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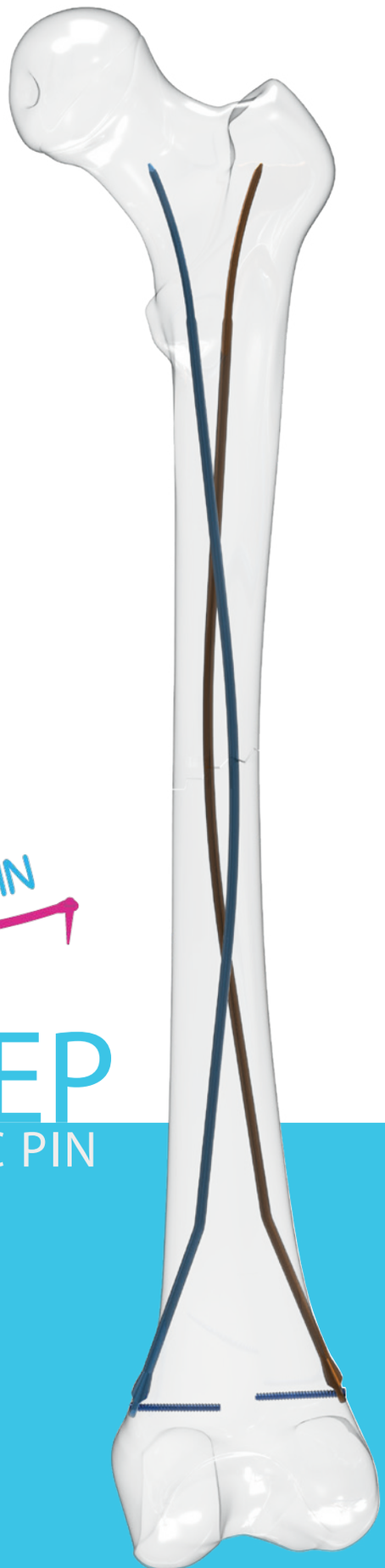

LOCKING TITANIUM ELASTIC PIN

LOCKING TEP

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INTRAMEDULLARY NAIL

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Introductions

Locking TEP (titanium elastic pin) has been developed to take advantage of more than the titanium elastic pin by giving slope to the front the elastic intramedullary nail system to improve stability and providing easy of application.

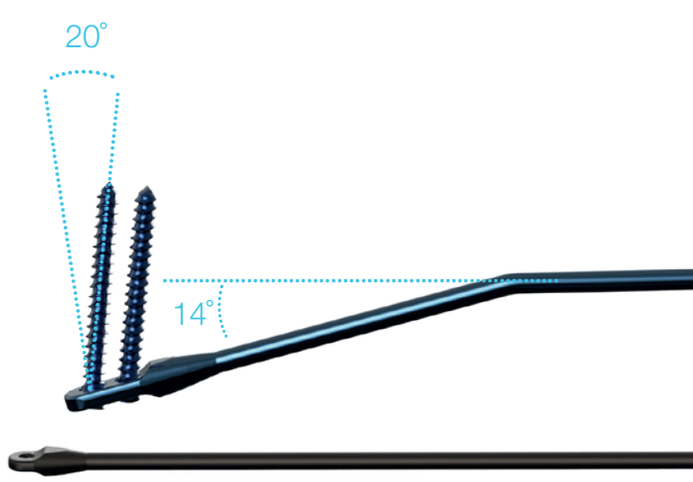
Axial and rotational stability are increased by

locking with the grooved hill of nail located in the fixing hole in the end part.

Minimally invasive surgical approach is preferred in the treatment of long bone fractures in pediatric orthopaedics. This system is designed for the treatment of long bone fractures seen in children and young people. This system can also be used in the treatment of humerus and upper extremity diaphyseal fractures in adults and in the femur and tibia fractures for small-statured patients.

L-TEP has significant advantage for fixation of diaphyseal fractures of narrow medullary canal. There are elastic nails flat, flexible, having different diameters and lengths also corrective, generating distraction and reduction forces beside this curved nails are available increasing application and stability.

