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Contents

IMPLANT FEATURES	2
INDICATIONS	4
PREOPERATIVE PLANNING	4

SURGICAL TECHNIQUE

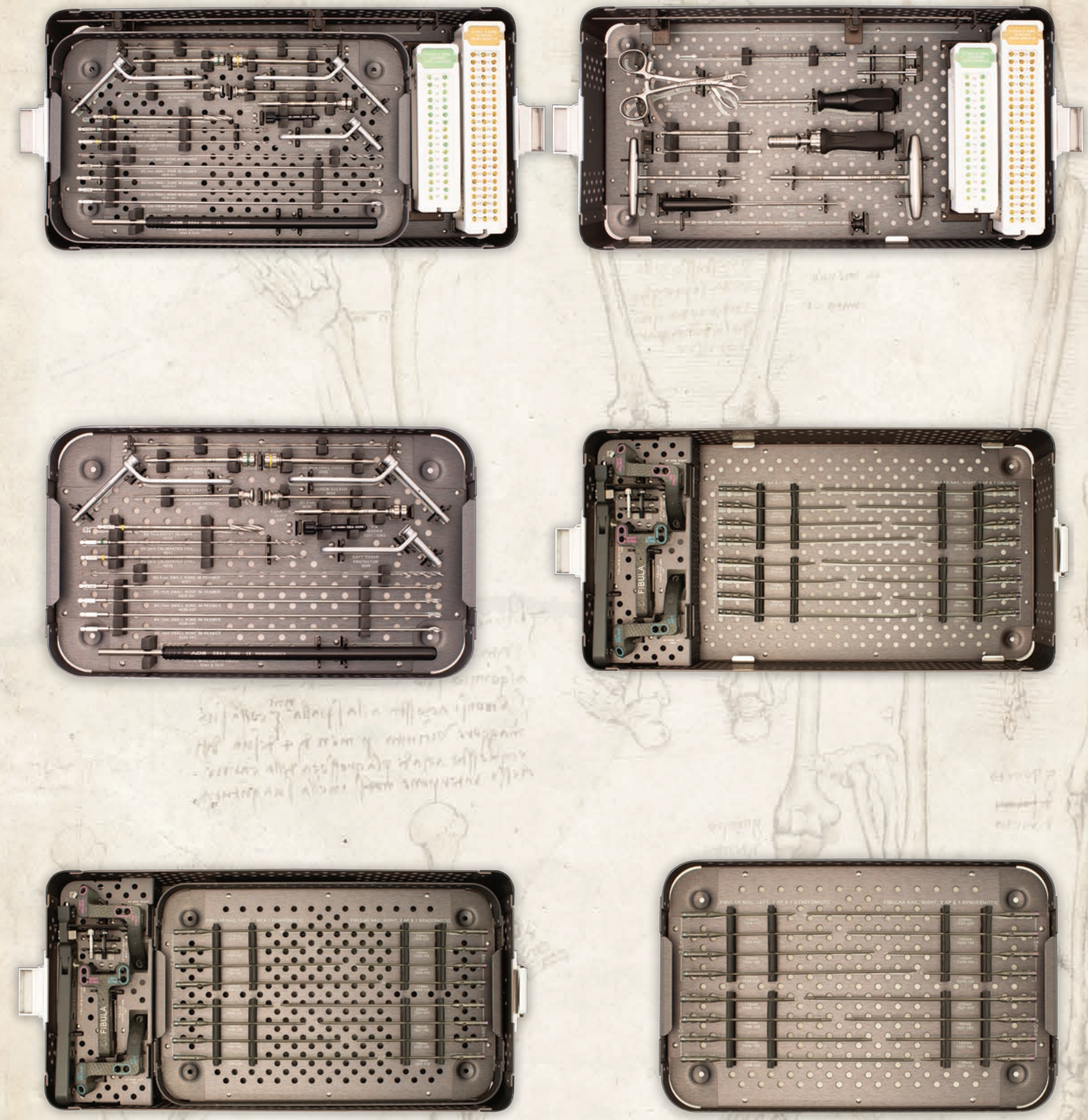
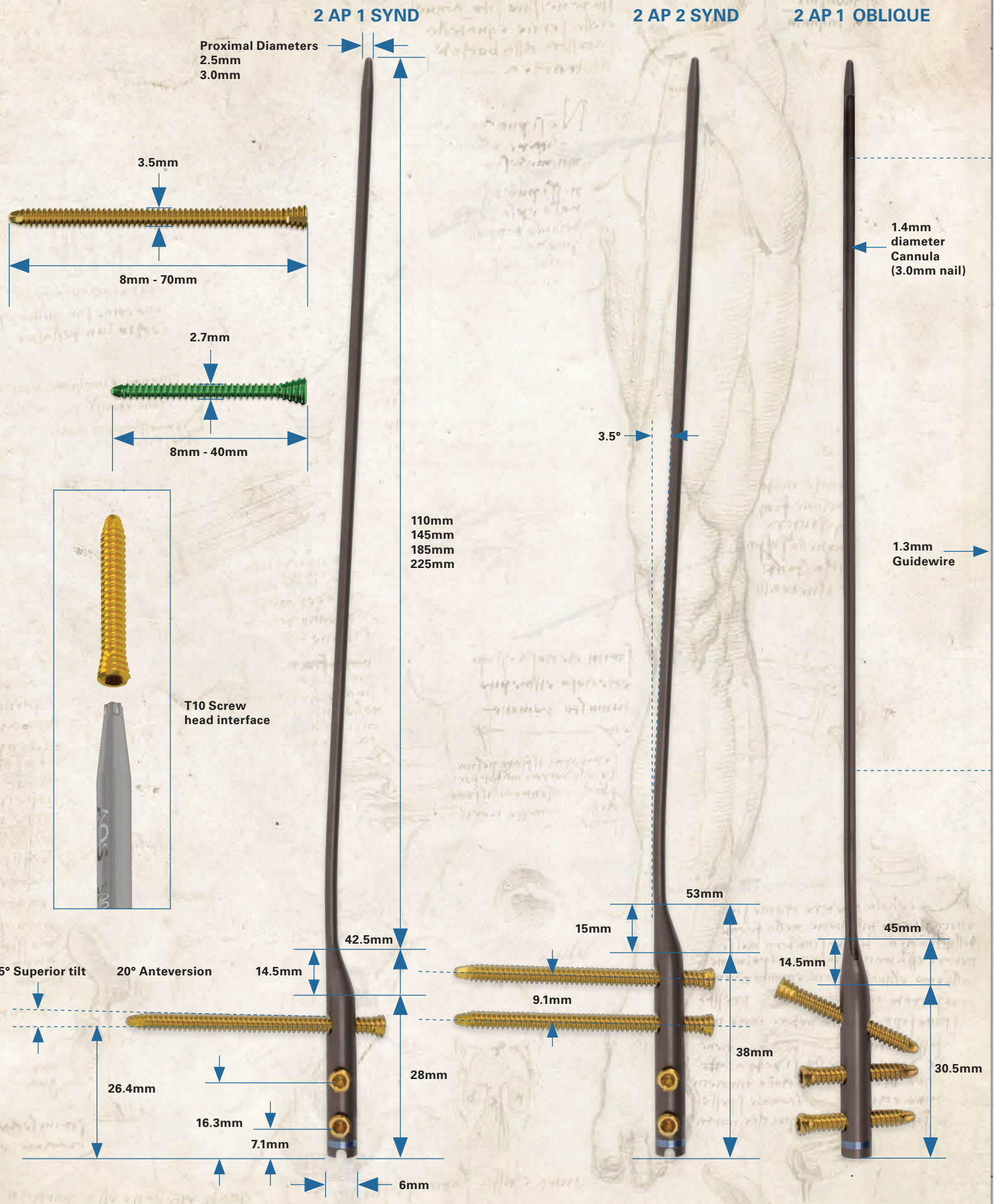
1. PATIENT POSITIONING	4
2. INCISION	4
3. ENTRY POINT	5
4. FRACTURE REDUCTION	5
5. NAIL SELECTION	6
6. REAMING	7-8
7. TARGETER & NAIL ASSEMBLY	9
8. NAIL INSERTION	10

