

**TLS**<sup>®</sup>

Tape Locking Screw

## **SURGICAL TECHNIQUE**

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Anterior Cruciate Ligament  
All inside - Short Graft - ST4

GROUPE  
**FH ORTHO**<sup>™</sup>

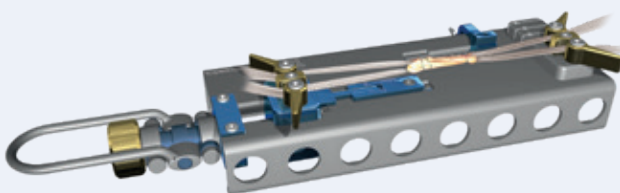
**The TLS<sup>®</sup> system:**

- Only one tendon harvested;
- Preloaded 4 bundle short graft;
- Immediate mechanical properties similar to a normal ACL;
- Atraumatic fixation of the graft;
- Optimal Secondary fixation : maximum tendon/bone contact (360°);
- Post-operative period : no splint, immediate and full weight-bearing, free movement.



Harvesting of the semi-tendinosus

| Patient's Height<br>M/F (in cm) | Suggested graft's length                 |  |
|---------------------------------|--|--|
|                                 | Cursor's position (in mm) on workstation |  |
|                                 | ACL (in mm)                              |  |
| < 165                           | between 45 and 50                        |  |
| ≥ 165 ≤ 174                     | between 50 and 55                        |  |
| ≥ 175 ≤ 190                     | 55                                       |  |
| 190                             | 60                                       |  |



Fixation of the tapes and pre-conditioning by initiating traction on the TLS<sup>®</sup> workstation

**Pre-operative planning (optional)**

A lateral view X-ray of the knee in extension enables the physician to evaluate the distance between the desired fixation points.

The length of the intraarticular path of the transplant is then determined.

Accordingly, the total length of the transplant corresponds to this measurement plus 10 mm for insertion into the femur and 15 mm for insertion into the tibia.



Evaluating the intra-articular length of the graft.

**Positioning of the patient**

The TLS<sup>®</sup> technique can be used with any patient positioning that is suitable for ligamentoplasty of the knee.

**Graft harvesting**

In most cases the graft used is the semi-tendinosous (ST). Sometimes the gracilis with an appropriate diameter in a relatively tall patient can be used alone in a loop with 4, 5 or 6 strands.



Open stripper - ref. 242 049

**Preparing the graft using the TLS<sup>®</sup> workstation**

Positioning of the posts on the workstation is determined by the intra-articular size of the graft.

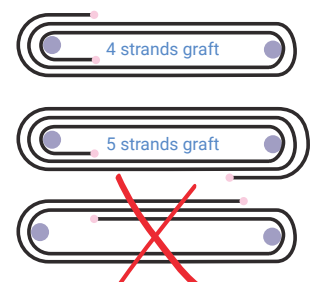
The posts are generally set at between 50 and 55 mm, depending on the size of the patient.

TLS<sup>®</sup> workstation - ref. 256 011 + 256 012 + 256 013 + 256 217

A loop with 4 or 5 strands is formed on the workstation (see technical sheet n°4). The 4 strands are joined together by means of 3 or 4 cross stitches using woven thread at both ends of the graft.

Sutures of different colours can be used to enable the transplant to penetrate into its bony recesses so as to be checked more easily.

Next the transplant is placed under traction on the TLS<sup>®</sup> workstation by its tapes, for 1 minute.



