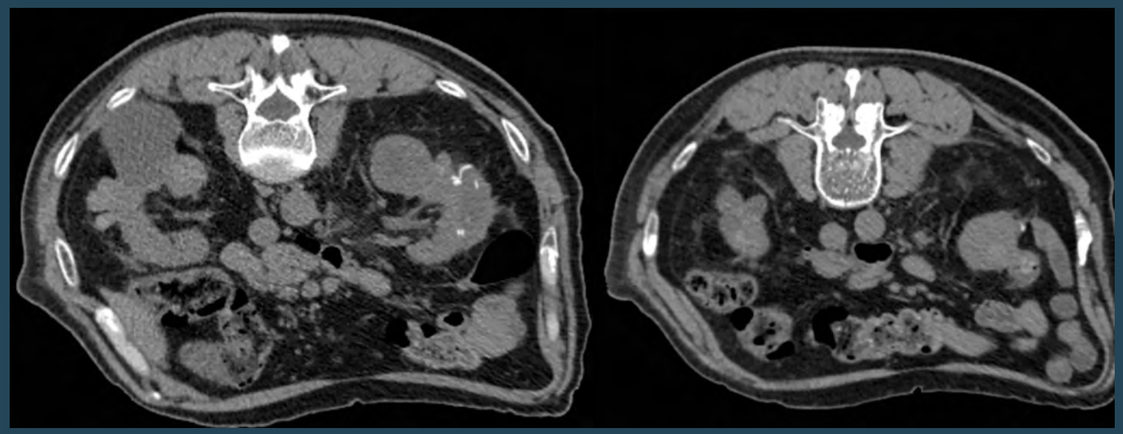
Bi-lateral ablations of multiple, large renal lesions

Read online and watch the video

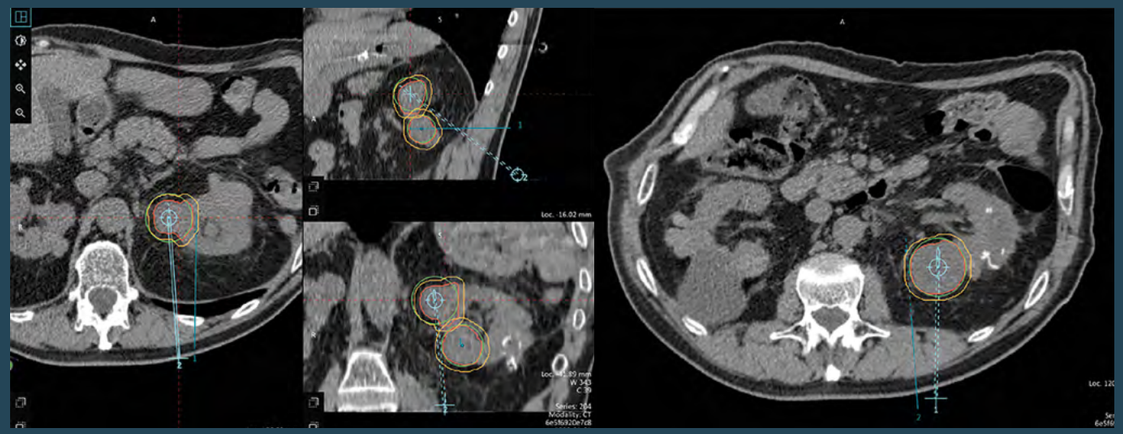
Kidney | MW | 72 y

Dr. Nadia Brezgalin and Dr. Natalia Goldberg
Carmel Medical Center, Haifa (Israel)

Bi-lateral ablations of multiple renal lesions with CAS-One IR in two sessions. Comprehensive planning of large ablations combined with a high accuracy in needle placement resulted in reduced intervention times. This helped to preserve the quality of life of the patient.



3-month post intervention imaging of the right kidney



Treatment planning of the microwave ablations in the left kidney

Initial condition

- Family history of urinary tract issues, renal cell carcinoma and breast cancer
- Patient is a smoker and has hypertension
- Unintentional weight loss triggered CE-CT scan, showing several lesions in both kidneys, the largest about 5 cm in the left kidney
- Biopsy revealed chromophobe RCC
- Laparoscopic partial resection of the large lesion in the left kidney. The course of the surgery was technically difficult considering severe adhesions and difficulty in separating the lesion as well as significant bleeding during resection. Therefore, it was decided not to proceed with the resection of an additional lesion. Two papillary findings were also identified
- Nephrostomy unsuccessful due to bleeding
- Resection of bladder tumour and removal of an urethral suppository

