



FIREFLY® Case Study

Revision PSF with VCR for Congenital Kyphoscoliosis

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Patient History:

- 10 year old / Female
- Primary Diagnosis:
 - Congenital Kyphoscoliosis
 - Failed PSF at T9 - L2
 - Dislodged proximal hardware
 - Presents with right quadriceps weakness

Treatment Plan:

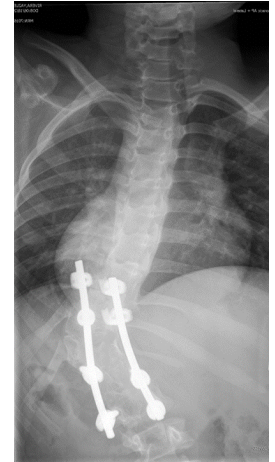
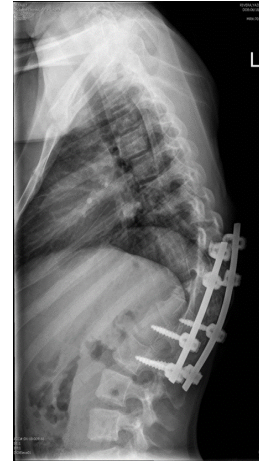
- FIREFLY Utilization at:
 - T4 - T10, L2 and L3
 - T11 vertebral resection
 - T12 hemivertebrectomy

Concierge Pre-Surgical Planning:

This is a case of a 10 year old female with a progressive congenital kyphoscoliosis. A previous surgery was performed 2 years prior by another surgeon. A CT scan was obtained to assess the bony anatomy and previous implants. An MRI showed no abnormalities.

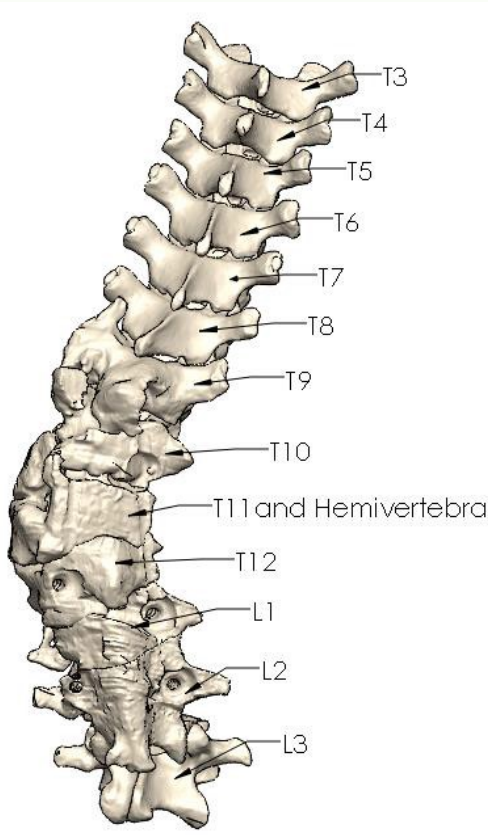


*3D rendering of existing hardware

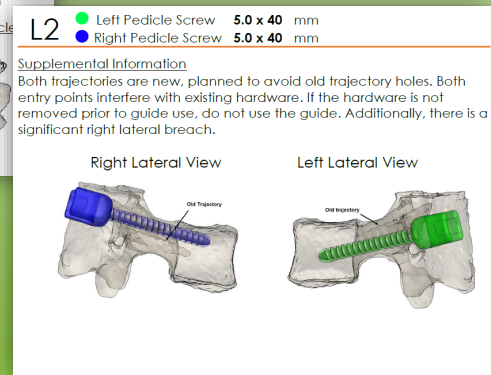
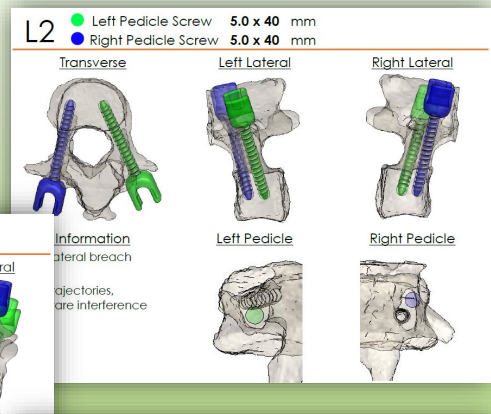
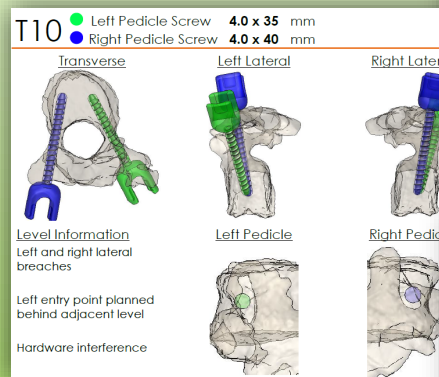


For optimal deformity correction in the revision setting, a resection of the T12 hemivertebra and entire T11 vertebra was deemed necessary. An important component of a successful deformity correction with a vertebral column resection is an expedient and accurate pedicle screw placement. This was critical in why we leveraged the available technology and used FIREFLY Pedicle Screw Navigation Guides.