Front slope of these nails are formed at the production stage appropriately with the surgical technique.
L-TEP is an intramedullary nailing system locking on the bone cortex with its end to provide rotational stabilization.
It is based on the symmetrical bracing action of two elastic nails inserted into the metahaphysis, each of which bears against the inner bone at three points. This produces the following four properties: flexural stability, axial stability, translation stability and rotational stability. All four are essential for achieving optimal results.

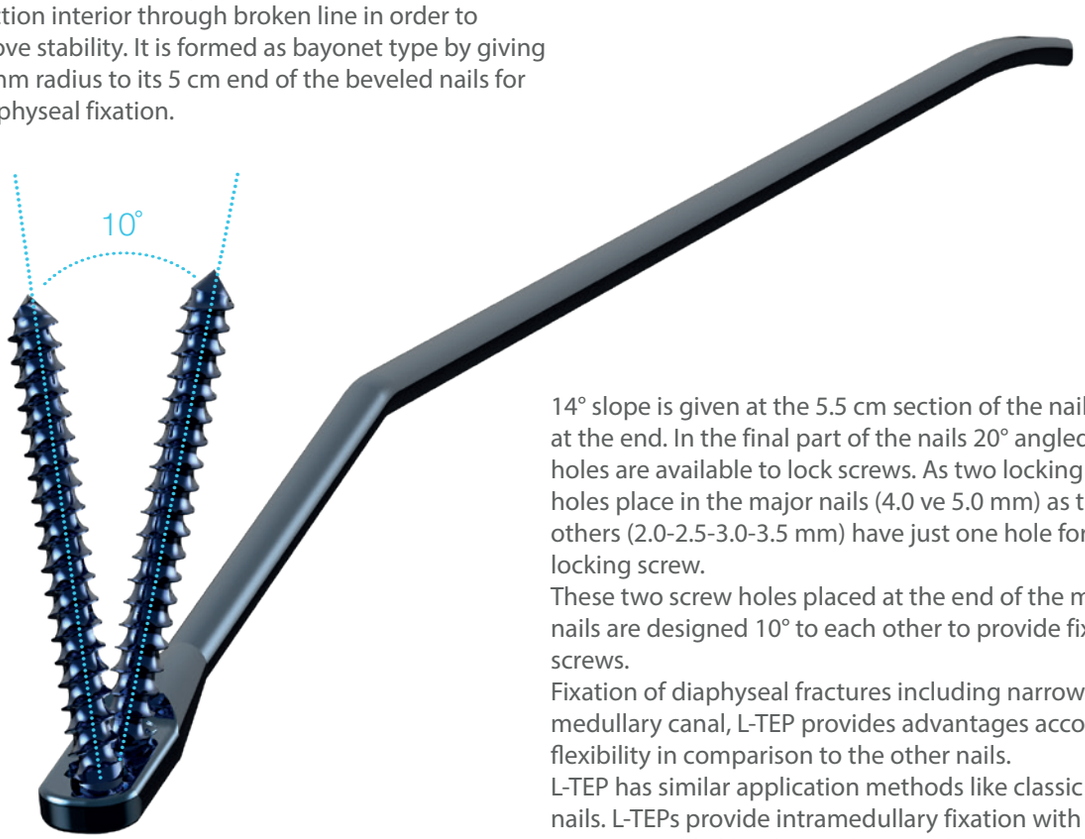


CE ISO 9001:2008
ISO 13485:2003

Features

L-TEP is produced with Ti6Al7Nb alloy suitable with ASTM F 1295/ISO 5832-11 standard and it has flexible capabilities reverted back after bending for different degrees. The system is available in two different sets of nails located; 2.0-2.5-3.0-3.5 mm a set of small nails, major ones 4.0-5.0 mm.
Straight and front slope nails are placed in the set having lengths of 200-250-300-350 and 400 mm.

It is designed inclined both end parts of the front beveled to provide easy application and comfortable detection interior through broken line in order to improve stability. It is formed as bayonet type by giving 315 mm radius to its 5 cm end of the beveled nails for metaphyseal fixation.