Treatment

- MWA of four large lesions in the right kidney: Treatment was conducted with CAS-One IR because of its advanced planning capabilities, that allowed treatment of all four lesions in one session. Freehand would only be an option for treatment of 1 -2 lesions per session
- MWA of the two remaining lesions in the left kidney after unsuccessful partial nephrectomy

Result

- Three month post ablation of the right kidney shows significant reduction of the over all tumour mass – Physicians were very pleased with the result of this palliative treatment
- The large 5 cm lesion in the left kidney shows good response to the microwave ablation on the post intervention scan
- The 2nd lesion in the left kidney remained untreated. The hard, fibrotic scar tissue after attempted surgery prevented penetration with the ablation needle
- The patient awaits follow up under oncological supervision

Case 09

MWA in the liver dome with an inferior-to-superior oblique trajectory

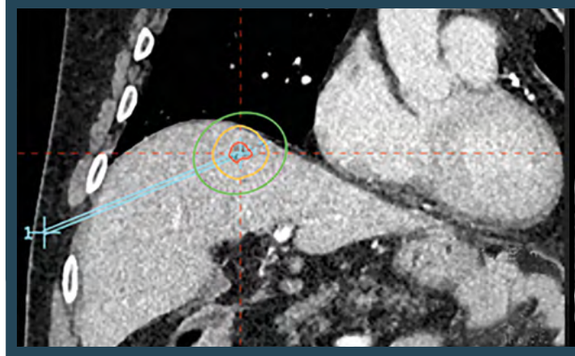
Liver | MW | ♂ 80 y

Dr. Shaheen Dixon
Basingstoke and North Hampshire Hospital, UK

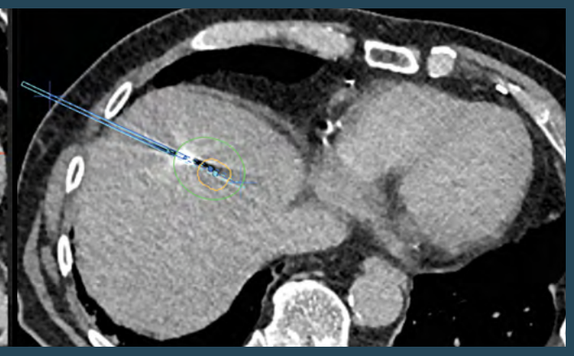
Read online and watch the video

CASE OF THE YEAR

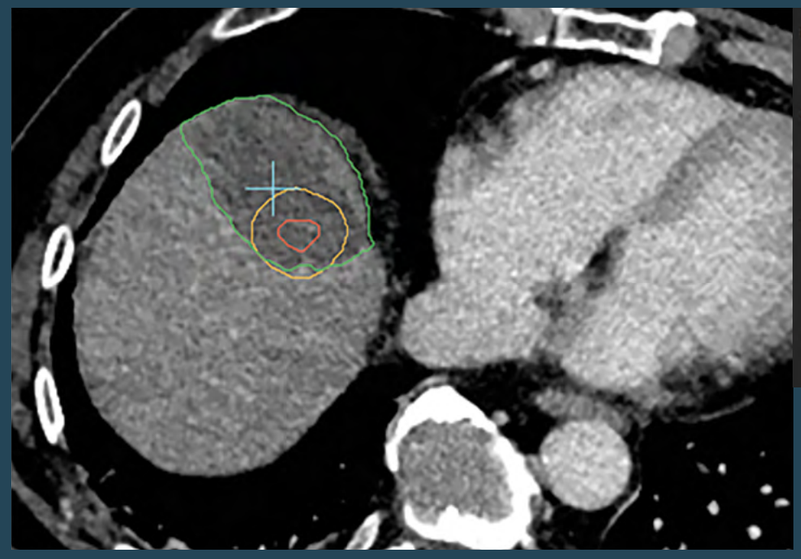
Ablation of a solitary lesion high up in the liver dome with an inferior-to-superior oblique trajectory using a non transthoracic approach. Quality Ablation with CAS-One IR helped increase the accuracy of the needle placement and safety for the patient during the procedure.



