



Captured Hip® Screw System

Surgical Technique

Options:
Supracondylar Plate
Trochanteric Plate

Captured Hip® Screw System

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Introduction



Written by Richard F. Kyle, MD

The implants in the Captured Hip Screw with Trochanteric and Supracondylar Plate System are made of Ti-6Al/4V. Titanium alloy, when compared to 316L stainless steel, offers biocompatibility, and strength.¹

The captured hip screw is very simple to insert. It is a keyless system. A single instrument is used to insert the assembled captured hip screw and plate in one step. This concept has been carried forward into the design of the instruments for the keyed supracondylar plate. Following placement of the central lag screw, the plate is simply guided over the driver onto the lag screw and against the bone.

The Captured Hip Screw System System was designed and developed in conjunction with Richard F. Kyle, M.D.

This hip fracture surgical technique is utilized by Richard F. Kyle, M.D. Biomet as the manufacturer of this device, does not practice medicine and does not recommend this device or technique. Each surgeon is responsible for determining the appropriate device and technique to utilize on each individual patient.

The captured hip screw uses the principle of sliding impaction, rather than compression with a compression screw. By firmly impacting the fracture after placement of the hip screw, a compressive load that is approximately four times greater than that of a compression screw is applied to close the fracture site.² This method eliminates the potential of stripping the lag screw threads in osteoporotic bone and avoids the need for a compression screw.

The supracondylar plate utilizes screw-controlled compression. Since the load is perpendicular to the sliding mechanism, distal femoral fractures do not impact naturally. A keyed mechanism is utilized to enhance rotational stability.

This system provides simple solutions to the surgeon's common hip and knee fracture needs. All implants, screws and instruments fit into one tray. The system is sensibly designed to address ease of use and inventory reduction, two important cost factors when considering managed care.

Captured Hip® Screw System

Description

The captured hip screw system is designed for use in intertrochanteric fractures. Intracapsular fractures may be managed with the addition of solid or cannulated cancellous screws to prevent rotation.

Subtrochanteric fractures may be treated with the device provided that a good medial buttress is achieved and weight-bearing is not allowed until the fracture shows evidence of union.

The trochanteric plate option can be used to control comminution of the greater trochanter as well as reverse oblique and high subtrochanteric fractures by preventing medialization of the femoral shaft.

The supracondylar plate is designed for use in supracondylar fractures, and fractures and osteotomies of the proximal and distal femur.

Femoral Neck and Intertrochanteric Fractures of the Femur

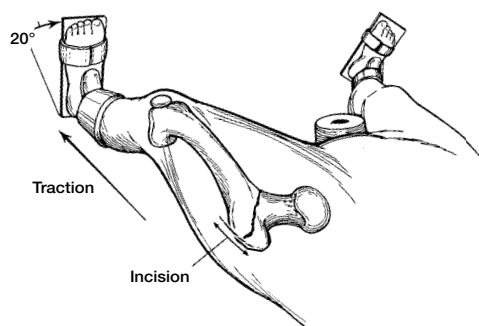


Figure 1

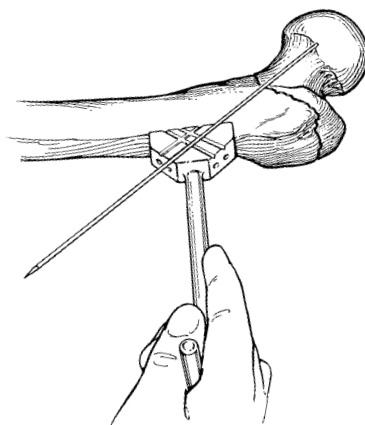


Figure 2

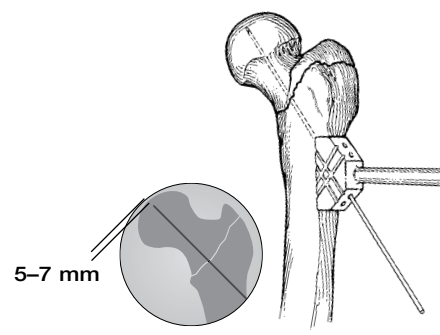


Figure 3

Surgical Technique

Patient Positioning

Place the patient supine on a standard fracture table. Reduce and align the fracture using traction with external rotation followed by approximately 20 degrees of internal rotation to compress the fracture (Figure 1). Verify reduction using dual-plane image intensification. Prepare and drape the hip in the usual manner.

Incision

Make a 10 cm incision in the lateral aspect of the hip, with dissection beginning at the flare of the greater trochanter and extending distally (Figure 1). Carry the dissection sharply down through the skin and subcutaneous tissue to the fascia lata. Split the fascia lata longitudinally, exposing the vastus lateralis. Retract the vastus lateralis anteriorly and expose the lateral aspect of the femoral shaft.

Guide Pin Positioning

Place a 3.2 mm guide pin on the anterior aspect of the femoral shaft and neck, 3-4 cm distal to the flare of the greater trochanter. Grooves are provided on the outer surfaces of the guide pin jig to indicate the pin angle options (and the subsequent captured screw assembly angle) and thus the proper placement of the hole for the internal guide pin. The guide pin should lie at the highest angle necessary to position the pin next to the medial cortex and in the center of the femoral head in the anterior/posterior (A/P) plane (Figure 2).

Drill the 3.2 mm guide pin through the corresponding hole in the guide pin jig. Advance it into the center of the femoral head under image control in both the A/P and lateral planes to within 5-7 mm of the subchondral bone (Figure 3).

Note: Central placement of the guide pin is the single most important step in secure fixation of the proximal fragment.

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Guide Pin Depth Gauge Reading	Recommended Captured Screw Assembly Length
70–100 mm	100 mm
100–130 mm	130 mm
130–160 mm	160 mm

Table 1

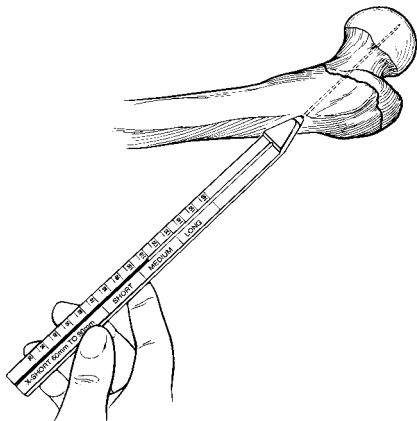


Figure 4

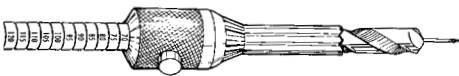


Figure 5

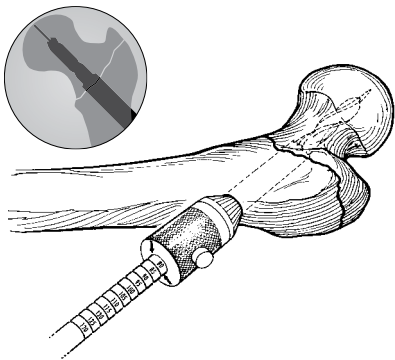


Figure 6

Captured Screw Assembly Selection

Place the guide pin depth gauge over the pin up to the femoral cortex (Figure 4). The measurement read at the end of the guide pin is a direct measurement of the length of the pin that extends into the femoral neck and head.