14° slope is given at the 5.5 cm section of the nail placed at the end. In the final part of the nails 20° angled screw holes are available to lock screws. As two locking screw holes place in the major nails (4.0 ve 5.0 mm) as the others (2.0-2.5-3.0-3.5 mm) have just one hole for the locking screw.
These two screw holes placed at the end of the major nails are designed 10° to each other to provide fixation of screws.
Fixation of diaphyseal fractures including narrow medullary canal, L-TEP provides advantages according to flexibility in comparison to the other nails.
L-TEP has similar application methods like classic elastic nails. L-TEPs provide intramedullary fixation with three point principle like classic elastic nails. Besides it provides fixation with locking screw at the end of the nails as it is defined in the name of the product.

The significant feature of the L-TEP is resolving/minimising of migration and irritation problems occurring frequently in the TEN applications with increasing stability.

Another feature offered by the system is no need to form the nails during the operation with the previously shaped nails. This feature significantly shortens the operation time.

It is an advantage that there is also straight form of nails in the set container allowing the user bending or curving the L-TEP according to operation requirements.
There are two different types of this special curved L-TEP as lateral and medial
As known elastic nails are generally applied with in pairs.
Lateral nail placed in the set container is used in the double nailing application by fixing the nails opposite direction (medial & lateral) to each other.
As an example; all the end of nails has to direct to the side of application in the place of metaphyseal fixation (final position) during the opposite to each other proximal tibia or distal femur double nailing application. In other words, after the application, the end of the nail entered from the lateral has to direct to lateral cortex and the end of the nail entered from the medial have to direct to medial cortex.
There may always not be the opportunity of fixation of the implant by opposite to each other (medial & lateral) during the double nailing application. For example, both of the nails have to be applied from lateral in the application of humerus or femur proximal entrances.

Position of the Lateral and Medial nails applied lateral of the Proximal Humerus

Position of lateral nails in opposite directions applied distal of the femur

Medial nails are designed with diameters of 3.5 mm and 4.0 mm according to these requirements.
Fixation direction of end point in the metaphysis is designed to reach to medial cortex despite the entrance from lateral of the other nail as the first one entered from the lateral reaches to lateral cortex.
To summarize; L-TEPs are designed suitable for minimal invasive surgical approach and they can be double applied.
For this purpose, L-TEPs have the feature of applicability of both of nails from the lateral entrance or as one of from medial entrance the other one from the lateral.
L-TEPs can be implanted with the antegrade or retrograde techniques providing protection of epi-physeal line.

Indications

L-TEP is used for intramedullary fixation of diaphyseal and metaphyseal fractures of long bones in children.

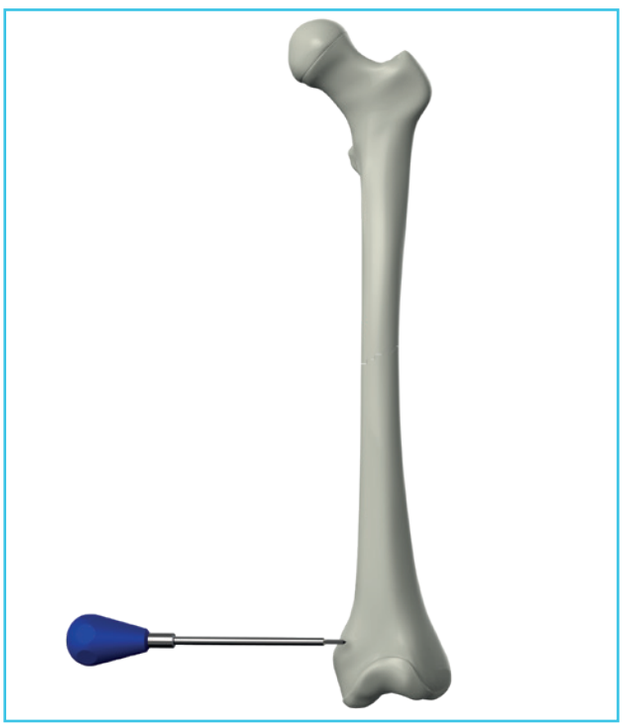
Indication range of L-TEP varies according to the patient's age, fracture zone and type of fracture.

