Interventional Radiology Coding Case Studies

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T9, L1, L2
Bone Biopsy, RF Tumor Ablation & Vertebral Augmentation

PROCEDURE: FLUOROSCOPIC IMAGE GUIDED T-9, L-1 and L-2 VERTEBRAL BODY CORE BIOPSY; T-9, L-1 and L-2 RADIOFREQUENCY TUMOR ABLATION AND VERTEBRAL AUGMENTATION.

CLINICAL HISTORY: Patient is a 55-year-old female with bilateral breast cancer now with spine, liver and adrenal metastases. She is having severe back pain which is not adequately alleviated by pain medication. Recent imaging studies, including a recent PET/CT on 05/25/2018, demonstrate spine metastases and compression fractures. Review of imaging suggests that the most severe disease is at L1-L2 and T9. She is here today for vertebral body biopsy, radiofrequency tumor ablation and vertebral augmentation.

TECHNIQUE: Informed consent was obtained from the patient prior to the procedure. During this process, the procedure and potential alternatives were explained along with the intended outcome and benefits. The risks of the procedure including the possibility of an unsuccessful procedure, as well as the risk of not doing the procedure were discussed. The patient was given the opportunity to ask questions regarding the procedure and appeared competent to make decisions. A signed consent form which documented this discussion was placed in the medical record. A time out procedure was performed. The time out procedure included full AP and lateral marking of T-9, L-1 and L-2 with a marker over the targeted vertebral body. The medical record was reviewed to ensure that the patient is stable for the planned surgical procedure. The radiographic studies were again reviewed. Radiographic findings were correlated with the clinical examination and the surgical plan is confirmed. The placement of the metastatic lesions in the vertebral bodies was noted so that-appropriate attempts could be made to target those specific lesions. I also conferred with the patient and family explaining the current condition and the need for intervention. All questions were answered. I also consulted with Dr. X, who will see the patient in follow-up as well. General anesthesia was utilized for the case and the patient, after intubation, was placed on the procedure table in the prone position.

FLUOROSCOPY TIME: Fluoroscopy time for the case was 42 minutes and 24 seconds.

1% plain Lidocaine was infiltrated into the skin and subcutaneous tissues over the T-9, L-1 and L-2 vertebral bodies.

L-2 VERTEBRAL BODY: A decision was made to use bipedicular access in order to adequately reach the metastatic lesions in the vertebral body. A small skin nick was made at the appropriate level on the left. PA and lateral fluoroscopy was utilized for targeting of the abnormal vertebral body. Initially, a 20-gauge spinal needle was passed down to the posterior surface of the left pedicle and 10 ml of 1 % Lidocaine was instilled. An introducer working cannula (DFine 10.5 gauge needle introducer cannula) and stylet was directed via a left-sided transpedicular approach towards the posterior-middle one-third L 1 vertebral body on the left. Great care was utilized to avoid adjacent structures. The posterior wall of the vertebral body was traversed. A biopsy specimen was then obtained from the L-2 vertebral body. This was placed in formalin and a copy of the results will go to Dr. X. The 11-gauge midline osteotome was then placed and vertebral augmentation and recanalization of the cancellous bone was performed. The osteotome was then removed.

After final positioning of the working cannula under fluoroscopic guidance, the introducer 10.5-gauge needle stylette was removed. Under fluoroscopic guidance, an initial cavity was created within the vertebral body by inserting a straight hollow coring cement staging osteotome to the working cannula into the anterior third of the vertebral body. The cavity was created with a mechanical device, a 10.5-gauge needle DFine midline osteotome. The device was utilized to remove bone and create a cavity. This was advanced multiple times under fluoroscopic guidance to create a cavity. This allowed coring and removal of cancellous bone creating the cavity within the vertebral body.

A larger directional staging osteotome was then inserted through the working cannula and across the midline to specific areas within the vertebral body as a cavity was created. The articulated arm was then deployed to further enlarge the cavity. The device was then withdrawn into the working cannula rotated and reinserted and articulated multiple times to the existing cavity at the L-1 vertebral body.

A small skin nick was then made on the right at the L-2 level. PA and lateral fluoroscopy was utilized for targeting of the abnormal vertebral body. Initially, a 20-gauge spinal needle was passed down to the posterior surface of the pedicle and 10 ml of 1 % Lidocaine was instilled. An introducer working cannula (DFine 10.5 gauge needle introducer cannula) and stylet was directed via a right sided transpedicular approach towards the posterior-middle one-third L-2 vertebral body on the right. Great care was utilized to avoid adjacent structures. The posterior wall of the vertebral body was traversed. The 11-gauge midline osteotome was then placed and vertebral augmentation and recanalization of the cancellous bone was performed. The osteotome was then removed.