Using this measurement, select the proper length screw. Table 1 provides screw selection for corresponding depth gauge readings.

Note: In some cases a reading between 60 and 70 mm may be taken. In this situation, a special short barrel hip screw should be utilized. This special captured screw assembly is available in a 135-degree angle.

Once the measurement is read and the proper captured screw assembly is determined, advance the guide pin into subchondral bone, thereby anchoring it for reaming and tapping.

Reaming and Tapping

The long adjustable reamer and calibrated tap can be set in 5 mm increments. In patients with healthy bone, set the reamer at 10 mm less than the position just below the actual guide pin depth gauge reading (i.e., a reading between 90 and 95 mm means that the reamer should be set at 80 mm). This ensures that the reamer never advances closer than 1 cm to the subchondral bone.

Note: In patients with osteoporotic bone, set the reamer at 70 mm (Figure 5).

Place the reamer over the guide pin and advance it into the proximal femur under image control, assuring that the guide pin does not move (Figure 6).

Note: The conical portion of the reamer only needs to remove bone in the distal part of the lateral hole to prepare the bone for the captured screw assembly.

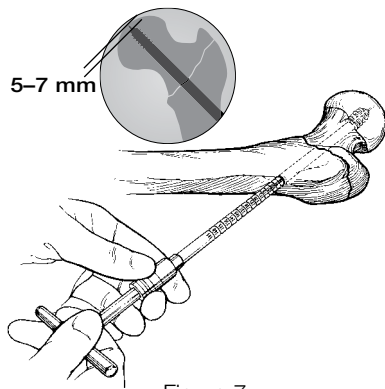


Figure 7

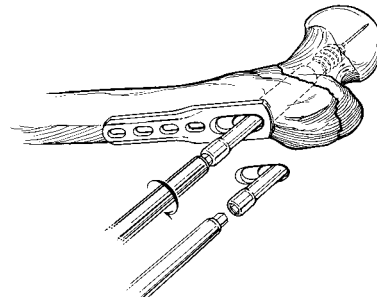


Figure 9

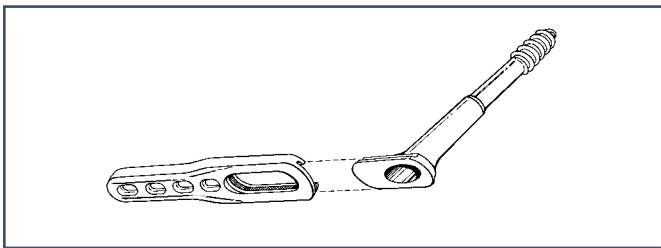


Figure 8

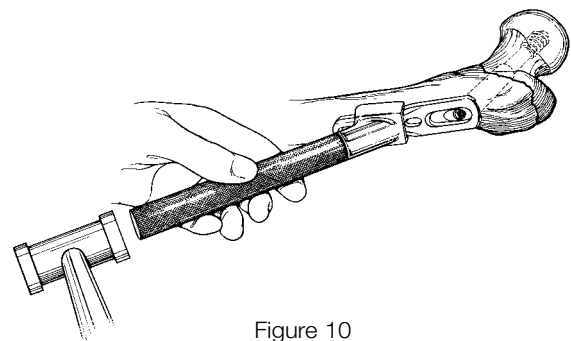


Figure 10

Note: To set the reamer to the desired depth, depress the button and slide the reamer head until the arrows line up with the matching value.

Set the calibrated tap at the position just below the actual guide pin depth gauge reading (i.e., a reading between 90 and 95 mm means that the tap should be set at 90 mm). Place the calibrated tap over the guide pin and tap the neck and head of the femur to within 5–7 mm of subchondral bone under image control (Figure 7).

Hip Screw Insertion

Ensure that the side plate is long enough to allow for the placement of four screws (eight cortices) below the most proximal extent of the fracture. While this makes the four-hole plate the most common selection, a two-hole plate may be selected for a nondisplaced femoral neck fracture. Assemble the side plate and captured screw assembly by sliding the barrel flange into the plate slot (Figure 8).

Insert the T-wrench inserter into the hexagonal base of the hip screw and place the entire assembly over the central guide pin into the prepared lateral cortex.

Advance the hip screw by turning the T-wrench inserter in a clockwise manner (Figure 9). While the side plate can remain loose during initial advancement, it is important to hold the plate parallel to the femoral shaft as it nears the bone. Verify the depth of the hip screw using image intensification. Remove the guide pin.

To ensure that the barrel portion of the captured screw assembly is fully seated, position the assembled captured hip screw impactor head and impactor handle onto the angled superior portion of the plate. With a mallet, lightly tap the impactor (Figure 10).

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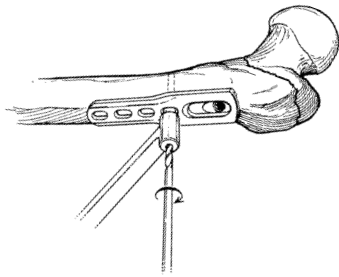


Figure 11

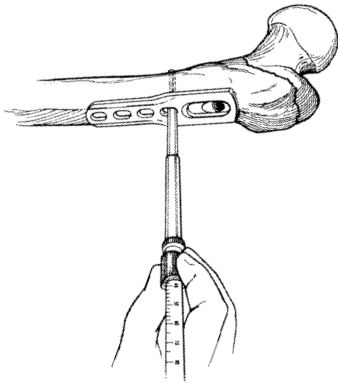


Figure 12

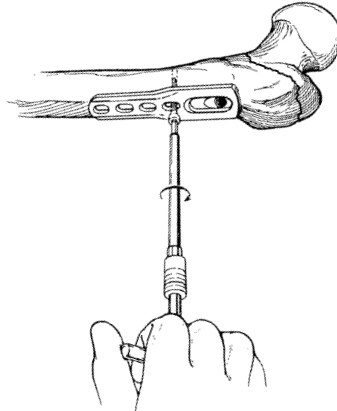


Figure 13

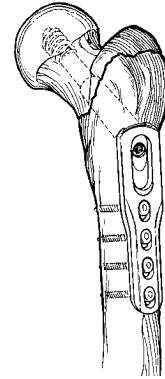


Figure 14a

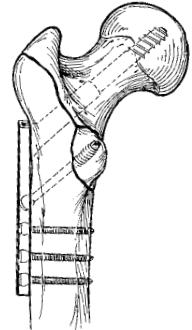


Figure 14b

Caution: Only light tapping of the screw is necessary. Forceful use of the impactor after the barrel has been inserted into the femoral shaft and prior to fixation of the side plate to the lateral aspect of the shaft may result in greater trochanteric comminution.

Screw Placement

Ensuring that the side plate or trochanteric plate is fully engaged to the captured screw assembly, place the 3.8 mm drill guide into the proximal screw slot. Drill both cortices using a 3.8 mm drill bit (Figure 11).

Measure the proper screw length using the hook depth gauge (Figure 12).