L-TEP can be used at the long bones of upper and lower extremity (transverse, oblique, spiral short diaphyseal fractures and metaphyseal fractures) for children aged between 3-15 years with intramedullary nailing system.

Also it can be used for adults to fix humerus and forearm diaphyseal fractures and metaphyseal fractures.

Surgical Techique

Pre-operative planning must be done carefully.
Input point of nail and final location of the end part have to be placed out of the articular capsule for the protection of epiphysis and epiphyseal plate and can vary according to the anatomical region to be applied
Example surgical technique: Standard technique applied for femoral transverse shaft fractures can be based as a beginning.



Femoral Surgical Technique

1 NAIL ENTRY POINT AND OPENING OF THE MEDULLARY CANAL:The narrowest part of the medullary canal is measured and nail diameter has to be one-third of it. Reduction is made. Full rotation control is made according to the intact limb.

The entry point of the locking TEP; it should be 2.5 cm proximal to the distal physis one another as opposite, medial and lateral. Take care not to damage growth plate. It is important for symmetrical connection to open medullary space concordant from both parts.

The length of the nails should be adjusted in the pre-operative period. The length of the nail should be short 4 cm from the distance between proximal and distal physis of the fractured bone.

L-TEP is entered into the bone by passing the cortex with *Awl* and reached the medulla by using *Curved Awl* with 45° to the shaft axis. Entry hole has to be 1 mm greater than the nail diameter. Same process has to be repeated for the opposite entry hole.

2 INSERTING THE NAIL: Under favour of the *Nail Inserter* last part of nail can be implemented and providing the right position of the nail without the necessity of fluoroscopy.

The nail is inserted into the open medullary canal as close as possible to the fracture line. Second nail is inserted like the first one. The first cross encounter of the nails is provided on the metaphyseal region. First nail is transmitted by hand or *Hammer* to the fracture line. *Impactor-Extractor Rod* can be used during the process. Second nail is transmitted like the first nail.
Fracture reduction can be done by turning the nails.
End of nail is sent a few centimetres forward to the fracture to provide fracture fragments to hold on safely.
The nails are sent through the fracture line in sequence by making last reduction.
Second cross encounter of the nail is provided after passing the fracture zone and end points of nails not to damage to femoral calcar.

3 THE FINAL POSITION OF THE NAIL:

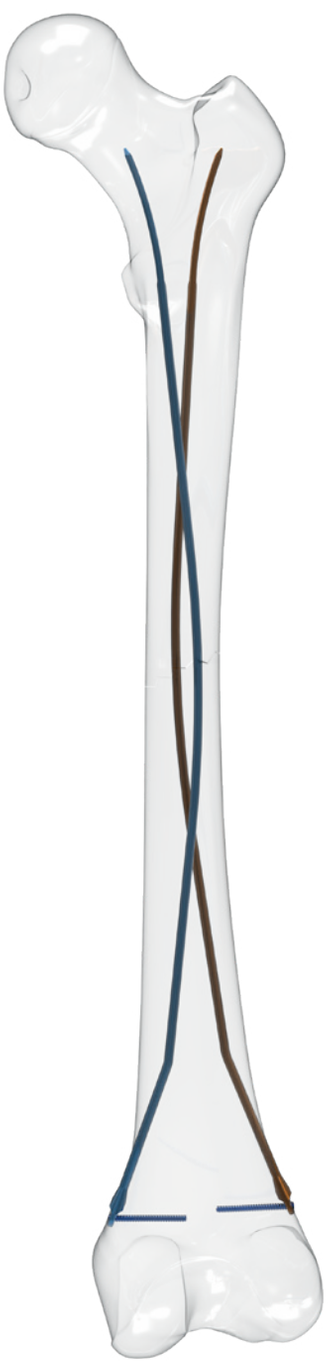
Final stabilization is made in that ways 2 cm distal to proximal epiphys line with the help of fluoroscopy control of nail position. At this step, the *Nail Inserter* is taken out. Provide the nail dive in cortex with the help of *Final Impractor* with the slight strikes of hammer.

