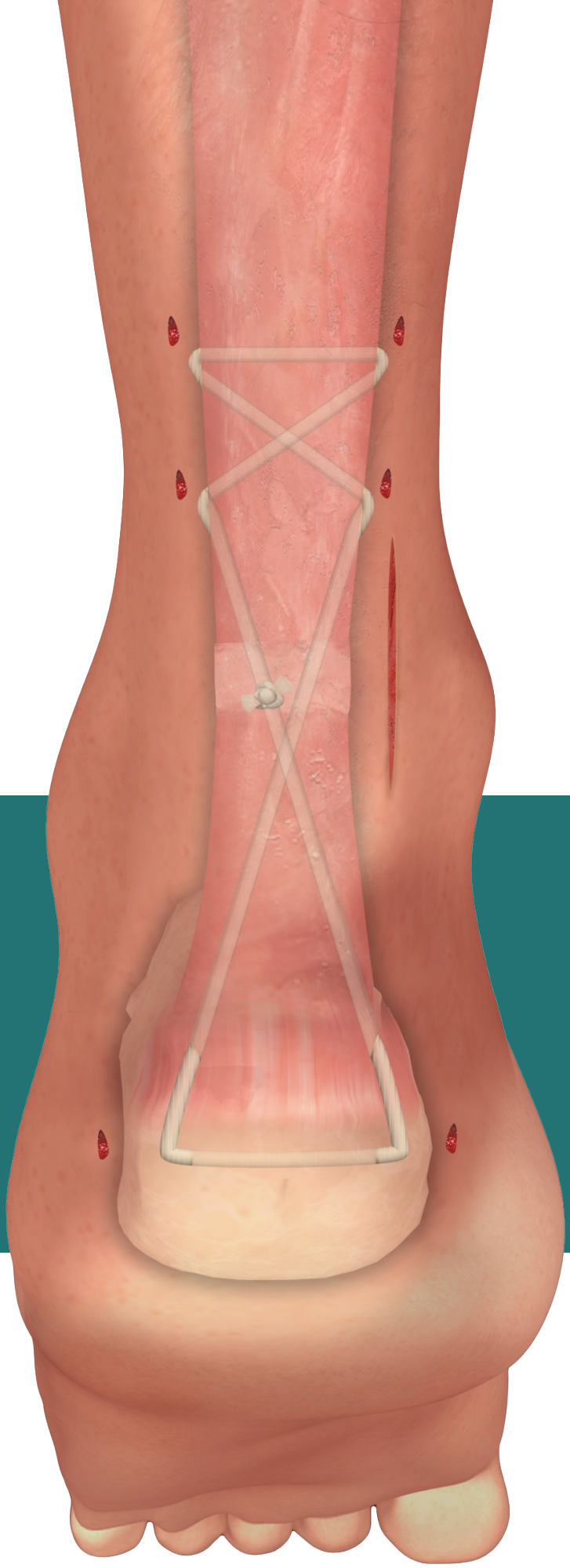


XIROS

AchilloCord$^{PLUS^{TM}}$ System

For repair of Acute Achilles Tendon Rupture

Surgical Technique Manual

AchilloCord^{PLUS} System

Introduction

The **AchilloCord**^{PLUS} System provides a non-harvesting, quick, easy and effective technique for the repair of an acute ruptured Achilles tendon. It is suitable for the active sports patient, and through early rehabilitation it facilitates a quick return to activities of daily living and sport.

Repair of a ruptured Achilles tendon with the **AchilloCord**^{PLUS} System benefits the patient in the following ways:

- The procedure does not use natural tissues for the repair, whether autogenous or allogeneic, with the known associated advantages
- The prosthesis has sufficient initial strength and it is not necessary to immobilise the leg in a cast postoperatively; this allows early rehabilitation with increased potential for retaining full range of motion
- Partial weight bearing and early mobilisation of the leg in the immediate postoperative phase helps retain muscle bulk and strength
- The consequent fast return to activities of daily living retains the patient's independence
- Fast return to activities
- Fast return to sport

We would like to thank **Mr. G. Sefton** FRCS, Consultant Orthopaedic Surgeon, Harrogate District Hospital, UK, and **Mr. A. Jennings** FRCS, Consultant Orthopaedic Surgeon, University Hospital of North Durham, UK, for their work in developing this product and technique from the original technique of Professor Kyosuke Fujikawa MD, MPhil, formerly Professor of Orthopaedics in the National Defense College, Japan.

Indications

The **AchilloCord**^{PLUS} is indicated for patients with acute ruptures of the Achilles tendon but is particularly suited to patients where an extended period of postoperative immobilisation is undesirable.

