

# FLASH<sup>™</sup> Navigation with 7D Technology

CASE STUDY | Pediatric Spina Bifida; T2-Pelvis Posterior Lumbar Fusion



### Surgeon Profile(s)

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### Clinical Presentation

A 13 yo female with high BMI presented with L1 spina bifida and neuromuscular scoliosis. The patient's mother noted progressive decompensation of the patient while in her wheelchair. X-rays showed a 65° left thoracolumbar scoliosis, pelvic obliquity, and complete lumbar spina bifida.

### Surgical Procedure

The decision was made for the patient to undergo a lumbar posterior spinal instrumented fusion with pelvic fixation and a transforaminal lumbar interbody fusion (TLIF) at L2–L3, L4–L5 and L5–S1. The TLIF's were performed to obtain anterior interbody fusion given lack of posterior elements in lumbar spine. Prior to exposure, points were selected on the patient's preoperative CT to indicate the segmental regions in which the FLASH Navigation System utilizes 7D machine-vision technology to perform fast and simple FLASH Registrations. After exposing the patient from T3 to S1, Dr. Comstock initiated the FLASH Registration process via the surgeon-controlled Foot Pedal and selected points on the patient's anatomy like those defined on the preoperative CT. The FLASH Navigation System matched an average of 2,616 colocalized data points between the preoperative CT and intraoperative FLASH in an average registration time of 7.3 seconds for an overall registration workflow time of 154.6 seconds and zero radiation.

### Case Highlights

- 25 screws guided
- Registrations performed
  - Average FLASH<sup>™</sup> registration time: 7.3 sec.
  - Average points registered: 2,616
  - Average registration workflow time: 154 min. and 6 sec.



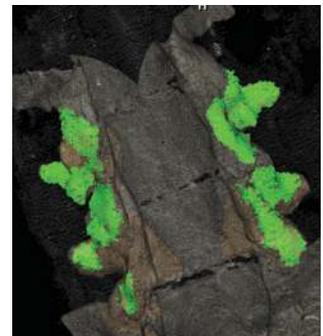
Detail from Preoperative CT image of spine during level definition, as shown on the FLASH Navigation System.

### Flex Array with Rod Connector

The Reference Clamp was placed at T12 to allow registration from L1–L3. However, L4, L5, and S2A1 did not have posterior elements which are typically used for registration. The Flex Array with Rod Connector attachment was used as an alternative reference option. The Flex Array with Rod Connector was placed in the right L3 screw head, and Dr. Comstock was able to expose a tiny posterior pedicle area of L4 that allowed a successful registration. This registration process was also done for L5. A small area of the posterolateral sacrum was exposed and allowed for successful registration of the sacrum for the S2A1 screws.



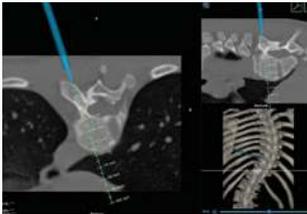
3D image of spine during level definition phase, as shown on the FLASH Navigation System.



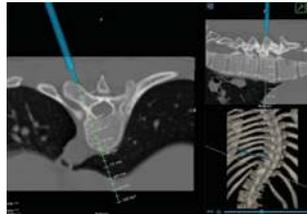
The 3,735 points used for registration without posterior elements are shown in green.

### Reslicer

The FLASH<sup>™</sup> Navigation's Reslicer tool was used for navigating all spinal levels for screw implantation. The Reslicer tool allows for accurate axial and sagittal views when the axis marker is aligned with the transverse processes of the level on which you are registered.



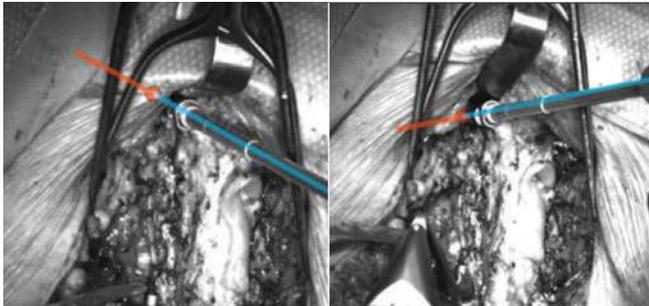
Images of spine prior to reslicing, as shown on the FLASH Navigation System.



Images of spine post-reslicing, as shown on the FLASH Navigation System.

### FLASH Trajectory

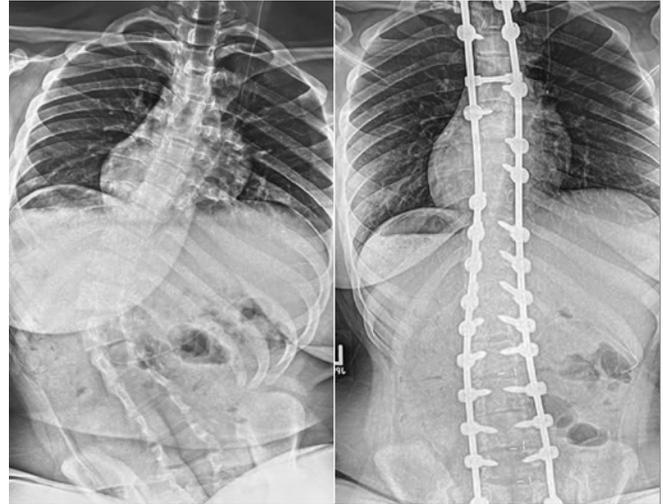
While navigating, the FLASH Navigation System helped plan and save multiple screw trajectories. This feature allowed Dr. Comstock to save a FLASH Trajectory, using augmented reality, that was displayed on the live camera view and was used as a visualization aid to provide feedback on the angle of pedicle screw insertion for unnavigated tools.



Live video of the saved augmented reality trajectory, much like a virtual k-wire, as shown via the FLASH Navigation System.

### Clinical Outcome

The correction of the spine that was performed resulted in a nice balanced spinal correction. Postoperatively the patient sits nicely balanced in her chair and both the patient and mother are very happy with her postoperative result.



Preoperative and postoperative X-ray showing correction achieved with 25 screws implanted using the FLASH Navigation System.

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