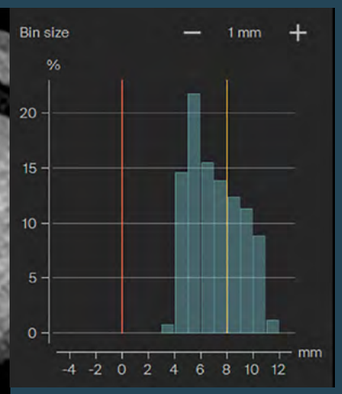
Coronal planning scan showing lesion in segment VIII in the liver dome planning of segmented tumour with 8mm margin



Needle validation scan. Burn time was 4 min



Tumour (red) and the majority of the clinical margin (yellow) are covered by the ablation volume (green)



Quantative margin assessment using AblaSure shows complete ablation of the tumour and the majority of the 8mm clinical margin

Initial condition

- Carer for wife and son
- Peripheral vascular disease and stenosis of the SMA and coeliac trunk
- 2002: Coronary artery bypass grafting
- 2012: Right hemicolectomy
- 2018: Transurethral resection for transitional cell carcinoma (TCC) blatter (G1pTa)
- 2019: Anterior resection for colorectal cancer (T3N0)
- 06/2021: PET, CT and MRI demonstrates solitary liver metastasis in seg VIII high up in the liver dome, size 13 x 10 x 12mm
- 09/2021: Freehand ablation attempt failed due to the significant breathing motion causing movement of the liver, despite anaesthetic breath hold. This posed a high risk for pneumothorax of the right lung. Several loads of contrast were administered and repeated scans taken to try and achieve the ablation.The last procedure took a total of four hours, then was abandoned. The patient went into urinary retention and was discharged 2 days later
- CAS-One IR allowed the insertion of the needle with an inferior-to-superior oblique trajectory avoiding a transthoracic approach, whilst increasing accuracy and safety during the procedure for the patient

Treatment

- Non-transthoracic, oblique trajectory planned and needle for microwave ablation inserted
- Ablasure showed complete ablation of the tumour but slight under ablation of the 8mm clinical margin
- Total procedure time from planning scan to ablation was one hour, showcasing a quick learning curve of the physician since the recent introduction of Quality Ablation
- Patient recovered from procedure and discharged the following morning

Result

- One advantage of CAS-One IR is that it allows planning of difficult trajectories in 3D. In this case it was possible to achieve the ablation without traversing the lung, reducing the chance of a pneumothorax
- Reduction of radiation dose to the patient and staff. The contrast runs required are minimal, amount of contrast reduced
- The segmentation functionality of the system allows clear identification of ablation margins, which in turn leads to more confidence, that the lesion was ablated with good technical success rather than the visual eyeballing and estimating it. In this case it was extremely important to achieve a good ablation zone on this patient due to his comorbidities and the fact that he is the sole carer for wife and son
- The system is overall easy to use and can be adapted into the workflow easily with practice. We are confident that this will increase our accuracy of A0 ablations, increase the types of ablations we can do and reduce overall re-ablation rates

