Surgical Technique

smith&nephew

COMPASS® ELBOW

Universal Hinge

Compass◇ Elbow Universal Hinge

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Nota Bene: The technique description herein is made available to the healthcare professional to illustrate the author's suggested treatment for the uncomplicated procedures. In the final analysis, the preferred treatment is that which addresses the needs of the specific patient.

Introduction

This technique defines the indication for application and use of the Compass Universal Hinge on the elbow.

Flexion contractures in the elbow are quite common after trauma to the joint and represent one of the major challenges in the care of these injuries. These disabling contractures may also occur after burns or the development of arthritis. Even minor contractures (30° to 40°) can significantly reduce function of the upper extremity.

However, regaining a functional range of motion after open release or distraction arthroplasty may be precluded by pain, swelling, and adaptive shortening of the muscle tendon unit on both sides of the joint. Until now, there was no effective method of increasing the motion of the elbow following trauma or contracture release. Neither early active motion, comprehensive therapy, dynamic splints, nor CPM ensure success.

Early active motion, while reducing the severity of contracture, requires the patient's own strength and constant effort. Passive stretching by a therapist risks the formation of heterotopic bone and myositis ossificans. Dynamic splints are useful, but require pressure on the soft tissues of the arm, reducing patient compliance. Finally, CPM devices provide early motion gains, but do not allow the joint to reach the extremities of motion which are the areas of greatest need.

Introduction

The Compass universal hinge, however, addresses the challenge of maintaining or even enhancing the range of position. It allows both passive and active movement of the elbow through a kinematically normal range of motion while stretching the soft tissue capsule at the extremes of flexion and extension. The result is a significant reduction in joint contracture without the drawbacks inherent in the previously discussed methods. In addition, patients with instability or massive injury following trauma may be mobilized early after repair and placement of internal fixation.

The Indications

The indications for use of the Compass Hinge include the following:

1. Acute trauma with instability.

2. “Cold” or delayed trauma to the elbow with subsequent instability.

3. Stiff elbow.

4. The arthritic elbow with posttraumatic arthritis with and without cartilage injury.

Design Rationale

The elbow (ulno-humeral articulation) is one of two joints which approximates a hinge (ginglymus). Only slight movement of the instant center of rotation occurs at the elbow during flexion and extension. Care must be taken, therefore, to locate the rotational axis of the elbow for proper treatment.

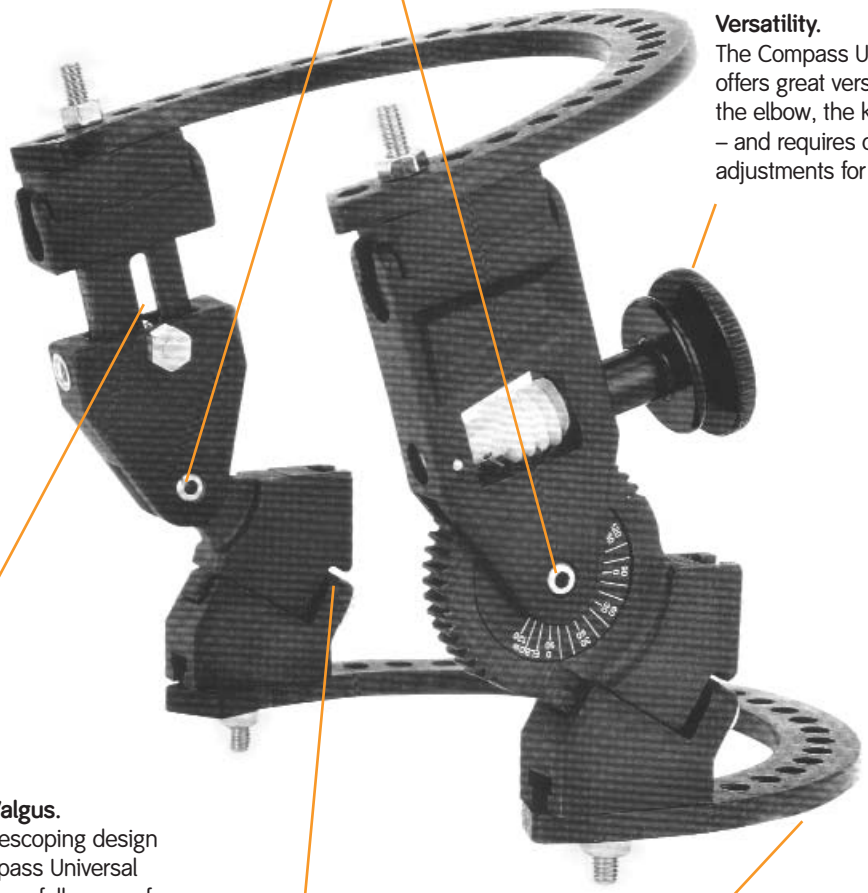
The Compass Universal Hinge uses the anatomic axis of the elbow as the mechanical axis of the device. The mechanical axes of the device's bilateral hinges are aligned coincident with the anatomic axis of the joint. The alignment can be verified throughout the course of application and treatment.

Once engaged, the Compass Hinge's precision worm gear permits passive mobilization of the elbow joint. This movement gently stretches the soft tissue capsule and muscle tendon during flexion and extension. Stress, relaxation and elongation increase the range of motion and range of position. Gentle, intermittent, passive displacement allows improvement or maintenance of a maximal range of motion (ROM) during hinge wear. The worm gear mechanism may also be disengaged to permit the patient to exercise active ROM.

The Ilizarov method emphasizes incremental passive displacement to allow soft tissue accommodation during limb lengthening and bone regeneration. With the Compass Universal Hinge, those same principles establish and maintain a maximal range of motion after contracture release, distraction arthroplasty, or trauma.

Design Features

Matching Axes of Rotation. The Compass Universal Hinge aligns its mechanical axis with the anatomic axis of the joint – elbow, knee, or angle. This allows the hinge to work with the joint, gently moving it through a biomechanically normal range of motion. A choice of passive or active modes ensures the greatest therapeutic value for each individual patient. As with the original design, radiolucent construction allows accurate alignment of the axes during hinge application. Once the hinge is placed, the axis reference pin is removed to reduce the likelihood of infection of the joint capsule.