## Arthroscopic step

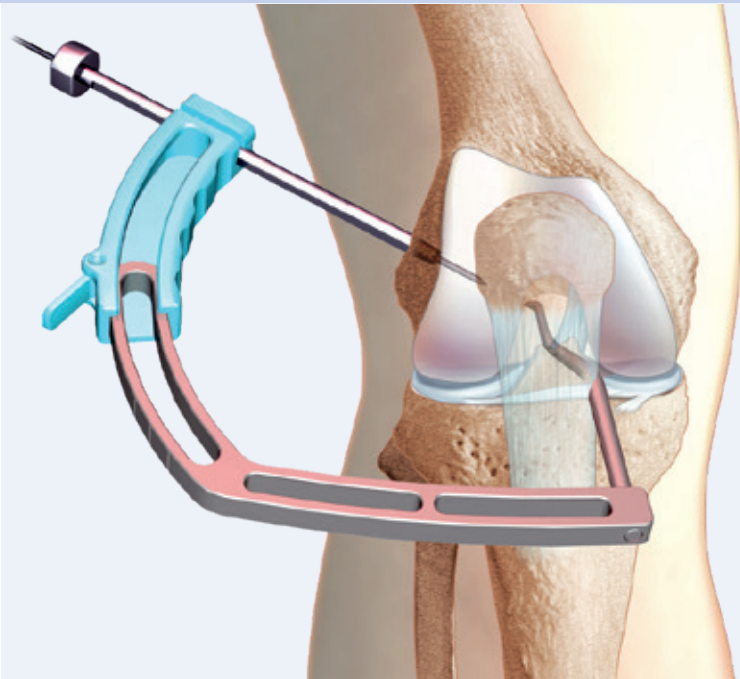
### Outside-to-inside femoral targeting

Use standard arthroscopic portals : lateral viewing portal and medial instrument tract.

Complete a full diagnostic arthroscopy and perform meniscal surgery as required. Carefully prepare the intercondylar notch.

Position the universal guide provided with the targeting point on the intended intra articular aperture for the femoral socket. The barrel of the aimer should form roughly a 45 degree angle with femoral tunnel. A small skin incision made and the barrel advanced through the soft tissues and seated on the femoral cortex. A 2,4 mm drill pin is advanced from outside to in.

Pin Dia 2,4 mm - ref. 255 994

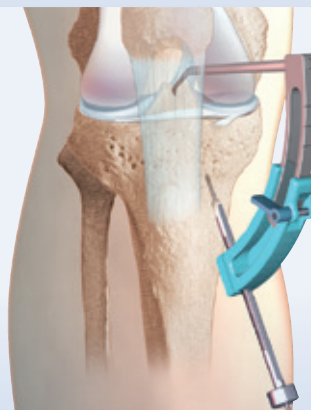


Positioning the pin using the universal ACL femoral guide

## Arthroscopic step

### Outside to inside tibial targeting

The tibial guide is inserted onto the ACL footprint. It should be noted that a fairly vertical tunnel (about 60°) is required so as to obtain sufficient tunnel length (> 50 mm is required for 15 mm graft socket, 10 mm bone bridge and a 25 mm screw).



Positioning the pin using the universal guide

## Drilling the tunnels

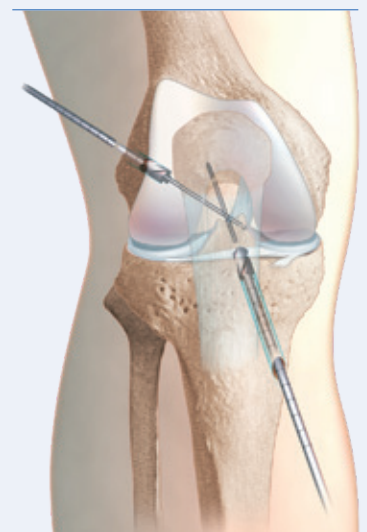
When the pins are accurately positioned, they can be overdrilled with the 4,5 mm drill provided. Before drilling the femoral tunnel confirm the depth from skin surface to femoral cortex. This distance can be used as a guide for tapping and subsequent screw placement.



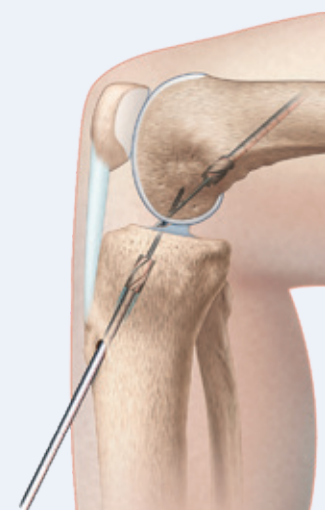
TLS® drill - ref 251 262

### Warning for BIO-C screws

1. For hard bones, do not use BIO-C screws, use Titanium or Peek screws.
2. Tapping for BIO-C screws must be done along the entire screw meaning 20 or 25 mm.
3. BIO-C screws must be perfectly engaged in the screwdriver to completely transmit the torque to the screws.