Contraindications

The **AchilloCord**^{PLUS} should not be implanted in patients:

- With known hypersensitivity to implant materials. If the patient is suspected of having any foreign body sensitivity, appropriate tests should be made prior to implantation.
- With infections or any structural or pathological condition of the bone or soft tissue that would be expected to impair healing or prevent secure fixation.
- With chronic ruptures of the Achilles tendon.
- That are skeletally immature as the **AchilloCord**^{PLUS} will not elongate with growth.
- Unable or unwilling to restrict activities to prescribed levels or to follow a rehabilitation program during the healing period.

AchilloCord^{PLUS} System

Implant

The **AchilloCord**^{PLUS} is a densely woven flexible tubular structure that is 5 mm in diameter and 800 mm in length.

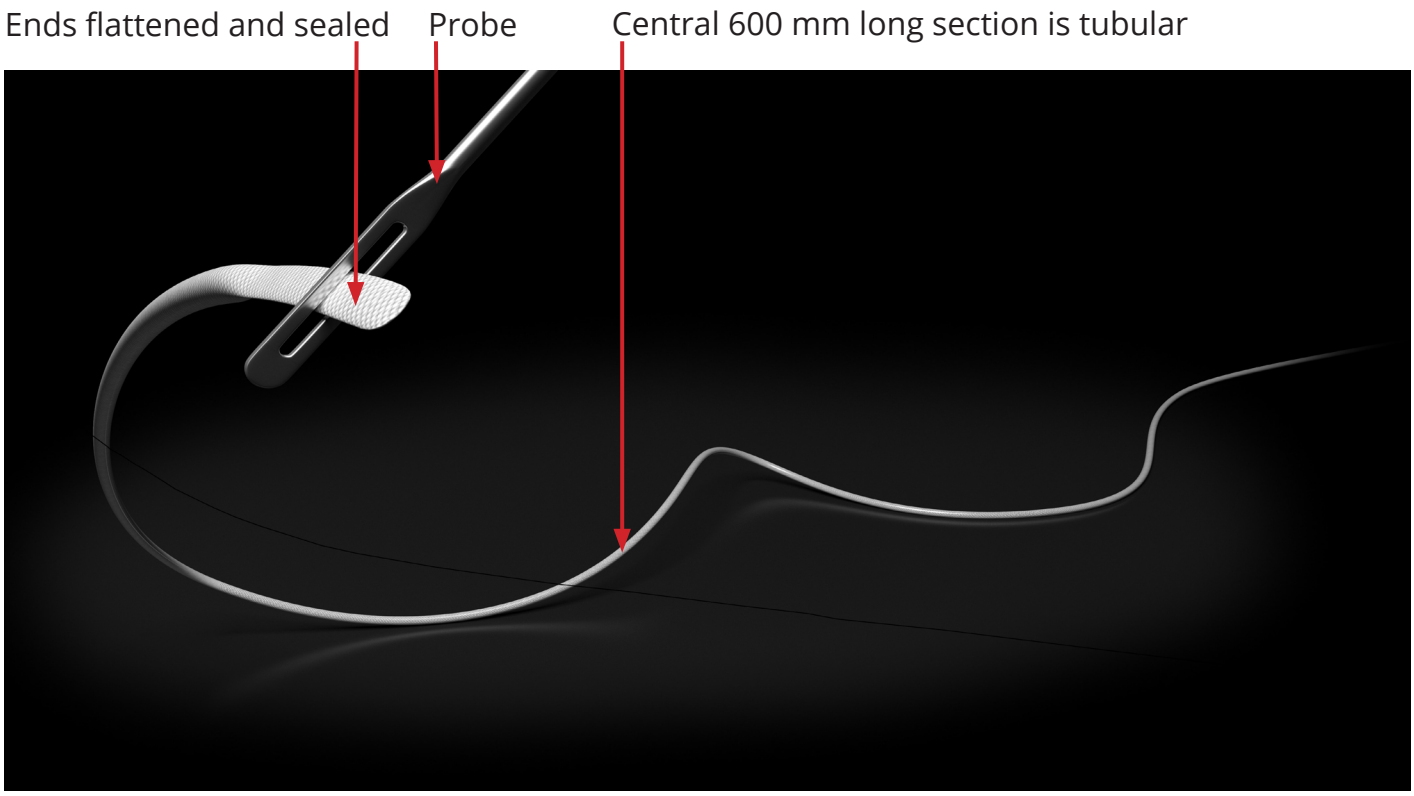
Both ends of the device are flat, allowing it to be easily threaded through the eye of the probe, which is used to pull it through soft tissue and bone tunnels.

The **AchilloCord**^{PLUS} is made from polyester, which has been in use for ligament and tendon repair for over 25 years.