Versatility.
The Compass Universal Hinge offers great versatility for use on the elbow, the knee, or the ankle – and requires only a few simple adjustments for any application.

Precision Worm Gear.
The Compass Universal Hinge incorporates a precision worm gear that provides controlled displacement throughout the extremes of flexion and extension.

Range of Valgus.
The self-telescoping design of the Compass Universal Hinge allows a full range of 10° varus to 10° of valgus, allowing quick, easy and anatomically appropriate application to the knee, ankle, or elbow.

Displacement/Distraction.
Distraction screws allow the surgeon to distract the joint as needed.

Radiolucent Arcs.
The Compass Universal Hinge is fully compatible with the Ilizarov system to provide a wide variety of fixation options.

Lower Profile.
The Compass Universal Hinge is lighter in weight and lower in profile than the original design. This improves patient comfort with the device and patient compliance throughout the healing process.

Frame Assembly

The frame should be prebuilt to confirm that proper ring size has been selected. It is important that the geared component is always medial with the knob facing posterior. Before tightening the rings to the hinge components, place an axis pin through the center of the hinges (Figure 1). Then tighten the rings to the connecting blocks with a 10 mm wrench (Figure 2). Make sure that countertorque is applied to the hinge components to ensure that they maintain alignment on the axis pin.

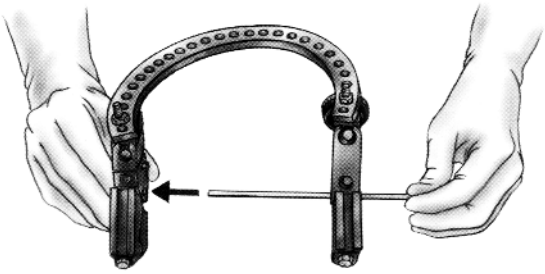


Figure 1

When the frame has been assembled and appropriately adjusted, it is helpful to test the alignment of the frame relative to the axis pin. A properly aligned frame should slide along the axis pin (M/L and L/M) without significant impingement (Figure 3). If the ring is too large or too small, adjustments can be made at this point to switch to either a larger or smaller ring bringing the hinge components either closer or farther away from the joint. Make sure that you allow for swelling in the postoperative period, allowing at least 2 cm of clearance from the skin to the hinge block at the time of surgery and at least two finger breadths posteriorly at the level of the elbow with the posterior portion of the ring. Make sure that the proximal ring is perpendicular to the humerus from the later view.

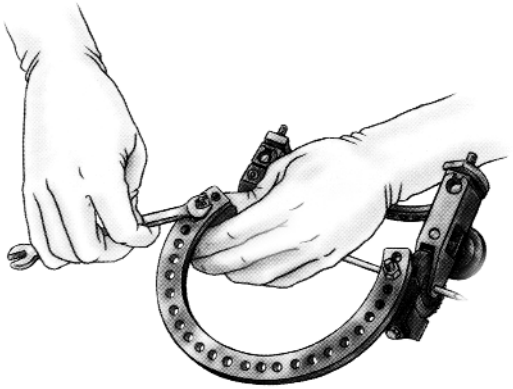


Figure 2

The valgus angle of the hinge can be adjusted by loosening the set screw on the lateral component and rotating the 10 mm Hex (Figure 4). Retighten the set screw when ring is perpendicular to the shaft of the bone.

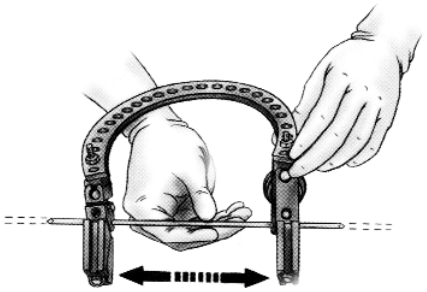


Figure 3

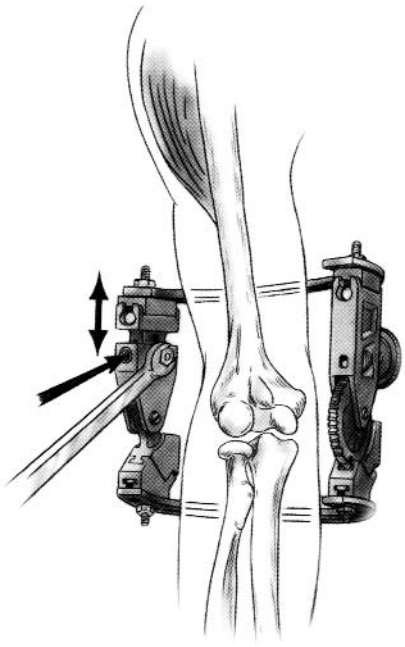


Figure 4

Preoperative Planning

Contracture Release

Before embarking on the surgical release, care should be taken to ensure that the injured joint is scrutinized for the existences of heterotopic bone. Loss of pronation and supination must also be considered, as well as the loss of flexion and extension. Lateral polytomography and/or CAT scanning should be performed to look for bone bridging the defect.

Once the determination is made that the patient is suitable for contracture release and the use of the Compass Hinge, a long discussion with the patient concerning length of treatment should be undertaken. The patient needs to understand that he/she will wear this device for at least six to eight weeks. There are frequently problems associated with the pins and proper care of these pins and earnest efforts by the patient are required to make this procedure a success.

Patient Positioning

For release of contracture and removal of heterotopic bone, the patient should be placed in the supine position with the arm on a radiolucent hand table. It is important to prep the patient all the way to the shoulder and axilla and a sterile tourniquet should be used. It is very important to position the patient so that the proximal portion of the arm/humerus is as lateral as possible. The shoulder should be at the very edge of the operating table. A donut may be necessary to support the head. If this is not done, it is difficult to visualize the proximal portion of the pins and their location in the humerus.

If the patient first requires a more extensive exposure of the distal humerus for fracture or reconstructive work, it may be useful to begin the operation with the arm over the chest when using one or more standard posterior approaches to the elbow, either olecranon ostectomy or a triceps sparing exposure (Bryan/Morrey). Once the fracture work is completed, the patient can then be made more supine and the hand table inserted under the drapes and the patient placed in the position as depicted in Figure 5, for the application of the Compass Hinge.

