

CT Guided Robotic Assisted Interventional Procedures

This compilation of diagnostic and therapeutic procedures were performed on Perfint's robotic targeting systems. Information contained here is for private circulation only. The information is intended for the purpose it serves and not beyond. In case of any issue, error or complaint please write to: clinicalmarketing@perfinttech.com

Perfint Healthcare (www.perfinthealthcare.com) is a world leader in planning and targeting solutions for image guided interventional procedures - with an emphasis on oncology and pain care. Perfint's products, PIGA CT and ROBIO, are used by radiologists around the world for biopsy, drug delivery, ablation, drainage and fine needle aspiration. PIGA CT and ROBIO are installed at some of the world's top hospitals and are CE marked. Perfint's newest product MAXIO, is set to change the world of Interventional Oncology. MAXIO will allow clinicians to visually plan, execute, and validate ablation procedures on a single system, and all in 3D. MAXIO has been designed to make complex, multi-probe ablations simpler, which will help to make these life-saving procedures available to more cancer sufferers than ever before.

Perfint Healthcare dedicates this collection of successful interventions to the millions of people around the world who are locked in a day-to-day battle against cancer - living boldly, fighting with hope. Perfint is proud to join the families, caregivers, researchers and donors who are engaged in this fight.

New Directions... New hope

Case Studies : By type of procedure

Clinical Cases performed with Robotic Assistance

PROCEDURE	PAGES
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DRAINAGE	58

Case Studies : By organ type

Clinical Cases performed with Robotic Assistance

ORGAN	PAGES
LUNGS	30, 38, 40, 50, 52, 54
ABDOMEN	6, 12, 14, 24, 36, 44, 46, 48
BONE	8, 26, 42, 58, 60
NERVE ROOT	10, 16
MEDIASTINAL	22, 34, 56
EPIDURAL	18
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Celiac Plexus Block - Anterior Approach

A patient with pancreatic tumour posted for celiac plexus neuro block (Pain Management)

Challenge:

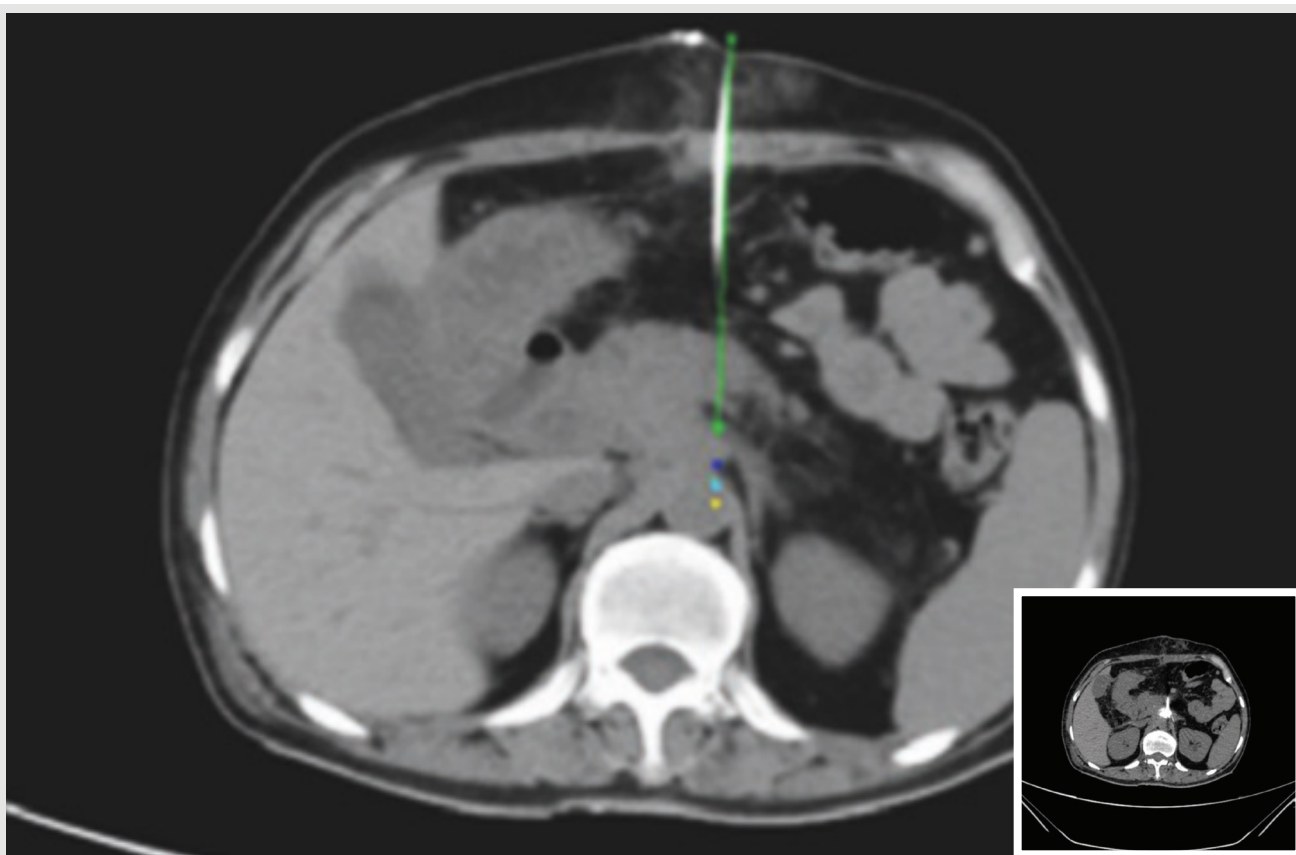
Anterior approach needs long precise trajectory to reach plexus which is 1mm from aorta.

Procedure:

Celiac plexus within 1mm of aorta targeted with targeting device without traumatizing vital structures. Contrast enhancement confirms the target. Absolute alcohol injected.

Target Depth : 103mm

Target Distance : 1mm
from Aorta



Notes

Facet Joint Injection

A patient with pseudo radicular pain posted for facet joint steroid injection. (Pain Management)

Challenge:

Posterior approach needs precise orbital angle to reach facet joints.

Procedure:

Both facet joints targeted with targeting device precisely. Mixture of anaesthetic and steroid injected to relieve pain.

Target Depth : 54mm

Target Size : 2mm



Notes

Selective Nerve Root Block (SNRB)

A patient with sciatica, posted for Selective Nerve Root Block at sacral level (Pain Management)

Challenge:

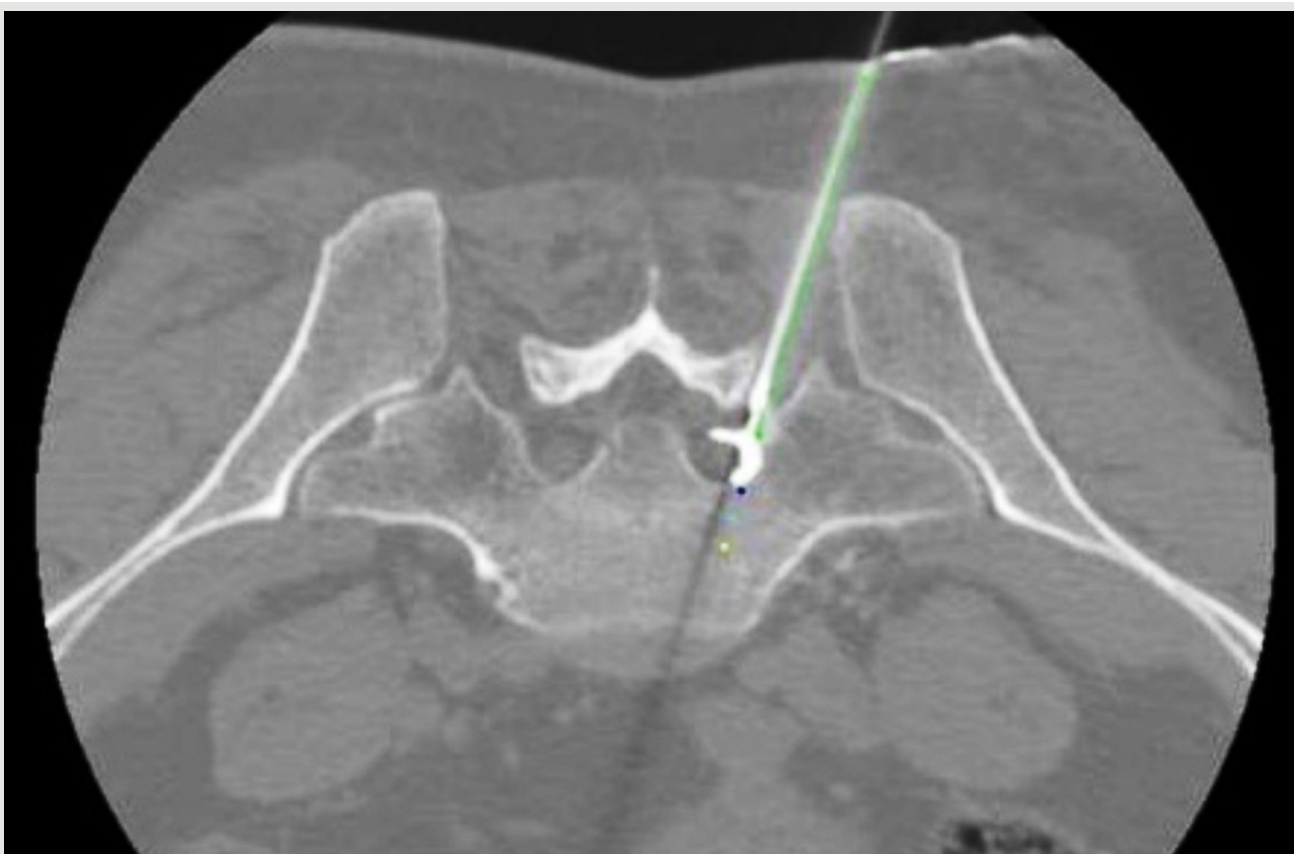
Targeting perineural space needs precise orbital angle and depth.

Procedure:

Nerve root targeted precisely with targeting device, through a space between sacrum and iliac bone. Contrast enhancement confirms the target. Mixture of anaesthetic and steroid to relieve pain.