Instruments

The following single use instruments are packaged with the implant set:

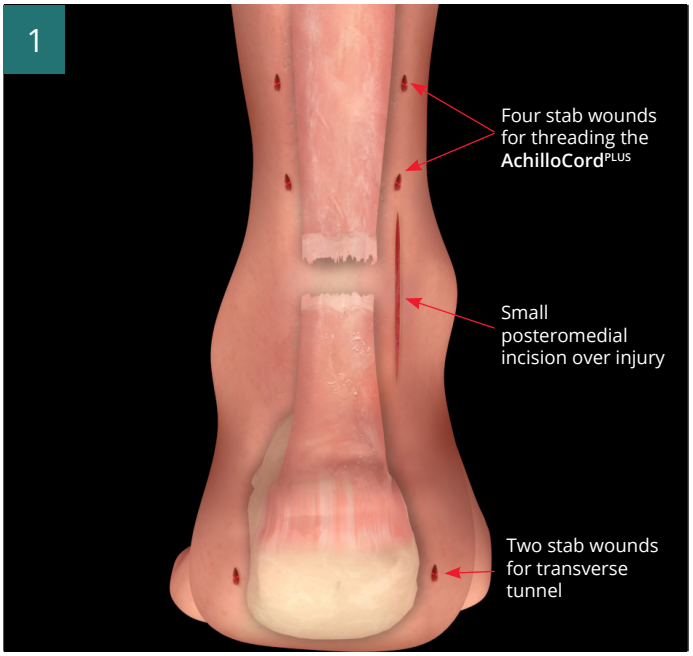
- 20 cm stainless steel rigid probe with eye for threading the **AchilloCord**^{PLUS}
- 3.2 mm diameter drill bit (plain shank)



Surgical Technique

PATIENT PREPARATION

With the patient lying prone, the injured limb is confirmed, the leg exsanguinated and a tourniquet is applied. The leg is prepared and draped using aseptic technique.

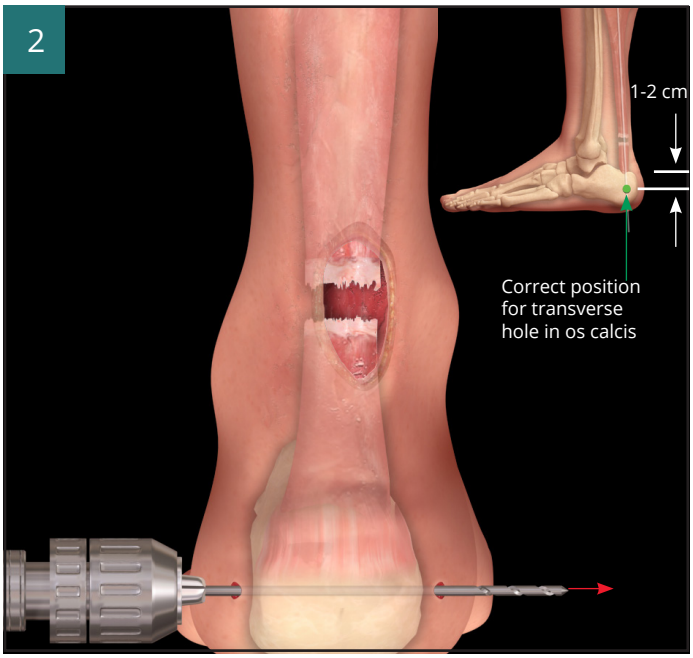


RECOMMENDED APPROACH

A posteromedial incision is made 2.5-3 cm long at the site of rupture, parallel to the medial border of the Achilles tendon. In addition, during later steps in surgery four stab incisions proximal to the injury site are made, two on the lateral side and two on the medial.

NOTE: It is important to avoid trapping or damaging the sural nerve, the course of which is along the lateral border of the Achilles tendon and should be identified before making the two stab incisions at the lateral side of the injury.

On completing the incision, the underlying soft tissues are dissected to expose the site of injury and confirm the pathology. The distal and proximal ends of the Achilles tendon are identified.

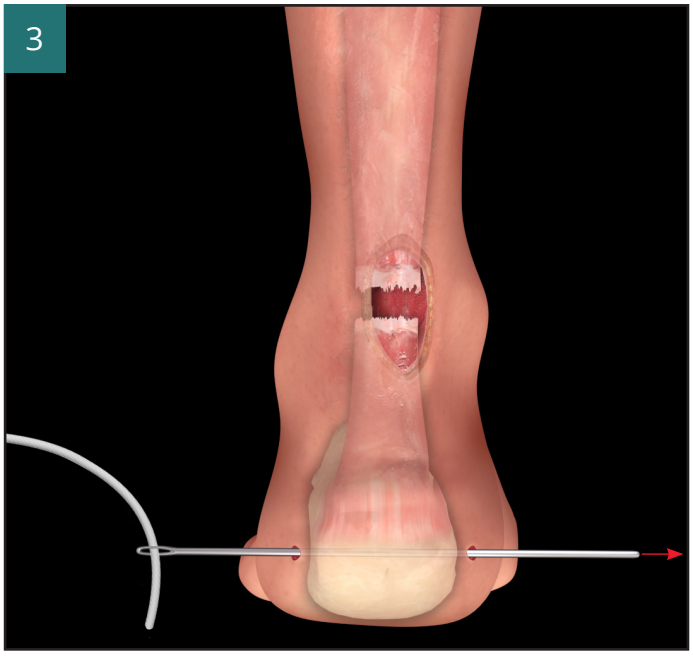


DRILLING THE TRANSVERSE TUNNEL IN THE OS CALCIS

A transverse tunnel is positioned along the long axis of the tendon, at approximately 1-2 cm below the insertion of the Achilles tendon to avoid undermining of the tendon insertion.