4 THE IMPLEMENTATION OF THE LOCKING SCREW OF THE NAIL:

Drill with *Bone Drill* with constant angle by installing the *Threaded Drill Sleeve* to lock the hole of the nail.

Length of screw is determined with the *Depth Gauge*.

The appropriate locking screw is inserted through the nails locking hole with a *Screwdriver* to fix the nails. The operation is terminated by the suture of the incision area.



5 LATERAL AND MEDIAL NAILING TECHNIQUE: Monolateral application method is preferred in fracture of femoral diaphysis close to distal and fracture of distal metaphysis.
This technique is different from the shaft fracture fixation technique.
Entrance area is opened approximately 1.5 cm from the antero-lateral of the subthrocanteric area longitudinally for the first nail.
Second nail is inserted 1 cm lateral to the first nail's entry point with the same principle as the first one.
Medial nail is used to provide support in the medullary canal at the level of fracture. First and second nail are inserted to fracture line on the base of three-points principle.
The nails are positioned furthering with TEP *Final Impactor* after the nails' alignment in order to provide support against each other for reduction and detection.
Fracture fixation is completed with inserting the nail locking screws.

Tibial Surgical Technique

It is always fixed in tibia antegradly not to damage entry point of tendon at distal, so it is contraindicated in the fractures of proximal tibia. Plane of the nails is settled diagonally because of triangular anatomical structure of the tibia and in this case, it is tent to recurvate tibia by causing tension on the posterior.

The entry point is determined as antero-lateral and antero-medial in the 1-2 cm distal of the proxymal physics. The first nail is transmitted by passing through the fracture line with *Inserter* and anatomic reduction is provided before proceeding adhesion in the distal metaphysis.
After all, detection is completed by furthering second nail to the fulcrum.

Ulna Radius Surgical Technique

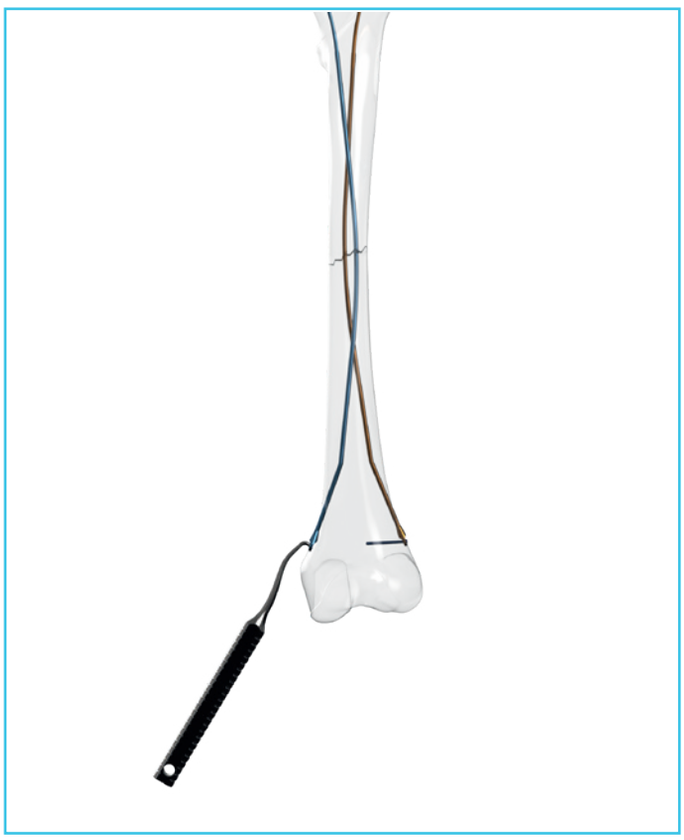
Just one nail is inserted individually in the radius and ulna intramedullary applications because both bones generate one unit.
A single nail is used on both radius & ulna to fill 60% of the medullary canal.
It is recommended that the nail should always be placed in a retrograde approach on the radius to avoid the risk of damage to the radial nerve which is close to elbow joint
Entry point is determined at the proximal of radial steloid or on the lister tubercul (from approximately 1 cm proximal of physis) for radius diaphysis fractures. Incision is made in distal 2 cm in length toward dorso-radial by saving radial nerve.
Ulna entry point is determined from posterior of olecranon antegradly or 2 cm from proximal metaphysis to olecranon apophysis.