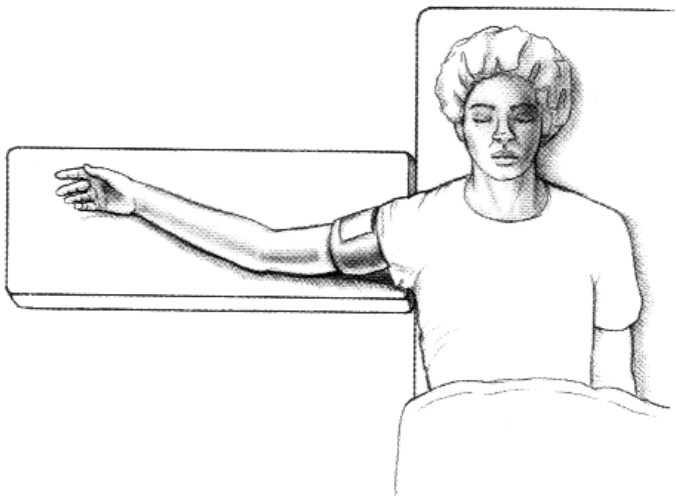


Figure 5

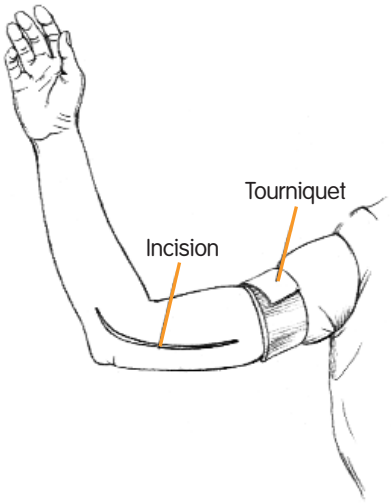


Figure 6

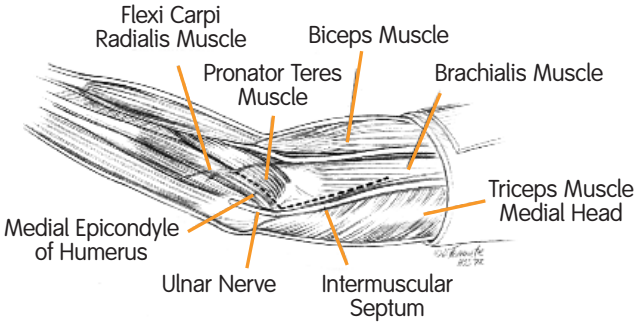


Figure 7

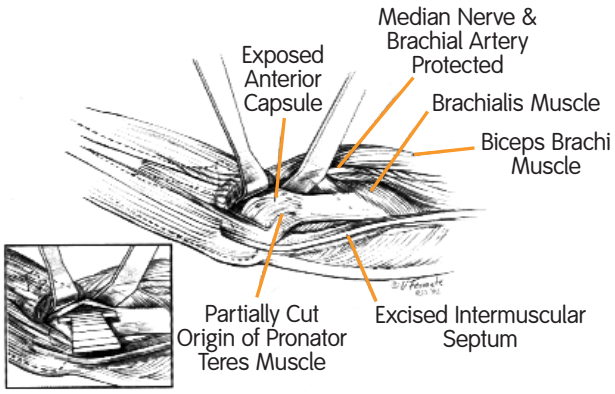


Figure 8

Anterior Exposure of the Joint

The Modified "Over the Top" Exposure of the Elbow

Incision – The skin incision may be predetermined from previous surgery. The incision can vary from posterior to medial. For nearly all applications, especially those patients who have contractures from trauma about the elbow and who lack significant flexion, it is important to transpose the ulnar nerve (Figure 6). The skin incision must be extensive enough to allow exposure of the ulnar nerve along its entire course, as well as exposure of the elbow and distal humerus. The most proximal portion of the incision allows direct visualization of the distal-middle humerus for placement of the medial pin.

Using the medial incision, the ulnar nerve can be mobilized and will allow exposure of both the anterior and posterior elbow joint (Figure 7). After the ulnar nerve is mobilized and the intermuscular septum excised, the anterior distal humerus and capsule are exposed by elevating the most proximal origin of the flexor muscle mass (the flexor carpi ulnaris [FCU]) is left attached to the medial epicondyle. Superior to the origin of the capsule, the subperiosteal dissection is carried out to the distal humerus and a Bennett retractor or a blunt Hohmann can be inserted over the anterior surface of the bone.

With the flexor pronator muscle mass elevated as depicted in Figure 7, the anterior muscle of the brachialis and biceps can be separated from the anterior capsule, thereby fully exposing the elbow joint (Figure 8 Inset). Heterotopic bone encountered at this time can also be excised. The principle danger in this exposure is excessive traction on the median nerve and brachial artery which are bordering the lateral aspect of the muscular incision (Figure 8).

Surgical Technique

There is usually a sufficient amount of brachialis muscle to protect the median nerve from direct contact with the anterior retractors. The most distal extent of the muscle split, at the flexor pronator origin, should not be lengthened without identification of the branches of the median nerve to the Pronator Teres. Once the capsule is exposed, it can be excised from proximal to distal (Figure 9). The most superior portion of the elbow joint can be visualized at this point and excision carried out from medial to lateral. Flexion of the joint itself relaxes tension to the anterior structures and often affords a better view. It is sometimes necessary to use a headlight to see all the way across as the capsular excision is performed. Each case is different and at this point the surgeon, using the medial exposure, must decide whether a full anterior release has been accomplished. If there is extensive heterotopic bone or concern over further scar and contracture at the lateral side, it may be necessary to perform a lateral exposure through a supplementary incision along the supracondylar ridge of the distal humerus. This need only be as extensive as necessary to complete the capsular incision and removal of heterotopic bone.