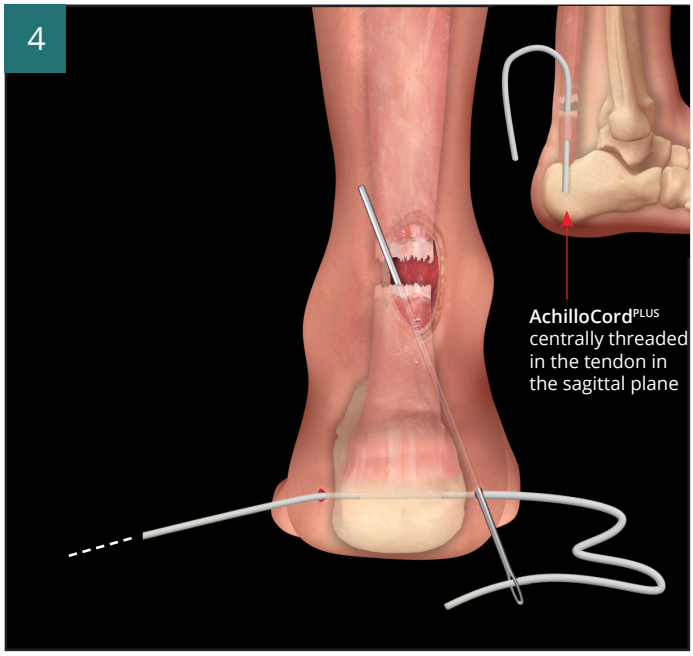
Prior to drilling the tunnel a horizontal stab incision is made on the lateral side of the os calcis to act as a pilot hole for the drill. A 3.2 mm drill bit (supplied) is used to make the tunnel horizontally from the lateral side to the medial. As the drill emerges at the medial side, the skin will begin to tent. A stab incision is made over the end of the drill bit, thus allowing it to exit.

NOTE: A 2.5 mm diameter drill bit (not provided) can be used to create a smaller tunnel, giving a snug fit between the **AchilloCord**PLUS and the tunnel wall. However, the probe supplied will not fit through such a small tunnel. A suture passer (not supplied) will therefore be required to pass the **AchilloCord**PLUS through the bone tunnel, if such a drill bit is used.



THREADING THE ACHILLOCORD^{PLUS} THROUGH THE DISTAL END OF THE RUPTURED TENDON

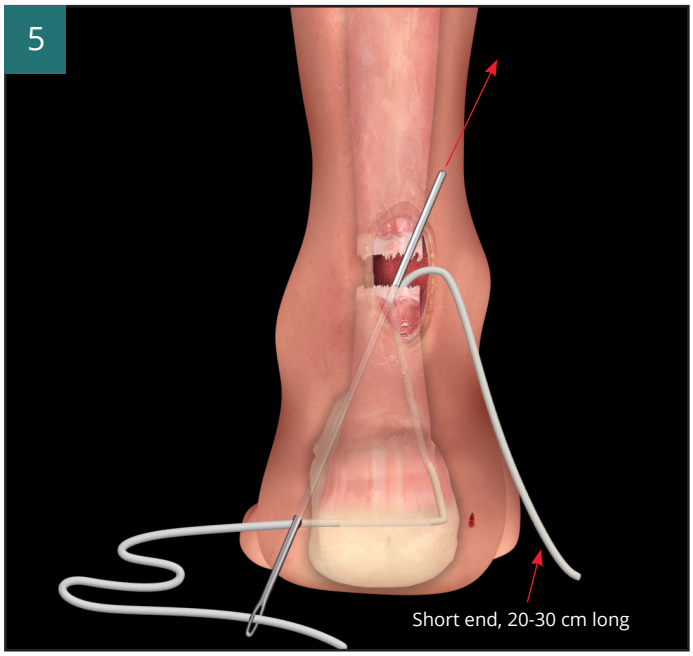
The **AchilloCord**^{PLUS} is threaded through the eyelet of the probe (supplied), which is used to pass one end of the **AchilloCord**^{PLUS} through the bone tunnel from the lateral side. The probe is pulled through until approximately 25 cm of the **AchilloCord**^{PLUS} emerges through the stab incision on the medial side of the os calcis.



The probe is used to make a subcutaneous path from the medial stab wound running as close as possible to the bone surface and exiting at the centre of the ruptured distal end of the Achilles tendon.