Humeral Surgical Technique

Monolateral antegrad technique is used to treat fractures of the distal humerus.
In this technique, entry point is determined at the level of lateral humerus deltoid muscle connection point.

The nail entry points are opened to nails approximately located on 1.5 cm distal and 1 cm lateral from each other.
Fracture fixation is made suitable via determined principles.
Monolateral retrograd technique is used on posterior implanting zone to treat fractures of the proximal humerus and humerus shaft.

In this technique, entry point is located exterior postero-lateral of the lateral supracondylar hill for each nails.
Nails are applied for humerus with same standard techniques used for tibia and forearm fractures.



Removing of the Implant

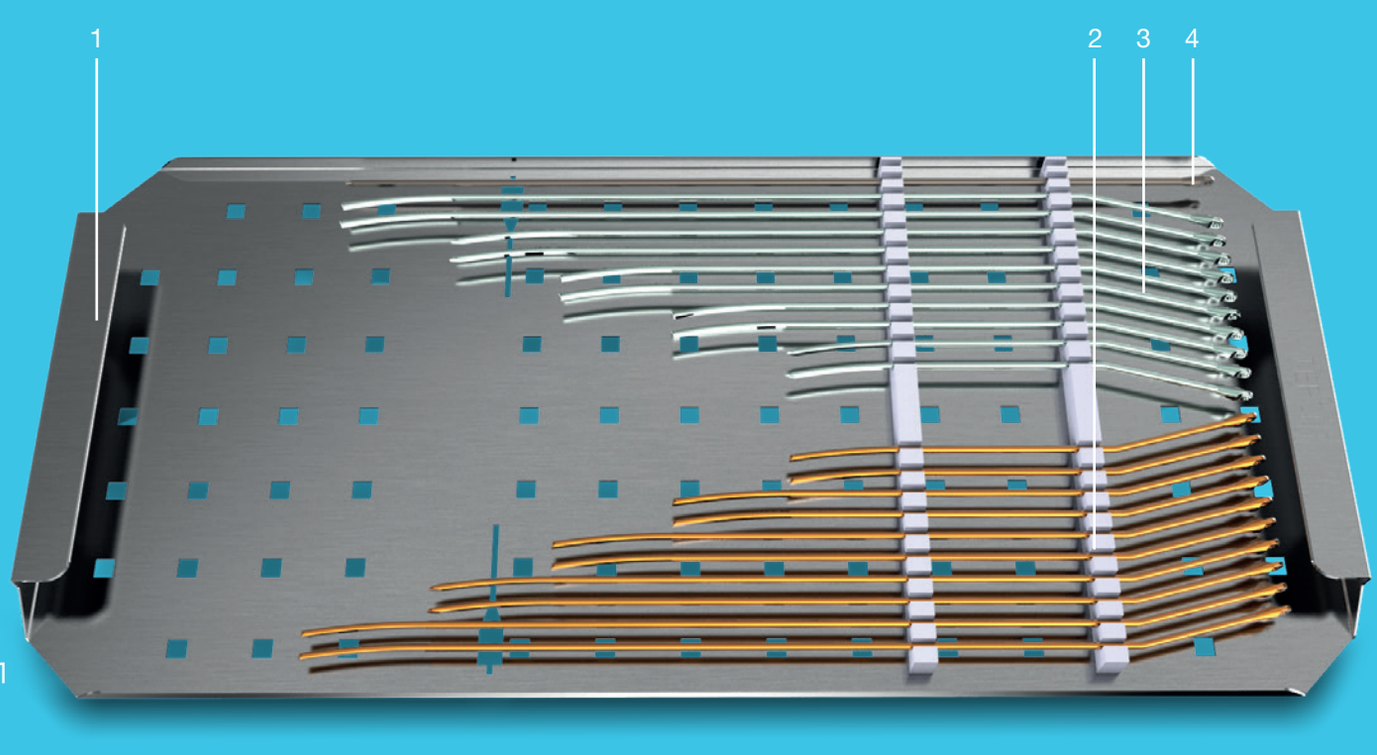
Locking screw is removed with a screw driver compatible with locking screw of the nail. Screw is pulled to the surface of the bone outwardly locking nail is inserting of extract hook with the screw hole.
It can be used as shown in figure above with *Impractor-Extractor Rod*, the rear portion of the hook in the meantime.