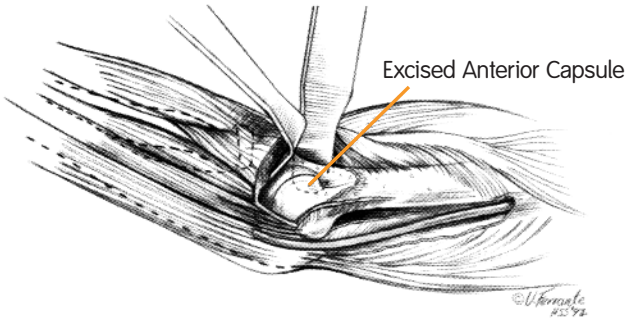


Figure 9

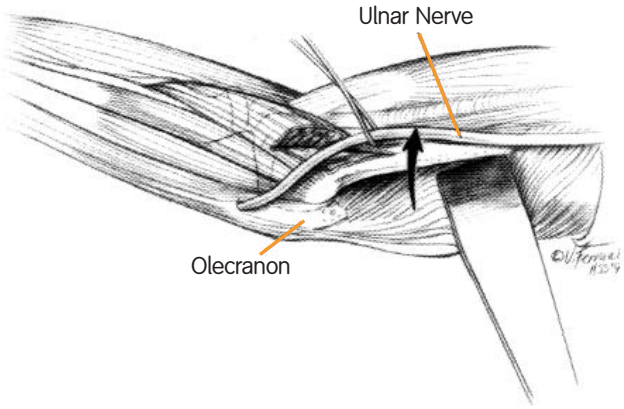


Figure 10

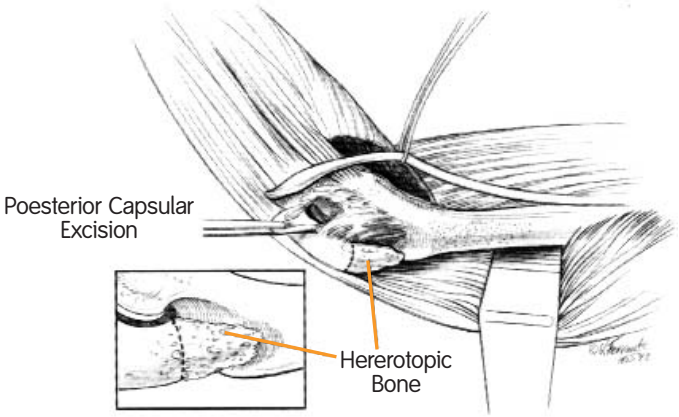


Figure 9

Posterior Exposure of the Joint

Once the anterior release is completed, there is usually little gain in extension of flexion because of contracture and accumulated soft tissue in the olecranon fossa posteriorly. Often heterotopic bone posterior to the olecranon also limits motion. The ulnar nerve must now be mobilized and transposed anteriorly. A vessel loop is usually used to accomplish this; however, it is somewhat dangerous to apply a hemostat or clamp to the loop for fear that inadvertent, sudden retraction could injure the nerve. With the nerve held anteriorly, the posterior exposure can then be performed (Figure 10). Similar to the anterior approach, a subperiosteal dissection and retraction of the triceps at the distal humerus is first performed with insertion of a Hohmannn retractor posteriorly separating the distal humerus from the triceps. In cases of posttraumatic adherence and burns, there is often a great deal of adherence all along the triceps to the exposure distally. Once the retractor is in place, the capsule of the posterior elbow joint can be exposed and excised (Figure 11). The entire *posterior* portion of the collateral ligament can be removed between the humerus and ulna. The anterior portion of the medial collateral ligament is protected by the overlying origin of the flexor carpi ulnaris muscle mass that has not been elevated. Once the capsule is exposed and excised posteriorly, a complete excision of the heterotopic bone and impinging

portion of the olecranon must be achieved (Figure 12). It is sometimes difficult to see all the way over to the lateral aspect of the olecranon for an adequate excision. Again, a supplementary lateral incision is occasionally necessary. Once the entire capsular release has been achieved both posteriorly and anteriorly, the elbow usually exhibits improved mobility. The anterior and posterior structures can still be quite tense or tight. Excessive or forceful manipulation is ill-advised. However, gentle, sustained pressure can be applied and manipulation of the elbow can be performed to maximize flexion and extension.

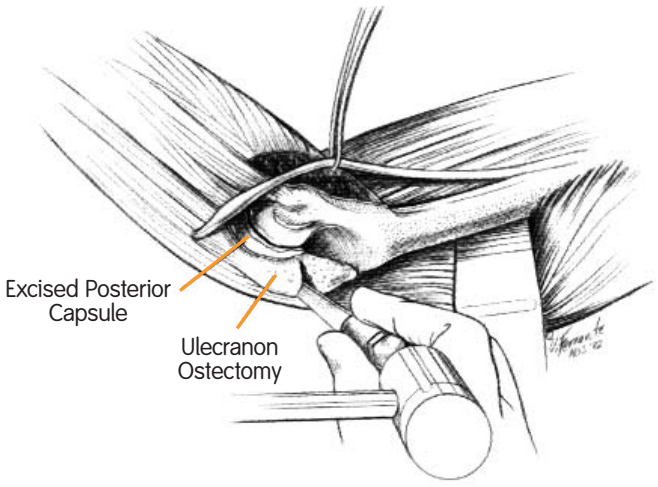


Figure 12

Closure – Before closing the entire wound, the ulnar nerve should be transposed and held with a fascial sling (Figure 13). The fascial sling should be constructed in a way that does not constrict the nerve and, during flexion and extension of the elbow, does not allow the nerve to subluxate nor become entrapped. It is sometimes necessary to make a small groove in the fascia of the flexor carpi ulnaris so that the nerve is not compressed.

This is also the time that the first medial pin can be placed with direct visualization. It is usually best placed posterior to the anteriorly transposed ulnar nerve; however, it sometimes can be placed anterior to the nerve, depending on the extent of release. The level of the pin placement is determined by placing the Compass Hinge first over the elbow and noting where it lies. Most of the wound can be closed leaving only the exposure of the distal humerus.