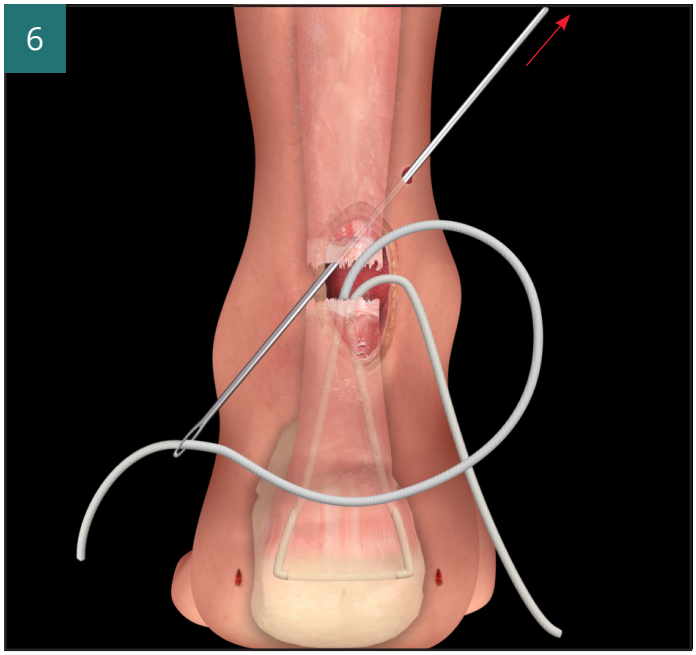
The **AchilloCord**^{PLUS} is threaded centrally within the tendon when viewed in the sagittal plane. The majority of the tape is therefore contained within the tendon, minimising adhesions. The **AchilloCord**^{PLUS} is pulled through so that it disappears under the skin on the medial wall of the os calcis.

NOTE: When making the second pass through each stab incision, it is important to avoid trapping subcutaneous tissue with the **AchilloCord**^{PLUS}. To check this, pull on the **AchilloCord**^{PLUS} and confirm that there is no puckering of the skin. Should the skin pucker, use an artery forceps to loosen the tissue around the **AchilloCord**^{PLUS}.



The probe is removed and re-threaded onto the other end of the **AchilloCord**^{PLUS}. The probe is used to make a subcutaneous path from the lateral stab wound, running as close as possible to the bone surface and exiting at the centre of the ruptured distal end of the Achilles tendon. All of the **AchilloCord**^{PLUS} is pulled through so that it disappears under the skin on the lateral wall of the os calcis.

The two ends of the tape are now exiting through the centre of the distal Achilles tendon. The two ends of the **AchilloCord**^{PLUS} are tensioned to remove any slackness from its distal location within the tendon.

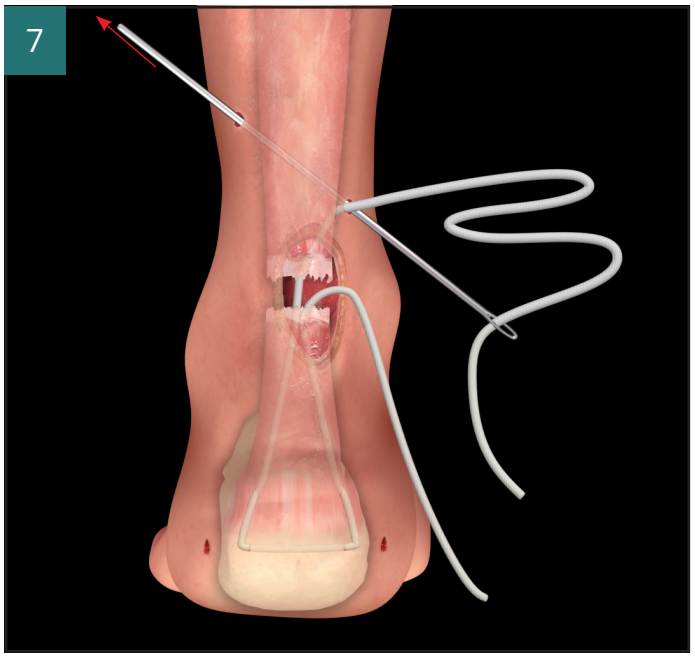


THREADING THE ACHILLOCORD^{PLUS} THROUGH THE PROXIMAL END OF THE RUPTURED TENDON

Where possible, the proximal end of the Achilles tendon is held with forceps and pulled down to approximate it to the end of the distal tendon stump. The end of the probe is passed through the centre of the tendon, so that the probe emerges about 2 cm proximal to the site of injury.

NOTE: A small stab incision at the centre of the tendon can be used to guide the probe to the correct location.

A stab incision is made on the medial side of the leg over the end of the probe where the skin tents. The probe and the **AchilloCord**^{PLUS} are pulled through while the tendon is grasped with forceps to maintain tension on the distal end of the tendon.