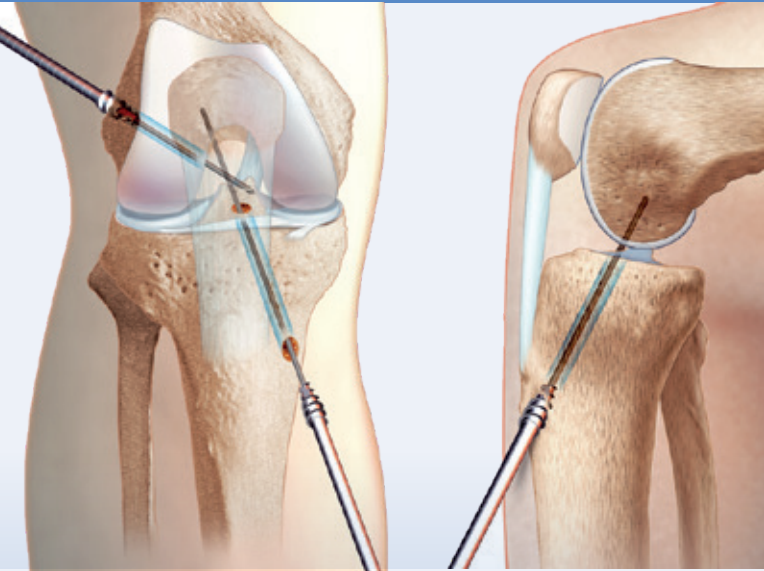
Front view



Side view

Drilling the femoral and tibial tunnel





Tapping the femoral entry

Tapping the tibial entry

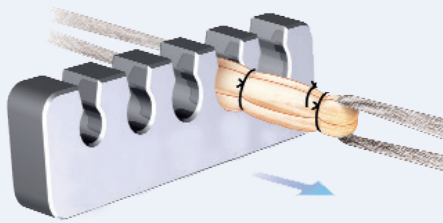
## Tapping

The entry to the femoral and tibial tunnel is tapped 15 mm in length on the femur and 20 mm in length on the tibia (use the graduated marks on the tapping sleeve to control introduction).



TLS® tap - ref 250 105

TLS® graft sizer



## Retrograde reaming of the cavities

Each end of the graft is measured with the TLS® calibrator.

TLS® calibrator - ref 255 923

The femoral and tibial graft sockets are prepared with a hand retroreamer of the corresponding size to the measured graft diameter.

Guided on a pin, the retrograde reamers are inserted with a hammer with the handle fixed vertically.



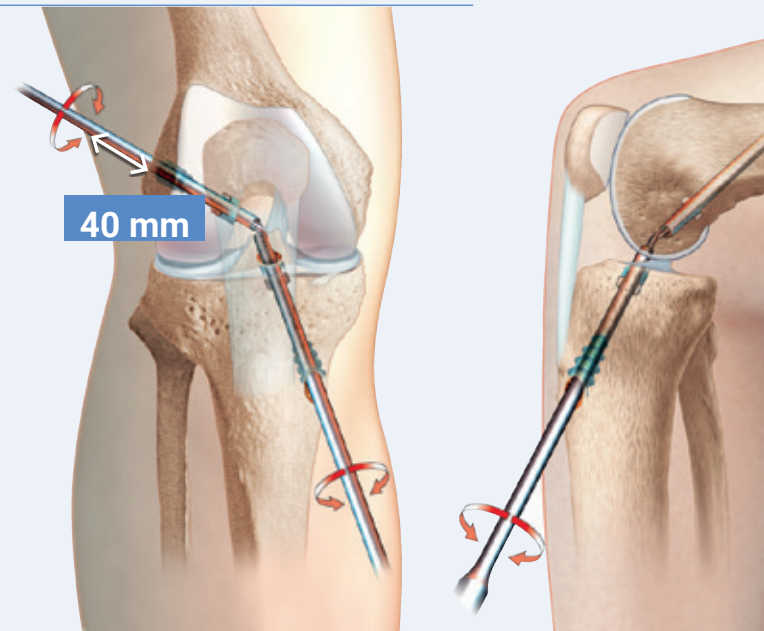
TLS® drills - ref. 254 537 or 253 165 or 251 830 or 250 102 or 250 101

The arthroscope is used to monitor the manual inside-out reaming.

This is done first on the tibia, and the hollowing out is carried out just until the tip of the retrograde reamer is showing on the surface of the tibia (tibial recess of 15 mm), and then on the femur until the laser marking (femoral recess of 10 mm).