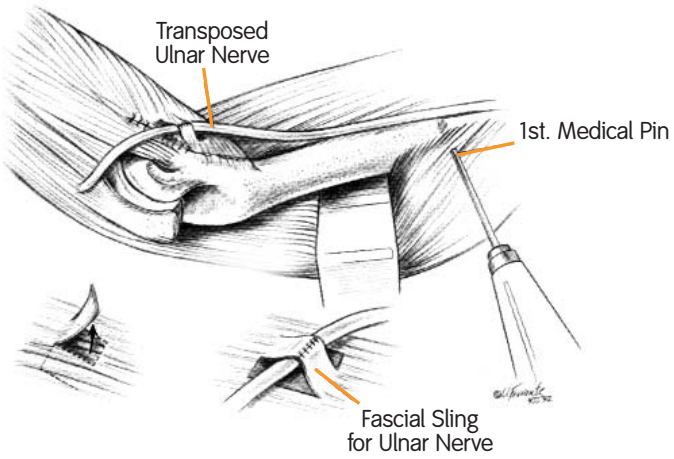
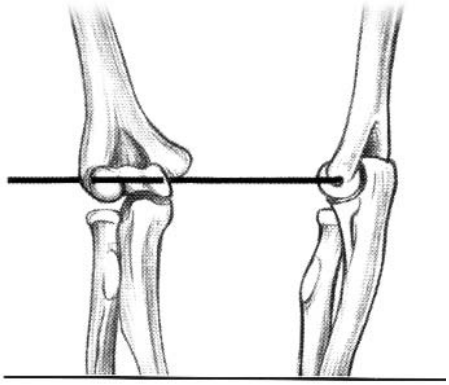


Figure 13



Axis of Rotation

Figure 14

Figure 15A

Figure 15B

Axis Pin Placement

There are two methods that can be used for axis pin placement. The temporary axis pin aligns the hinge to the axis of rotation. Proper placement is crucial. Remember that the center axis pin is removed from the distal humerus at the end of the case.

Method 1 (Single pin technique)

Where you can easily visualize the axis of the distal humerus, the axis pin may be placed under direct vision. This may be the case with an extensive contracture release or gross instability. In these cases, it is not uncommon to have the entire distal humerus exposed.

In this setting, simply identify the starting point; usually this is easier on the lateral side. Imagine that the distal humerus is a spool sitting on the end of a column. The goal is to place the pin perfectly in the center of rotation of that spool. The axis is distal to both the medial and lateral epicondyles (Figure 14).

Take the 3.5 mm axis pin through either the medial or lateral side of the exposed joint, place the pin centrally and begin drilling to start the hole in the alignment that is as close to the axis as possible. Confirm the alignment either by C-arm in the A/P plane or by direct visualization at this time.

The alignment of the axis is crucial. It is important to take the time necessary to achieve perfect placement of this pin for alignment of the Compass Hinge at the elbow. Both an A/P and lateral should be viewed to ensure adequate placement (Figures 15A and 15B).

Method 2 (Two pin technique)

More commonly, the distal humerus is visualized incompletely, but exposed on both the medial and lateral sides. In this case the surgeon must have a competent assistant to help with axis pin placement.

1. Preassemble the frame using the proper size rings. Make certain that the frame can rotate on its hinges. The gear portion is usually located on the medial side.

2. Both surgeons identify the center point on the distal humerus, medial and lateral, the axis of rotation.

3. The hinge is now brought into position and held by hand.

4. Starting with the medial side, the surgeon pushes the 3.5 mm axis pin through the frame, by hand, into the center of rotation as viewed from the medial side. This point is located just distal and anterior to the medial epicondyle (Figure 16). This medial pin is held at this point during the placement of the axis pin from the later side.

5. From the lateral side, the second surgeon carefully pushes a second 3.5 mm pin through the axis hole to the center of rotation, as viewed from the lateral position (Figure 17).

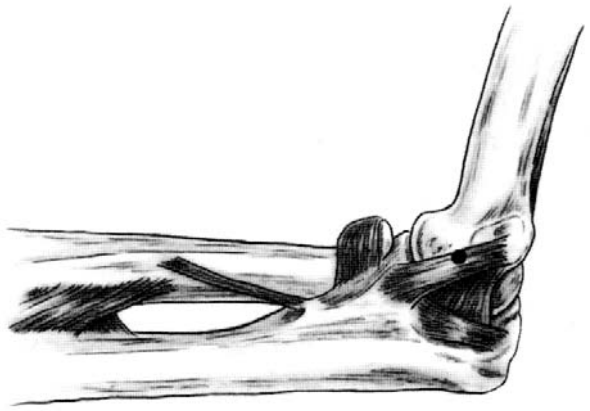


Figure 16

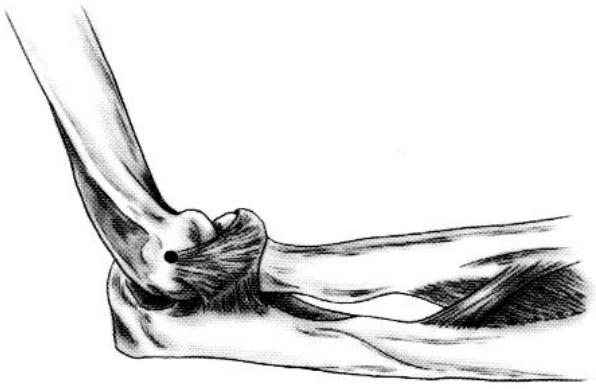


Figure 17

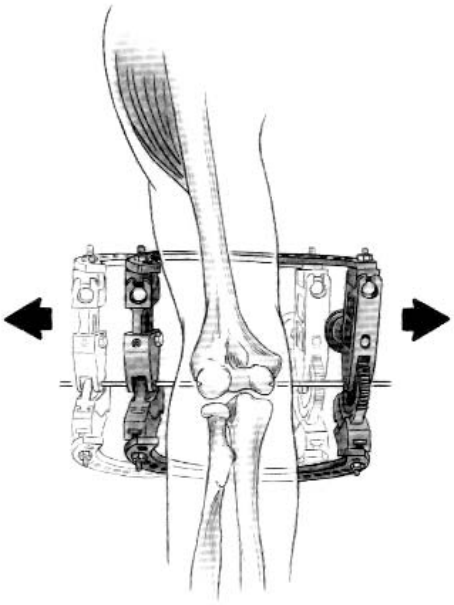


Figure 18

6. The two axis pins must now be adjusted into alignment. Neither pin should be moved from their respective point of entry, as this reflects the axis of rotation, but rather the angle of entry adjusted until the frame itself can easily be slid medial to lateral, back and forth, assuring uniaxial alignment (Figure 18).