After final positioning of the working cannula under fluoroscopic guidance, the introducer 10.5-gauge needle stylette was removed. Under fluoroscopic guidance, an initial cavity was created within the vertebral body by inserting a straight hollow coring cement staging osteotome to the working cannula into the anterior third of the vertebral body. The cavity was created with a mechanical device, a 10.5-gauge needle DFine midline osteotome. The device was utilized to remove bone and create a cavity. This was advanced multiple times under fluoroscopic guidance to create a cavity. This allowed coring and removal of cancellous bone creating the cavity within the vertebral body.

A larger directional staging osteotome was then inserted through the working cannula and across the midline to specific areas within the vertebral body as a cavity was created. The articulated arm was then deployed to further enlarge the cavity. The device was then withdrawn into the working cannula

rotated and reinserted and articulated multiple times to enlarge the existing cavity at the L 1 vertebral body.

L-1 VERTEBRAL BODY: For the L-1 vertebral body, a decision was made to use unipedicular access as bipedicular access was not necessary to adequately reach the metastatic lesions in the vertebral body. A small skin nick was made at the appropriate level on the left. PA and lateral fluoroscopy was utilized for targeting of the abnormal vertebral body. Initially, a 20-gauge spinal needle was passed down to the posterior surface of the pedicle and 1 0 ml of 1% Lidocaine was instilled. An introducer working cannula (DFine 10.5 gauge needle introducer cannula) and stylet was directed via a left sided transpedicular approach towards the posterior-middle one-third L 1 vertebral body on the left. Great care was utilized to avoid adjacent structures. The posterior wall of the vertebral body was traversed. A biopsy specimen was then obtained from the L-1 vertebral body. This was placed in formalin and a copy of the results will go to Dr. X. The 11-gauge midline osteotome was then placed and vertebral augmentation and recanalization of the cancellous bone was performed. The osteotome was then removed.

After final positioning of the working cannula under fluoroscopic guidance, the introducer 10.5-gauge needle stylette was removed. Under fluoroscopic guidance, an initial cavity was created within the vertebral body by inserting a straight hollow coring cement staging osteotome to the working cannula into the anterior third of the vertebral body. The cavity was created with a mechanical device, a 10.5-gauge needle DFine midline osteotome. The device was utilized to remove bone and create a cavity. This was advanced multiple times under fluoroscopic guidance to create a cavity. This allowed coring and removal of cancellous bone creating the cavity within the vertebral body.

A larger directional staging osteotome was then inserted through the working cannula and across the midline to specific areas within the vertebral body as a cavity was created. The articulated arm was then deployed to further enlarge the cavity. The device was then withdrawn into the working cannula rotated and reinserted and articulated multiple times to enlarge the existing cavity at the L-1 vertebral body.

T-9 VERTEBRAL BODY: A decision was made to use bipedicular access in order to adequately reach the metastatic lesions and compression fracture in the T-9 vertebral body. A small skin nick was made at the appropriate level on the left. PA and lateral fluoroscopy was utilized for targeting of the abnormal vertebral body. Initially, a 20-gauge spinal needle was passed down to the posterior surface of the pedicle and 1 0 ml of 1 % Lidocaine was instilled. An introducer working cannula (DFine 10.5 gauge needle introducer cannula) and stylet was directed via a left sided transpedicular approach towards the posterior-middle one-third T-9 vertebral body on the left. Great care was utilized to avoid adjacent structures. The posterior wall of the vertebral body was traversed. A biopsy specimen was then obtained from the T-9 vertebral body. This was placed in formalin and a copy of the results will go to Dr. X. The 11-gauge midline osteotome was then placed and vertebral augmentation and recanalization of the cancellous bone was performed. The osteotome was then removed.

After final positioning of the working cannula under fluoroscopic guidance, the introducer 10.5-gauge needle stylette was removed. Under fluoroscopic guidance, an initial cavity was created within the

vertebral body by inserting a straight hollow coring cement staging osteotome to the working cannula into the anterior third of the vertebral body. The cavity was created with a mechanical device, a 10.5-gauge needle DFine midline osteotome. The device was utilized to remove bone and create a cavity. This was advanced multiple times under fluoroscopic guidance to create a cavity. This allowed coring and removal of cancellous bone creating the cavity within the vertebral body.

