OrthoLine™ System Tips and Pearls

Addressing Common Questions: Part I

Driver Features

The most commonly misunderstood feature of the OrthoLine system is that the hand and power drivers are designed to fail before the screw head can be stripped.

A deformed driver tip is pictured below **(a)**. This failure occurs when too much torque is applied to the driver. Failure torque varies with the size of the driver and the implant. The 1.6 mm/2.0 mm T6 driver is the most susceptible to deformation because it requires the least amount of torque to fail.

Rapidly applying too much torque to either the hand or power driver can result in the driver tip shearing off, making screw removal difficult or even impossible. A great rule of thumb is, “Two-finger tight!”

Screw Trajectories

The OrthoLine system includes many anatomic plating options. Effective understanding of the trajectory of each screw allows surgeons to avoid certain frustrating errors during surgery. For example, cross-threading of the locking drill guide (LDG) can result in cross-threading of the screw, damaging the plate’s threads, or implanting a screw in an undesired location or at an undesirable trajectory. However, proper threading of the LDG prevents all of these potential issues.

To ensure proper seating, first turn the LDG counterclockwise until a click is heard. If no click is heard, adjust the angle slightly until you hear one. The click signals that the correct trajectory is likely reached. Initiate a clockwise turn to seat the guide. It is recommended to have a second plate on the sterile field with screws already placed to serve as a visual reference of each screw’s trajectory.

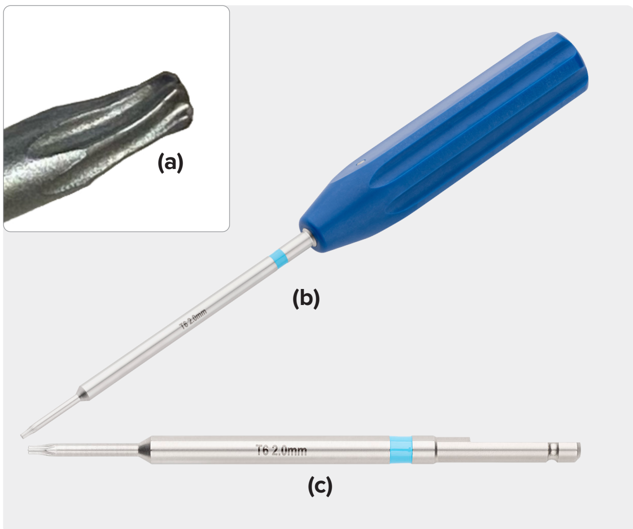

Figure 1. Deformed driver tip **(a)**, T6 screwdriver **(b)** and T6 driver **(c)**

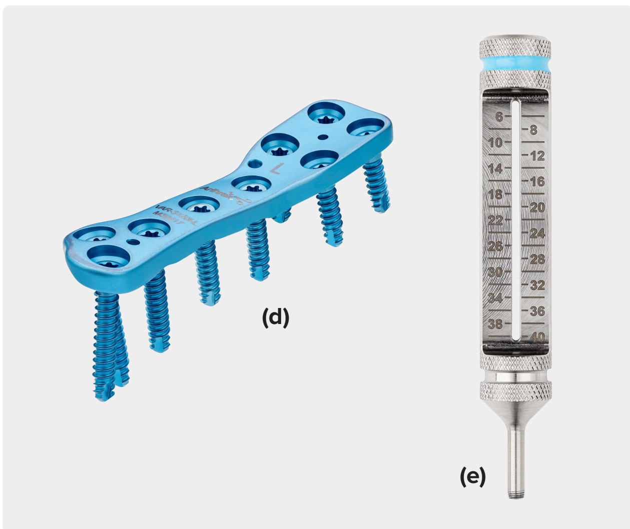

Figure 2. 2.0 mm ilial fracture plate **(d)** and 2.0 mm locking drill guide **(e)**

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Variable-Angle Locking (VAL) Screws

The variable-angle locking screw is a feature that excites most surgeons. The most frequently asked question is, “What angle should be used to lock a VAL screw in place?” The VAL drill guide is designed to sit securely in a locking screw hole without damaging the plate’s threads. This provides an advantage over a locking VAL guide, which locks in place and could potentially cross or damage the threads needed for the VAL screw. The nonlocking VAL guide cone allows for 12° of angulation in any direction. While approximately 3° more could be added, this should be carefully considered before drilling. Exceeding 12° may compromise the locking mechanism or result in protrusion into a joint space or convergence with other screws.