7. Once the two pins are coincident, entering at their respective centers of rotation, the lateral pin is driven in approximately 2 cm by power. Again, a check should be made that driving the lateral pin in did not cause the medial pin, held by hand, to shift. The frame should still be easy to slide from medial to lateral, back and forth, before driving in the pin from the medial side (Figure 18).

8. The medial pin is then drilled in, approximately 2 cm under power.

9. A check is made that the frame still can slide freely from medial to lateral.

10. An A/P fluoroscopic view is checked. A lateral may also be checked if desired, however, with experience, this becomes unnecessary since you have been able to visualize both sides of the axis at the time of pin placement.

Surgical Technique

Half-Pin Placement

Rancho Technique for Placement of Half-Pins

1. Determine the desired position of the pin location and angle.

2. Build a cube assembly that allows the particular pin placement. This may be a cube attached directly to a ring. It may be hinged for proximal-distal angulation. The hinged construct is built by attaching a cube to a hinge or post with a bolt. A star washer is used between the cube and post to resist rotation of the cube and possibly loosening of the bolt. An 8 mm bolt should be used, especially for the one hole cube, so that this bolt does not interfere with the large hole in the cube through which the guide sleeve and pin pass.

3. The drill guide is passed through the large hole. It should touch the skin and be in the location and direction desired for the pin.

4. Lift the guide so that an incision can be made.

5. Make an incision and separate the soft tissues and periosteum so that the drill guide rests on bone. The drill guide has a concave tip that reduces slipping.

6. Lightly lock the drill guide in place with a set screw or a bolt.

7. Using the appropriate size of drill and accepted techniques for reducing heat transfer to the bone, drill carefully through bone cortices. Bone thickness can be determined by reading the number of millimeters indicated on the drill shank at the top of the guide.

8. Thickness from cortex to cortex can also be determined by hooking the tip of the depth gauge on the outside of the far cortex and reading the number of millimeters at the top of the guide.

9. Choose the appropriate thread length designed by measurement and place the pin through the guide using the driver-extractor. Manual placement is recommended. The Smith & Nephew half-pins are self-tapping.

10. Once the pin is firm in both cortices (X-ray verification is helpful), remove the drill guide.

11. Slide the proper size of centering sleeve over the pin. Align the bold line on the head to point to the threaded hole to be used to lock the pin. This allows the bolt or set screw to impinge the pin directly ensuring a more secured lock.

12. Ensure all connections are tightened securely.

13. After each pin placement, check alignment of elbow and hinge axis.

4 mm pins use a 2.7 mm drill
5 mm pins use a 3.8 mm drill

Humeral Pin Placement

Two half pins are placed, one medial and the other lateral. The principle is to secure the humerus in two places, without impaling any of the major muscle-tendon units or jeopardizing any neurovascular structures.

1. The medial pin is usually placed first through a two-hole Rancho cube on the undersurface of the upper ring (Figure 19A).

2. The medial pin will be close to the ulnar nerve and should run along the medial intermuscular septum.

3. As this pin is drilled, care should be taken to ensure that the upper 5/8 ring is not flexed or extended, but perpendicular to the humerus (Figures 19B and 19C).

4. Both cortices should be engaged.

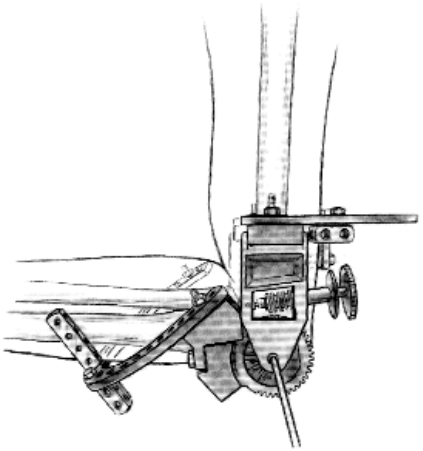


Figure 19A

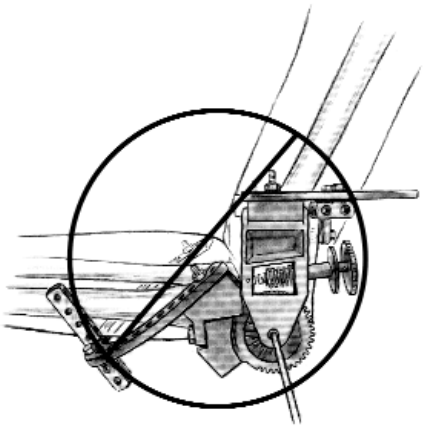


Figure 19B

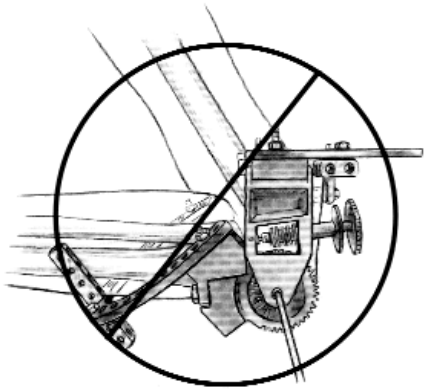


Figure 19C

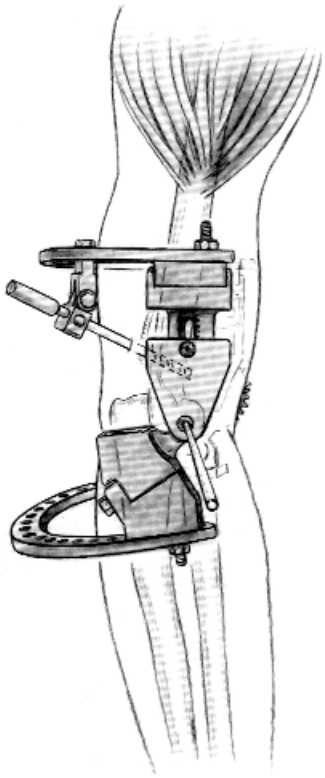


Figure 20

The lateral pin is usually placed using a two-hole post and a single-hole Rancho cube.

1. The lateral flare of the humerus is used for placement.

2. The drill guide rests on the lateral supracondylar ridge, directed anterior and distally. The radial nerve, at this level, is posterior to the pin.