NAIL LOCKING

9. DISTAL SCREW LOCKING	11-14
10. BLOCKING SCREW PLACEMENT	15-16
11. WOUND CLOSURE	16
12. NAIL EXTRACTION	16

This Surgical Technique sets forth detailed recommended procedures for using AOS devices and instruments. It offers guidance, but as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required. Surgeons must always rely on their own professional clinical judgement when deciding which products and surgical treatments to use with their patients. Refer to package insert for information on indications, warnings, precautions and contraindications.

Implant Features (3.0 Cannulated/2.5 Solid)



Fibular Nail Surgical Technique

Indications

The AOS Fibular Nail System is intended for fixation of fractures and osteotomies of the fibula, including fractures where the medullary canal is narrow or flexibility of the implant is paramount.

Preoperative Planning

Prior to performing a surgical reduction of the fracture, AP and lateral radiographs of the injured fibula should be taken. Use the preoperative radiographs to evaluate patient anatomy and estimate nail length, fibula canal diameter, potential amount of reaming (if necessary), and screw length.

Radiographs of the contralateral fibula can be used to provide insight to the pre-injured fibula anatomy.

1. Patient Positioning

The patient is positioned in the supine position on a radiolucent fracture table. A roll can be placed on the ipsilateral buttock. The injured leg should be aligned with manual manipulation performed by the surgeon, if necessary.

NOTE: The C-arm should be positioned to allow for proper imaging of the affected fibula in the AP and lateral planes along the entire length of the fractured bone.

To confirm adequate visualization and reduction capabilities, the patient should be surgically draped to allow the surgeon to operate from the knee distally to the foot on the affected limb.

2. Incision

A longitudinal incision is made 1-2cm below the distal tip of the fibula (**Fig 1**). The incision is continued down through to the subcutaneous tissue and the muscles are split in line with their course.