Target Depth : 68mm

Target Size : 10mm



Notes

Bilateral Celiac Plexus Alcohol Ablation

A patient with pancreatic tumor posted for Pain Management procedure

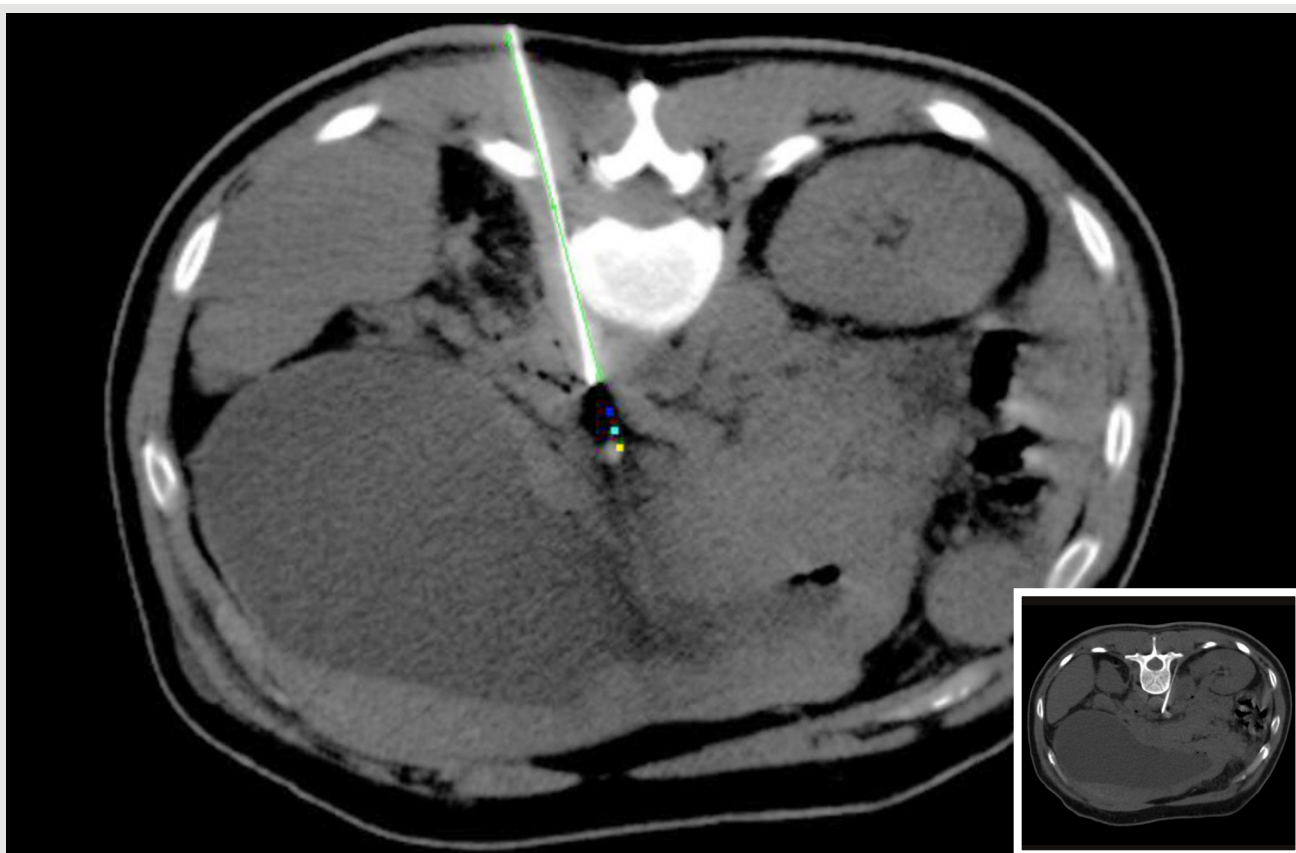
Challenge:

Targeting celiac plexus, needs precise angle and depth: overshoot of the needle may hit vital organs.

Procedure:

Celiac plexus targeted with precision without involving critical abdominal structures. Phenol injected to relieve pain.

Target Depth	: 95mm(R), 96mm(L)
Orbital Angle	: 15.26°(R), 11.42°(L)



Notes

Trans Aortic Celiac Plexus Block

A patient with Cholangiocarcinoma posted for Pain Management procedure

Challenge:

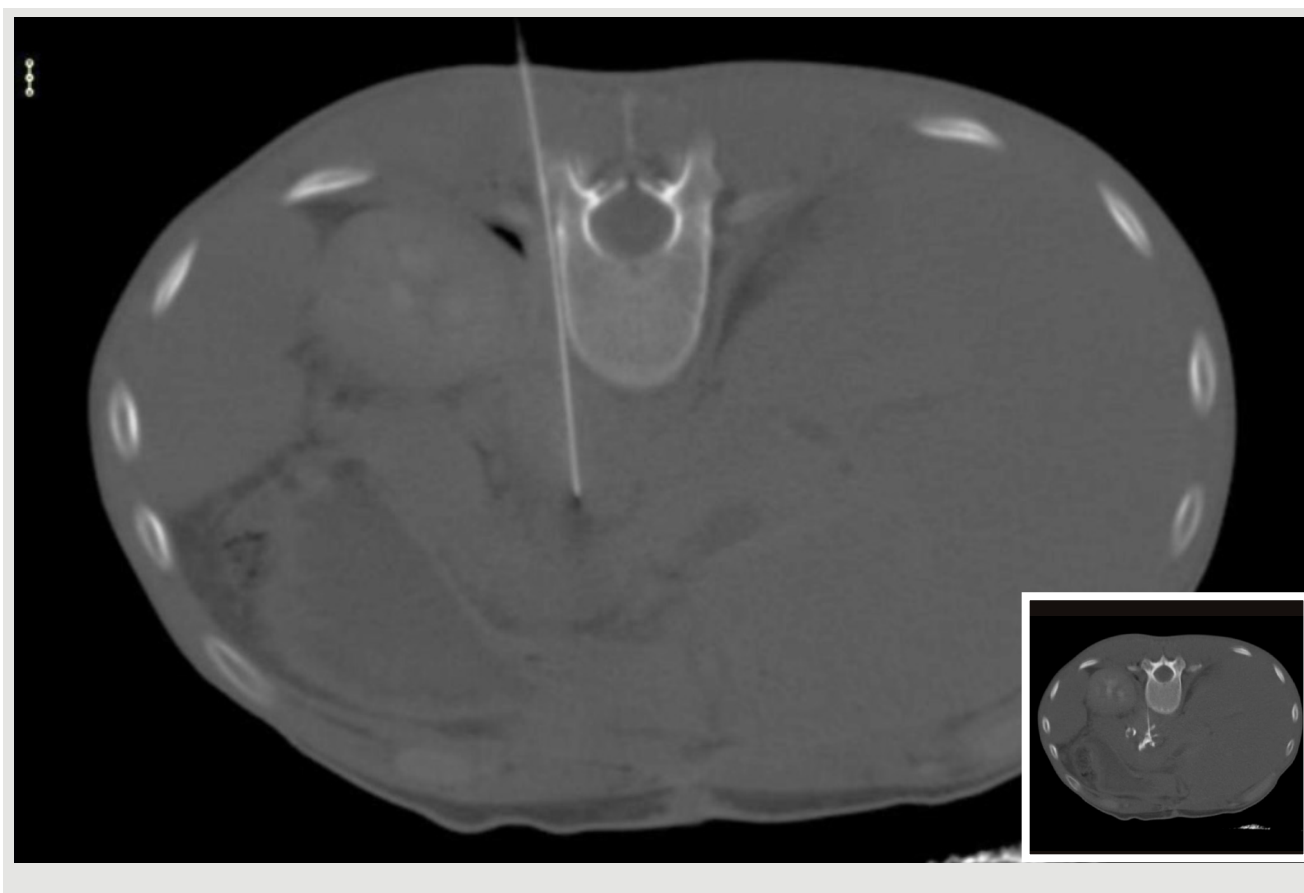
To reach the deep seated celiac plexus is difficult by manual approach.

Procedure:

Targeting device assisted to reach the target up to the aortic wall and needle advanced by “loss of resistance technique” to reach the plexus.

Target Depth : 51mm

Orbital Angle : 7.97°



Notes

Nerve Root Block

Nerve Root Block at the level of S1,
planned for pain management

Challenge:

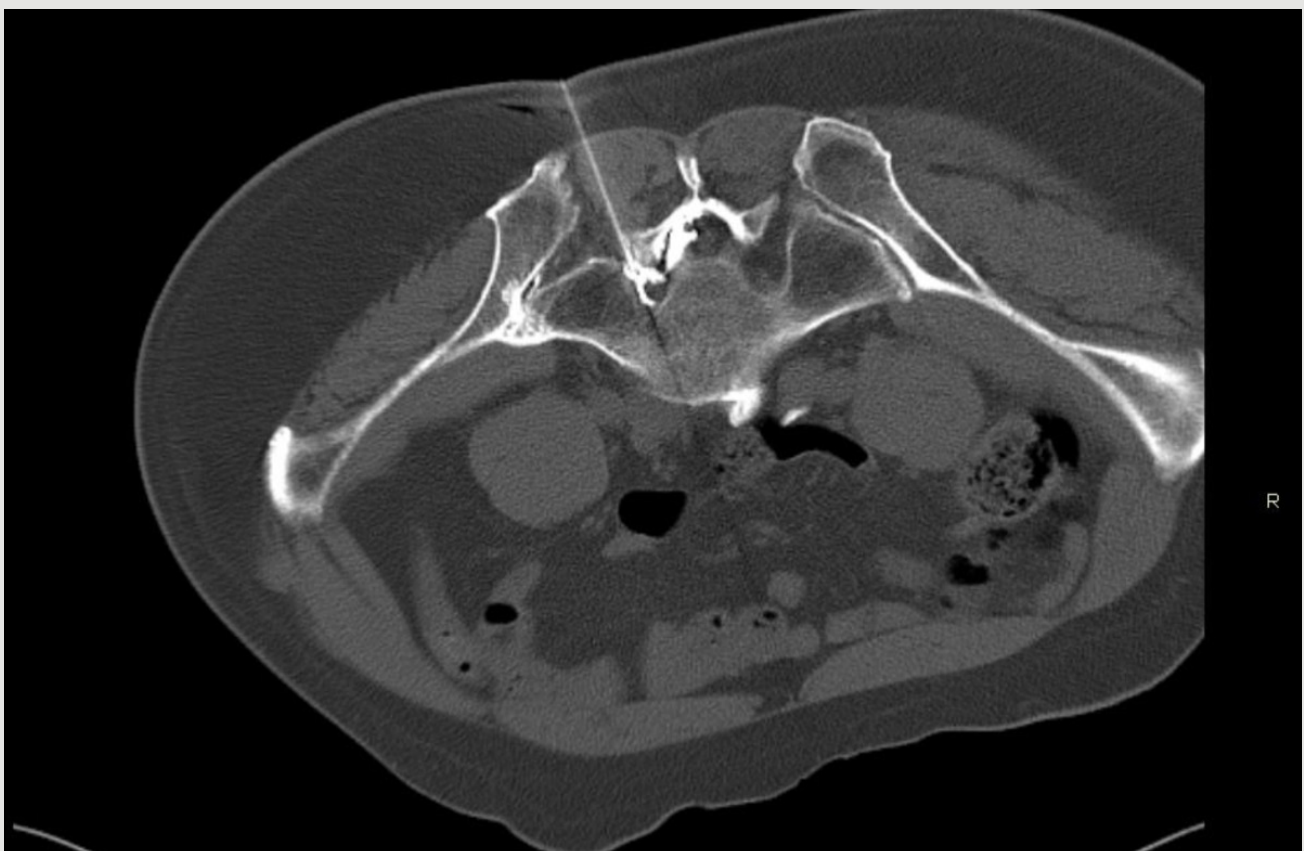
Targeting nerve root need precise
orbital angle and accurate depth,
overshoot may injure nerve.

Procedure:

S1 level nerve root targeted precisely with
targeting device without traumatizing nerve.
Mixture of anaesthetic and steroid injected to
relieve pain.