An analysis of the 3D modeling allowed the existing trajectories at L2 to be evaluated. The evaluation determined that optimal replacement screws would be planned at L2.



*3D rendering with existing hardware removed

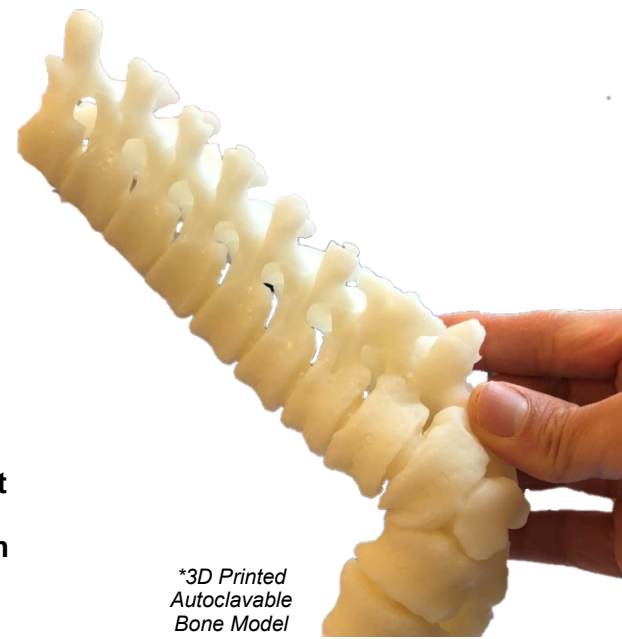


Intra-Operative:

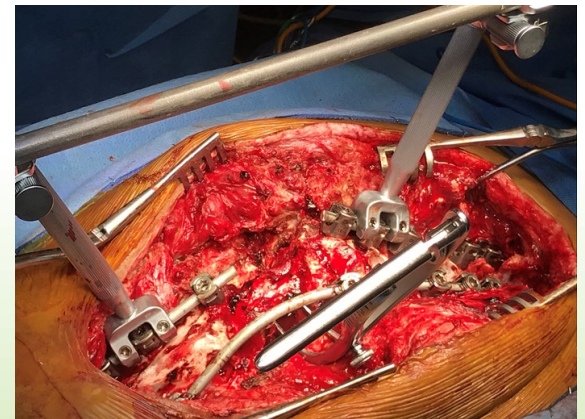
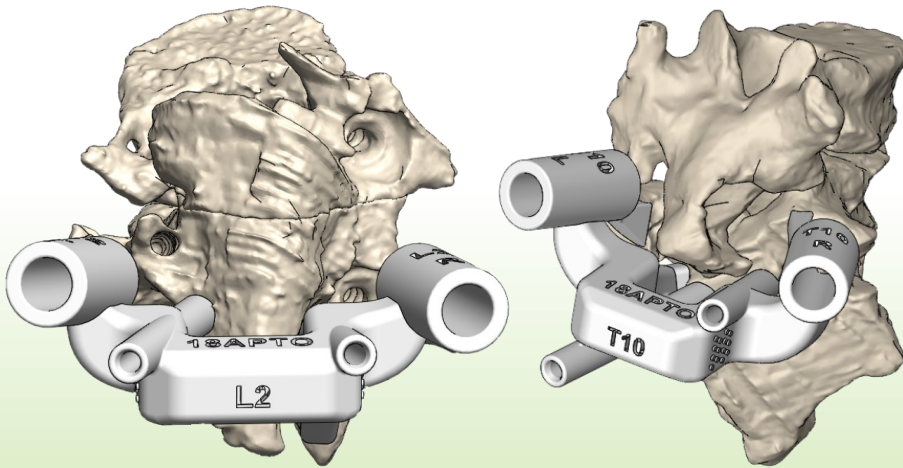
Having the 3D model of the spine and the 3D printed guides allowed for screw placement in less than one hour, saving valuable time and minimizing blood loss. This allowed energy to be focused on the resection and correction.

The 3D model of the spine was also valuable in planning and performing the vertebral column resection through an old fusion mass. A temporary rod was placed on the right concave side while the majority of the resection was performed from the convex side. The remainder of the resection was completed after placing a new temporary rod on the left side.

Deformity correction was performed using two temporary rods on the convex side controlled by manipulating arms, and a permanent rod was placed on the concave side after definitive correction was achieved. The two temporary convex rods were then replaced with a permanent convex rod.