3. Entry Point

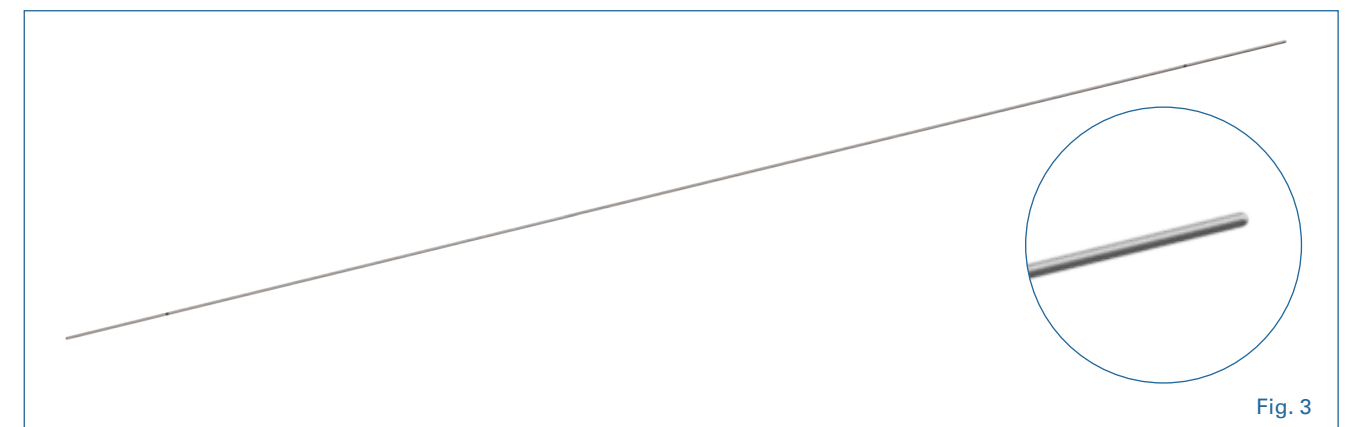
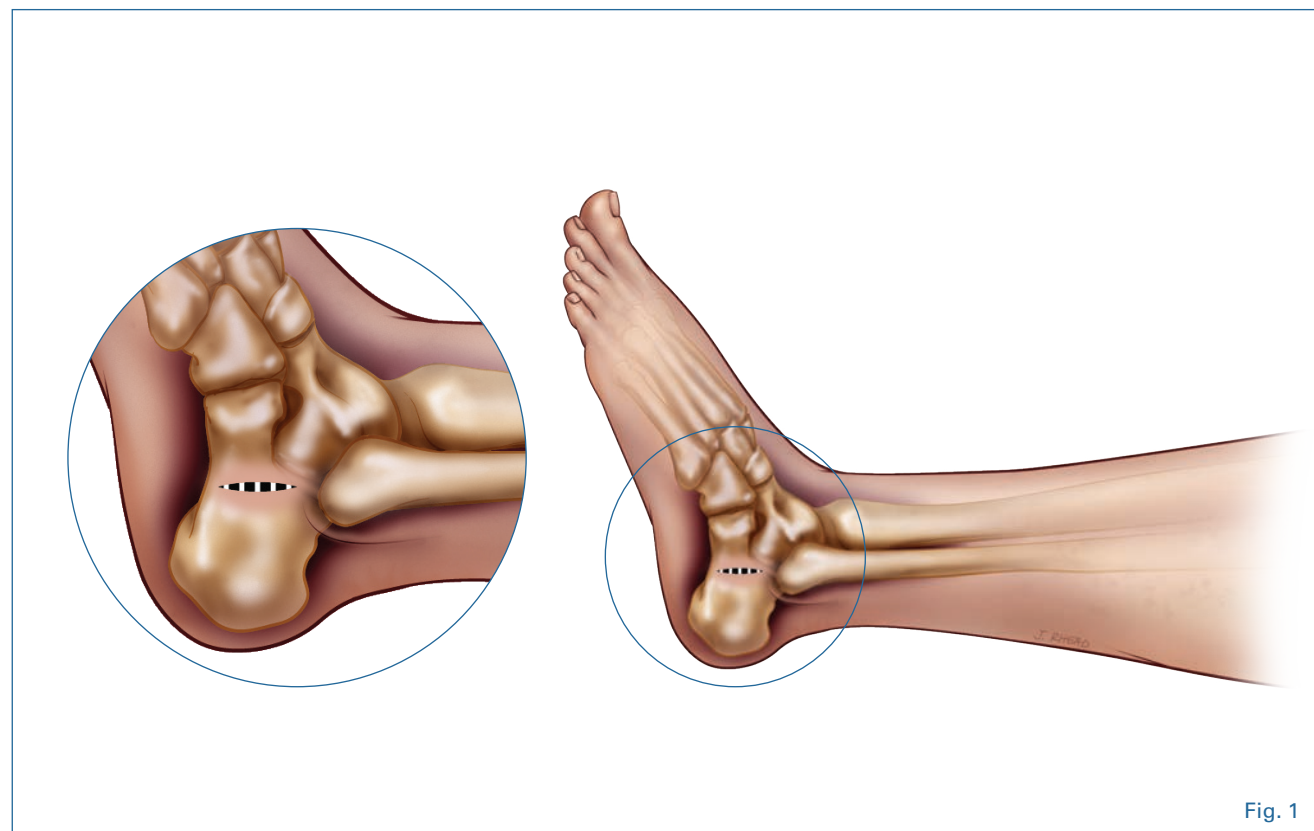
On the distal tip of the fibula, the entry point is established at the lateral edge of the articular facet towards the center of the proximal canal. The starting point should be aligned with the canal axis (**Fig. 2**).

NOTE: Radiographic imaging can be used in the AP and lateral planes to confirm initial placement.

4. Fracture Reduction

Obtain appropriate anatomic reduction in order to restore length, alignment and rotation of the injured limb. Introduce a **1.3mm Double Round Guide Wire (0118-100) (Fig. 3)** through the previously established entry point in the distal tip of the fibula.

NOTE: Confirm position and containment of the Guide Wire within the fibular canal via fluoroscopy in both the AP and lateral views.



To assist with fracture reduction, a **Reduction Tool (0855-200)** is inserted over the Guide Wire and up to the level of the fracture (**Fig. 4**). Reduction of the proximal fracture fragment to the distal fracture fragment is now performed. The Guide Wire is advanced across the fracture until it is centered within the distal fragment.

5. Nail Selection

The Fibular Nail is available in two distal shaft diameters 2.5mm, 3.0mm. (The 3.0mm diameter fibular nail is cannulated). Each size option is available in three (3) screw pattern configurations:

- 2 AP Screws and 2 Syndesmotic Screws (**Fig. 5a**)
- 2 AP Screws and 1 Syndesmotic Screw (**Fig. 5b**)
- 2 AP Screws and 1 Oblique Screw (**Fig. 5c**)

Based on fracture pattern and surgeon preference, the appropriate diameter and screw pattern configuration is selected.