The retrograde reamer is then removed again with handle held vertically.

A TLS® pin guide cannula is screwed into the threaded print over the guide pin, so as to preserve the precise axis of the tunnel.



Front view

Side view

Tibial (15 mm) and femoral (10 mm) recesses

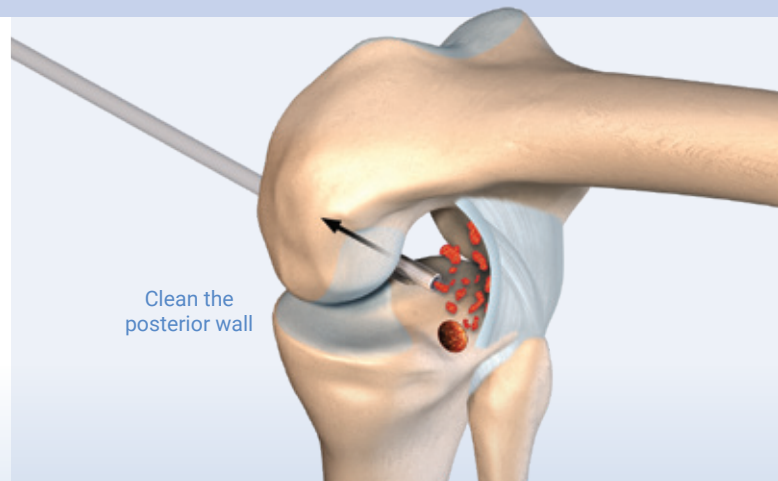


TLS® pin guide cannula - ref 255 275

The pin guides are then definitively removed. It is often necessary to clean the entry to the recesses.

## Clean the posterior wall

The posterior corner should be cleaned by suction with cannula or an opened blade shaver to take out bone debris.



## Passing the threads

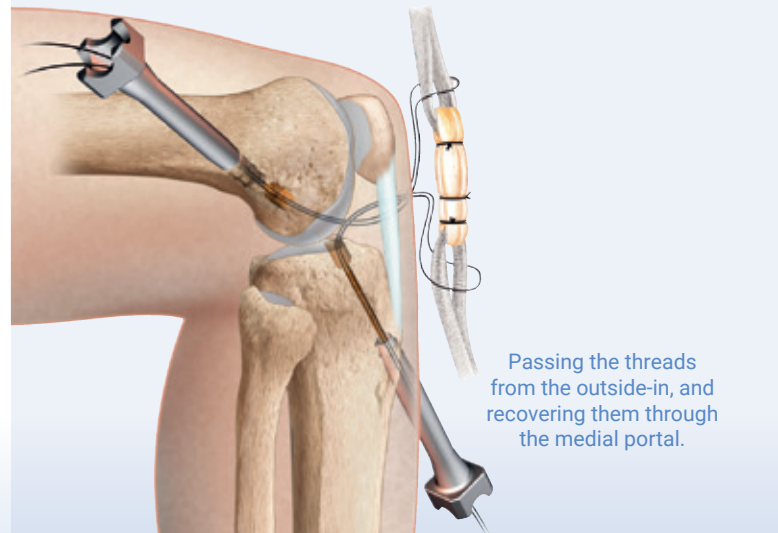
The medial arthroscopic portal is widened (very important or the graft will not pass across the skin).

The passing sutures are passed into the knee using the suture passer and are retrieved simultaneously from the medial portal using a grabber.



Pulling wire provided with TLS® + tendon fixation tape - ref. 256 193

TLS® wire guide - ref. 256 010



Passing the threads from the outside-in, and recovering them through the medial portal.

## Implanting the graft

The tapes corresponding to the graft for the femur are passed through in a loop formed by the traction thread. The graft is then pulled automatically positioning itself in the femoral socket.

Pulling the tape will automatically position the graft appropriately.

