

FLASH[™] Navigation with 7D Technology

CASE STUDY | FIBROUS DYSPLASIA CURETTAGE



Surgeon Profiles

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Clinical Presentation

A 17 yo female presented with a history of severe back and left leg pain. MRI and CT showed an intraosseous, expansile and multiloculated lesion within the body of S1 and posterior elements extending to the left sacro-iliac joint in the left L5–S1 facet with a mild narrowing of left S1 foramen, without evidence of nerve compression and no malignant features. The pathology result confirmed the benign nature of the lesion (fibrous dysplasia).

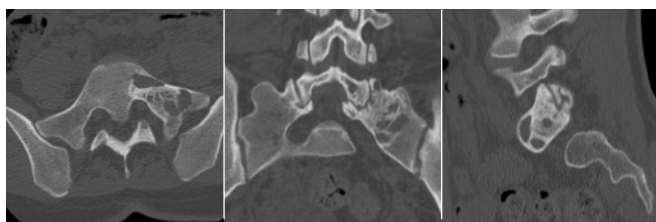


FIG. 01. Preoperative CT of patient visualizing the fibrous dysplasia at S1.

Surgical Procedure

The patient was positioned prone on a Jackson table with a posterior incision made from L4 to S2. The subcutaneous tissues were divided to the fascia. Subperiosteal dissection was carried out to expose the posterior elements out to

the transverse processes of L5 and the ala of the sacrum. Following exposure, FLASH[™] Navigation with 7D Technology was set up. The spinous process reference frame was placed on the sacral spinous process and L5 and S1 were registered as a block registration which captured 2,317 data points within 4s for a total workflow time of 69.3s.

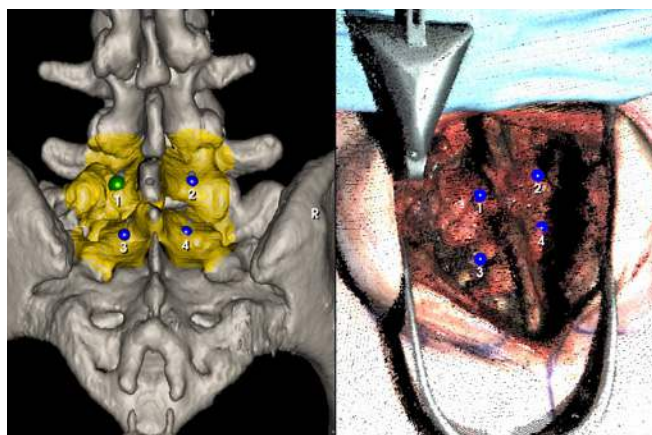


FIG. 02. To initiate the workflow of FLASH Navigation, upload the preoperative CT. The FLASH is initiated to capture the topography, creating a 3D digitization. This is then registered to the preoperative CT by selecting four points across L5 and S1.

From this registration, multi-axial pedicle screws were placed at L5 bilaterally, the right S1 and a fixed angle pedicle screw was placed on the left of S1. FLASH Fix was utilized throughout the case when the surgeon felt like the reference frame may have been bumped and after decompression and osteotomies. FLASH Fix was initiated and captured 1,088 data points for a total workflow time of 16.1s to ensure accuracy. Following screw placement, EMG threshold testing was performed for each screw with all screws above threshold. Laminotomy decompression was performed at L5–S1 on the left side. The left distal lamina of L5 and the inferior facet of L5 on the left were removed. The superior facet of S1 on the left and the posterior margin of the left S1 pedicle were then removed and the margin of the S1 neural foramen which corresponded to the distal portion of the tumour was defined. The 5.5mm Flex Rod Connector was utilized to secure the reference frame into the pedicle screw of L5 while registering to S1. Using the guidance from the FLASH Navigation, the lateral margin of the S1 from the pedicle to the ala was removed, to the superior endplate, to the first sacral foramen with an osteotome. Under the guidance of FLASH Navigation, the anterior margins of S1 were curetted to remove the tumour while preserving the shell of cortical bone.