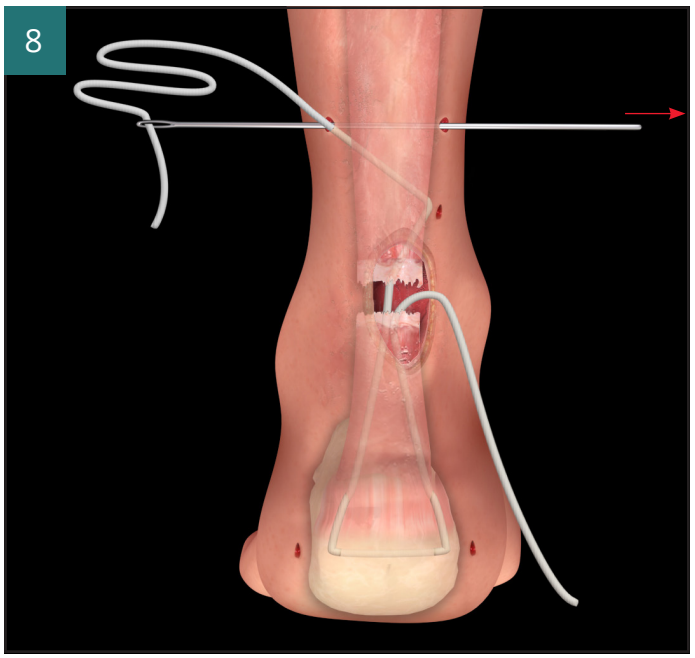
The probe is positioned close to the exit point of the **AchilloCord**^{PLUS} and passed through the Achilles tendon to the lateral side, about 4 cm proximal to the site of injury, taking care to avoid the sural nerve.

The majority of the tape is thus contained within the tendon, resulting in less chance of adhesions.

NOTE: It is important to avoid going too deeply with the **AchilloCord**^{PLUS} into the muscle or the tendon as this may interfere with the blood supply of that region.

As the point of the probe can be seen tenting the skin, a stab incision is made over the end of the probe, and the probe and **AchilloCord**^{PLUS} are pulled through to the lateral side.

NOTE: Again, it is important to avoid trapping the **AchilloCord**^{PLUS} on subcutaneous tissue around each stab incision, which is indicated by puckering of the skin.



The probe is pushed back through the stab incision horizontally so that it exits on the medial side.

NOTE: Care must be taken to avoid trapping the sural nerve as the **AchilloCord**^{PLUS} is looped back through the Achilles tendon.

A stab incision is made over the site of the probe and the **AchilloCord**^{PLUS} is drawn through the Achilles tendon.

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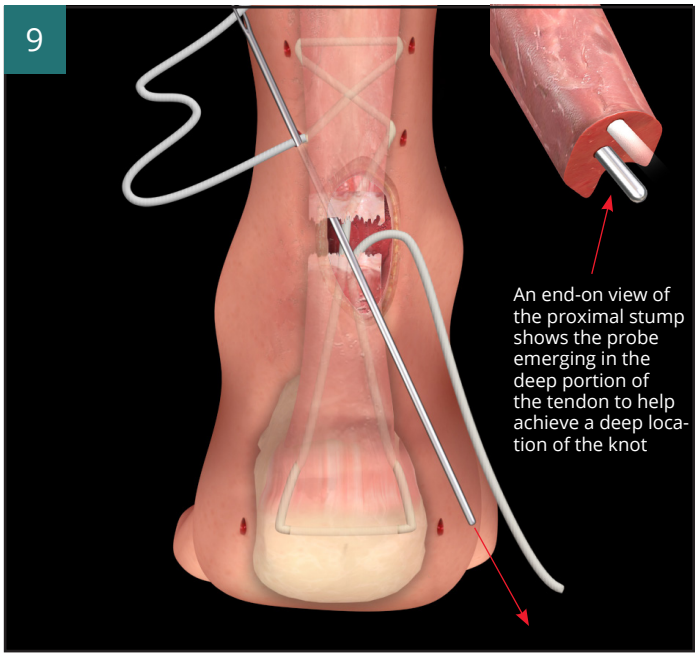

The probe is pushed back through the 3rd stab incision, into the tendon so that it exits about 2 cm proximal to its ruptured end. The 4th stab incision is made over the end of the probe and the **AchilloCord**PLUS is pulled through the Achilles tendon to the lateral side.

Finally, the probe is used to draw the **AchilloCord**PLUS from the lateral side distally through the proximal end of the Achilles tendon. It is advantageous for the probe to emerge through the deep portion of the tendon stump to help place the knot deep and hence away from the skin.

NOTE: Care must be taken to avoid trapping the sural nerve as the **AchilloCord**PLUS is looped back through the Achilles tendon.

The two ends of the **AchilloCord**PLUS are pulled to ensure the cord is taut within the tendon with no slackness. While the **AchilloCord**PLUS is under tension, it is confirmed that there is no trapped subcutaneous tissue by checking for puckering of the skin around any of the stab incisions.