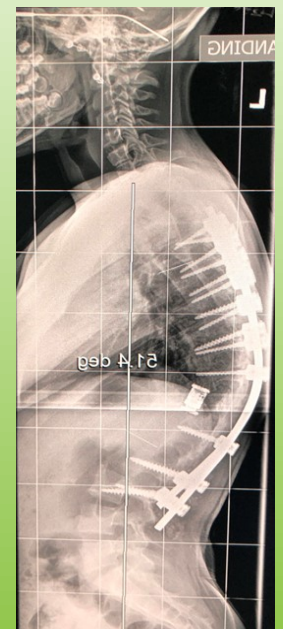
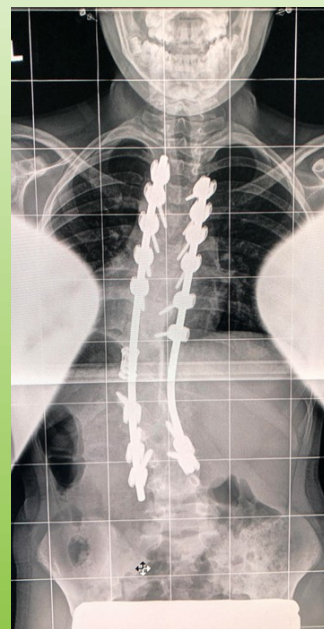
**3D Printed Autoclavable Bone Model*

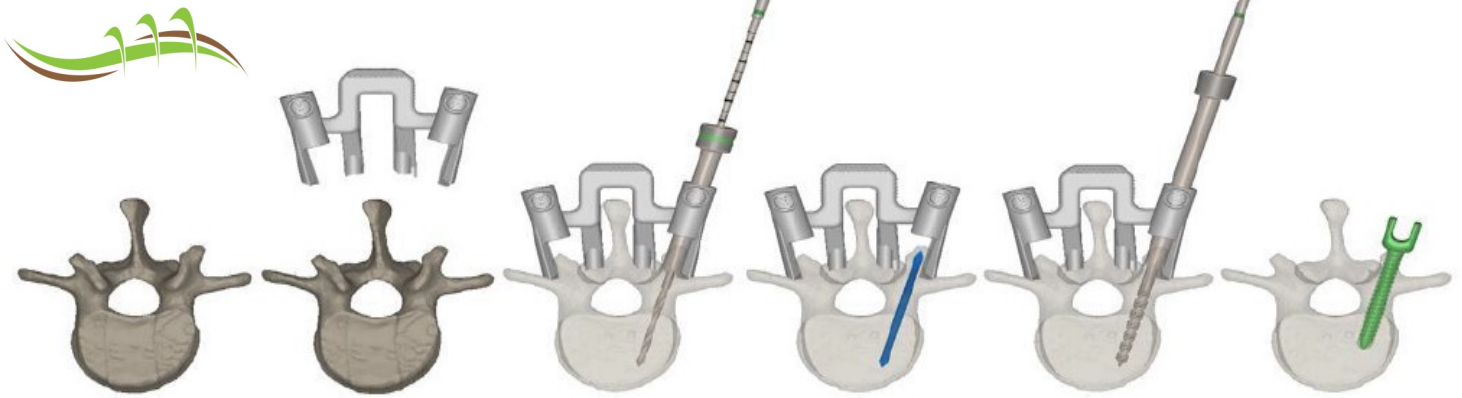


Results:

The patient underwent a revision PSF T4-L3 with hemivertebrectomy of T12 and vertebral resection of T11. The coronal plane corrected from a 65 degrees scoliosis to 20 degrees. Sagittal plane improved from 80 degrees to 51 degrees of kyphosis. She regained full strength in the right lower extremity and returned to full activities four months postoperatively.

Plane	PRE-OP DEFORMITY	POST-OP DEFORMITY
Coronal	65°	20°
Sagittal	80°	51°





Discussion:

The 3D printed guides served as a unique solution to deal with complex anatomy in a patient who needed revision of a previous PSF. They facilitated safe and efficient placement of anchors during a vertebral column resection case with an excellent overall outcome.

What is FIREFLY?

FIREFLY Guides are FDA-cleared and enable optimal screw placement by incorporating planned screw diameter, trajectory, length, and entry point into the guide design.

A preoperative CT is used to make a 3D virtual model of the patient's spine, which is then used to create a detailed presurgical plan. The guides are then designed around the surgeon's approved trajectories. This makes each guide not only patient-specific, but level-specific as well.

A 3D printed, anatomically exact bone model of the patient's spine is also provided for intraoperative use and patient education.

- ◆ FDA cleared and CE marked for use in adult and pediatrics
- ◆ Cleared for use without intraoperative fluoroscopy
- ◆ Predetermined screw sizes and mechanical constraint contribute to faster screw placement
- ◆ Validated to 99.7% accuracy¹
- ◆ No capital expenditure cost

Navigate. Don't Complicate.™

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