A larger directional staging osteotome was then inserted through the working cannula and across the midline to specific areas within the vertebral body as a cavity was created. The articulated arm was then deployed to further enlarge the cavity. The device was then withdrawn into the working cannula rotated and reinserted and articulated multiple times to enlarge the existing cavity at the T-9 vertebral body.

A small skin nick was then made on the right at the T-9 level. PA and lateral fluoroscopy was utilized for targeting of the abnormal vertebral body. Initially, a 20-gauge spinal needle was passed down to the posterior surface of the right pedicle and 10 mL of 1% Lidocaine was instilled. An introducer working cannula (DFine 10.5 gauge needle introducer cannula) and stylet was directed via a right sided transpedicular approach towards the posterior-middle one-third T-9 vertebral body on the right. Great care was utilized to avoid adjacent structures. The posterior wall of the vertebral body was traversed. The 11-gauge midline osteotome was then placed and vertebral augmentation and recanalization of the cancellous bone was performed. The osteotome was then removed.

After final positioning of the working cannula under fluoroscopic guidance, the introducer 10.5-gauge needle stylette was removed. Under fluoroscopic guidance, an initial cavity was created within the vertebral body by inserting a straight hollow coring cement staging osteotorne to the working cannula into the anterior third of the vertebral body. The cavity was created with a mechanical device, a 10.5-gauge needle DFine midline osteotome. The device was utilized to remove bone and create a cavity. This was advanced multiple times under fluoroscopic guidance to create a cavity. This allowed coring and removal of cancellous bone creating the cavity within the vertebral body.

A larger directional staging osteotome was then inserted through the working cannula and across the midline to specific areas within the vertebral body as a cavity was created. The articulated arm was then deployed to further enlarge the cavity. The device was then withdrawn into the working cannula rotated and reinserted and articulated multiple times to enlarge the existing cavity at the T-9 vertebral body.

RADIOFREQUENCY ABLATION OF L-1, L-2 and T-9 VERTEBRAL BODIES: The radiofrequency ablation generator was then turned on. A 2nd osteotome with an articulated arm using a radiofrequency probe was inserted and utilized at all 5 of the access levels (1 at L-1, 2 at L-2 and 2 at T-9). This was articulated at each level. 2 ablations were performed on the left at L-2 with a single ablation performed on the right at L-2. A total of 3 ablations were performed at the L-1 level at different positions within the vertebral body. At the T-9 level, 2 ablations were performed on the right at various inferior levels with a single ablation performed from the left-sided access at T-9. Temperature degrees Celsius reached and ablation times with power utilized are described below.

At the L-1 vertebral body, 3 ablations were performed for total time of 9 minutes and 55 seconds. In the 1st ablation the distal temperature reached 56 with the proximal. temperature of 45, in the 2nd ablation the distal temperature reached 69 with a proximal temperature of 50, in the last ablation the distal temperature was 71 with a proximal temperature of 50.

At the L-2 vertebral body, 2 ablations were performed from the left-sided access with a total time of 7 minutes and 45 seconds. For the initial ablation the temperature reached 55 with a proximal temperature 45. A 2nd ablation was performed and the distal temperature reached 58 with a proximal temperature of 48. A single ablation was performed via the right-sided access for 4 minutes and 25 seconds with the distal temperature reaching 67 and the proximal temperature of 50.

At the T-9 level, 2 ablations were performed via the right-sided access and 2 ablations were performed from the left sided access. On the right, the initial ablation the distal temperature reached 60 with a proximal temperature of 40 and the 2nd ablation the distal temperature reached 57 with a proximal temperature of 45. These 2 ablations from the right sided access lasted 8 minutes and 34 seconds. From the left-sided access, 2 ablations were performed for a total time of 8 minutes and 45 seconds with the initial ablation reaching a distal temperature of 65 with a proximal temperature 48 and the 2nd ablation reaching the distal temperature of 60 with a proximal temperature 47.

All of these above mentioned ablations were performed with an eye towards reaching the location of the metastatic lesions seen on the patient's MRI scan.