Assemble the power adaptor or quick couple T-handle to the 4.5 mm solid hex driver shank and drive the 4.5 mm self-tapping screw through the hole, securing the plate to the femoral shaft (Figure 13).

Note: In osteoporotic bone or in the metaphyseal portion of the distal femur, 5.0 mm cancellous bone screws are provided for fixation.

Always perform final tightening by hand. Using this technique, place the screws in succession in the plate slots to fasten the plate to the bone (Figure 14a).

Note: The proximal hole in the side plate may be used to place an angled 6.5 mm solid or cannulated cancellous bone screw if lagging of medial bone fragment is required (Figure 14b).

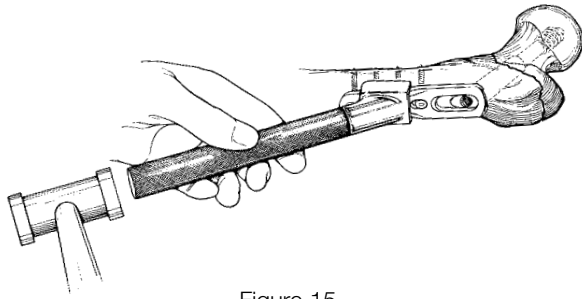


Figure 15

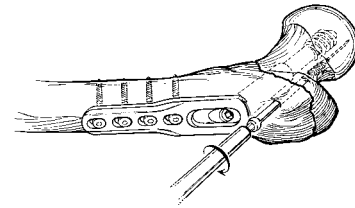


Figure 17

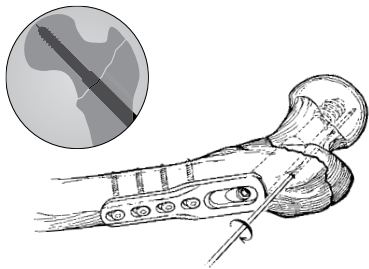


Figure 16

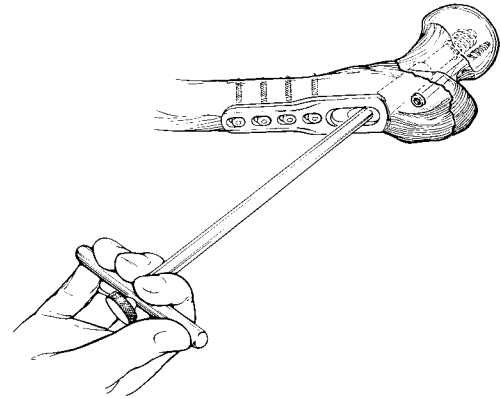


Figure 18

Final Seating and Impaction of the Hip Screw

Following fixation of the side plate to the femoral shaft, attain final seating of the hip screw into the femoral head by using the T-wrench inserter. Locate the tip of the hip screw within 5-7 mm of subchondral bone as verified by image intensification. Release traction from the effected hip.

Impact the fracture by placing the assembled impactor over the proximal aspect of the plate and applying three to four firm blows with a mallet (Figure 15).

Note: 6.5 mm cannulated cancellous screws are provided in the system if additional fixation is desired anterior or posterior to the captured screw assembly. Place a 3.2 mm guide wire under image intensification (Figure 16).

Insert the self-drilling, self-tapping cannulated screw over the guide wire using the assembled 6.5 mm hex driver

shank and T-handle (Figure 17). Cannulated drills and taps are available if hard, dense bone is encountered.

Optional Compression

Alternatively, compression may be applied by placing the T-wrench inserter into the screw and locking it there with the extractor lock. Grasp the T-wrench inserter and pull on it forcefully to compress the fracture (Figure 18).

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Caution: In patients with intertrochanteric fractures with subtrochanteric components, weight-bearing is prohibited until callus formation is apparent on the X-ray.

Extraction

After performing a routine opening exposure, use the 4.5 mm solid and 6.5 mm hex driver shanks to remove the screws fixing the side plate to the shaft of the femur. Attach the extractor lock through the T-wrench inserter to the captured screw assembly. Remove the hip screw by turning the T-wrench inserter in a counter-clockwise manner. Close in a routine fashion.

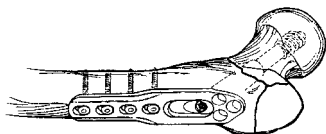


Figure 19

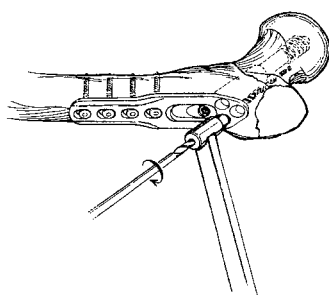


Figure 20

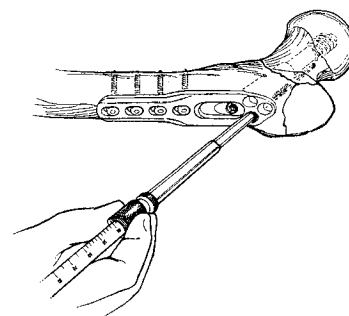


Figure 21

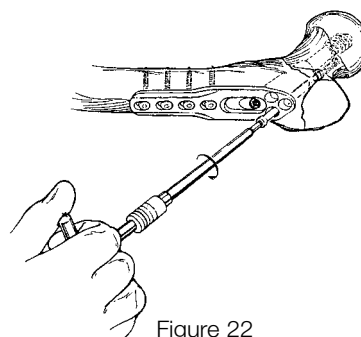


Figure 22

Screw Placement with Trochanteric Side Plate Option

Control comminution of the greater trochanter by using the trochanteric side plate (Figure 19). This plate also benefits reverse oblique and high subtrochanteric fractures by preventing medialization of the femur shaft.

Reduce the bony fragments using forceps or clamps and proceed in the same fashion as the side plate fixation. The quantity and sequence of screw placement in the proximal flare is physician dependent.

The most proximal screw hole provides fixation for the greater trochanter and the two distal screw holes also provide greater trochanter fixation. The two distal screw holes may also be used for anti-rotation of the femoral head, reverse oblique and subtrochanteric fractures to prevent medialization of the femoral shaft.

Place the 3.8 mm drill guide into one of the flared screw holes and drill to the desired depth using a 3.8 mm drill bit (Figure 20).

Measure the proper screw length using the hook depth gauge (Figure 21).

Caution: When using the hook depth gauge in a blind hole (i.e., one that does not go through both cortices), select a screw 2 mm less (or the next smaller size) than indicated.

Assemble the power adaptor or quick couple T-handle to the solid hex driver shank and drive the 6.5 mm self-tapping screw through the hole securing the plate to the bone (Figure 22).

Captured Hip® Screw System

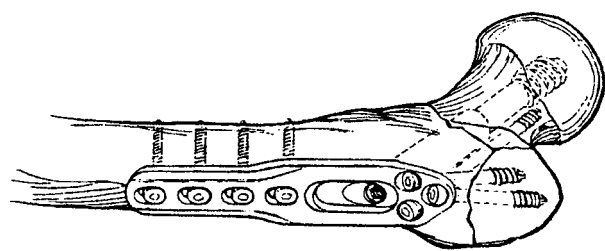


Figure 23

Note: For placement of the 6.5mm screws, use the respective drivers below.