Target Depth : 75mm

Accuracy : 2mm



Notes

Epidural Injection, L5-S1 Level

A patient with back pain posted for epidural steroid injection (Pain Management)

Challenge:

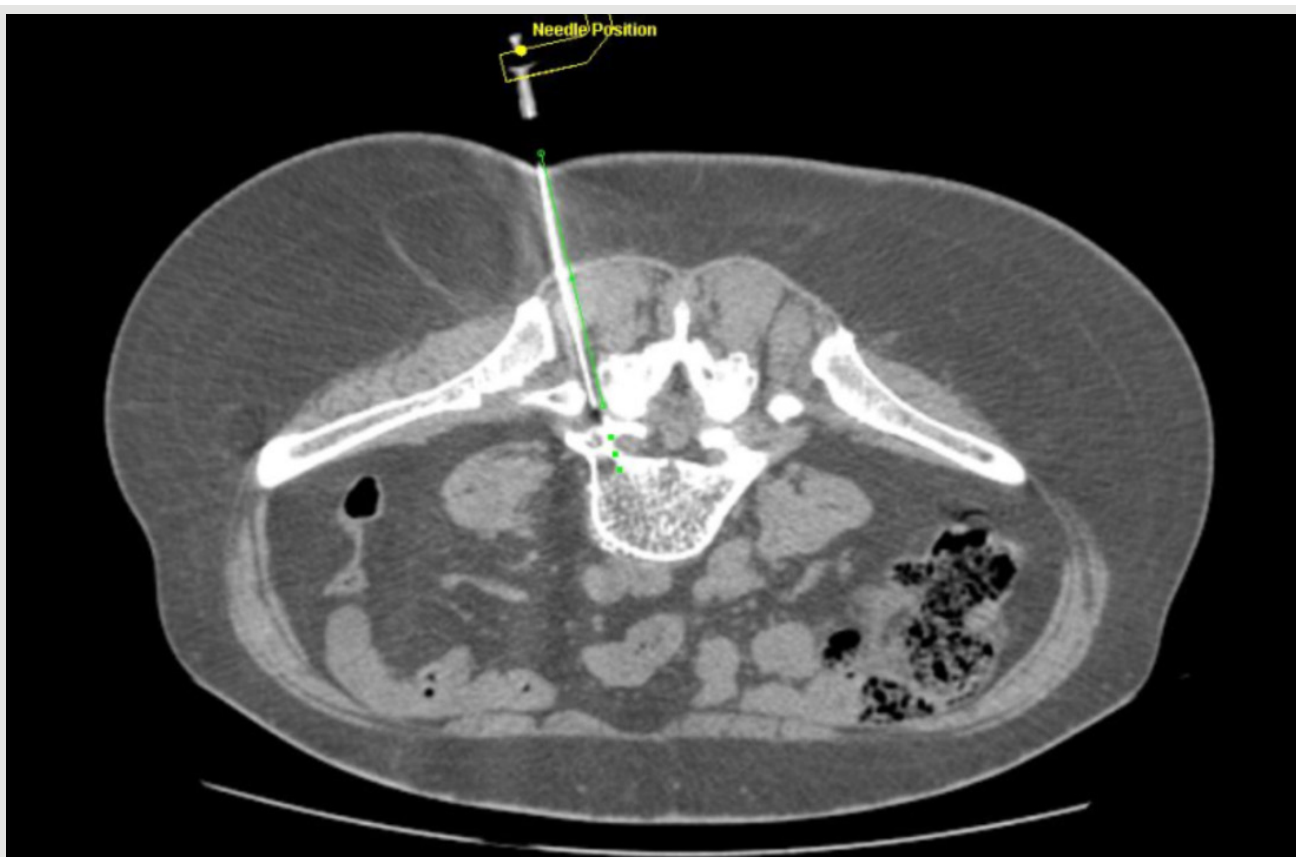
Precise orbital angle needed to reach nerve root.

Procedure:

L5-S1 level epidural space targeted precisely with targeting device without traumatizing nerve root. Mixture of anaesthetic and steroid injected to relieve pain.

Target Depth : 78mm

Orbital Angle : 13.8°



Notes

Pelvic Mass Biopsy

A mass in pelvic region, posted for biopsy

Challenge:

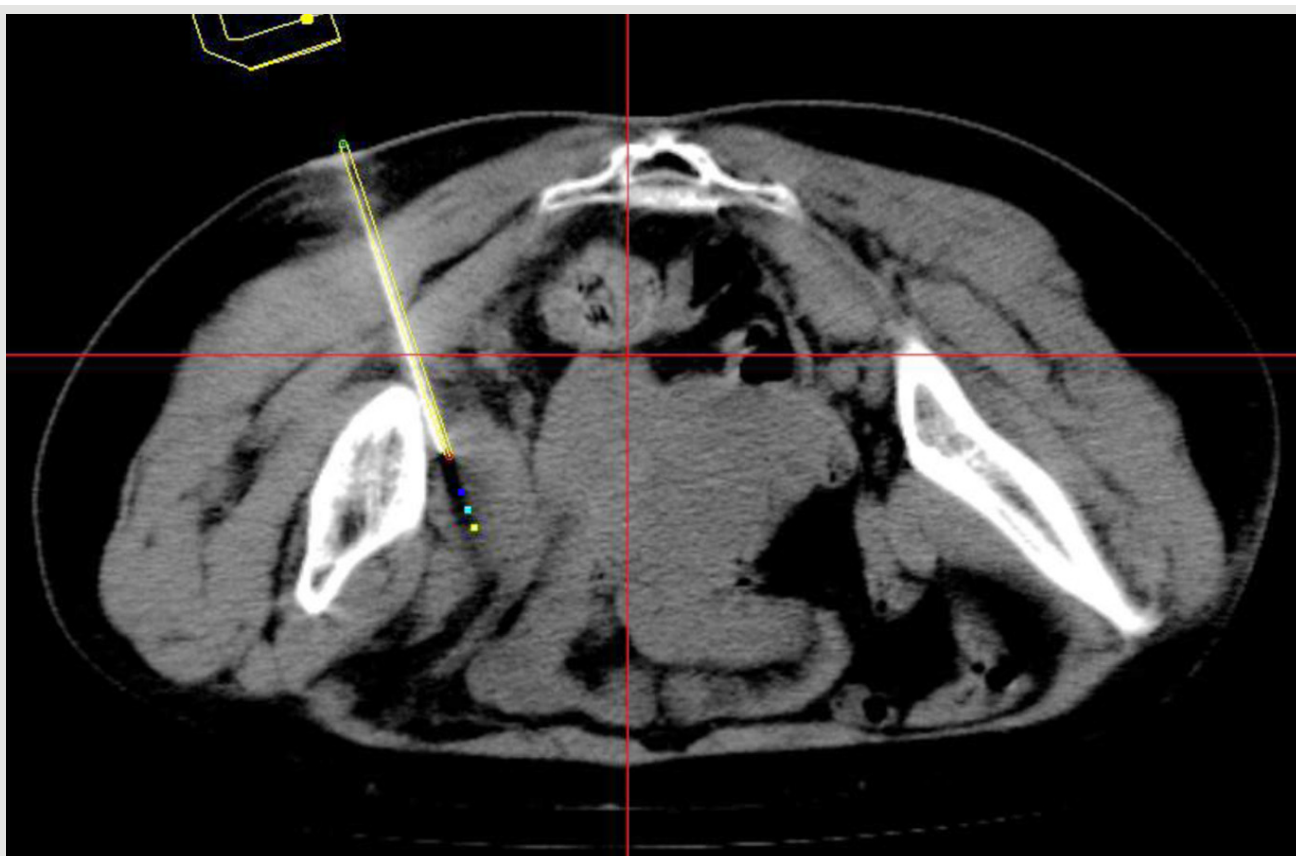
Precise plan needed with orbital angle between iliac bone and bowel loops.

Procedure:

A pelvic mass attached to iliac bone targeted with targeting device without traumatizing pelvic organs.

Target Depth : 87mm

Orbital Angle : 18.79°



Notes

Mediastinal Mass Biospy

A mediastinal mass 3mm of aorta and trachea, posted for biopsy

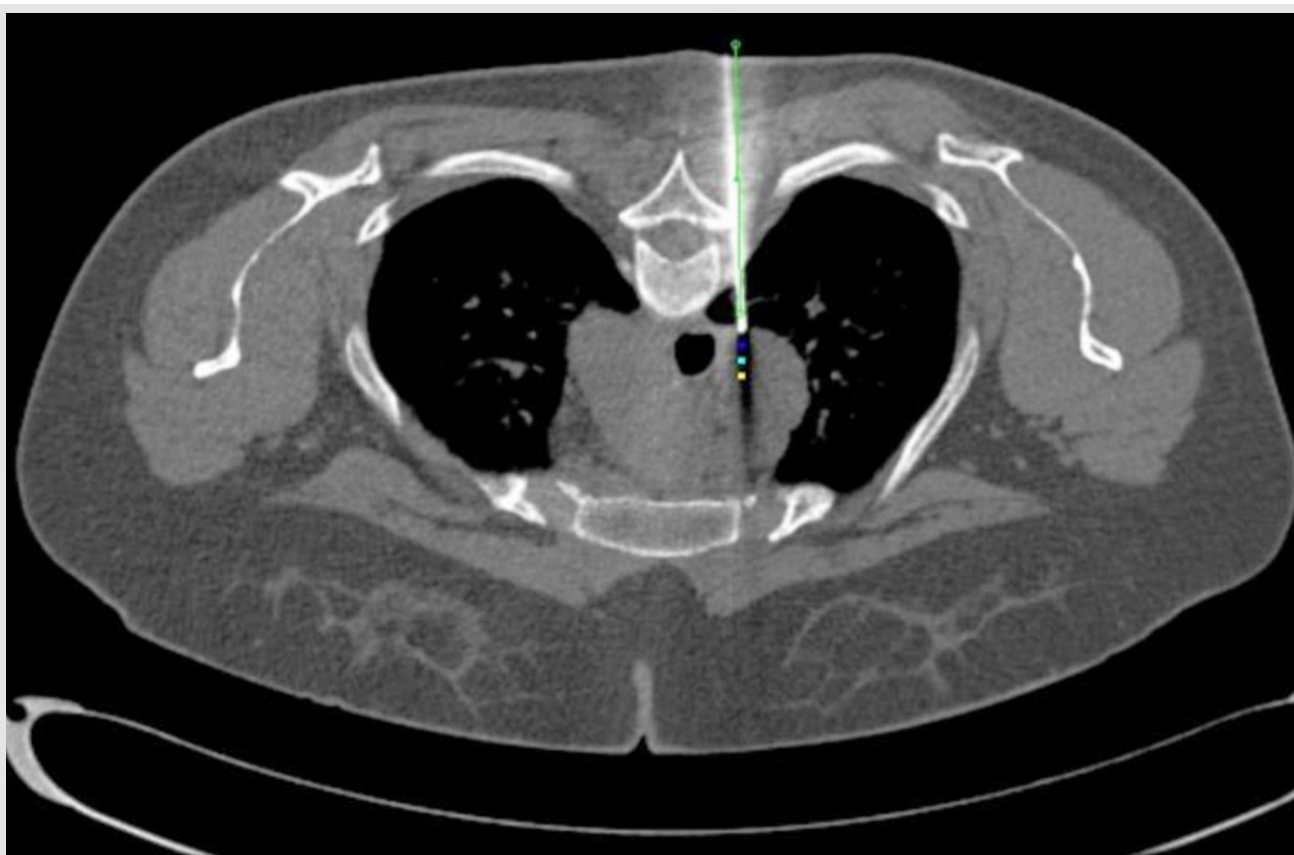
Challenge:

A 20mm mass, 3mm of aorta and trachea needs precise plan through intercostal space.

