Fluoroscopic video demonstrates utility of the Vital Power instrumentation for pedicle preparation and screw placement

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Objective

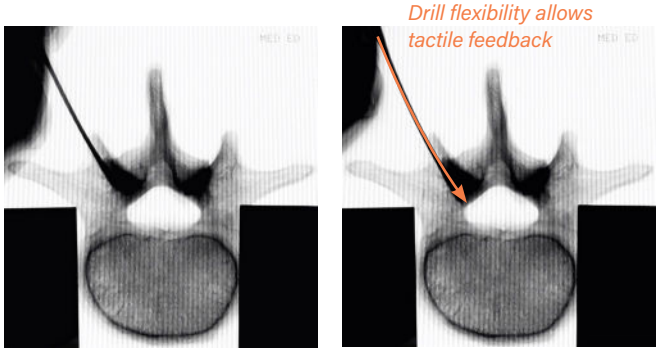
Visualize the utility and tactile feedback afforded by the Vital™ Power system instrumentation when used for pedicle preparation and screw placement.

Materials

Vital™ Power Instrumentation	
Ø2.4 mm Pilot Drill Bit	PN:731M0040
Ø3.2 mm Reamer Probe	PN:731M0030
Stab-N-Grab T27 Driver	PN:731M0010
Vital™ Spinal Fixation System	
Ø6.5 mm x 40 mm Polyaxial Screws	PN:701M6540
Ziehm Vision RFD 3D – 3D C-Arm	
Isolated cadaveric thoracolumbar vertebrae	
Radiation safety personal protective equipment	

Methods

- Fluoroscopic video recorded real-time pedicle preparation of isolated cadaveric thoracolumbar vertebrae performed by one spine surgeon using the Vital Power instrumentation.
- The following technique was used to develop the pedicle tract with the pilot drill bit:
  - Pulse the drill bit slowly, roughly 2-3 pulses/second
  - Use only the weight of the handpiece to provide the downward force necessary to advance the drill bit through the pedicle channel
- Multiple trajectories using the pilot drill bit were pursued, both ideal and unideal, to record the movement of the drill bit when encountering the cancellous pedicle tract versus the cortical pedicle wall during pedicle preparation.
- Technique followed by expanding the pedicle tract with the blunt tip reamer probe and placing pedicle screws with the Stab-N-Grab driver.
- Comments regarding the utility of the instruments were obtained by a spine surgeon expert in using power-assisted tools for pedicle preparation and screw insertion (current study) and a spine surgeon new to the technique.



Video: Unideal Trajectory

Results

Snapshots and video demonstrate the utility and tactile feedback afforded by the Vital Power instrumentation during each step of pedicle preparation and screw placement.

Developing the Pedicle Tract – Unideal Trajectory

- The weight of the handpiece provides sufficient downward force to advance the drill bit
- Upon encounter with the cortical bone of the medial pedicle wall, the drill bit flexes as it absorbes the downward force, providing tactile feedback to the surgeon
- After feeling this 'hard stop', the drill bit is backed out and a different trajectory is selected through the initial pilot hole

Developing the Pedicle Tract – Ideal Trajectory

- The weight of the handpiece provides sufficient downward force to advance the drill bit
- The drill bit encounteres no resistance, which indicates an ideal trajectory through the pedicle channel

Video:
Ideal Drill
Trajectory

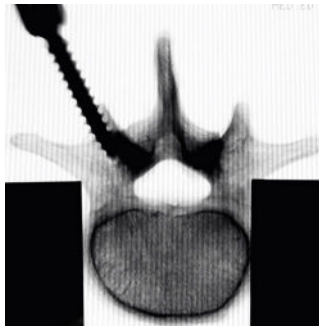
Expanding the Pedicle Tract

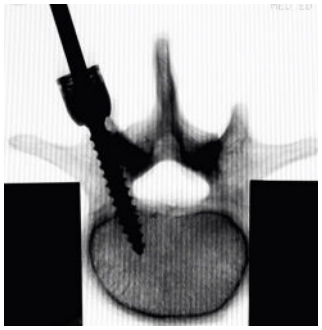
- The weight of the handpiece provides sufficient downward force to advance the reamer probe, which expands the pedicle tract and compacts the adjacent cancellous bone

Video:
Ream

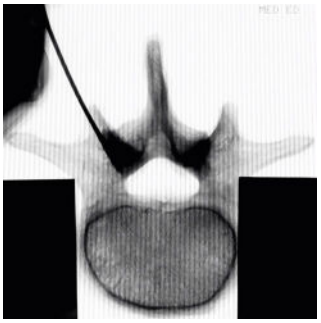
Placing the Pedicle Screw

- The 'play' afforded by the Stab-N-Grab driver allows the pedicle screw to find and follow the established pedicle tract



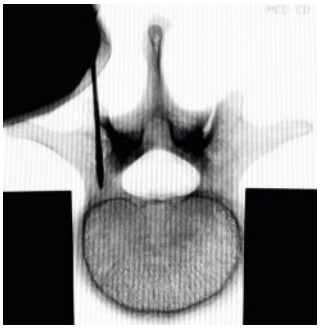


Unideal Trajectory — Full Technique



Video:
Full Prep Unideal
Drill Trajectory

Ideal Trajectory — Full Technique



Video:
Full Prep Ideal
Drill Trajectory

Surgeon Commentary

"This flexible drill bit self-centers in the pedicle; it bounces off or skives past the hard cortical walls in pursuit of the soft cancellous pedicle tract; it has the tactile sensation of a ball tip probe" – *Dr. David Skaggs, MD MMM, Cedars-Sinai Guerin Children's*

"As a young pediatric spinal deformity surgeon, power-assisted pedicle preparation has made a huge difference in my practice. The tactile feedback provided by the flexible drill and the reamer is unmatched from any pedicle probe I have used. Once I am in the pedicle, the blunt tipped reamer is fast and efficient in preparing the pedicle for screw insertion while being extremely safe. Instrumentation is now one of the quickest parts of my surgical procedure and allows me to focus more on optimizing deformity correction" – *Dr. Kenneth D. Illingworth, MD, Cedars-Sinai Guerin Children's*

Video:
Screw Placement

CONCLUSION

Fluoroscopy successfully demonstrates the utility of Vital™ Power instrumentation for pedicle preparation and screw placement. When developing the pedicle tract, the flexibility of the Ø2.4 mm pilot drill bit affords the surgeon tactile feedback to differentiate between the cancellous bone of the pedicle track and the cortical bone of the pedicle wall. The 'play' in the Stab-N-Grab driver allows the screw to follow the prepared pedicle tract.

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