Discontinued Cat. Nos.	Driver
14520-xx	14616
14521-xx	
14522-xx	
Active Cat. Nos.	Driver
8157-61-xxx	14541
8157-62-xxx	
8157-64-xxx	

Always perform final tightening by hand. An example of screw placement for the fracture indicated is shown (Figure 23).

Note: For final seating and impaction of the hip screw, please see next section.

Caution: In patients with intertrochanteric fractures with subtrochanteric components, weight-bearing is prohibited until callus formation is apparent on the X-ray.

Extraction

After performing a routine opening exposure, use the 4.5 mm solid and 6.5 mm hex driver shanks to remove the screws fixing the side plate to the shaft of the femur. Attach the extractor lock through the T-wrench inserter to the captured screw assembly. Remove the hip screw by turning the T-wrench inserter in a counter-clockwise manner. Close in a routine fashion.

Supracondylar Fractures and Fractures of the Lower Third Femur

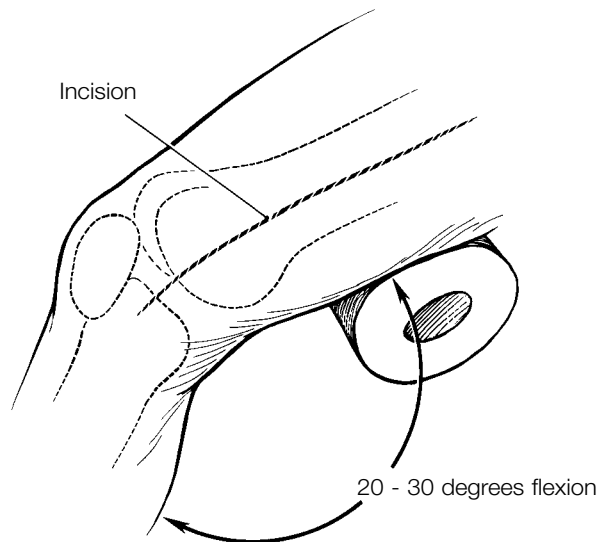


Figure 24

Supracondylar Fractures and Fractures of the Lower Third Femur

Patient Positioning

Pay careful attention to the positioning of the patient on the standard operating table. Place a sandbag under the buttock of the operated extremity with the patient in the supine position. This effectively rotates the extremity internally and facilitates the surgical approach. Use a roll under the leg to provide 20–30 degrees flexion (Figure 24). The same positioning can also be achieved using a fracture table.

Incision

Perform a standard lateral exposure starting at the lateral femoral epicondyle and extend it proximally.

Note: The initial incision over the femoral epicondyle may be limited to allow insertion of the lag screw and later extended for plate application. This reduces overall wound exposure and blood loss.

A straight lateral incision allows extension distally and proximally for an extensile exposure. Incise the suprapatellar pouch at the edge of the epicondyle and reflect medially in order to expose the intercondylar notch. The lateral superior genicular artery requires cauterization or ligation. Retract the vastus lateralis muscle anteriorly to expose the fracture. Place a retractor posterior to the femur to protect the posterior neurovascular structures.

Convert a three-part fracture into two parts by reducing the intercondylar component. Hold the reduction temporarily with 3.2 mm Kirschner wires and bone-holding clamps or reduction forceps. Take care in placing the K-wires so as not to interfere with the placement of the supracondylar lag screw. Cannulated screws may be used to permanently secure the fragments.

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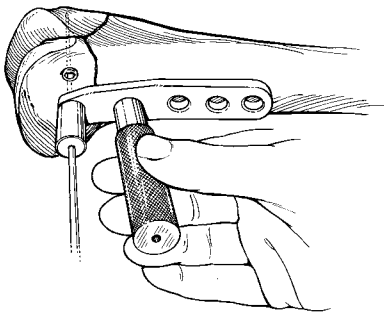


Figure 25

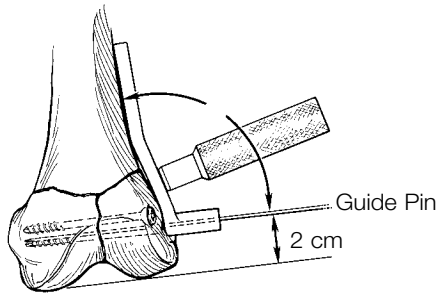


Figure 26a

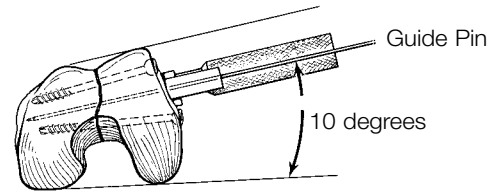


Figure 26b

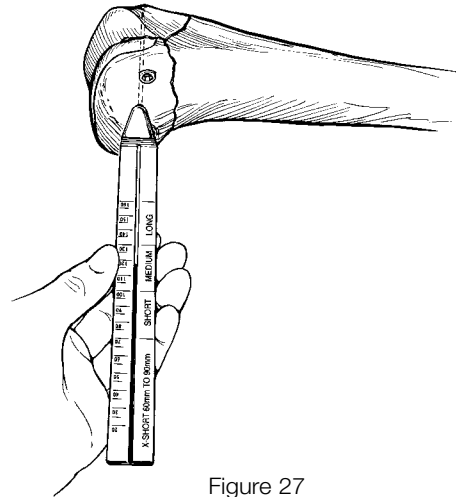


Figure 27

Guide Pin Positioning

Assemble the central pin guide handle to the central pin guide and place against the lateral wall of the femoral condyles. Drive a 3.2 mm threaded guide pin through the guide and extend to, but not through, the medial cortex (Figure 25).

Note: This pin should pass 2 cm from the articular cartilage.

It is important that the 3.2 mm guide pin is positioned at 95 degrees to the shaft and parallel to the joint axis angled about 10 degrees (parallel to the inclination of the patellofemoral joint) anteriolateral to posteromedial (Figures 26a, 26b). Verify the pin position with image intensification. Remove the central pin guide.

Lag Screw Size Selection

Measure the central guide pin depth using the guide pin depth gauge to determine the appropriate lag screw length (Figure 27). Lag screws are provided in 10 mm increments.

When using the depth gauge, the reading will fall within a 10 mm range (i.e., between 70-80 mm). If the depth gauge reading falls in the lower half of the 10 mm range, select a screw size 10 mm shorter than the lowest mark in the range. For example, if the reading is between 70 and 75 mm, use a size 60 mm screw.

Using the shorter screw ensures that the screw will not pass through the medial condyle and that there will be adequate length to compress the fracture. If the depth gauge reading falls in the upper half of the 10 mm range, select a screw the same size as the lowest reading in the range. For example, if the reading is between 75 and 80 mm use a 70 mm screw. This method allows for a minimum of 5 mm of compression for most every screw size.

Note: If the measurement falls between 50 and 55 mm, then the 50 mm screw must be used.