Procedure:

A mass 3mm of aorta, targeted with targeting device through intercostals space without traumatizing aorta and trachea.

Target Depth	: 87mm
Target Size	: 20mm
Distance from Aorta	: 3mm



Notes

Liver Biopsy with 3D Angle Plan

A liver mass, posted for core biopsy

Challenge:

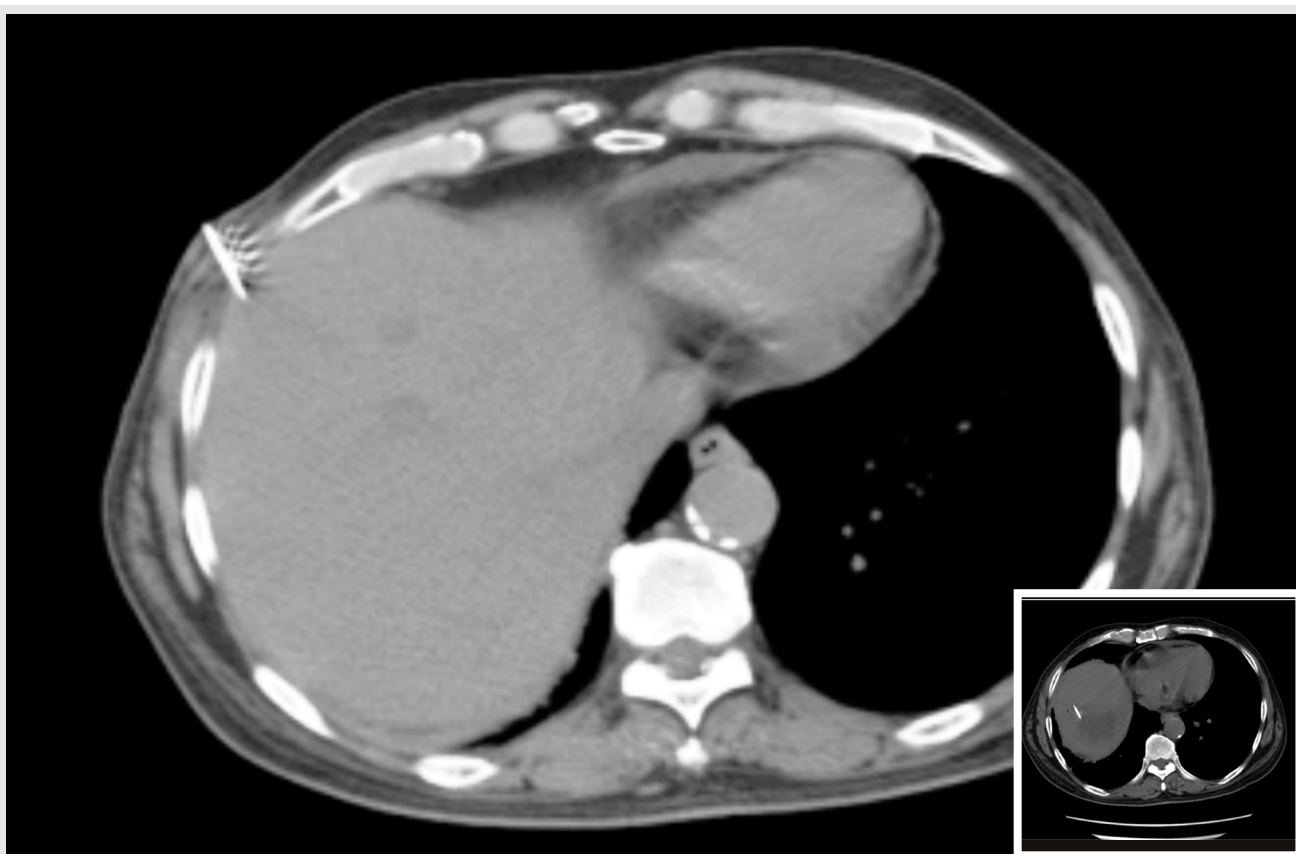
Cranial and orbital angle needed to reach the target without involving lung parenchyma.

Procedure:

The biopsy performed carefully with targeting device at 22° orbital and 18° cranial angulations (3D angulations) at mid liver level. Needle tip reached target as per plan without traumatizing lung tissue.

Target Depth : 84mm

Target Size : 20mm



Notes

Vertebral Bone Biopsy

Vertebral body lesion posted for bone biopsy

Challenge:

Precise planning needed to reach soft tissue component of vertebra through psoas muscle.

Procedure:

A lesion within body of the vertebra targeted with targeting device in a single pass, through psoas muscle without traumatizing vital abdominal structures.

Target Depth : 102mm
Distance from Aorta : 3mm
Orbital Angle : 44°



Notes

Retrocrural Lesion Biopsy

A lesion at retrocrural region, attached to vertebra posted for biopsy

Challenge:

Precise plan needed to reach the lesion without traumatizing abdominal vital structures.

Procedure:

Retrocrural mass targeted with targeting device without traumatizing aorta and other vital structures.

Target Depth : 85mm

Target Size : 20mm



Notes

Lung Mass Biopsy

A mass in right lung posted for biopsy

Challenge:

Precise trajectory plan needed to reach the lung mass through intercostal space.

Procedure:

Biopsy and FNAC done for a lung mass with targeting device in a single pass.

Target Depth : 66mm

Orbital Angle : 27.34°



Notes

Inguinal Lymph Node Biopsy

A lymph node in inguinal region, posted for biopsy

Challenge:

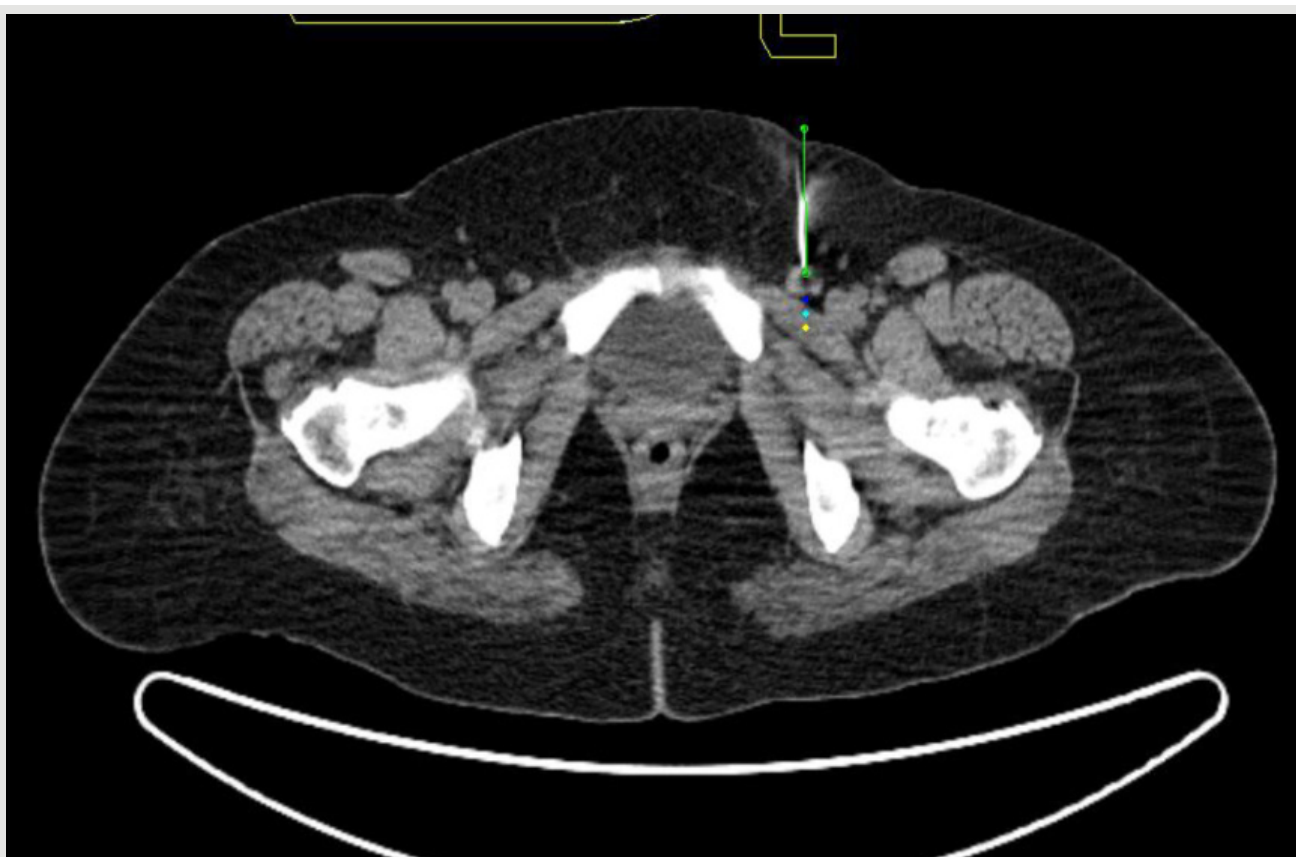
Precise plan needed to reach 10mm lymph node, 2mm of femoral artery.

Procedure:

A lymph node targeted with targeting device without traumatizing femoral artery.

Target Depth : 53mm

Target Size : 10mm



Notes

Mediastinal Biopsy

A patient with mediastinal mass, 3mm of aorta and trachea planned for biopsy

Challenge:

Needs posterior approach to reach deep seated mediastinal mass.
Overshoot of the needle may traumatize critical blood vessel.

Procedure:

FNAC and biopsy done with targeting device for the deep seated mediastinal mass.