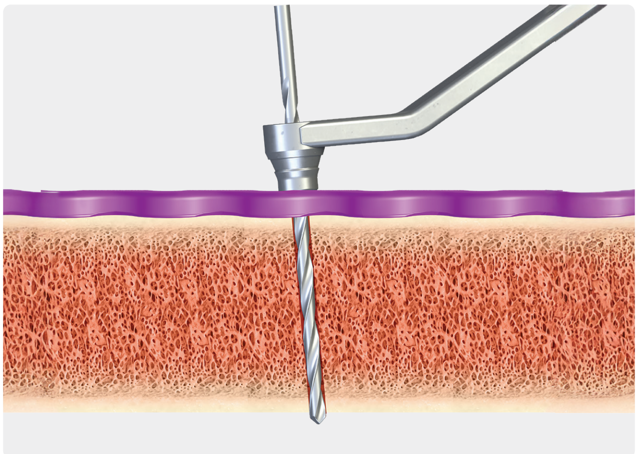


Figure 3. Nonlocking VAL guide and drill bit

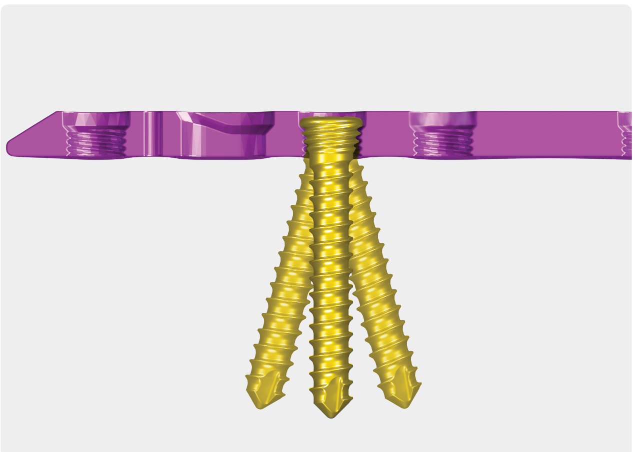
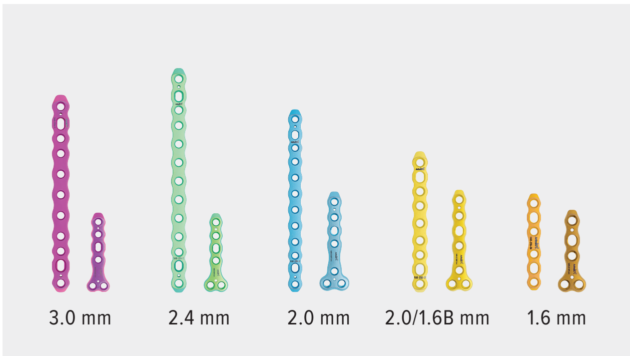


Figure 4. VAL screw cone of angulation

Titanium Alloy vs Stainless Steel

Arthrex has developed both titanium alloy and stainless steel locking plates. The 2.7 mm, 3.5 mm, and 4.5 mm tibial plateau leveling osteotomy (TPLO) plates are made from stainless steel. The 1.6 mm, 2.0 mm, 2.4 mm, and 3.0 mm TPLO and OrthoLine™ plates are made from titanium alloy. It is important to note that our titanium alloy is significantly different from commercially pure titanium. When comparing our titanium alloy plates to stainless steel (LCP below), you’ll see both a stiffness ratio and a yield load. Our titanium alloy has a much greater yield load due to the elasticity of the material, making titanium alloy plates ideal for smaller patients. The strength and stiffness of the stainless steel plates make them ideal for larger patients.

Figure 5 shows cantilever bending in a bone block model. Yield loads may differ between this data and actual 4-point bending data that compares only the plates. A learning curve may be involved with switching from a competitive company’s stainless steel plates to Arthrex titanium alloy plates since titanium alloy is inherently softer than stainless steel. This means that the plate or screw can be damaged if too much force is used. It is recommended to exercise special caution when contouring and inserting screws the first few times.



Size	Stiffness Ratio	Yield Load % Increase
1.6 OrthoLine plate	0.8 × stiff as 1.5 mm LCP	306.98
1.6 Broad OrthoLine plate	0.95 × stiff as 1.5/2.0 mm LCP thin	144.00
2.0 OrthoLine plate	1.5 × stiff as 1.5/2.0 mm LCP thick	217.39
2.4 OrthoLine plate	1.25 × stiff as 2.4 mm LCP thick	207.32
3.0 OrthoLine plate	1.9 × stiff as 2.7 mm LCP	275.00

Figure 5. OrthoLine™ Fracture Management System: Biomechanics

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