Guide Pin Depth Gauge Reading	Reamer or Tap Setting	Recommended Lag Screw Length	Maximum Compression
50-55 mm	50 mm	50 mm	0 mm
55-60 mm	55 mm	50 mm	5 mm
60-65 mm	60 mm	50 mm	10 mm
65-70 mm	65 mm	60 mm	5 mm
70-75 mm	70 mm	60 mm	10 mm
75-80 mm	75 mm	70 mm	5 mm
80-85 mm	80 mm	70 mm	10 mm
85-90 mm	85 mm	80 mm	5 mm
90-95 mm	90 mm	80 mm	10 mm
95-100 mm	95 mm	90 mm	5 mm

Table 2

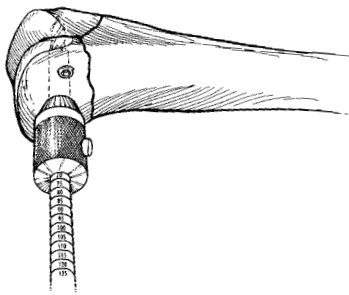


Figure 28

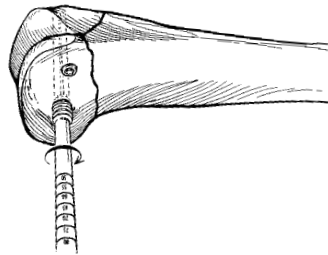


Figure 29

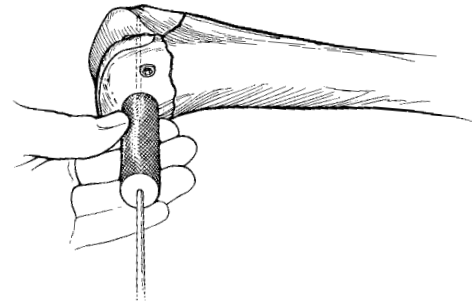


Figure 30

Reaming and Tapping

The short adjustable reamer and calibrated tap can be set in 5 mm increments. If the guide pin depth gauge reads in the lower half of the 10 mm range, set the reamer and tap at the lower reading (i.e., set at 70 mm if the reading is between 70 and 75 mm). If the depth gauge reads in the upper half of the 10 mm range, set the reamer or tap at a mid-range setting (i.e., 75 mm for a reading between 75 and 80 mm). For clarity, Table 2 provides instrument settings and lag screw selection for corresponding depth gauge readings.

Note: Perform reaming and tapping under image intensification to ensure that the far cortex is not compromised.

Note: In osteoporotic bone, set the reamer at its shortest depth because additional reaming is not necessary.

Advance the step reamer over the guide pin and drill the hole (Figure 28).

Assemble the tap to the quick couple T-handle and use it to prepare the femoral condyle for placement of the lag screw (Figure 29).

In the event that the guide pin comes out in either the reaming or tapping step, a guide pin centralizer (same as the central pin guide handle) is provided for replacement of the guide pin (Figure 30).

Captured Hip® Screw System

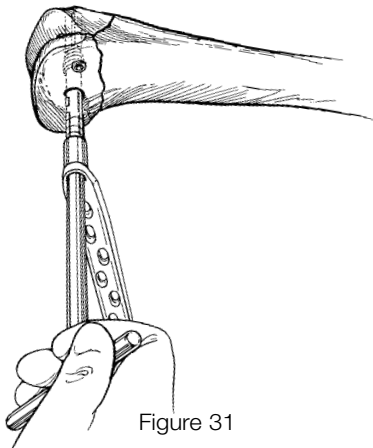


Figure 31

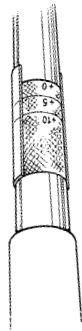


Figure 32

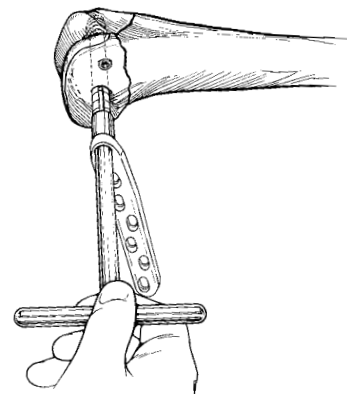


Figure 33



Figure 34

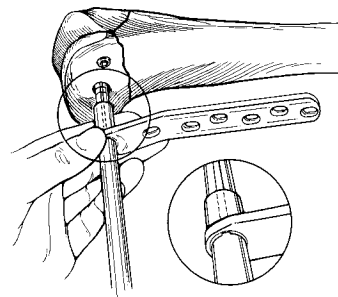


Figure 35

Plate and Lag Screw Insertion

Ensure that the supracondylar plate is long enough to allow for the placement of four screws (eight cortices) above the most proximal extent of the fracture. Slide the chosen supracondylar plate onto the shaft of the lag screwdriver. Begin driving the lag screw using the lag screwdriver (Figure 31).

To assist in determining the insertion of the lag screw, 0, +5 and +10 mm lines are indicated on the lag screwdriver.

CAUTION: Never advance the lag screwdriver past the +10 mm line to ensure proper engagement of the barrel over the screw (Figure 32).

Note: In good quality bone, the lag screw can simply engage the cancellous bone of the femoral condyle. In osteoporotic bone, it is beneficial to engage one thread of the lag screw in the cortical bone of the medial condyle.

Drive the lag screw to the proper depth, making sure that the T-handle of the lag screwdriver is parallel to the femoral shaft and plate. This positioning ensures that the supracondylar plate will align with the femoral shaft (Figure 33).

Note: When the handle is parallel to the plate, this ensures proper alignment of the keys on the screw to the keyways in the barrel.

Verify the position of the lag screw using the image intensifier (Figure 34).

Using the driver shank as a guide, slide the supracondylar plate along the driver and onto the lag screw (Figure 35).

Ensure that the plate lines up with the femoral shaft. A standard plate impactor head has been provided for impaction through the barrel hole. Thread the standard

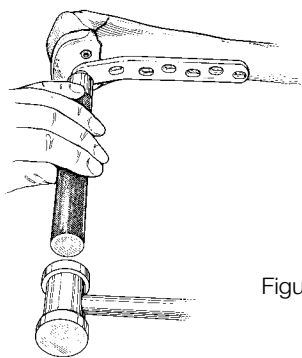


Figure 36

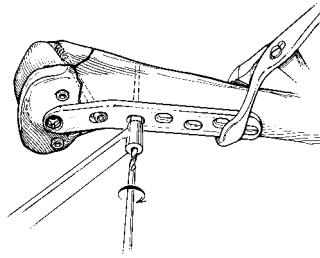


Figure 37

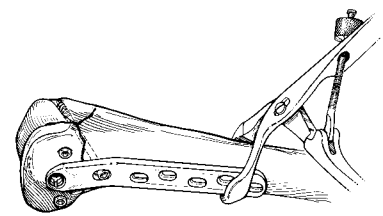


Figure 38

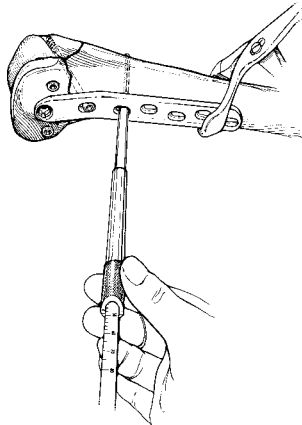


Figure 39

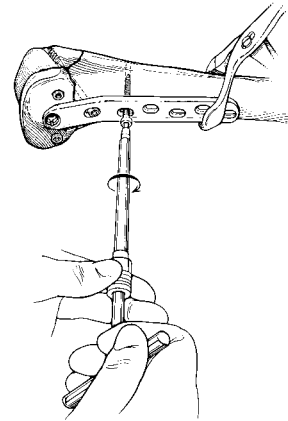


Figure 40

impactor head onto the impactor handle. Prior to impaction, ensure that the lag screw does not extend outside of the lateral surface of the bone. Gently impact the supracondylar plate against the femoral condyle using the assembled impactor (Figure 36).