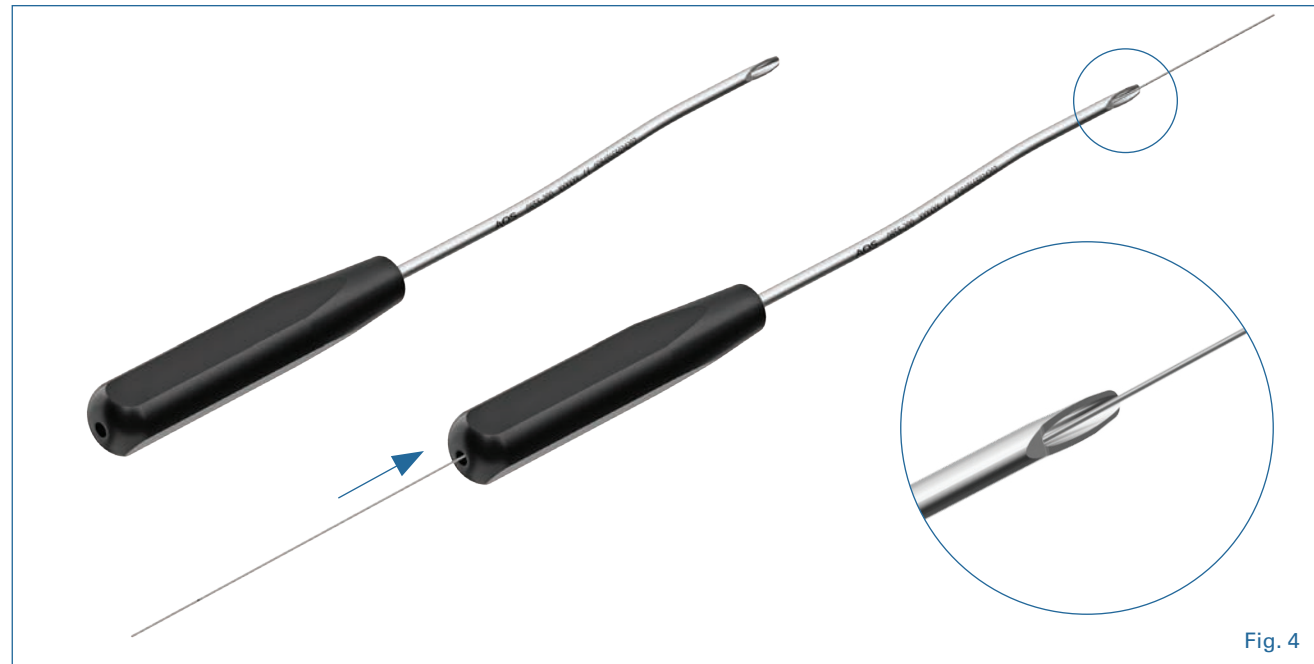


Fig. 4

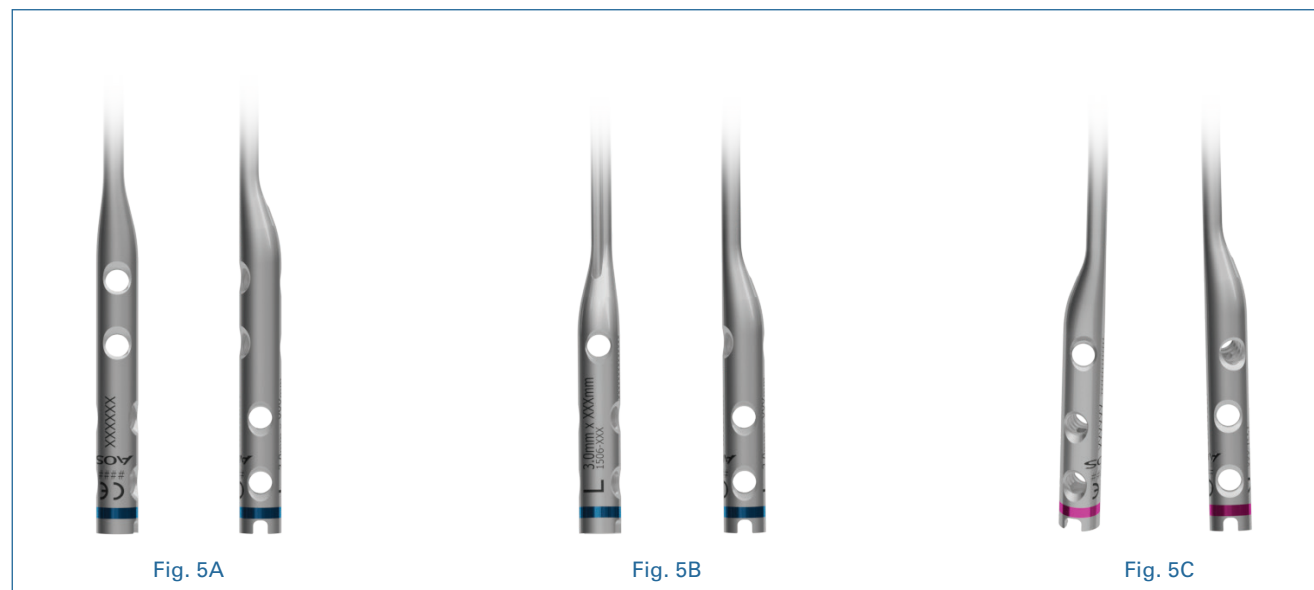


Fig. 5A

Fig. 5B

Fig. 5C

6. Reaming

NOTE: Make sure proper fracture alignment of the injured limb is achieved prior to reaming and is maintained throughout the reaming process to avoid eccentric reaming.

Place the **Soft Tissue Protector (0655-000)** over the Guide Wire and slide into the incision. The **6.1mm Entry Reamer (4019-100)** is placed over the guide wire and through the Soft

Tissue Protector to ream for the distal diameter of the nail (**Fig. 6**).

NOTE: The Entry Reamer should be inserted to the first notch if a 3-hole (2 AP/1 Oblique or 2 AP/1 Syndesmotic) fibular nail is selected (**Fig. 7A**). The entry reamer should be inserted to the second notch if the 4-hole (2-AP/2 Syndesmotic) nail is selected (**Fig. 7B**).