Target Depth : 108mm
Distance from Aorta : 3mm



Notes

Pancreatic Head Lesion

A patient with mass in the pancreatic head, posted for core biopsy

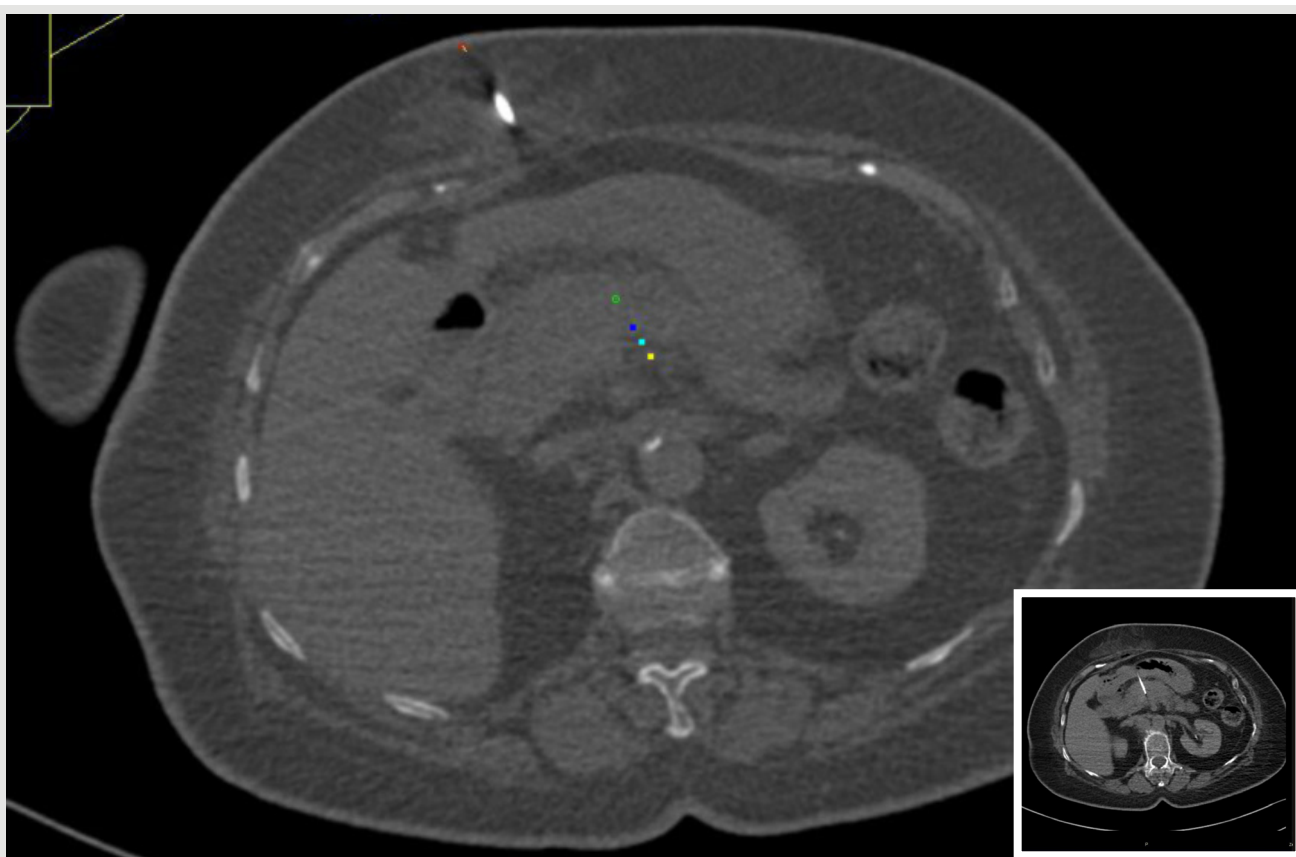
Challenge:

Need precise cranio-caudal, orbital angle and accurate depth to reach target without involving critical structures.

Procedure:

A pancreatic head lesion precisely targeted with 3D angle with targeting device, without traumatizing blood vessels.

Target Depth	: 83mm
Orbital Angle	: 30.64°
CC Angle	: 10.53°



Notes

CASE
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Biopsy of Para Vertebral Lung Mass

A patient with paravertebral lung mass,
posted for biopsy

Challenge:

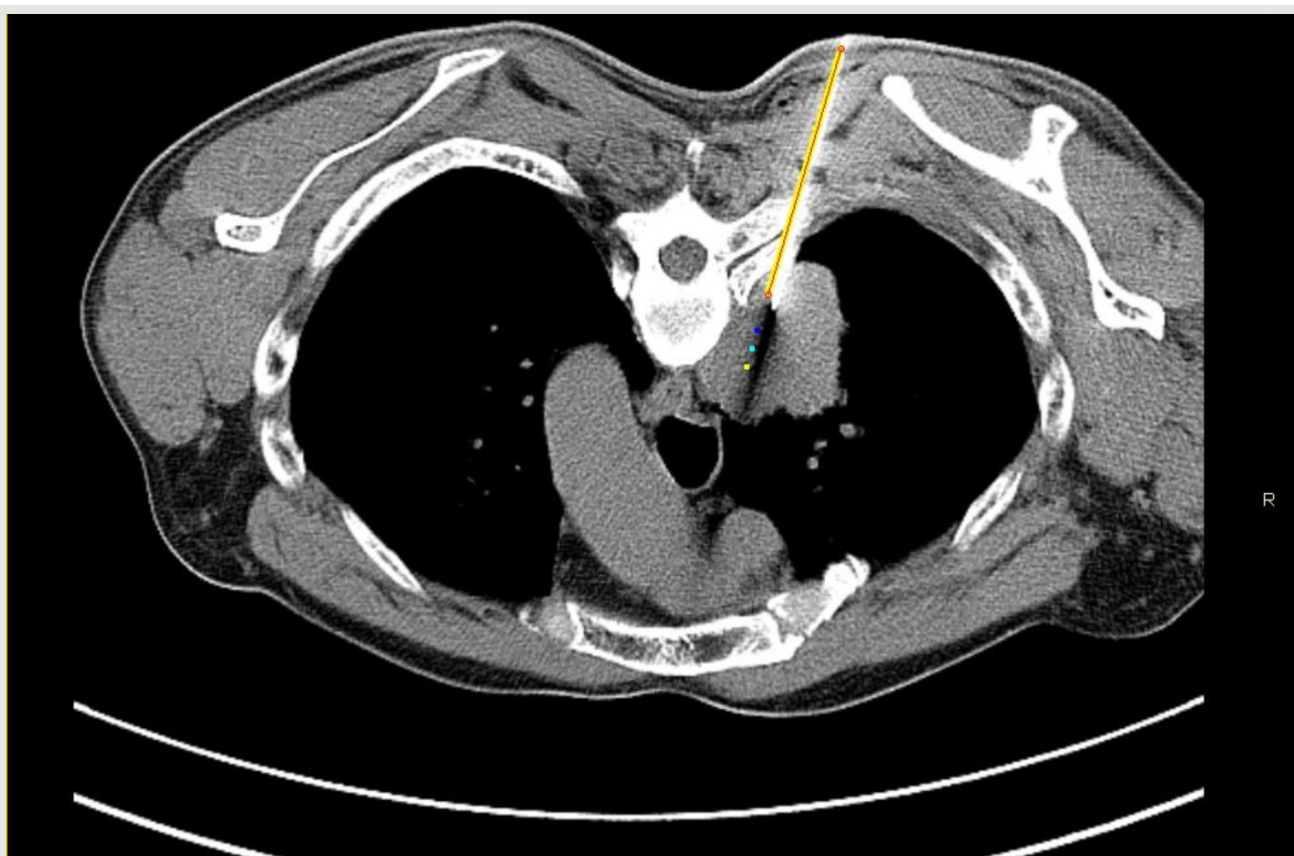
Need precise plan through narrow
space between rib & vertebra

Procedure:

A paravertebral lung mass targeted with
targeting device through intercostal without
involving lung parenchyma.

Target Depth : 68mm

Orbital Angle : 16.5°



Notes

Biopsy of Lower Lobe Lung Mass

A patient with lung mass right lower lobe, planned for core biopsy

Challenge:

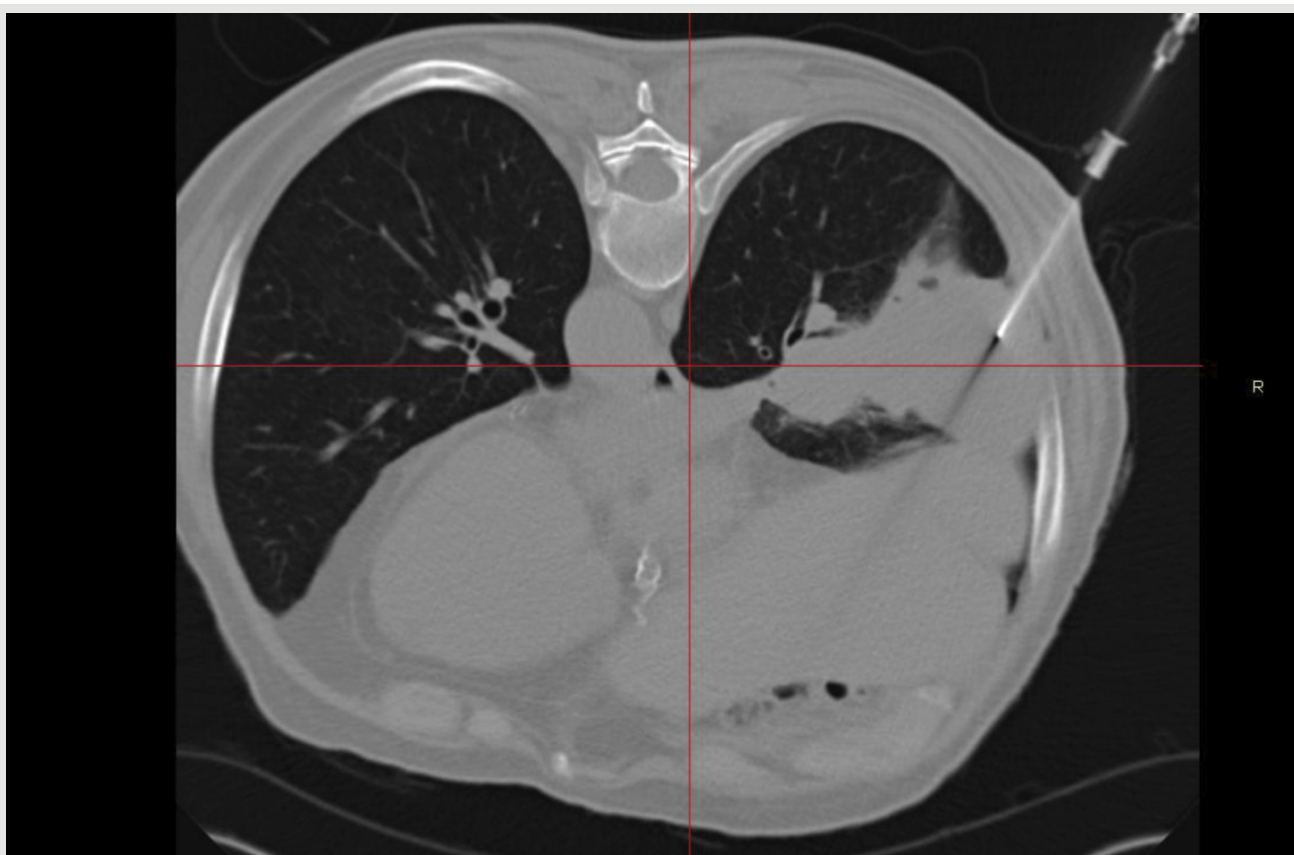
Since the mass very close to diaphragm, it was moving up and down with respiration. Precise orbital angle needed to avoid lung tissue.

Procedure:

Core biopsy of lung mass close to diaphragm performed with targeting device using medspira interactive breath-hold system to synchronize with breath hold.