Screw Placement

Hold the supracondylar plate in place with one or two bone clamps after re-establishing the proper bone length. Perform minimal to no periosteal stripping. If there is shaft comminution and indirect reduction has been used, use four screws in the proximal four slots to fix the plate to the shaft. Screws may also be incorporated for adjunct fixation in the region of comminution where good purchase can be obtained without periosteal stripping. If there is little or no comminution and compression of the shaft is desired, place the distal screws first.

Note: The distal hole in the neck of the plate may be used to place a 6.5 mm solid or cannulated cancellous bone screw if lagging of metaphysical bone to the femur is required (Figure 37).

Note: In hard or dense bone, tap with the solid or cannulated 6.5 mm cancellous tap.

Place the 3.8 mm drill guide into a screw slot (Figure 38).

Drill both cortices using a 3.8 mm drill bit. Measure the proper screw length using the hook depth gauge (Figure 39).

Assemble the power adaptor or quick couple T-handle to the 6.5 mm hex driver shank and drive the 6.5 mm self-tapping screw through the hole, securing the plate to the femoral shaft (Figure 40). Always perform final tightening by hand.

Captured Hip® Screw System

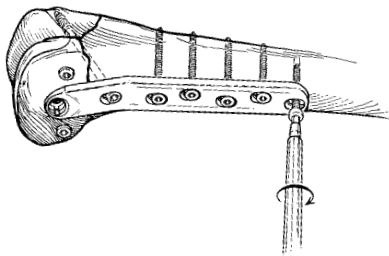


Figure 41

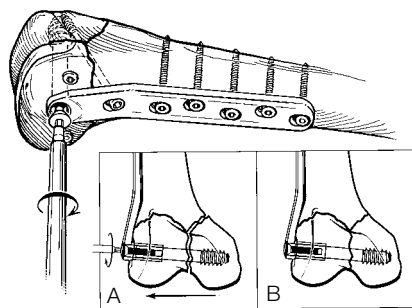


Figure 42

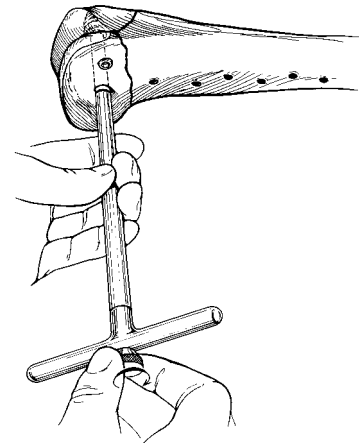


Figure 43

In a similar fashion, use the 4.5 mm solid hex driver shank to place 4.5 mm cortical bone screws in succession in the plate slots to fasten the plate (Figure 41).

Note: In osteoporotic bone or in the metaphyseal portion of the distal femur, 5.0 mm cancellous screws are provided for fixation.

Compressing a Condylar Fracture

Insert the short compression screw into the lag screw and turn it clockwise using the 6.5 mm hex driver shank until the compression screw engages the supracondylar plate (Figure 42). Continue turning clockwise until the condylar fracture has closed the desired amount (insets a and b) as viewed under image intensification.

Closure and Postoperative Instructions

Confirm final positioning of the implant and proper fracture reduction using X-ray or image intensification. If significant medial comminution exists, consider bone grafting medially. Close in a routine fashion.

Early motion of the knee is preferable if fracture repair is stable. Delay weight-bearing until callus formation is identified by X-ray.

Extraction

After performing a routine opening exposure, use the 4.5 mm solid and 6.5 mm hex driver shanks to remove screws fixing the plate to the shaft of the femur. Use the 6.5 mm hex driver to remove the short compression screw. Remove the supracondylar plate. Attach the extraction rod through the lag screwdriver to the lag screw (Figure 43). Remove the lag screw. Close in a routine fashion.

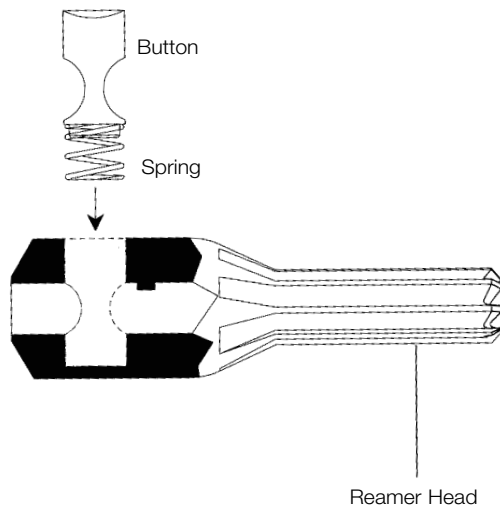


Figure 44a

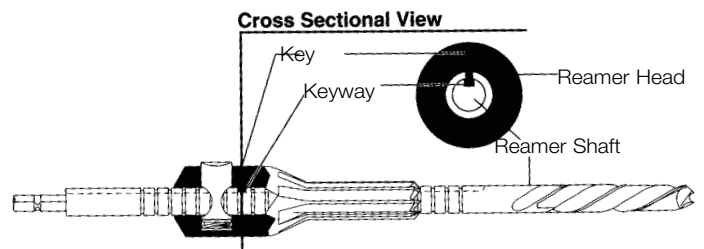


Figure 44b

Reamer Disassembly

Depress the button and slide the reamer head along the shaft away from the drill flutes.

Once the reamer head is off, remove the button for cleaning purposes (Figure 44a).

Do not disassemble the button and spring from one another.

Reamer Assembly

Depress the button and slide the reamer shaft through the hole of the reamer head.

Take care to align the keyway slot of the reamer shaft with the key inside the reamer head (Figure 44b).