Fig. 6

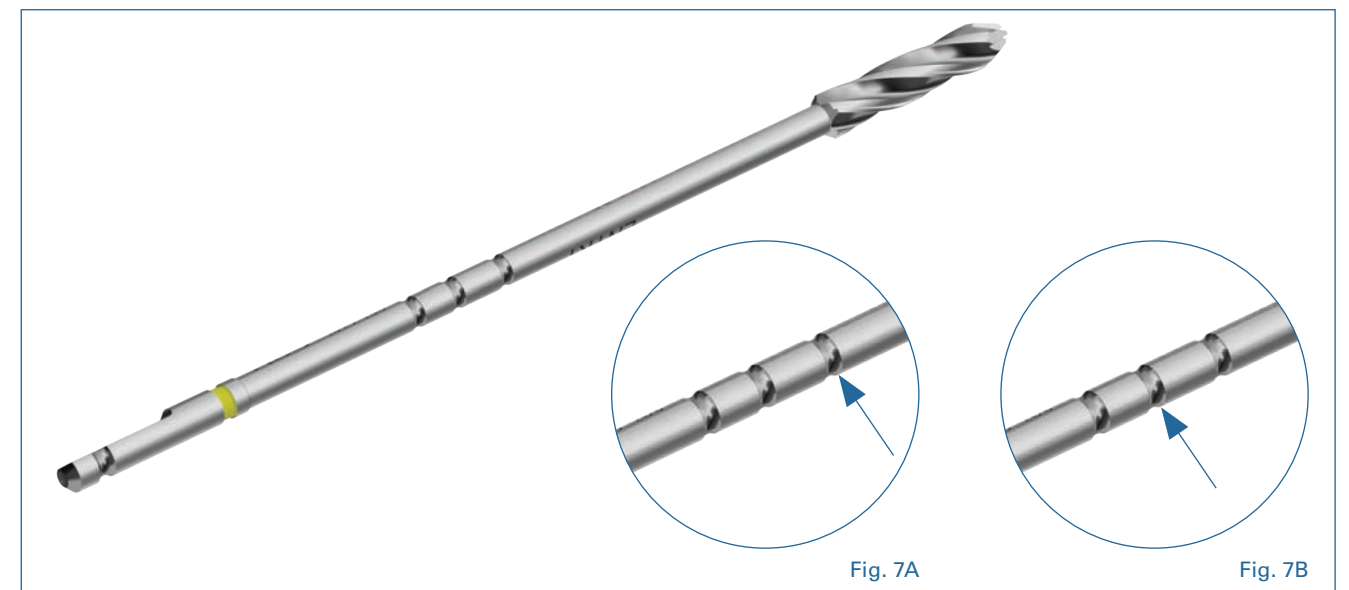


Fig. 7A

Fig. 7B

The diaphyseal canal is reamed using the **Small Bone IM Reamers (4020-031)** (3.1mm to 5.1mm available) (Fig. 8). Monitor diaphyseal canal radiographically to ensure proper reaming depth is achieved. Use the **2.6mm Small Bone Reamer (4021-000)** or larger for the 2.5mm nails. Use the **3.1mm Small Bone Reamer (4020-031)** or larger for 3.0mm nails.

NOTE: Based on the surgeon's preference and bone condition, a **3.4mm Small Bone Reamer (4020-034)** is also available to use with the 3.0mm nails if a larger reamer is desired.

With the Guide Wire in position and the desired depth, place the **Depth Gauge (0544-000)** over the guide wire to measure for nail length and choose the appropriate nail.

NOTE: The length of nail is measured by selecting the closest measurement mark on the depth gauge to the black laser marking on the guide wire (Fig. 9).

NOTE: If using the 2.5mm nail, the Guide Wire should be removed. If using the 3.0mm nail, which is cannulated, the Guide Wire can remain inserted in order to place the nail using the guide wire placement.