Target Depth : 62mm

Orbital Angle : 25.84°



Notes

Vertebral Biopsy

A patient with lytic lesion within the body of vertebra, posted for bone biopsy

Challenge:

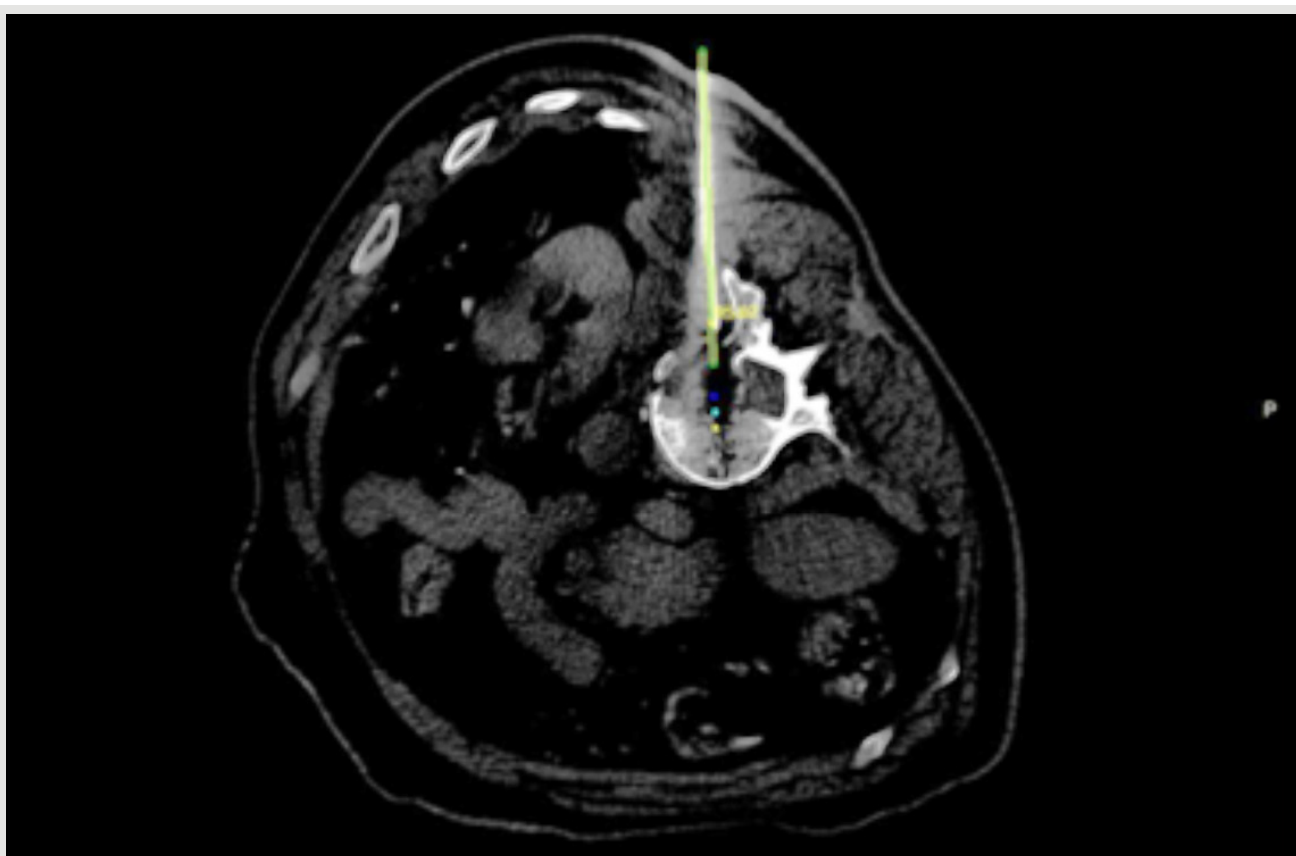
Precise planning needed to reach the lesion through pedicle.

Procedure:

A lytic lesion in body of the vertebra, targeted with targeting device in a single pass.

Target Depth : 108mm

Target Size : 15mm



Notes

Para vertebral Lymph Node Biopsy

A patient with multiple para-aortic lymph node, posted for biopsy

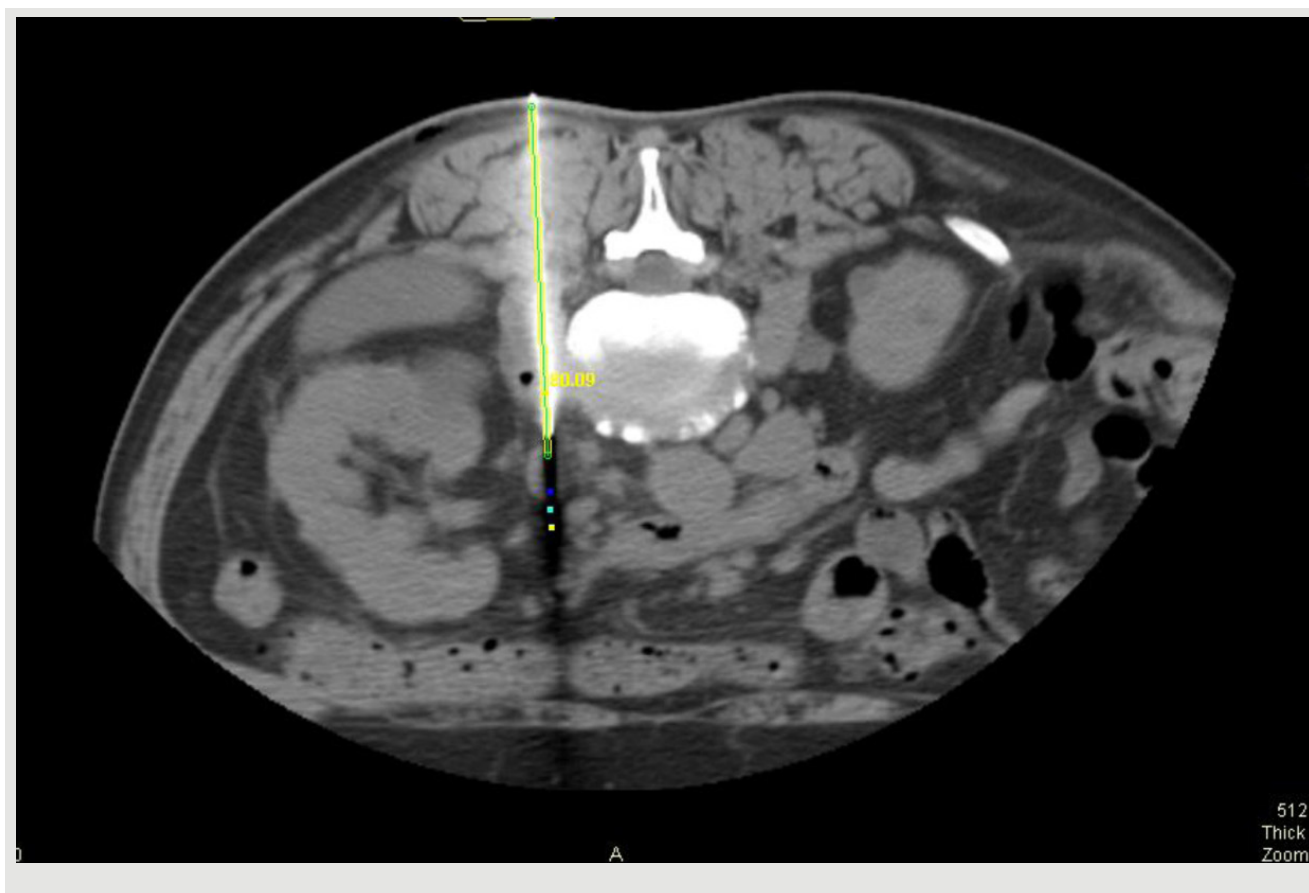
Challenge:

Precise plan need to reach 22mm mass, surrounded bowel loops and blood vessels.

Procedure:

A lymph node targeted with targeting device precisely through psoas muscle without traumatizing vital structures in abdomen.

Target Depth : 97mm
Target Size : 22mm
Distance from Renal Vein : 3mm



Notes

Retroperitoneal Mass Biopsy

A mass attached to vertebra in retroperitoneal region, posted for biopsy

Challenge:

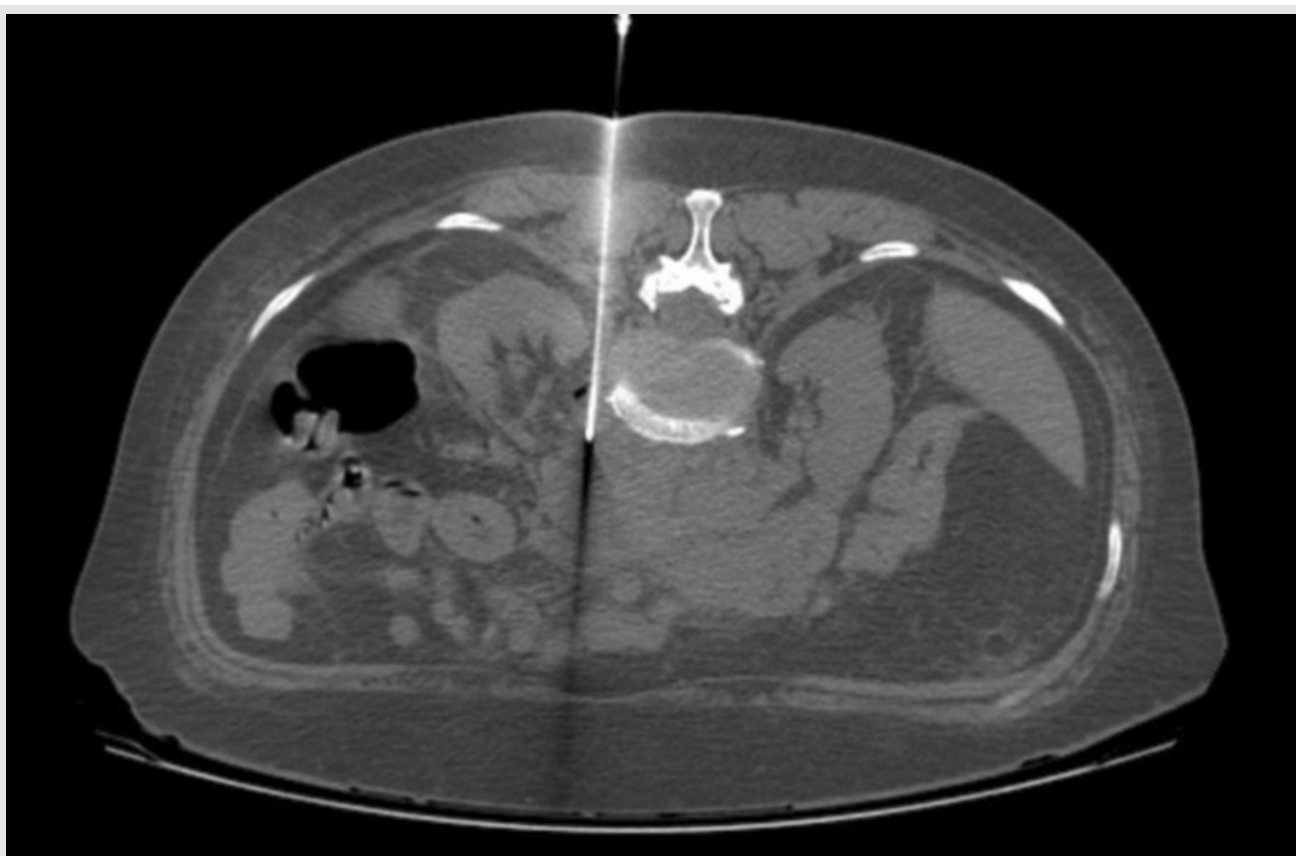
Precise plan needed through space between kidney and vertebra to reach deep seated retroperitoneal mass.