VERTEBRAL AUGMENTATION AT L-1, L-2 and T-9 VERTEBRAL BODIES:

L-2: The controller from the DFine system was turned on. The warming cartridge, delivery cables and hydraulic assembly were connected to the controller. The bone cement was mixed and the cement cartridge was filled to attach to the warming cartridge. After removal of the introducer stylette, the locking delivery cannula was attached to the cement. This was then inserted through the left-sided working cannula and into the locking delivery cannula into the cavity created within the L-2 vertebral body.

This was then locked in place with the working cannula to establish and stabilize its position. The bone cement was converted to an ultra-high viscosity, semi-solid material and was driven through the warming cartridge. The Ultra-high viscosity cement was delivered through the locking delivery camera cannula to fill the cavity created by the osteotome. The mass in the ultra high viscosity cement continued to grow at 1.3 cc/minute. This expands the cavity size while filling it. The cement was allowed to interdigitate within the fractures within the vertebral body.

The cement was allowed to heal. The cement injection was terminated after the mass of Ultra-high viscosity cement was used to interdigitate and adequately fill the cavity. The locking cannula was then removed. Great care was utilized to not displace cement during removal. Great care was utilized to avoid passing the cement to the fractures into the disc spaces. Great care was also utilized to prevent cement from passing into the spinal canal cavity.

Next, the locking delivery cannula was then inserted through the right-sided working cannula and into the locking delivery cannula into the cavity created within the right side of the L-2 vertebral body.

This was then locked in place with the working cannula to establish and stabilize its position. The bone cement was converted to a ultra-high viscosity, semi-solid material and was driven through the warming cartridge. The ultra-high viscosity cement was delivered through the locking delivery camera cannula to fill the cavity created by the osteotome. The mass in the ultra-high viscosity cement continued to grow at 1.3mL/minute. This expands the cavity size while filling it. The cement was allowed to interdigitate within the fractures within the vertebral body.

The cement was allowed to heal. The cement injection was terminated after the mass of ultra-high viscosity cement was used to interdigitate and adequately fill the cavity. The locking cannula was then removed. Great care was utilized to not displace cement during removal. Great care was utilized to avoid passing the cement to the fractures into the disc spaces. Great care was also utilized to prevent cement from passing into the spinal canal cavity.

A total of 5.0 ml of the cement was placed into the L-2 vertebral body. This was placed in the appropriate position across the midline. This helped to elevate the superior end plate fracture. A small amount of cement extended into the L-1-L-2 disc space. The introducer was placed into the cannula to tap out the remaining cement. The needle introducer cannula was then removed.

L-1: The controller from the DFine system was turned on. The warming cartridge, delivery cables and hydraulic assembly were connected to the controller. The bone cement was mixed and the cement cartridge was filled to attach to the warming cartridge. After removal of the introducer stylette, the locking delivery cannula was attached to the cement. This was then inserted through the single right side working cannula and into the locking delivery cannula into the cavity created within the L-1 vertebral body.

This was then locked in place with the working cannula to establish and stabilize its position. The bone cement was converted to a ultra-high viscosity, semi-solid material and was driven through the warming cartridge. The ultra-high viscosity cement was delivered through the locking delivery camera cannula to fill the cavity created by the osteotome. The mass in the ultra-high viscosity cement continued to grow at 1.3 ml/minute. This expands the cavity size while filling it. The cement was allowed to interdigitate within the fractures within the vertebral body.

The cement was allowed to heal. The cement injection was terminated after the mass of Ultra-high viscosity cement was used to interdigitate and restore vertebral height as well as adequately fill the cavity. The locking cannula was then removed. Great care was utilized to not displace cement during removal. Great care was utilized to avoid passing the cement to the fractures into the disc spaces. Great care was also utilized to prevent cement from passing into the spinal canal cavity.

A total of 3.0 ml of the cement was placed into the L-1 vertebral body. This was placed in the appropriate position across the mid line. The introducer was placed into the cannula to tap out the remaining cement. The needle introducer cannula was then removed.

T-9: The controller from the DFine system was turned on. The warming cartridge, delivery cables and hydraulic assembly were connected to the controller. The bone cement was mixed and the cement cartridge was filled to attach to the warming cartridge. After removal of the introducer stylette, the locking delivery cannula was attached to the cement. This was then inserted through the left-sided working cannula and into the locking delivery cannula into the cavity created within the T-9 vertebral body.