Case 10

Re-biopsy of spine inflammation enabled using CAS-One IR

Read online

Bones | Biopsy | 49 y

Dr. Pawel Szaro
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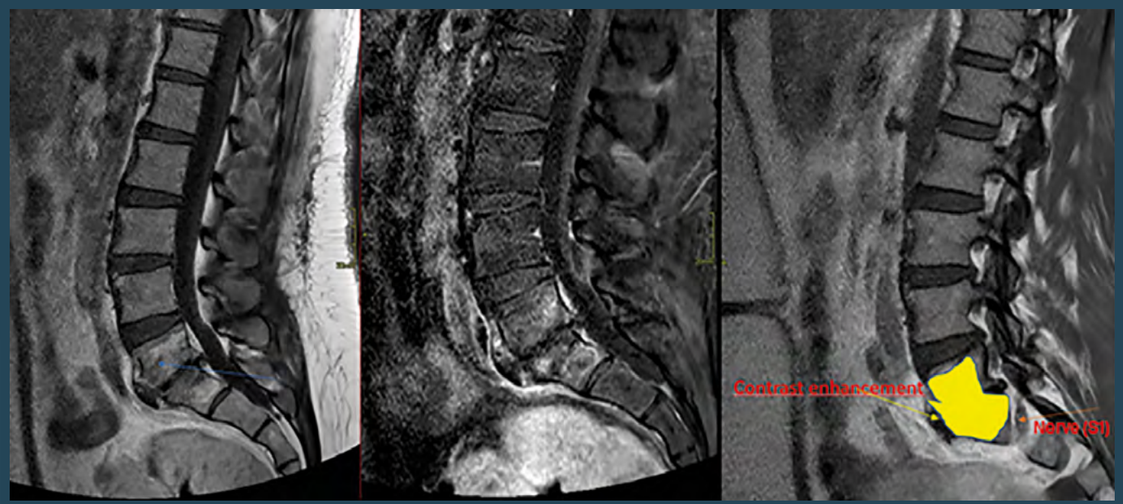
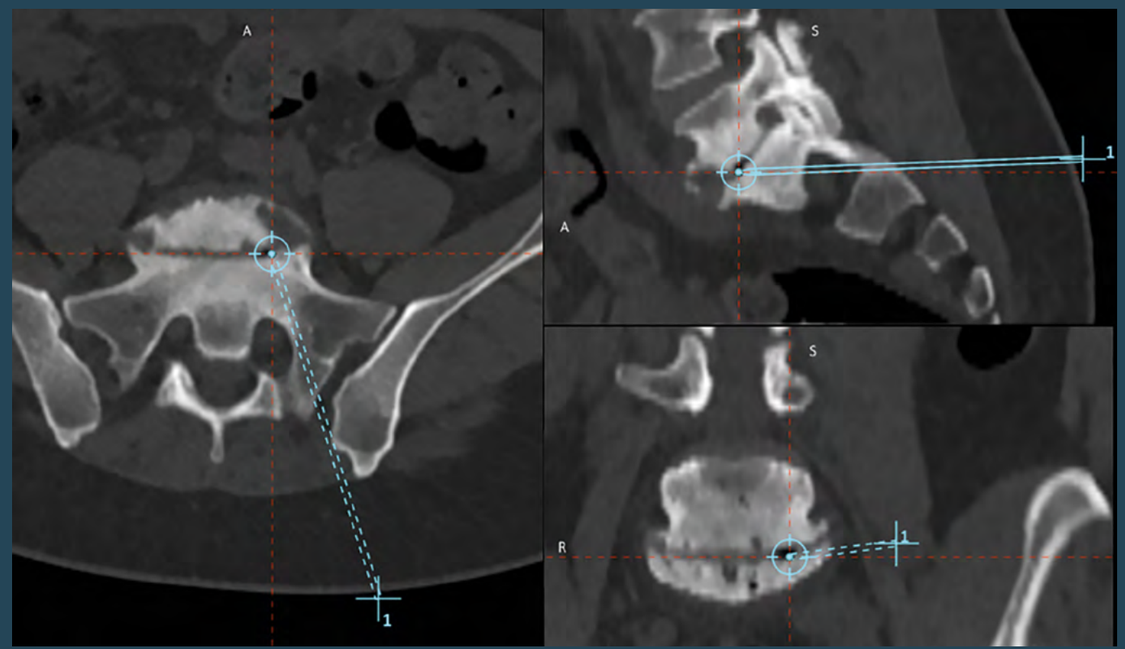
Transpedicular bone core biopsy in the upper sacrum for suspected inflammation visible on MRI. Re-biopsy with CAS-One after failed first attempt in another hospital.



MR imaging showing contrast enhancement in the area of inflammation and risk structures such as the S1 nerve



Precise trajectory planning in the multiplanar view

Initial condition
- History of obesity and substance abuse (addiction)
- Thoracal Spondylodiscitis Th 6-7 in 2019 without signs of bacteria
- MRI control showed regression
- Complaints about pain in the lower back related to increased movement
- Neuropathic pain and little diffusion to the right leg
- Dyspnea difficulties and intermittent fever
- MRI shows onset of inflammatory changes in degenerated area S1 possibly caused by low-virulence spondylodiscitis
- Re-Biopsy planned with CAS-One for culture bacteria-specific PCR

Treatment
- Due to the transpedicular access necessary and the proximity to sensitive nerve pathways, the biopsy was performed with CAS-One IR. A previous attempt at another hospital had failed
- Enhanced 3D visibility of the pathways supported planning and avoidance of risk structures such as nerves and vertebral arteries
- CAS-One IR Aiming Device enabled highly accurate placement of the co-axial needle
- Intra-operative image fusion allowed the physicians to compensate for patient movement during procedure
- Biopsy of S1 was taken after the bone substance was too hard to penetrate
- After adaption to the new plan, the co-axial needle was placed through the left pedicle, lateral to the nerve
- The biopsy needle was successfully drilled into the S1 body and sufficient tissue for a biopsy was taken

Conclusion
- Approximately 20mm of bone fragment was successfully extracted
- Further laboratory investigation is ongoing
- CAS-One IR allowed precise planning of the trajectory in areas that are difficult to access as well as tracking of the current needle position in the verification scans
- CAS-One IR helped to visualize a double-oblique needle trajectory. In this case, due to the hard bone pressure and the angle to the bone cortex. The process of free-hand drilling (or drilling without external support) can also lead to displacements
- CAS-One IR allowed fusion of previous MR images with the initial planning scan, to identify lesions that are not visible on the CT imaging