Procedure:

Biopsy done for deep seated mass with targeting device without traumatizing renal vessels.

Target Depth : 97mm

Target Size : 25mm



Notes

Biopsy-Renal Mass

SOL in lower pole of kidney planned for biopsy

Challenge:

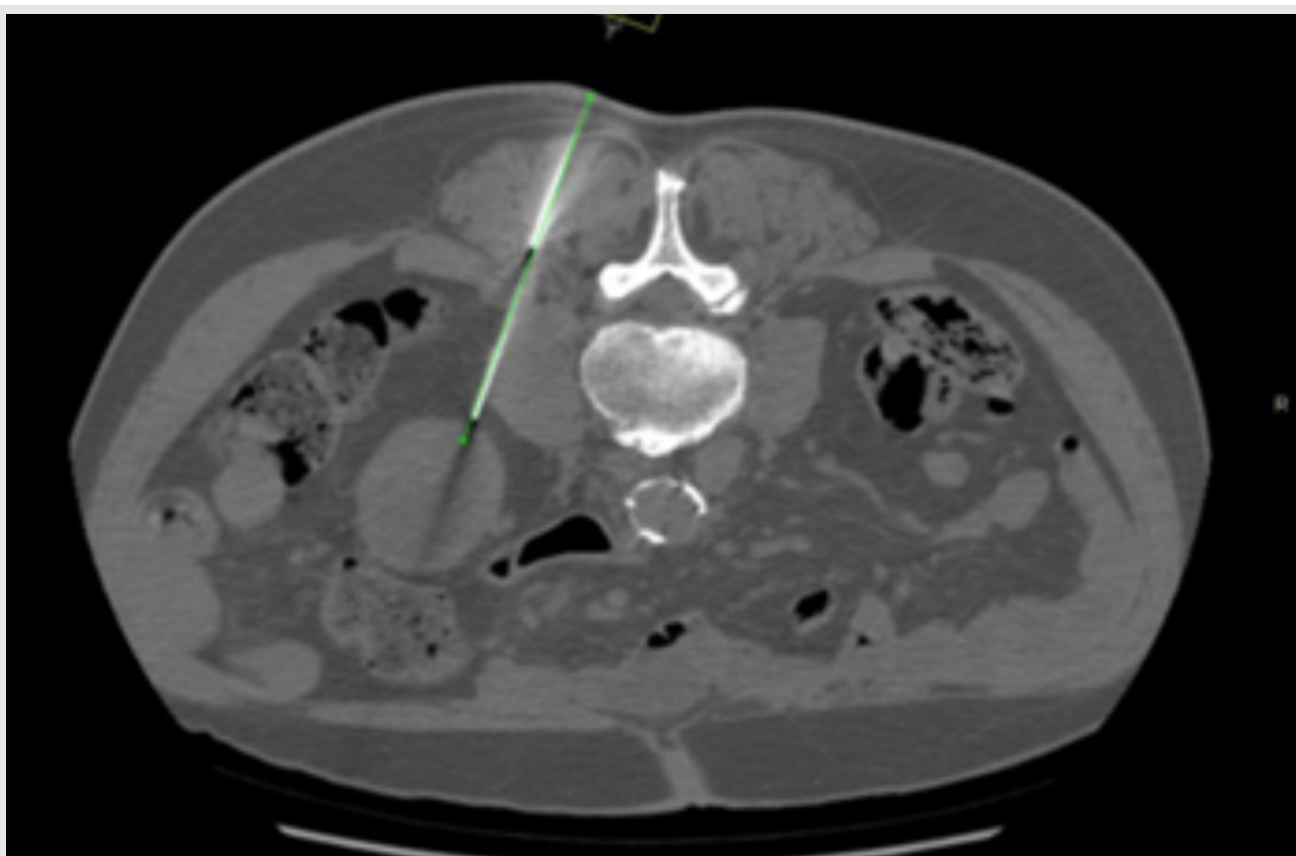
Needs precise trajectory for posterior oblique approach through psoas muscle to reach the target.

Procedure:

Renal mass precisely targeted with targeting device through psoas muscle without traumatizing bowel loops.

Target Depth : 114mm

Orbital Angle : 20°



Notes

Subcentimeter Lung Nodule FNAC

7mm nodule in left lung posted for FNAC

Challenge:

Need a precise angle and depth to target 7mm lung nodule.

Procedure:

A small 7mm lung lesion targeted with targeting device and FNAC done through intercostal space.

Target Depth : 65mm

Target Size : 7mm



Notes

Solitary Pulmonary Nodule FNAC

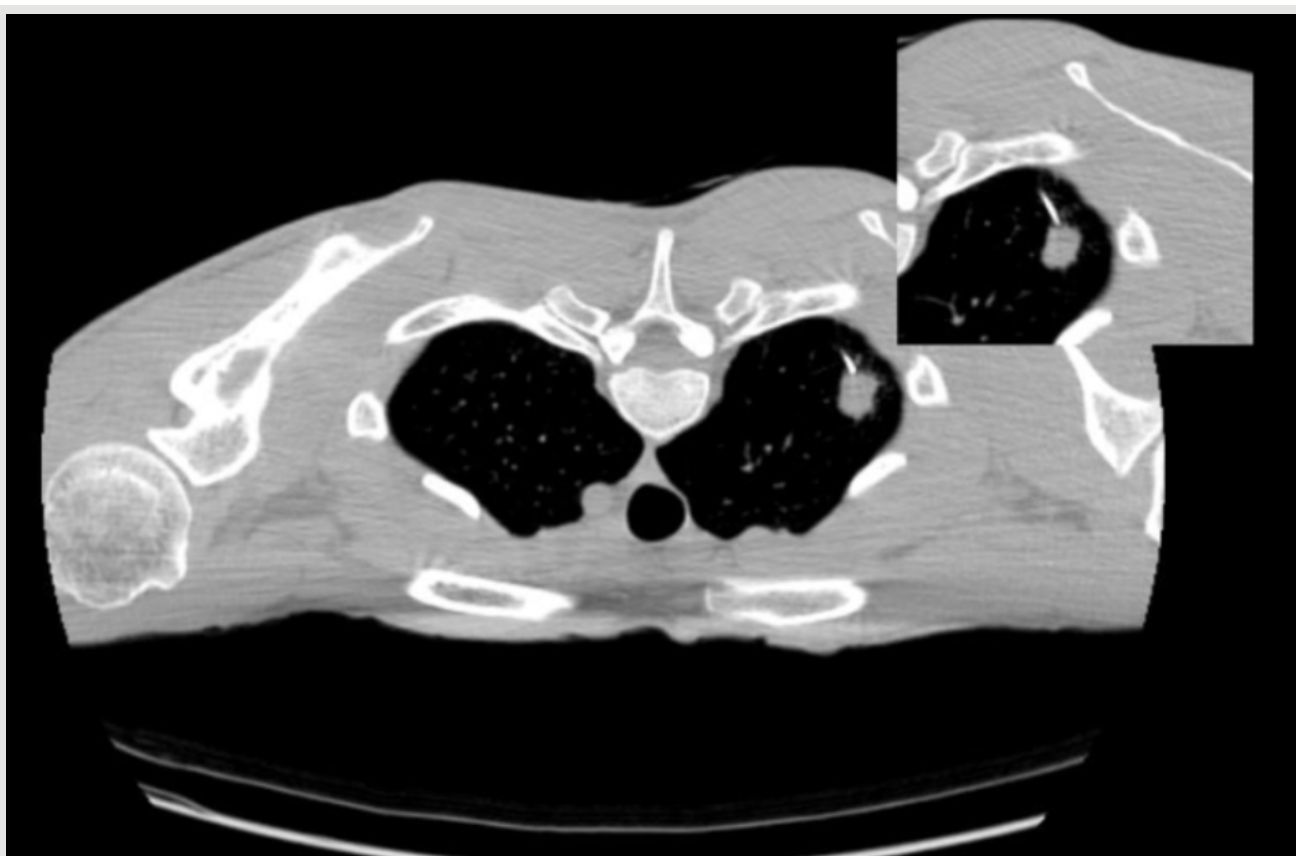
Solitary pulmonary nodule in the right upper lobe, posted for FNAC

Challenge:

The nodule surrounded by ribs and scapula. Precise cranio-caudal and orbital angle needed to reach the target.

Procedure:

A 12 mm of mass targeted with targeting device through intercostal space with 3D angle (cranio-caudal and orbital).



Notes

FNAC of Lung Nodule

FNAC was planned for a 7mm nodule in medial segment of the right middle lobe

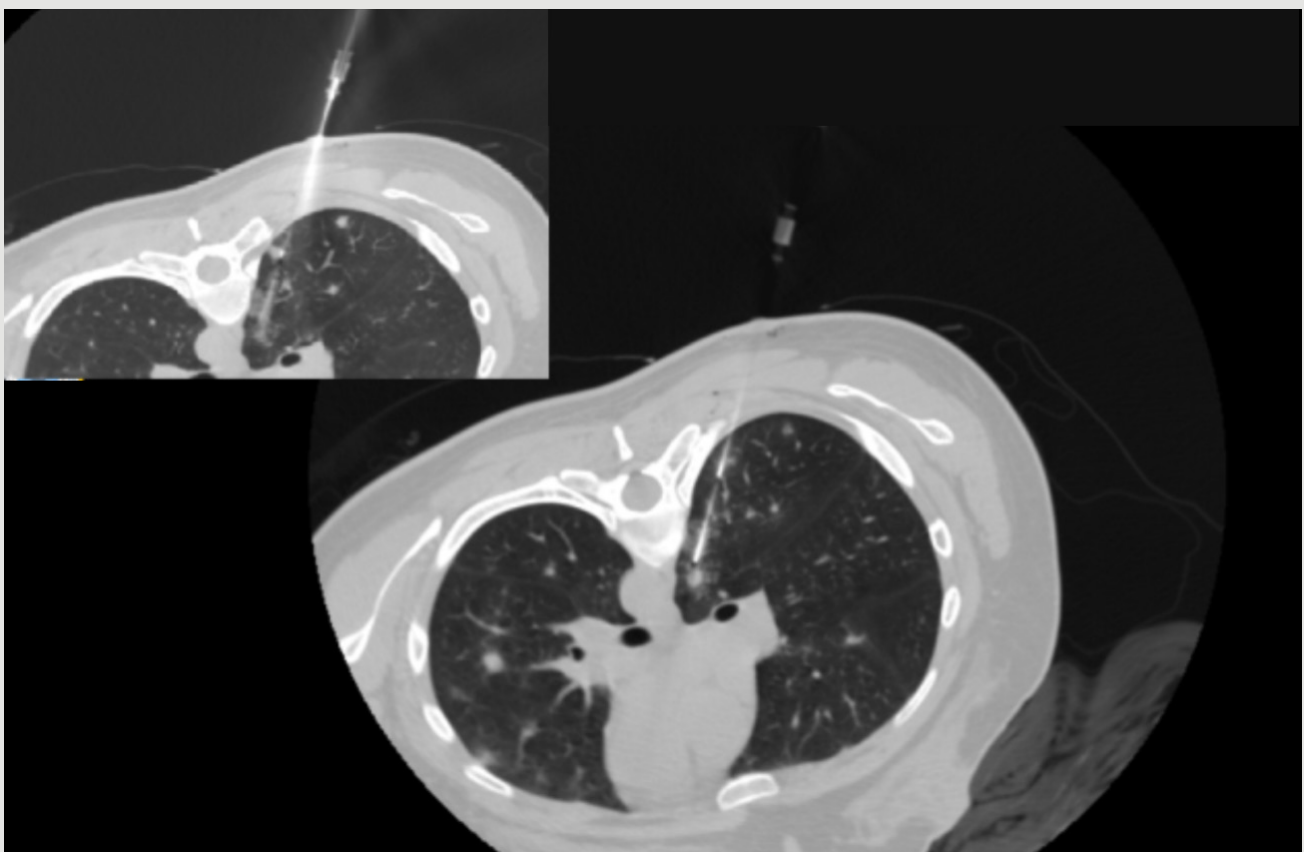
Challenge:

Targeting a nodule, 3mm of aorta and 6mm of right bronchus needs precise trajectory.