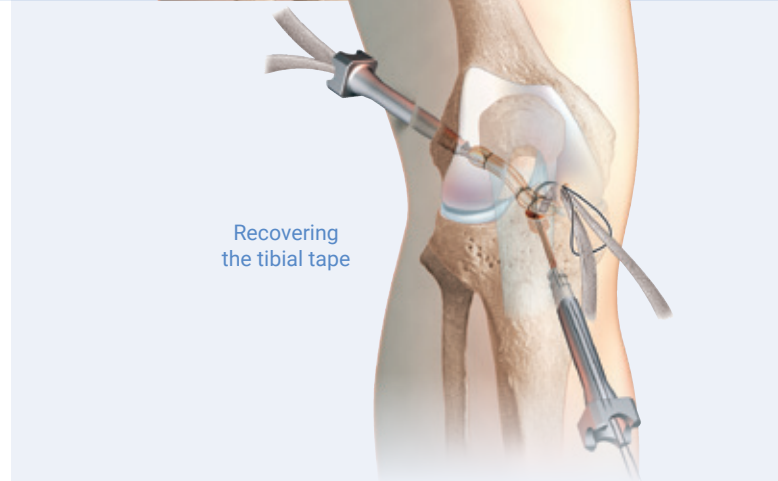
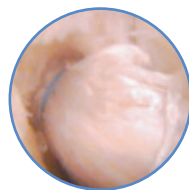
TLS® tendinosus fixation tape - ref 256 193

A first "sardine tin key" femoral maneuver at the tip of the cannula makes it possible to press-fit the graft into its recess.

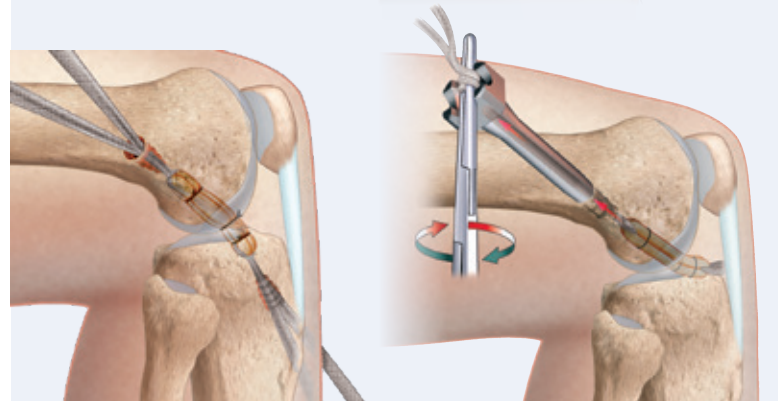
The tape corresponding to the tibial tip of the graft is then also passed through a loop in the traction threads just as with the femur.

In this way, the graft is put into position.

The tibial "sardine tin key" maneuver at the tip of the cannula is performed, arthroscopically inspect the graft and confirm it docks into the tibial tunnel.

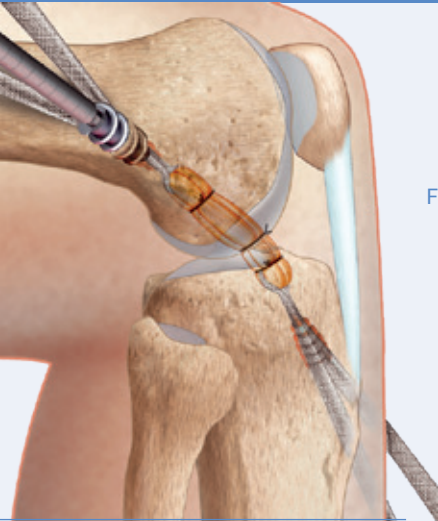


Recovering the tibial tape



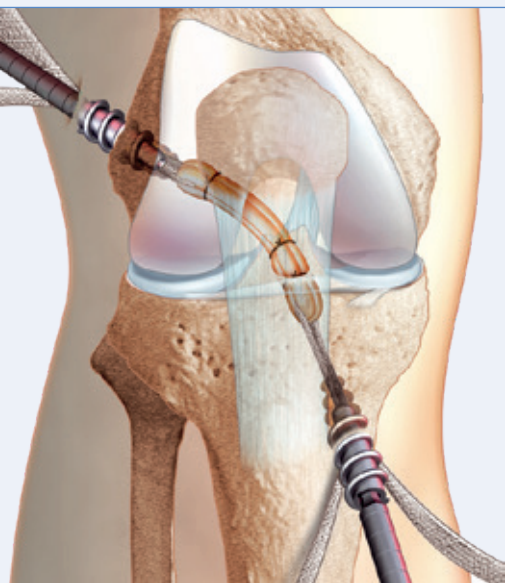
Positioning the graft

Femoral "sardine tin key" maneuver verifying the position and adjusting the traction



Femoral fixation of tapes with screw.