Captured Hip® Screw System

Catalog Numbers and Descriptions

Captured Hip Screw with Supracondylar and Trochanteric Plate System

Captured Hip Screw Implants

Side Plate (Cat. Nos. 140xx)



- Available in two – 14-hole configurations (two-hole increments)
- Flexibility allows plate conformity to the femur
- Low profile design
- Oval compression plate screw holes allow optimum positioning of the bone screws (important in the securing of medial fragments)
- Proximal hole allows for use of 6.5 mm screw

Trochanteric Side Plate (Cat. Nos. 14252-4, 6)



- Available in four and six-hole configurations
- Same features as standard side plate
- Added benefit of proximal buttress flange that conforms to the greater trochanter
- Proximal screw holes to stabilize severe comminution of greater trochanter and for reverse oblique fracture patterns

Captured Screw Assembly (Cat. Nos. 14033-x, Cat. Nos. 14007-x)



- Angled barrels available in 135, 140, 145 and 150 degrees
- Captured screws for each angle accommodate lengths of 90 to 160 mm in three assemblies, thus reducing inventory
- Short barrel accommodating 60 to 90 mm length available in the most commonly used 135-degree angle

Supracondylar Plate Implants

95-degree Standard Supracondylar Plate (Cat. Nos. 14552-xx)



- Available in six – 14-hole configurations (two-hole increments)
- Low profile plate
- Distal hole allows for use of 6.5 mm screw

Standard Lag Screw (Cat. Nos. 14553-xx)



- Available in 50 to 90 mm lengths (10 mm increments)
- Unitized insertion with the supracondylar plate

Short Compression Screw (Cat. Nos. 8113-05-003)



- Facilitates up to 10 mm of compression
- Smooth radiused compression screw/plate profile

Self-Tapping Solid Screws

6.5 mm Solid 22 mm Threaded Cancellous Lag Screw (Cat. Nos. 8157-62-xxx)

- Available in 5 mm increments from 40–120 mm lengths



6.5 mm Solid 40 mm Threaded Cancellous Lag Screw (Cat. Nos. 8157-64-xxx)

- Available in 5 mm increments from 60–120 mm lengths



6.5 mm Solid Fully-Threaded Cancellous Bone Screw (Cat. Nos. 8157-61-xxx)

- Available in 5 mm increments from 25–120 mm lengths



5.0 mm Solid Cancellous Fully-Threaded Bone Screw (Cat. Nos. 14224-xx)

- Available in 2 mm increments from 20–60 mm lengths and 5 mm increments from 65–80 mm lengths



4.5 mm Solid Cortical Fully-Threaded Bone Screw (Cat. Nos. 14022-xx)

- Available in 2 mm increments from 26–58 mm lengths
- Double lead thread design for bone



Self-Tapping, Self-Drilling Cannulated Screws

6.5 mm Cannulated 22 mm Thread Cancellous Lag Screw (Cat. Nos. 14196-xx)

- Available in 5 mm increments from 25–120 mm lengths
- Self-drilling and self-tapping
- Reverse radial tapping flutes for ease of removal
- 3.2 mm guide wire



6.5 mm Cannulated 40 mm Thread Cancellous Lag Screw (Cat. Nos. 14197-xx)

- Available in 5 mm increments from 40–120 mm lengths
- Self-drilling and self-tapping
- Reverse radial tapping flutes for ease of removal
- 3.2 mm guide wire



Captured Hip® Screw System

Ordering Information

Captured Screw Assemblies		
Cat. No.	Description	Length mm
14033-0	135°	90
14033-1	135°	100
14033-2	135°	130
14033-3	135°	160
14007-1	140°	100
14007-2	140°	130
14007-3	140°	160
14033-4	145°	100
14033-5	145°	130
14033-6	145°	160
14007-4	150°	100
14007-5	150°	130
14007-6	150°	160
Side Plates		
14027	2 Hole Plate	67
14000	4 Hole Plate	97
14029	6 Hole Plate	128
14030	8 Hole Plate	158
14031	10 Hole Plate	189
14034	12 Hole Plate	220
14032	14 Hole Plate	250
142524	Troch Plate 4 hole	112
142526	Troch Plate 6 hole	114
95° Standard Supracondylar Plates		
14552-6	6 slot	131
14552-8	8 slot	161
14552-10	10 slot	203
14552-12	12 slot	239
14552-14	14 slot	275
Lag Screws		
Cat. No.	Length mm	
14553-50	50	
14553-60	60	
14553-70	70	
14553-80	80	
14553-90	90	
Compression Screw		
Cat. No.	Description	
8113-05-003	Short Compression Screw	
Screws		
Cat. No.	Description	
4.5 mm Solid Cortical Fully-Threaded Bone Screws*		
14022-xx	26 – 58 mm (2 mm increments)	
5.0 mm Solid Cancellous Fully-Threaded Bone Screws*		
14224-xx	20 – 60 mm (2 mm increments)	
14224-xx0	65 – 80 mm (5 mm increments)	
6.5 mm Solid 22 mm Thread Cancellous Lag Screws*		
8157-62-xxx	40 – 110 mm (5 mm increments)	

6.5 mm Solid 40 mm Thread Cancellous Lag Screws*	
8157-64-xxx	60 – 110 mm (5 mm increments)
6.5 mm Solid Cancellous Fully-Threaded Bone Screws*	
8157-61-xxx	25 – 110 mm (5 mm increments)
6.5 mm Cannulated 22 mm Thread Cancellous Lag Screws*	
14196-xx	25 – 120 mm (5 mm increments)
6.5 mm Cannulated 40 mm Thread Cancellous Lag Screws*	
14197-xx	40 – 120 mm (5 mm increments)

Instruments	
Cat. No.	Description
14008	T-wrench Insertor
14011	Extractor Lock
14052	Guide Pin Jig
14142	Guide Pin Depth Gauge
14315	Power Adaptor
14316	T-handle
8242-00-120	Hook Depth Gauge
14540	3.8 mm Drill Guide
14541	4.5 mm Solid Hex Driver Shank
14549	Central Pin Guide - Standard
14566	Extraction Rod
14569	Calibrated Lag Screw Tap
14570	Lag Screw Driver
14577	Central Pin Guide Handle/Repositioner
14578	Impactor Handle
14580	Captured Hip Screw Impactor Head
14581	Standard Plate Impactor Head
14585-1	Adjustable Reamer - Short
14585-3	Adjustable Reamer - Long
14616	6.5 mm Hex Driver Shank

Disposables	
14012-9	3.2 mm x 9 in. Guide Pin
14545	3.8 mm Solid Twist Drill, 7 in.
14584	6.5 mm Solid Cancellous Tap
14627	6.5 mm Cancellous Tap
14629	5.0 mm Cannulated Drill

Modules and Cases	
14530	Solid and Cannulated Screw Module
14532	Captured Hip Screw Module
14533	Standard Supracondylar Plate Module
14534	General Instruments Module
14535	Screw Instruments Module
14602	Sterilization Case (10 in. x 10 in. x 5 in.)
14603	Sterilization Case (10.5 in. x 20 in. x 5 in.)