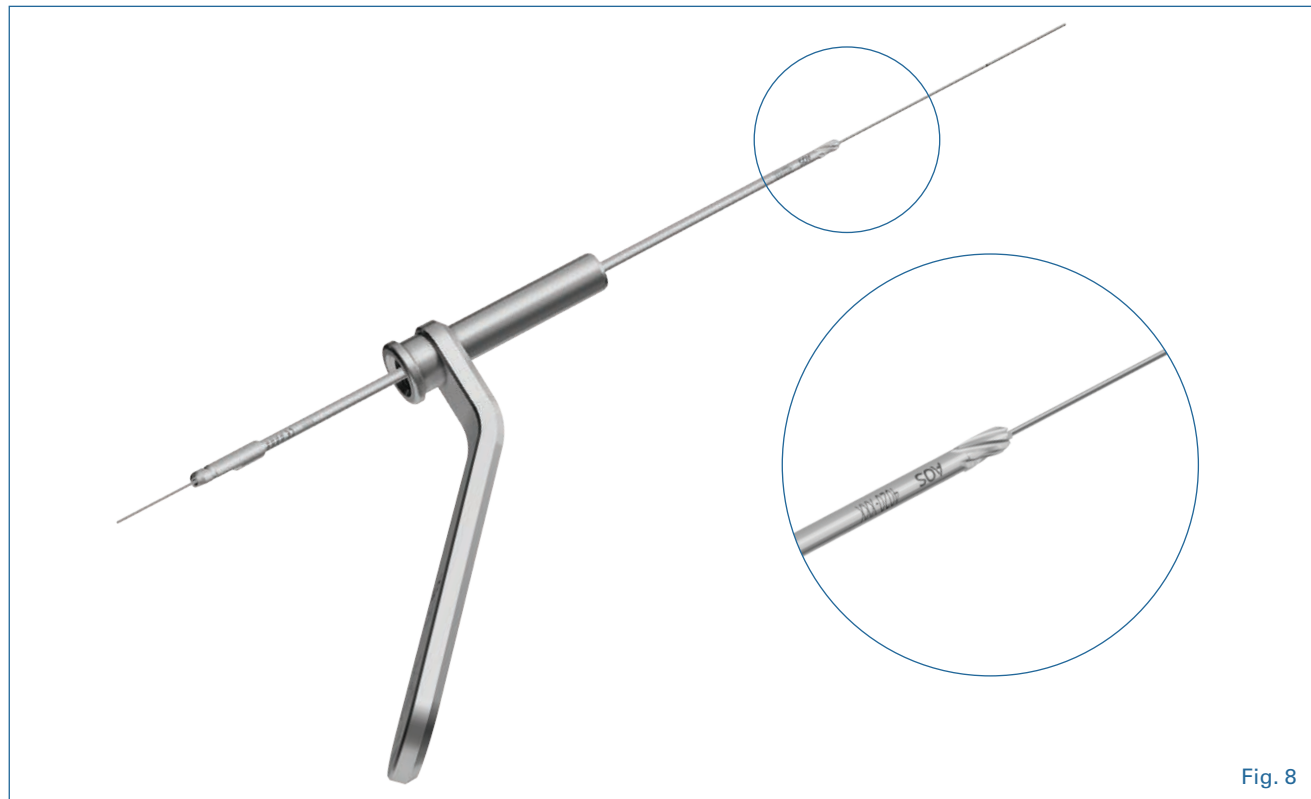


Fig. 8

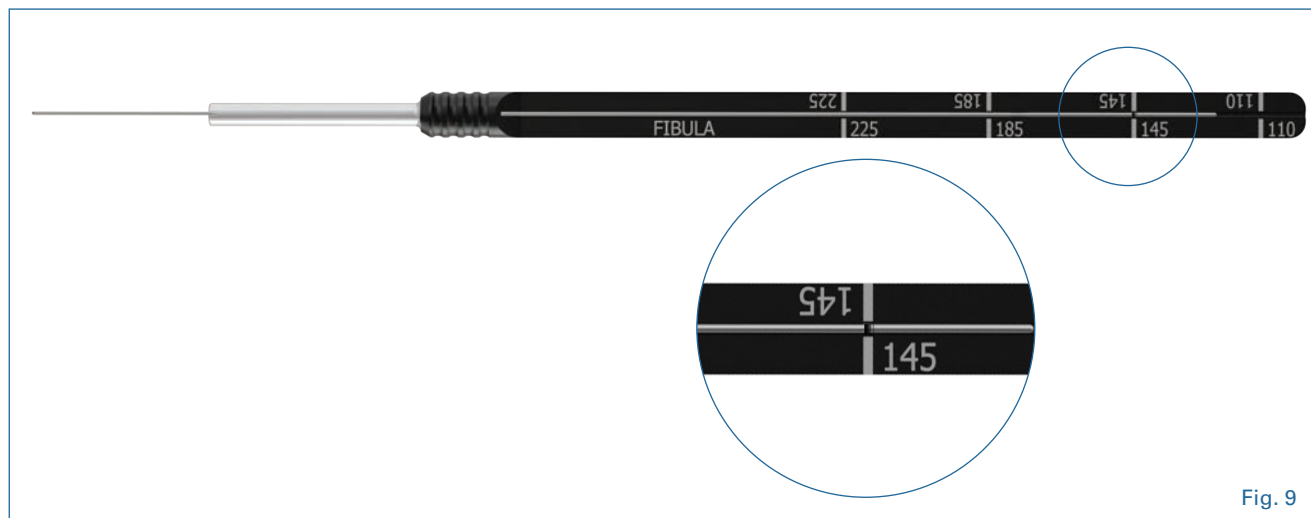


Fig. 9

7. Targeter and Nail Assembly

Attach the ipsilateral AP Arm **4903-000 (Left)**, **4904-000 (Right)** to the appropriate side of the **Fibular Targeting Arm (1291-100)**, using the **AP Connection Bolt (1290-000)**.

NOTE: Two AP Connections Bolt options are available. The first option, **1290-000 (See Fig. 10)**, is stainless steel. The second **AP Connection Bolt (1290-100)** option is black

anodized aluminum and is radiolucent. The AP Connection Bolt can be tightened using the **5.0mm Hex Driver (5001-000)** (Fig. 10). Once assembled, the previously selected nail can be attached to the assembly using the **Nail Locking Bolt (1295-100)** (Fig. 11).

NOTE: The fibular nails have a color-coded band to indicate the correct side of the patient, right or left, to implant (Fig. 12).



Fig. 10



Fig. 11



Fig. 12

8. Nail Insertion

Once the selected nail is assembled to the Targeter Assembly, introduce the nail into the distal fibula using the Targeter to control rotation (Fig. 13).

NOTE: If the 3.0 Cannulated Nail is selected, pass the nail over the Guide Wire.

Using the Targeter Assembly, the nail is advanced until the



Fig. 13

screw holes are in the desired placement, based on fracture and surgeon preference.

NOTE: The notch on the tip of the Targeting Arm indicates a 5mm space from the tip of the fibular nail as it is attached to the Targeting Arm (Fig. 14).

CAUTION: Make sure to maintain final reduction manually while removing the guide wire and locking the nail in place with the screws.



Fig. 14

Nail Locking

NOTE: If the Guide Wire is still placed into the patient (for use with the 3.0mm nails), remove the Guide Wire once the nail has been properly placed and prior to inserting screws.

9. Distal Screw Locking

The Targeter is designed to accurately place desired screws for each of the screw patterns (AP, Syndesmotic, and Oblique) (Fig. 15).

NOTE: Placing the AP screws first can provide surgeon ability to control and set the rotation and length of the distal fibular



Fig. 15

fragment by using the Targeter Assembly as a joystick. Using radiography, make sure that the distal fragment of the fibula is aligned with the desired position and final rotation prior to placing any screws. Once the syndesmotic screw(s) is inserted, the length and rotation of the distal fibula fragment is finalized.

AP Screw

Insert the **Screw Sheath Assembly (0644-100)** and **2.5mm Drill Guide (0350-000)** into the desired AP holes in the Targeter. Make a stab incision to allow the Screw Sheath Assembly and Drill Guide to be advanced to the medial outer cortex of the bone. Use the **2.5mm Calibrated Drill (4016-000)** (Fig. 16) and drill to the second cortex.