TLS® screw diameter 10 mm - length 20 mm



Putting tibia into traction

Tibial fixation of ligaments by securing in extension. Tibial screw diameter 10 mm - length 25 mm

## Fixing

### Inserting TLS® screws

The guide pin is positioned in between the two femoral tapes until there is contact between tip of the pin and the graft.

Guide pin for TLS® screw - ref 255 970

The femoral screw is put into position first, with verification of the depth, using the markings on the screwdriver so as not to make contact with the graft.



TLS® screwdriver - ref 254 599

Isometry controls are carried out in flexion and extension.

Verifying that the graft is at the correct tension can be done by means of a further arthroscopic view.

The tibial tapes are secured into position with a pin guide TLS® screw.

The tibial screw can then be put into place with the knee in nearly full extension. Excess tape is cut at the level of the TLS® screws.

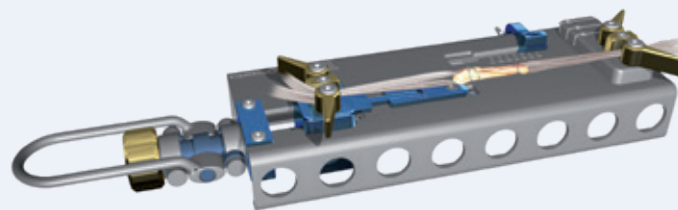
## Suggested post-operative care

- Physiotherapy starts the day following the operation.
- Immediate weight-bearing.
- Free flexion and extension.
- No splint.

## References

| Ref.    | TLS® instrumentation list                        |
|---------|--|
| 264 932 | TLS® tape cutter                                 |
| 250 105 | TLS® cannulated tap Ø2,5                         |
| 264 933 | Long cannula TLS x2                              |
| 264 934 | Cannula screwing handle                          |
| 256 012 | Pre-tensioned assembly                           |
| 264 937 | TLS® workstation                                 |
| 254 599 | Screwdriver 3.5 cannula Ø1.8                     |
| 263 783 | TLS® Peek screwdriver                            |
| 265 664 | Open tendon stripper                             |
| 265 643 | TLS® calibrator                                  |
| 269 982 | TLS® ACL OUT/IN guide tibia-femur point to point |
| 254 537 | Retrograde cannulated reamer Ø6                  |
| 253 165 | Retrograde cannulated reamer Ø7                  |
| 251 830 | Retrograde cannulated reamer Ø8                  |
| 250 102 | Retrograde cannulated reamer Ø9                  |
| 250 101 | Retrograde cannulated reamer Ø10                 |
| 251 831 | Drill bit Ø11 cannulated Ø 2.5                   |
| 264 939 | Aiming barrel TLS®                               |
| 256 010 | Wire guide x2                                    |
| 251 262 | Cannulated reamer Ø4,5                           |
| 264 586 | Drill bit pin Ø 2.4 (x2)                         |
| 255 970 | Screw guide pin Ø 1.8                            |
| 264 651 | Screw guide pin Ø 1.2                            |
| 267 267 | TLS® graft length plate                          |
| 256 011 | TLS® pre-tensioned screw                         |
| 265 642 | Tendon hook                                      |
| 265 641 | Angulated awl                                    |

| Ref.    | Tendon anchoring system                           |
|---------|---|
| 253 569 | TLS® tendon anchoring screw Ø10 mm lg 20 mm       |
| 248 853 | TLS® tendon anchoring screw Ø10 mm lg 25 mm       |
| 264 274 | TLS® tendon anchoring screw Ø12 mm lg 20 mm       |
| 263 653 | TLS® tendon anchoring screw Peek Ø10 mm lg 20 mm  |
| 263 654 | TLS® tendon anchoring screw Peek Ø10 mm lg 25 mm  |
| 264 648 | TLS® tendon anchoring screw Bio-C Ø10 mm lg 20 mm |
| 264 649 | TLS® tendon anchoring screw Bio-C Ø10 mm lg 25 mm |
| 256 193 | TLS® tendon anchoring tape - option               |
| 265 746 | TLS® tendon anchoring tape (x2)                   |



TLS® workstation



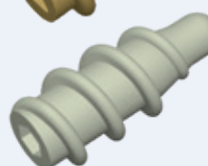
TLS® fixation tape



TLS® Titanium screw



TLS® Peek screw



TLS® BIO-C screw



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