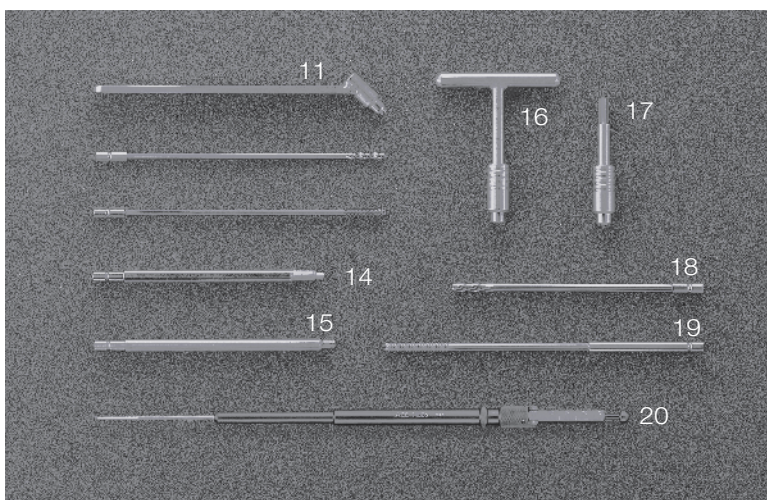
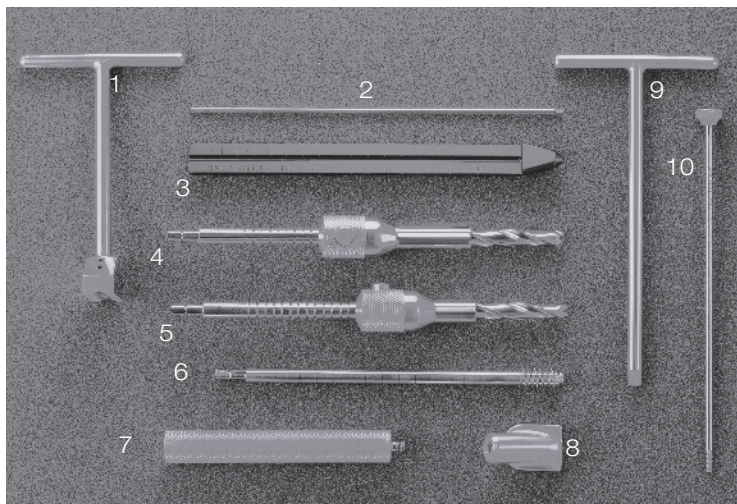
Ancillary Part	
14599	Reamer Button Spring Assembly

*Warning: This device is not approved for screw attachment or fixation to the posterior (pedicles) of the cervical, thoracic or lumbar spine.

General Instruments Module

Cat. No.14534

Cat. No.		Description
1	14052	Guide Pin Jig
2	14012-9	3.2 mm X 9 In. Guide Pin*
3	14142	Guide Pin Depth Gauge
4	14585-3	Adjustable Reamer - Long
5	14585-1	Adjustable Reamer - Short
6	14569	Calibrated Lag Screw Tap
7	14578	Impactor Handle
8	14580	Captured Hip Screw Impactor Head
9	14008	T-Wrench Inserter
10	14011	Extractor Lock



Screw Instruments Module

Cat. No. 14535

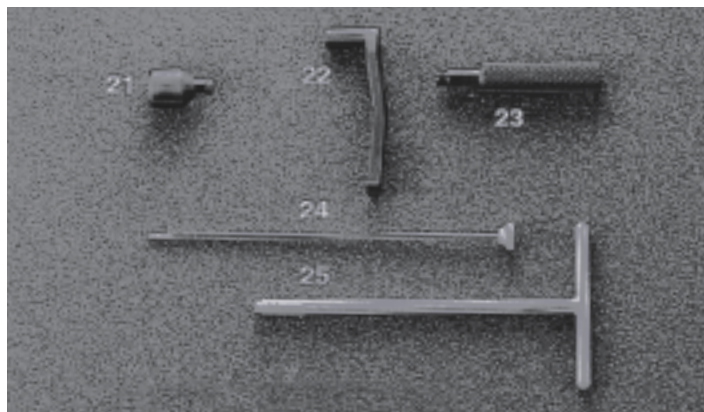
Cat. No.		Description
11	14540	3.8 mm Drill Guide
12	14545	3.8 mm Solid Twist Drill, 7 in.*
13	14584	6.5 mm Solid Cancellous Tap*
14	14541	4.5 mm Solid Hex Driver Shank
15	14616	6.5 mm Hex Driver Shank
16	14316	T-handle
17	14315	Power Adaptor
18	14629	5.0 mm Cannulated Drill*
19	14627	6.5 mm Cancellous Tap*
20	8242-00-120	Hook Depth Gauge

Instruments Contained In Standard Supracondylar Plate Module Cat. No. 14533

Cat. No.		Description
21	14581	Standard Plate Impactor Head
22	14549	Central Pin Guide - Standard
23	14577	Central Pin Guide Handle/Repositioner
24	14566	Extraction Rod
25	14570	Lag Screwdriver

Ancillary Parts

Cat. No.		Description
14599		Reamer Button Spring Assembly (Not Shown)



* Disposables

References

1. DVA-107504-DVER.
2. Massie, William K. "Fractures of the Hip." Journal of Bone and Joint Surgery, April 1964: 669.

Important: This Essential Product Information does not include all of the information necessary for selection and use of a device. Please see full labeling for all necessary information.

The use of metallic surgical appliances provides the orthopaedic surgeon a means of bone fixation and helps generally in the management of fractures and reconstructive surgeries. These implants are intended as a guide to normal healing, and are NOT intended to replace normal body structure or bear the weight of the body in the presence of incomplete bone healing. Delayed unions or nonunions in the presence of load bearing or weight bearing might eventually cause the implant to break due to metal fatigue. All metal surgical implants are subjected to repeated stress in use, which can result in metal fatigue.

Indications: The Captured Hip Screw is for the internal fixation of hip fractures. The Supracondylar plate systems is intended only for fractures and osteotomies of the proximal and distal femur. The Trochanteric Side Plate is used in conjunction with the Captured Hip Screw and is designed for use in osteotomies, arthrodesis and hip fractures; including intertrochanteric, intracapsular and subtrochanteric

Contraindications: Screws, plates, nails, compression hip screws, pins and wires are contraindicated in: active infection; conditions which tend to retard healing such as blood supply limitations, previous infections; insufficient quantity or quality of bone to permit stabilization of the fracture complex; conditions that restrict the patient's ability or willingness to follow postoperative instructions during the healing process; foreign body sensitivity; and cases where the implant(s) would cross open epiphyseal plates in skeletally immature patients.

Additional Contraindication for Orthopaedic Screws and Plates only: Cases with malignant primary or metastatic tumors which preclude adequate bone support or screw fixations, unless supplemental fixation or stabilization methods are utilized.

Additional Contraindications for Compression Hip Screws only: Inadequate implant support due to the lack of medial buttress.

Additional Contraindications for Retrograde Femoral Nailing only: A history of septic arthritis of the knee; knee extension contracture with inability to attain at least 45° of flexion.

Warnings and Precautions: In using partial weight bearing or nonweight bearing appliances (orthopaedic devices other than prostheses), a surgeon should be aware that no partial weight bearing or nonweight bearing device can be expected to withstand the unsupported stresses of full weight bearing.

Adverse Events: The following are possible adverse events after fixation with orthopaedic screws, plates, nails, compression hip screws, pins and wires: loosening, bending, cracking or fracture of the components or loss of fixation in bone attributable to nonunion, osteoporosis, markedly unstable comminuted fractures; loss of anatomic position with nonunion or malunion with rotation or angulation; infection, both deep and superficial; and allergies and other reactions to the device material.

Additional Adverse Events for Compression Hip Screw only: Screw cutout of the femoral head (usually associated with osteoporotic bone).

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