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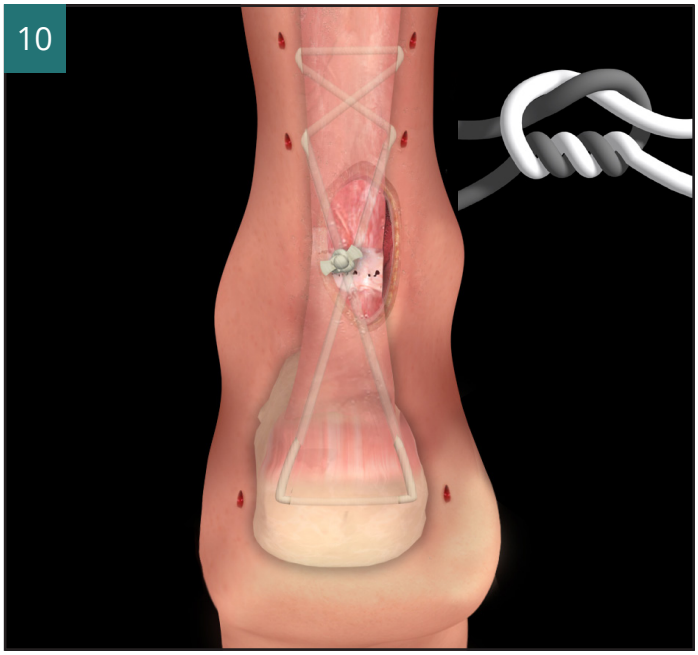
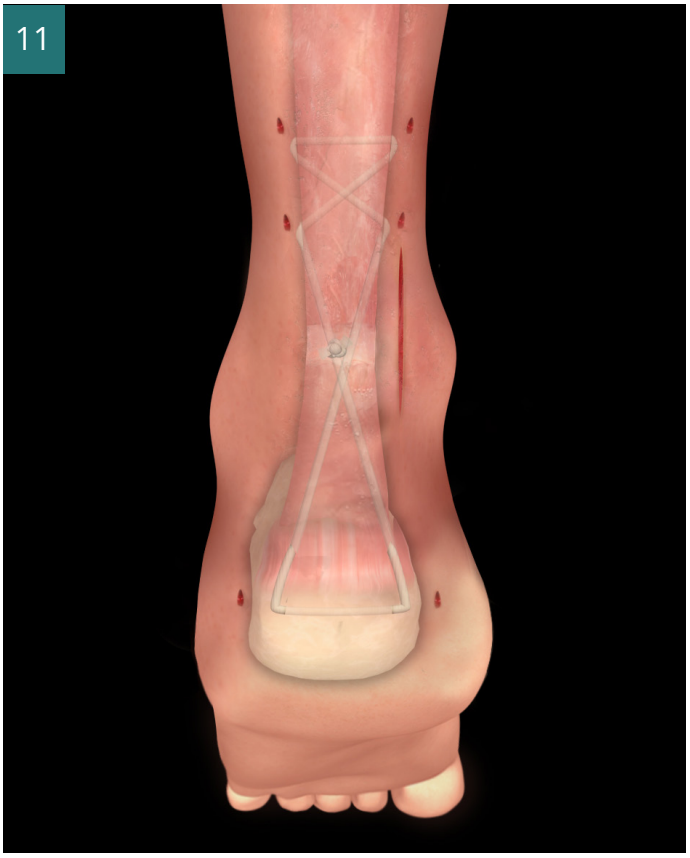


TENSIONING AND KNOTTING THE ACHILLOCORDPLUS

With the ankle in a plantar flexion position, the proximal end of the **AchilloCord**PLUS is tensioned to take up any slack and approximate the two ends of the Achilles tendon. Then the distal end of the **AchilloCord**PLUS is pulled so that any bunching of the cord at the rupture site is made taut. This also pulls the proximal stump closer to the distal stump.

NOTE: Ensure the length of the repair is physiological and that the **AchilloCord**PLUS is taut within the Achilles tendon.

It is important to avoid over-tightening of the repair or shortening of the repaired Achilles tendon, as the patient will have subsequent problems achieving full dorsiflexion. Likewise, with a loose repair the patient will have problems in regaining full power of plantar flexion, and problems with normal gait.

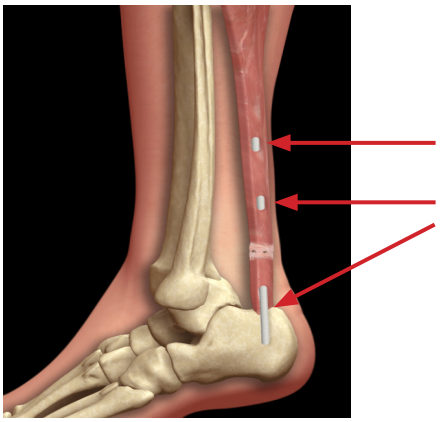


On achieving the appropriate tension and length of repair, the two ends of the **AchilloCord**PLUS are tied with a surgeon's knot at the site of injury. Care is taken to ensure the knot is locked.