Procedure:

A lung nodule between right bronchus and aorta targeted with targeting device through intercostal space without traumatizing vital structures.

Target Depth : 91mm
Distance from Right Bronchus : 6mm
Distance from Aorta : 3mm



Notes

Mediastinal Mass FNAC

A mediastinal mass at subcarinal space, posted for FNAC

Challenge:

Precise orbital angle and accurate depth required to reach the mass at subcarinal space, needle over shoot may injure critical blood vessels.

Procedure:

A mediastinal mass, 2mm of right bronchus and pulmonary vessels targeted with targeting device through intercostal space without traumatizing pulmonary vessels and right bronchus

Target Depth	: 109mm
Target Size	: 5x6mm
Distance from Right Bronchus	: 2mm
Orbital Angle	: 27.9°



Notes

Ostoid Osteoma of Femur

Osteoid osteoma femur, posted for RF Ablation

Challenge:

5mm of osteoid osteoma needs precise localization.

Procedure:

An osteoid osteoma of 5mm precisely targeted with targeting device and RF ablation performed to ablate the tumor.

Target Depth : 53mm

Target Size : 5mm



Notes

Vertebral Abscess Drainage

Vertebral body abscess posted for drainage

Challenge:

Reaching vertebral body through pedicle needs precise cranial and medial angulations (3D angulation).

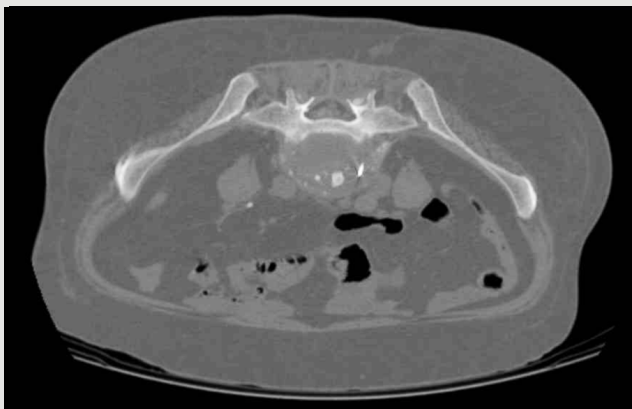
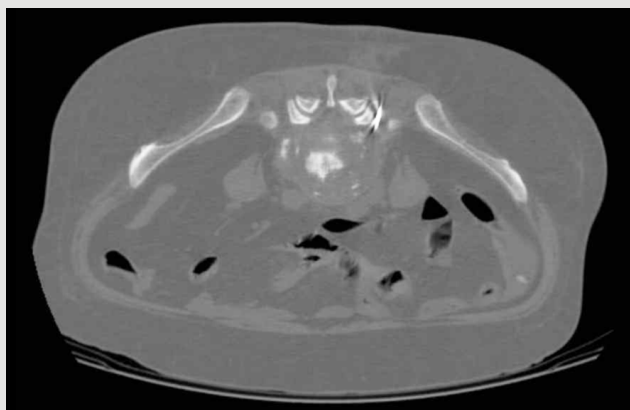
Procedure:

Vertebral abscess successfully drained through pedicle with 3D angulations by single pass.

Target Depth : 97mm

CC Angle : 10.56°

Orbital Angle : 16.57°



Notes

Winning with Customers Globally



Some of Our Key Users



 Alfred Hospital - Melbourne	 Makati Medical Center - Philippines	 University of Istanbul - Turkey	 Global Hospitals	 Lilavati Hospital - Mumbai
 Tata Memorial Hospital - Mumbai	 IGMC - Shimla	 ILBS - Delhi	 KG Hospitals - Coimbatore	 Seven Hills - Mumbai
 Jaslok Hospital - Mumbai	 AIIMS - Delhi Dept. of Radiology Dept. of Nuclear Medicine	 King Edward Hospital - Mumbai	 JIPMER - Pondicherry	 BHU - Varanasi
 Mahajan Diagnostics - Delhi	 Saral Diagnostics - Delhi	 Bharat Scans - Chennai	 Nivaran Scan - Mumbai	 Vijaya Medical Center - Vizag

* This is a partial list of customers world wide, using Perfint's Robotic assistance solutions.

World Class IO Systems



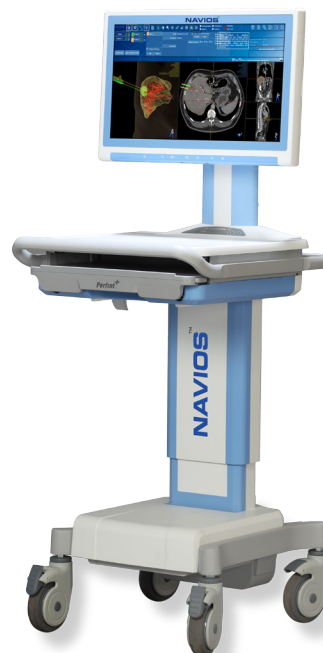
ROBIOTM

ROBIOTM **EZ**

ROBIOTM **EX**



MAXIO™



NAVIOS™

The Robotic Targeting System For CT Guided Interventions



ROBIOTM



ROBIOTM **EZ**

SUPERIOR PATIENT EXPERIENCE



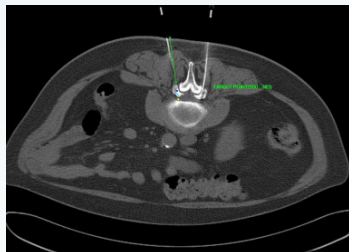
- Easy anaesthesia delivery
- Fewer needle punctures

EASY TO USE



- Proven 5 step workflow
- Instant hot shoe registration

CONSISTENT ACCURACY



- Navigate through slices
- Execute complex trajectory

SAFE TARGETING



- Safely access smaller & difficult to reach targets

The Advanced Robotic Targeting System For CT and PET-CT Guided Interventions

10 procedures made safer and simpler.

The ROBIO EX is a CT & PET-CT guided robotic positioning system that assists with fast and accurate tumor targeting and tool placement for abdominal and thoracic interventions, including biopsy, FNAC, pain management, drainage and tumor ablation.

ROBIO EX offers several features to help clinicians target the tumor and plan for accurate tool placement for diagnosis or therapy. ROBIO EX can be used for targeting and tool placement in deep seated lesions requiring orbital or crano-caudal angulation or a combination of both.

ROBIO EX helps reduce the number of needle punctures, check scans, procedure time, patient pain and radiation exposure.



ROBIOTM **EX**

Targeting solutions for interventional oncologists

	CT Guidance	PET CT Guidance
Biopsy	•	•
Fine Needle Aspiration (FNAC)	•	•
Drug Delivery / Pain Management	•	•
Ablation	•	•
Drainage	•	•

Consistent, reproducible accuracy — every time



Patient Stabilization

ROBIO EX comes with an easy to use and reusable patient immobilizer to minimize patient movement during procedure



Target Stabilization

For targets affected by respiratory movement, the ROBIO EX uses Medspira Interactive Breath Hold Control System (IBC) to help the patient maintain a constant breath-hold position during the procedure



Device Stabilization

Registration of ROBIO EX is fast and easy with Perfint Proprietary InstaReg™ Technology. Just roll the ROBIO EX onto the floor panel, push a button and registration is complete in seconds

What is MAXIO?

MAXIO™ is an image-guided, physician controlled stereotactic accessory to a Computed Tomography (CT) system. MAXIO is intended for the stereotactic spatial positioning and orientation of an end effector and instrument guide to assist in manual advancement of one or more instruments for CT guided procedures such as Ablation, Biopsy, Drainage, FNAC, etc.

MAXIO™ provides pre-operative planning assistance by visually representing the planned instrument path and position(s) of one or more instruments on the model, along with performance data provided by the instrument manufacturer or as specified by the user.

MAXIO™ provides intra-operative guidance and post-procedure verification support by registering images from multiple series.

MAXIO™ consists of a stereotactic device and its accessories, software loaded on a computer, and a respiratory gating system. MAXIO™ uses single use sterile disposables.

CT guided procedures are heading in a whole new direction...

Today, physicians plan interventional procedures by combining 2D images with their understanding of human anatomy. Physicians are then expected to manually advance one or more instruments to reach the target, without causing damage to vital structures, while accounting for organ and patient movement. It is, therefore, not surprising that these procedures are limited to the most skilled and experienced physicians.

Now, MAXIO assists physicians to **visualize and plan** an entire procedure, such as tumor ablation, in 3D. Multiple VOI, Multiple instruments, Placement sequencing can all be planned before advancing a single instrument.

Once the plan is confirmed, MAXIO's **stereotactic arm**, combined with intra-operative registration, assists the physician to carefully advance one or more instruments accurately to reach the target.

MAXIO's post-operative image registration helps physicians **verify** and extend the treatment if needed. MAXIO's reporting tool then helps generate required reports.

... MAXIO is leading the way

Physicians benefit from MAXIO's intelligent planning and targeting...



- Registering pre-operative images and off-line plan with current CT images
- Organ specific visualization and segmentation
- Multiple VOI, multi-probe placement plan for multiple procedures
- Accurate placement without fluoroscopic radiation
- Ability to treat hard to access and large tumors
- Post procedure verification

Acknowledgement

- Tata Memorial Hospital, Mumbai, India
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- National Cancer Institute, Colombo, Sri Lanka
- University of Istanbul, Turkey
- Global Hospitals, Chennai, India
- Sahyog Center, Ahmedabad, India
- SRMC, Chennai, India
- Vijaya Diagnostic Center, Vishakapatnam, India



Perfint continuously upgrades its products and specs. Please check with your local representative for latest information.

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