FLASH™ Navigation with 7D Technology

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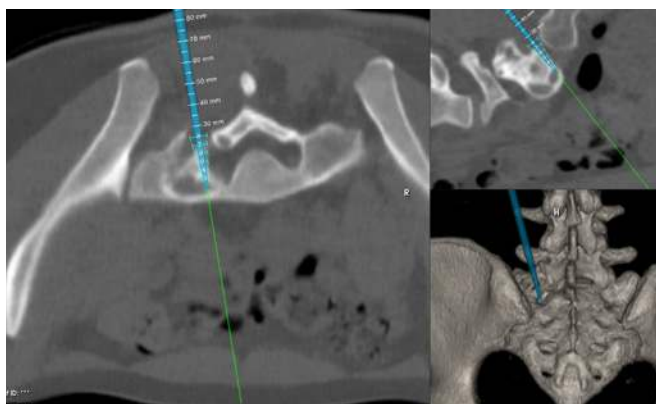


FIG. 03. Utilizing FLASH™ Navigation to define the margins of the fibrous dysplasia at S1.

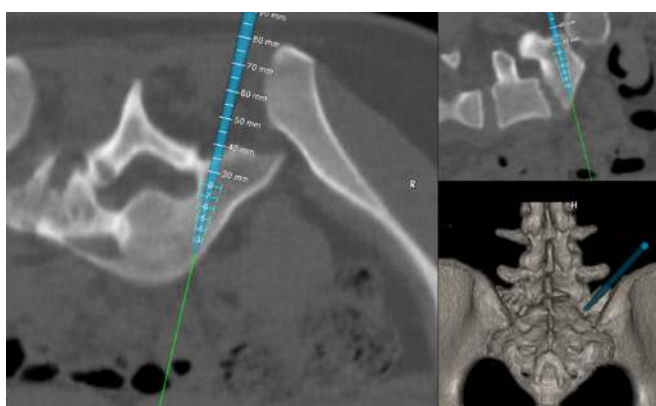


FIG. 04. FLASH Navigation screen view during navigation.

A corticocancellous allograft (60cc) was created from the bone graft placed in the bone mill which was then impacted through a funnel into the left sacral defect until the defect was completely packed with allograft bone. A piece of corticocancellous bone was harvested from the left iliac crest and secured from the distal margin of the left L5 lamina to the left sacral lamina. 6.0mm titanium alloy rods were placed on each side after contouring them appropriately. Gentle compression was applied

across the screws to lordose the level. A 6-hole plate from a mandibular system was secured with 2.0mm screw in the left L5 lamina, one screw in the plate into the graft and a third screw into the left sacral lamina. Further bone from the spinous processes were placed and impacted into the decorticated right L5–S1 facet joint and under the plate on the left side to supplement the fusion. Closure was performed over a hemovac drain placed subfascial. Interrupted 1 Vicryl suture was used for the fascia, interrupted buried 2-0 Vicryl was used for the subcutaneous tissues and 4-0 Vicryl was used subcuticular for the skin. A sterile bandage was applied and the patient was awakened from the anesthesia.

Clinical Outcome

Position of the implants was confirmed with AP and lateral radiographs. EMG, SSEP, and MEP monitoring were used for the case without any changes. The patient tolerated the procedure well. She was extubated and transported to recovery room in stable condition. At the latest follow-up the patient was pain-free, mobilizing well, and the images showed a satisfactory removal of the lesion. Both the patient and her family were happy with the surgical outcome.

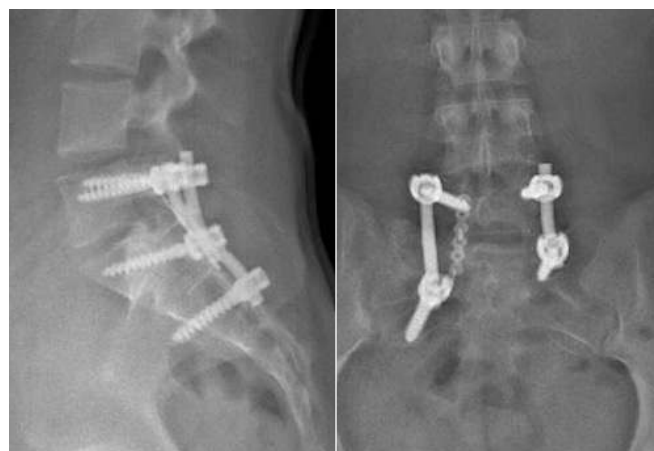


FIG. 05. Postoperative X-ray displaying accurate placement of pedicle screws.

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