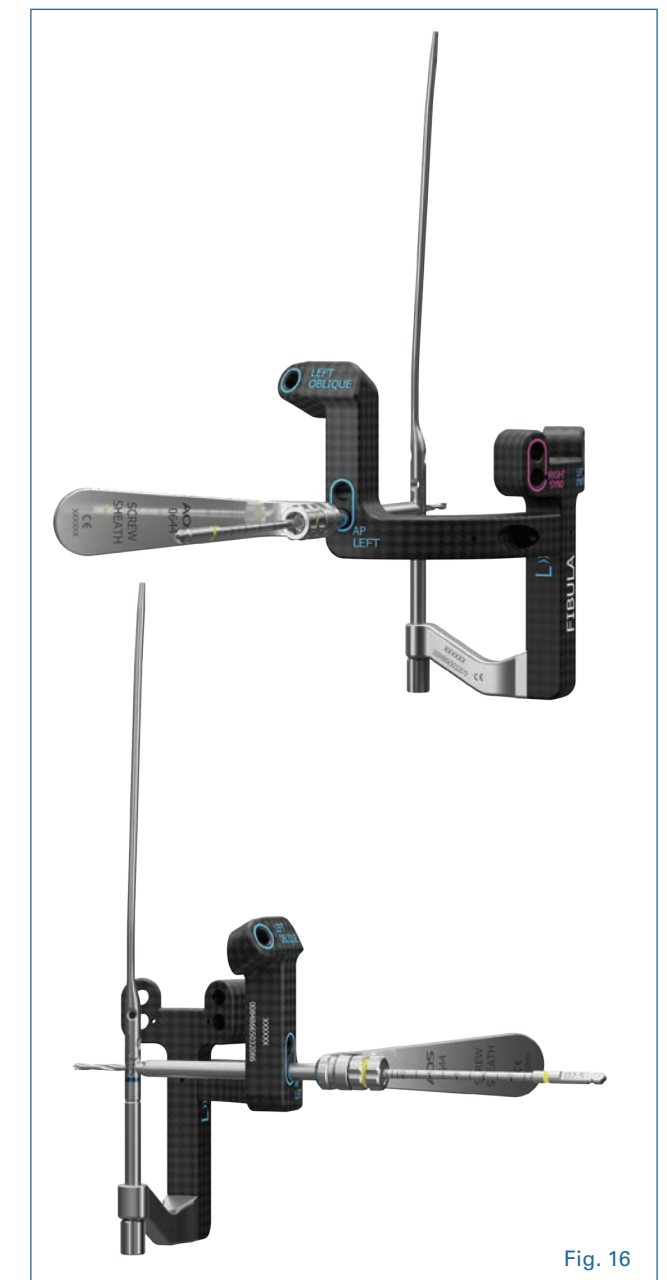


Fig. 16

NOTE: Use fluoroscopy to confirm position of drill and cortices.

Once drilling is completed, take note of the calibration mark on the drill shaft in order to determine the appropriate screw length (**Fig. 17**).

Select the appropriate sized (diameter and length) screw,

insert and advance to the desired position using the **T10 Screwdriver (5008-000 or 5020-000) (Fig. 18)**.

NOTE: To avoid irritating or disrupting the peroneal tendon, the screw should not penetrate the posterior cortex.

If a second AP screw is desired, repeat the process above with the second AP hole.