NOTE: Some surgeons may prefer to use a reef knot with or without an extra throw. In either case it is very important to check that the knot is locked before trimming the ends of the **AchilloCord**PLUS to length.

The Simmond's test is performed to ensure adequate repair. The calf muscle is squeezed, which should result in plantar flexion of the foot.

On confirmation of adequate repair, any excess **AchilloCord**PLUS is cut with scissors straight across, at right angles to its edge. This will minimise the generation of loose fibres.



BEFORE CLOSURE

IMPORTANT:

- Any loose fibres created when trimming to length must be carefully removed from the incision site
- After trimming to length it may be necessary to restrain the cut ends by stitching them back to the cord
- It is vital to ensure that the knot is well buried in the Achilles tendon

A strong non-absorbable suture is used to stitch the ends of the tendon together over the top of the knot, so that the knot is covered by tissue and remains buried in the tissue.

WOUND CLOSURE

Where possible an absorbable suture with a running knot is used to close the sheath of the Achilles tendon.

The area is washed with an antibiotic wash to minimise the risk of infection. With acute ruptures there is usually no need to drain the wound.

The subcutaneous tissue is closed using interrupted sutures. Finally the skin incision is closed using a continuous suture. Local anaesthetic should be injected into the wound.

Steri strips are used to close the stab incisions if they are small; otherwise individual sutures are used.

Immobilisation is not required, however the ankle should be covered with a wool and crepe dressing. Active and passive plantar flexion are permitted in the immediate postoperative phase.

REFERENCES

1. **Jennings AG, Sefton GK, Newman RJ.** Repair of acute rupture of the Achilles tendon: a new technique using polyester tape without external splintage. Ann R Coll Surg Engl. 2004;86(6):445-448.
2. **Jennings AG, Sefton GK, Newman RJ.** Acute Achilles tendon ruptures. SA Bone & Joint Surgery. 1999;9(3):165-166.
3. **Fernandez-Fairen M, Gimeno C.** Augmented repair of Achilles tendon ruptures. Am J Sports Med. 1997;25(2):177-181.

Postoperative Management

The rehabilitation programme (below) should be supervised by a specialist physiotherapist. All mobilisation and exercises should be performed within the pain free range of movement.

The patient should be warned not to exceed the prescribed activity levels or to overload the repair before complete healing has occurred.

The following provides only an outline of the prescribed programme. For a full description please refer to the document "**AchilloCord**^{PLUS} System, Rehabilitation for Acute Achilles Tendon Repair" (LAB 118).

The rehabilitation regime was developed in conjunction with **Ian Horsley** MSc, MCSP, Clinical Lead Physiotherapist, English Institute of Sport (EIS) North West, of BackinAction Physiotherapy and Sports Injury Clinic, Wakefield, UK.

Immediate Postoperative Actions
- Active and passive plantar flexion.
- Partial weight bearing with elbow crutches –emphasise heel-toe gait to reduce swelling ~ 25% body weight (BW).

Days 1-3
- Active plantar flexion.
- No dorsiflexion allowed.
- 2 cm heel raise in situ.
- Resting with leg elevated (not in plantar flexion).

Days 4-7
- Partial weight bearing with elbow crutches – increase weight bearing as tolerable ~ 40% BW.
- Begin exercise programme.

Days 7-14
- Walking with elbow crutches ~ 50% BW.
- Stitches are removed if satisfactory wound healing.

Days 14-21
- Walking with elbow crutches ~ 75% BW.
- Begin passive dorsiflexion.

Days 21-28
- Walking with elbow crutches ~ 100% BW.
- Begin active plantar flexion and dorsiflexion.

Days 28-42
- Mobilising with 1 elbow crutch in opposite arm to operated leg.
- Remove heel raise.

Day 42 Onwards
- Increase walking frequency.
- Commence function training.

NOTE: Return to driving is allowed only when full weight bearing without suffering discomfort is achieved.

Ordering Information

102-1142 AchilloCord^{PLUS} System Implant Set, includes:

AchilloCord^{PLUS}, 5 mm x 800 mm (supplied sterile)

Packaged with the following disposables:

Rigid Probe with eye, stainless steel, 20 cm (supplied sterile)
Drill Bit, plain shank to fit Jacobs Chuck, 3.2 mm diameter (supplied sterile)

Video files of the surgical technique animation and live operation are available on request.

Please refer to the Instructions for Use leaflet packaged with the **AchilloCord**^{PLUS} System for further essential information including Use, Sterility, Indications, Contraindications, Warnings and Precautions, Potential Adverse Effects and Storage. Additional copies may be obtained from the Xiros™ Sales Department, or downloaded from http://www.xiros.co.uk

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