It is helpful to envision and place the posterolateral humeral pin just anterior to the triceps pin but directed from posterolateral to anteromedial. The radial nerve is now anterior to this pin. A Rancho cube below the humeral 5/8 ring is used to fix this pin (Figure 20).

At this time, assure that the alignment of the axis is acceptable. Modifications of position from anterior to posterior are possible using the sliding 5/8 ring attachment assemblies.

Placement of Ulnar Fixation

It is important at this point to assure that the distraction component is well-seated. Again using the Rancho System, two or three 4 mm pins are used in the ulna. The more proximal pin provides better control and can be placed up and through the coronoid. Spacing the pins along the subcutaneous border of the ulna allows excellent rotational control. If the elbow is grossly unstable, it is quite important to reduce the elbow before placing the ulnar pins. It is often helpful to place the elbow in approximately 90° of flexion when applying the ulnar fixation. If a distraction arthroplasty is performed and the elbow is grossly unstable, it is possible to have translated the ulna on the humerus without knowing this. It is therefore helpful, if there is any concern about this, to view the joint under the C-arm in the A/P plane before proceeding with ulnar fixation.

Once the joint is reduced and held in position, the first proximal ulnar pin can be placed using a two-hole post (Figure 21). This is tightened into place on the ring perpendicular to the ulna. A second pin can be placed as well (Figure 22). Again, because of the size and the trefoil shape of the ulna, it is sometimes frustrating when placing these pins and great patience may be necessary to predrill and achieve bicortical fixation of the 4 mm pins. Once the first two pins are in place, ranging through flexion and extension and assuring reduction of the joint is important. If there is a tendency for the elbow to subluxate, then alignment has not been achieved and the bolts must be loosened and reduction achieved.

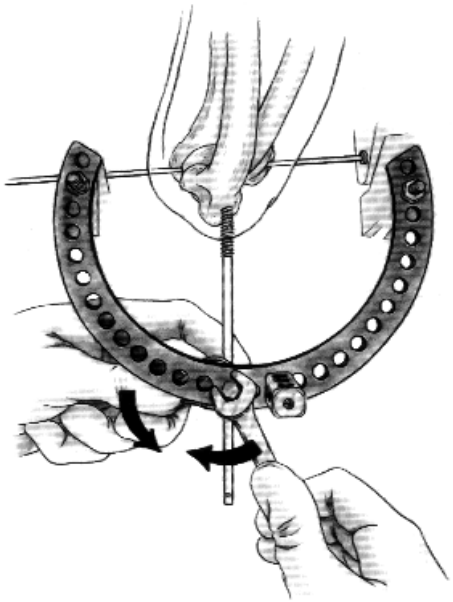


Figure 21

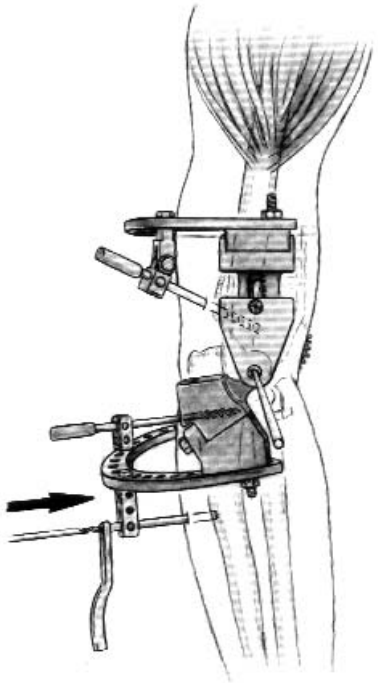


Figure 22

In summary, the assembly is as follows:

1. The axis pin is placed across the distal humerus using a 3.5 mm pin.

2. The hinge – the medial gear block and the lateral hinge block are slid onto the axis pin and using the ring of appropriate size, the hinge blocks are connected and affixed firmly using the hinge block connectors through the bolts. If there is valgus alignment, it needs to be adjusted. Loosen set screw on lateral component and rotate 10 mm Hex until ring is in proper alignment. Tighten set screw.

3. The alignment of the hinge relative to tilt axis pin is confirmed by sliding the frame along the pin. The proximal medial and the proximal lateral half pin is placed using the 3.8 mm drill and 5 mm half pin (in most adults).

   The second pin is placed and then the optional third pin is placed on the lateral side.

4. Before the axis pin is removed, confirm that the hinge rotates appropriately.

5. The ulnar assembly, or the fixation of the ulna is then performed. Ensure that the joint tracks appropriately and that the distractor blocks are flush at this zero position.

6. Next, the ulna is placed in the reduced position at approximately 90° and the first 4 or 5 mm pins is placed proximally followed by a second and/or third pin if needed. These are extended down distally and kept on the subcutaneous border of the ulna.

Again, the axis pin is kept in place if possible, taken through a range of motion to determine that the hinge is functioning well actively and passively. And finally, the axis pin is removed. All pin lengths should be checked by C-arm to ensure proper length and alignment, and finally, cut off at the appropriate length. Before leaving the operating room, confirm that all connections are tightened including the half pins to the frame.

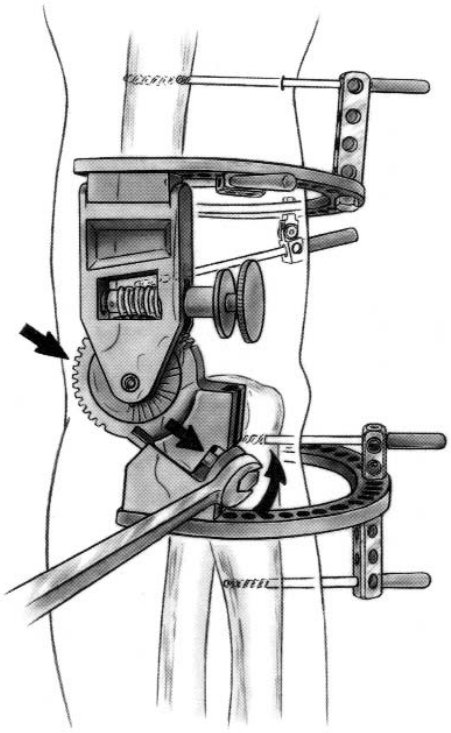


Figure 23

Application of Distraction

Once the joint has been reduced and all pins applied, distraction can then be applied to the system through the distraction mechanism. Distraction is achieved by turning the bolts located on the ulnar ring fixation blocks (Figure 23). Both sides of the hinge should be distracted an equal amount. Use of distraction should be done at the discretion of the surgeon.