This was then locked in place with the working cannula to establish and stabilize its position. The bone cement was converted to a ultra-high viscosity, semisolid material and was driven through the warming cartridge. The ultra-high viscosity cement was delivered through the locking delivery camera cannula to fill the cavity created by the osteotome. The mass in the ultra-high viscosity cement continued to grow at 1.3 mL/minute. This expands the cavity size while filling it. The cement was allowed to interdigitate within the fractures within the vertebral body.

The cement was allowed to heal. The cement injection was terminated after the mass of ultra-high viscosity cement was used to interdigitate and adequately fill the cavity. The locking cannula was then removed. Great care was utilized to not displace cement during removal. Great care was utilized to avoid passing the cement to the fractures into the disc spaces. Great care was also utilized to prevent cement from passing into the spinal canal cavity.

Next, the locking delivery cannula was then inserted through the right-sided working cannula and into the locking delivery cannula into the cavity created within the right side of the T-9 vertebral body.

This was then locked in place with the working cannula to establish and stabilize its position. The bone cement was converted to a ultra-high viscosity, semi-solid material and was driven through the warming cartridge. The ultra-high viscosity cement was delivered through the locking delivery camera cannula to fill the cavity created by the osteotome. The mass in the ultra-high viscosity cement continued to grow at 1.3 mL/minute. This expands the cavity size while filling it. The cement was allowed to interdigitate within the fractures within the vertebral body.

The cement was allowed to heal. The cement injection was terminated after the mass of ultra-high viscosity cement was used to interdigitate and adequately fill the cavity. The locking cannula was then removed. Great care was utilized to not displace cement during removal. Great care was utilized to avoid passing the cement to the fractures into the disc spaces. Great care was also utilized to prevent cement from passing into the spinal canal cavity.

A total of 2.5 ml of the cement was placed into the T-9 vertebral body. This was placed in the appropriate position across the midline. This helped to elevate the superior end plate fracture. The introducer was placed into the cannula to tap out the remaining cement. The needle introducer cannula was then removed.

Glue was placed over the 5 wound sites after good hemostasis was achieved. The patient tolerated the procedure well. The patient was admitted overnight to the hospitalist service for pain control prior to discharge. The patient will follow up with me in approximately 2 weeks with an office visit.

FINDINGS:
There are metastatic lesions associated with pathologic fractures involving T-9, L-1 and L-2. Successful T-9, L-1 and L-2 biopsies along with radiofrequency ablation of the tumors within the vertebral bodies. Successful vertebral augmentation at all 3 levels afterwards.

COMPLICATIONS: None.

IMPRESSION:
1. Successful percutaneous biopsy of T-9, L-1 and L-2.
2. Successful radiofrequency ablation of T-9, L-1 and L-2 vertebral bodies.
3. Successful vertebral augmentation at the T-9, L-1, and L-2 vertebral bodies

Interventional Radiology Coding Case Studies
CPT Codes

Week of July 2, 2018

T9, L1, L2
Bone Biopsy, RF Tumor Ablation & Vertebral Augmentation

Procedure Codes:

- 22513 Vertebral augmentation (kyphoplasty) T9
- +22515 Vertebral augmentation (kyphoplasty) L1
- +22515 Vertebral augmentation (kyphoplasty) L2
- 20982 Radiofrequency ablation L1, L2, & T9

Diagnosis Codes:

- M84.58XA Pathologic fracture due to neoplasm, L1, L2, & T9
- C79.51 Secondary malignant neoplasm of bone
- C78.7 Secondary malignant neoplasm of liver and intrahepatic bile duct
- C79.70 Secondary malignant neoplasm of unspecified adrenal gland
- C50.911 Malignant neoplasm of unspecified site of right female breast
- C50.912 Malignant neoplasm of unspecified site of left female breast

Comments:

- Code 20982 is assigned for ablation of the tumors of the spine at L1, L2 & T9. Imaging is bundled into the surgical code. This code is reported only one time per session even when multiple tumors are treated.
- Code 22513 is assigned for the first level kyphoplasty and add-on code +22515 is assigned for each additional level. Bone biopsy is included when performed at the same level.
  - One primary code is assigned per encounter either thoracic (22513) or lumbar (22514). Each additional level is reported with the add-on code +22515. The NCCI manual states the following: *"CPT® codes 22510-22512 represent a family of codes describing percutaneous vertebroplasty, and CPT® codes 22513-22515 represent a family of codes describing percutaneous vertebral augmentation. Within each of these families of codes, the physician may report only one primary procedure code and the add-on procedure code for each additional level(s) whether the additional level(s) are contiguous or not."* – NCCI Chapter 9

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