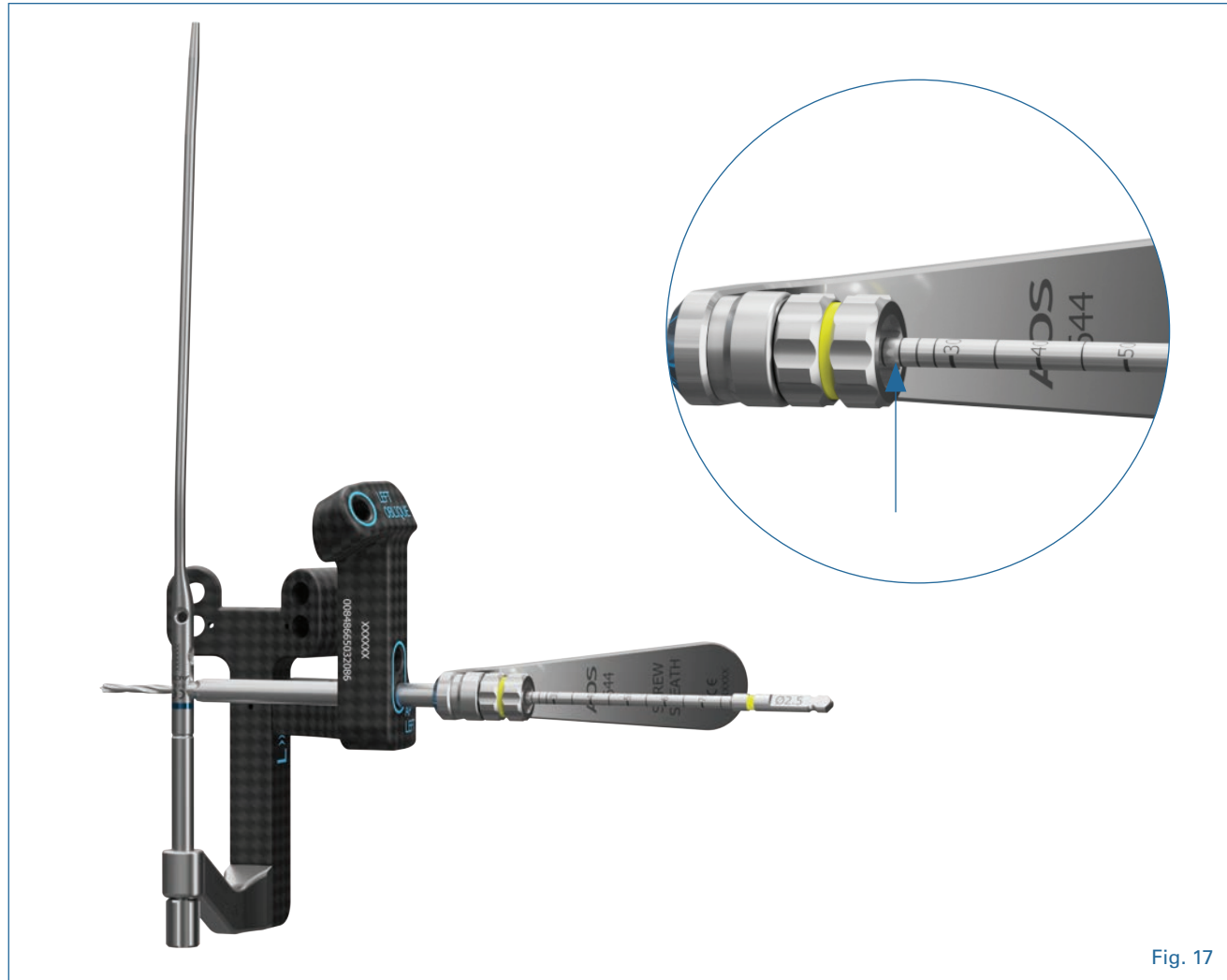


Fig. 17

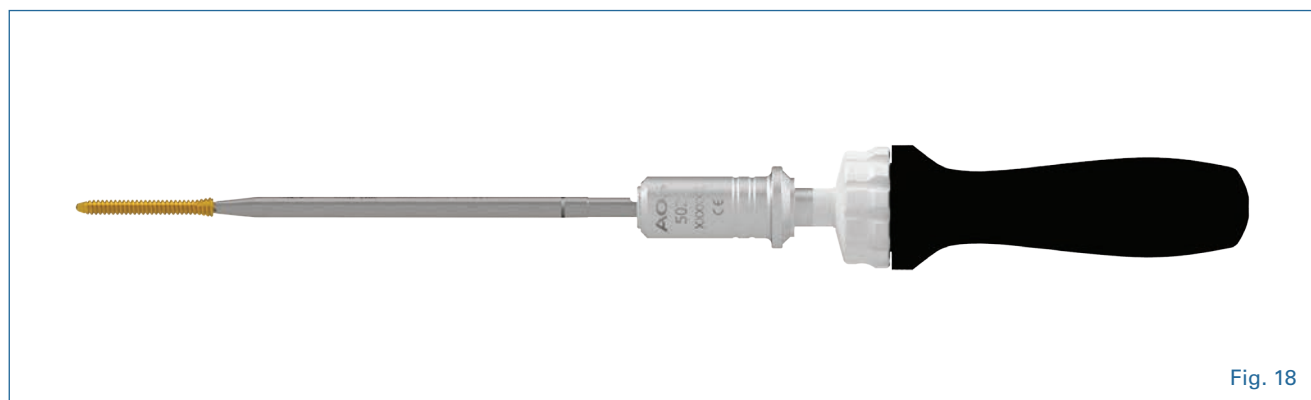


Fig. 18

Oblique Screw

If a fibular nail with the oblique screw-hole pattern is selected, insert the Screw Sheath Assembly and Drill Guide in to the corresponding hole labeled oblique in the Targeter (**Fig. 19**). Make a stab incision to allow the Screw Sheath Assembly and Drill Guide to be advanced to the medial outer cortex of the bone. Use the 2.5mm Calibrated Drill to drill to the second cortex.

NOTE: Use fluoroscopy to confirm position of drill and cortices.

Once drilling is completed, take note of the calibration mark on the drill shaft in order to determine the appropriate screw length (**See Fig. 17**).



Fig. 19

Select the appropriate sized (diameter and length) screw and insert and advanced to desired position. (See Fig. 18).

Alternatively, 2.7mm screws are available and may be used instead. Use the **2.0mm Drill guide (0353-000)** and **2.0mm Calibrated Drill (4017-000)** to place the 2.7 screws.

Syndesmotic Screw

If a fibular nail with syndesmotic screw hole(s) is selected, align the Targeter with the location of the syndesmosis in order to place the screws. Insert the Screw Sheath Assembly and 2.5mm Drill Guide into the desired syndesmotic screw hole(s) in the Targeter (Fig. 20).

Make a stab incision to allow the Screw Sheath Assembly and

Drill Guide to be advanced to the medial outer cortex of the bone. Use the 2.5mm Calibrated Drill to drill to the second cortex.

NOTE: Use fluoroscopy to confirm position of drill and cortices.

Once drilling is completed, take note of the calibration mark on the drill shaft in order to determine the appropriate screw length (See Fig. 17).

Select the appropriate sized (diameter and length) screw and insert and advance to desired position (see Fig. 18).



Fig. 20

10. Blocking Screw Placement

If a blocking screw is desired, attach the **Fibular Blocking Screw Guide (1292-100)** to the **Targeting Arm (Fig. 21)**. The Blocking Screw Guide has four different height holes that correspond to the length of nail used. The guide will also rotate so that you can more precisely target the canal above the proximal tip of the nail in order to place the blocking screw in the desired position.

To rotate the Fibular Blocking Screw Guide, loosen the knob and rotate to desired position (Fig. 22).

Insert the Screw Sheath Assembly and Drill Guide into the

appropriate screw hole labeled with the respective length of nail previously inserted.

Make a stab incision to allow the Screw Sheath Assembly and Drill Guide to be advanced to the medial outer cortex of the bone. Use the 2.5mm Calibrated Drill to drill to the second cortex.



Fig. 21



Fig. 22

NOTE: Use fluoroscopy to confirm position of drill and cortices.

Once drilling is completed, take note of the calibration mark on the drill shaft in order to determine the appropriate screw length (See Fig. 17).

Select the appropriate sized (diameter and length) screw and insert and advance to the desired position (See Fig. 18).

11. Wound Closure

After the nail and all desired screws are inserted, the Targeting Guide can be removed from the fibular nail by releasing the Nail Locking Bolt from the Targeter. Irrigate the joint to ensure that no debris is remaining. The wound can be closed using the surgeon's preferred method.

12. Nail Extraction

Using fluoroscopy, locate all distally placed screws. Expose each screw head to prepare for removal.

Prior to removing any of the screws, locate the proximal end of the fibular nail. Insert the **Extraction Handle (0854-000)** (Fig. 23) into the proximal end of the nail. Begin turning the Extraction Handle clockwise to ensure the Extraction Handle engages with the threads in the fibular nail.

NOTE: If any of the bone has grown in to either the screws or the nail, it may inhibit implant removal. Before proceeding with nail removal, use instruments such as ronguers, dental picks, or small curettes to remove the bone overgrowth before attempting implant removal.

Once the Extraction Handle is fully seated, all distally placed screws (including blocking screw if placed) can be removed. After screws are removed, pull the Handle distally to extract the fibular nail completely.

NOTE: Use fluoroscopy to visualize the removal of the nail and to avoid damage to the fibula or other structure(s).



Fig. 23