Again it is helpful to check the entire range of motion of the elbow. It is often impossible to achieve full extension or full flexion immediately on the table after this release because of static and resting length contracture of both the triceps and biceps and brachialis muscle masses. It is nonetheless helpful to achieve as much as possible.

Immediate Postoperative Dressings

A light dressing is applied around the Compass Hinge in the wounds with sponges and clips over the pins. The axis pin can be removed at any point once the humeral fixation is achieved. If the patient's principle lack of position has been extension, then extension to the point of tightness is applied and the patient goes to the recovery room in this position. It is important to ensure that excessive extension is not applied. Brachial block anesthesia is helpful in creating a painless extremity, but does preclude examination for any nerve function. Hemovac drains are used and left in place for several days to reduce the amount of potential hematoma formation. Ice packs around the elbow are also used to reduce swelling and inflammation.

Postoperative Mobilization

The first few days are spent gradually improving extension or flexion depending upon the patient's needs. CPM is not used, nor has it been found to be helpful in this situation. Rather a slow, controlled passive stretch of the entire elbow is used to gradually improve and overcome the resting length of the biceps brachialis and triceps. Once the swelling and immediate postoperative edema is resolved, the patient beings cycling his/her motion from flexion to extension over a six- to eight-hour period. For six to eight hours, the patient works on achieving greater and greater extension, either alone or under the supervision of the therapist. With the clutch engaged, gradual extension is applied increasingly in accordance with the patient's tolerance. They are usually left in extension overnight.

The following day, work is done to achieve as much flexion as possible, again on a gradual basis over a period of hours with change in position applied, as tolerated, as frequently as every 15-30 minutes. Again, rapid changes in position are not well tolerated in the early postoperative period.

Widening the range of position is the goal over the first week and analgesia is important. If an indwelling brachial block is possible, this is often quite helpful. If not, patient controlled anesthesia with intravenous narcotics, is often the best method. Nonetheless, it should be appreciated that this is not comfortable and adequate analgesia must be given to achieve the desired result. Indomethecin therapy is also initiated immediately to reduce the frequency and extent of heterotopic ossification that is potential in all of these cases.

The patient's hand and wrist are often somewhat unsupported so the use of an off-the-shelf wrist splint is sometimes helpful. Once the swelling and soreness have begun to resolve, the patient is comfortable with the Compass Hinge, and the family is taught the method of gradual stretching and use of the Compass Hinge, the patient may be discharged. At four to five days following the surgery, the patient may shower with the arm uncovered. Clean water is obviously important. A sterile dressing over the wound with standard sponges over the pin site is the dressing of choice. Again, ice should be used liberally for the first week, packed around the elbow during stretching sessions.

First Two Weeks

The first and second weeks are often not noted for extensive gains, but every effort should be made to achieve as much range of position as possible. The patient's medial pin often drains serous fluid because of some motion of the skin at that site.

Again, clean dressings around the pins and standard pin care are used. If any of the pins become irritated or inflamed, the patient must be inspected for excessive skin tension and the skin released. Oral antibiotics are sometimes necessary for cellulites around the pin sites.

The first postoperative visit is usually at one week following discharge from the hospital. The patient is asked to keep a record of his/her range of position and the particular times a day. This gives the surgeon some information as to how well the patient is using the Compass Hinge. Again the use of a therapist to help supervise the range of position is also helpful. Sessions in a therapy setting with ice and stretching over a half-day period can be quite beneficial in the early stages. Again, the overall goal is to overcome the resting tension in the muscle, both on the flexor and extensor surfaces of the elbow.

Removal

Six to eight weeks following application, depending upon the patient's overall progress, removal of the hinge is generally done in an outpatient surgery suite.

Gentle manipulation can be performed at the time. Physical therapy is usually continued to maintain range of motion and to regain strength.

Catalog Information

Compass Universal Set
Cat. No. 7106-0000

Compass Universal Hinge
Cat. No. 7106-0001

(Includes medial gear and lateral hinge assemblies only)

Compass Instrumentation Sterilization Case

Cat. No. 7106-0004

Tray Accepts:

Description	Cat. No.	Qty.
1 Hole Rancho Cube	10-3451	2
2 Hole Rancho Cube	10-3452	2
3 Hole Rancho Cube	10-3453	1
4 Hole Rancho Cube	10-3454	1
5 Hole Rancho Cube	10-3455	1
5 mm Centering Sleeve	10-3405	5
Set Screw	11-2727	10
Hex Driver	11-2719	1
2.7 mm Drill	10-3044	1
3.8 mm Drill	10-30456	1
Pin Driver Extractor	11-2716	1
Drill Guide and Trocar	7103-1040	1
Drill Sleeve Adapter	7101-1005	1
Composite 1/2 Pin Arc 150 mm	7110-1555	2
Composite 1/2 Pin Arc 180 mm	7110-1557	2
Composite 1/2 Pin Arc 200 mm	7110-1558	2
8 mm Bolt	10-0550	10
10 mm Bolt	10-3200	20
16 mm Bolt	10-3201	10
20 mm Bolt	10-3203	10

Description	Cat. No.	Qty.
40 mm Threaded Socket	10-0901	4
60 mm Threaded Socket	10-0911	4
Nut	10-3300	40
Thin Washer	10-2700	10
Star Washer	10-2708	5
Half Pin 4 x 20	12-2700	3
Half Pin 4 x 30	12-2702	3
Half Pin 4 x 40	12-2704	3
Half Pin 5 x 20	12-2707	4
Half Pin 5 x 30	12-2709	4
Half Pin 5 x 40	12-2711	4
Half Pin 5 x 50	12-2713	4
130 mm 5/8 Ring	10-1363	2
150 mm 5/8 Ring	10-1364	2
180 mm 5/8 Ring	10-1366	2
200 mm 5/8 Ring	7110-1362	2
13 mm / 10 mm Wrench	L20-2002	2
9/64 x 9 (3.5 mm) Steinman Pin	12-8117	6

Notes

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www.smith-nephew.com

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