All of the nail is pushed out of the bone with *Impractor-Extractor Rod* and slightly strikes of *Hammer*, *Nail Inserter* is inserted the section once taken out of the bone 2.5 cm section of the end of nails.

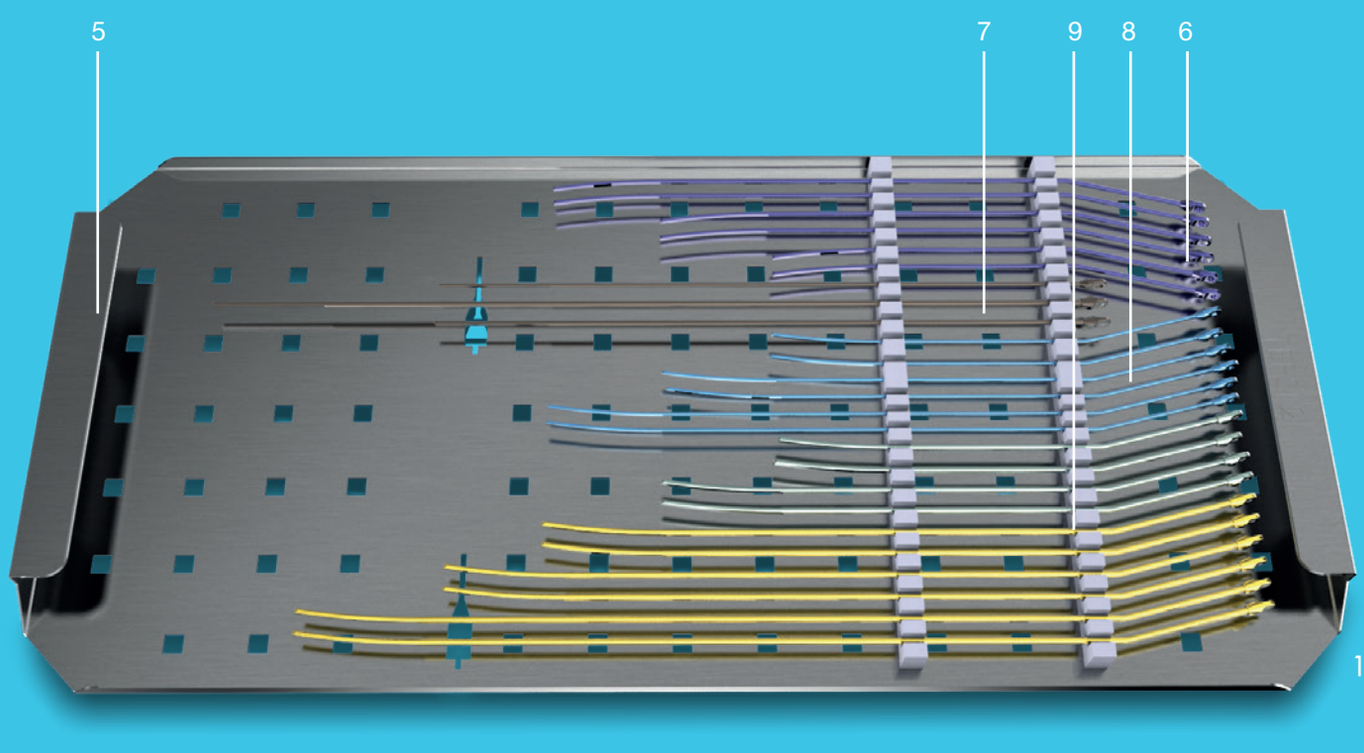
Implants & Instruments

2.0-2.5-3.0-3.5 mm Locking TEP

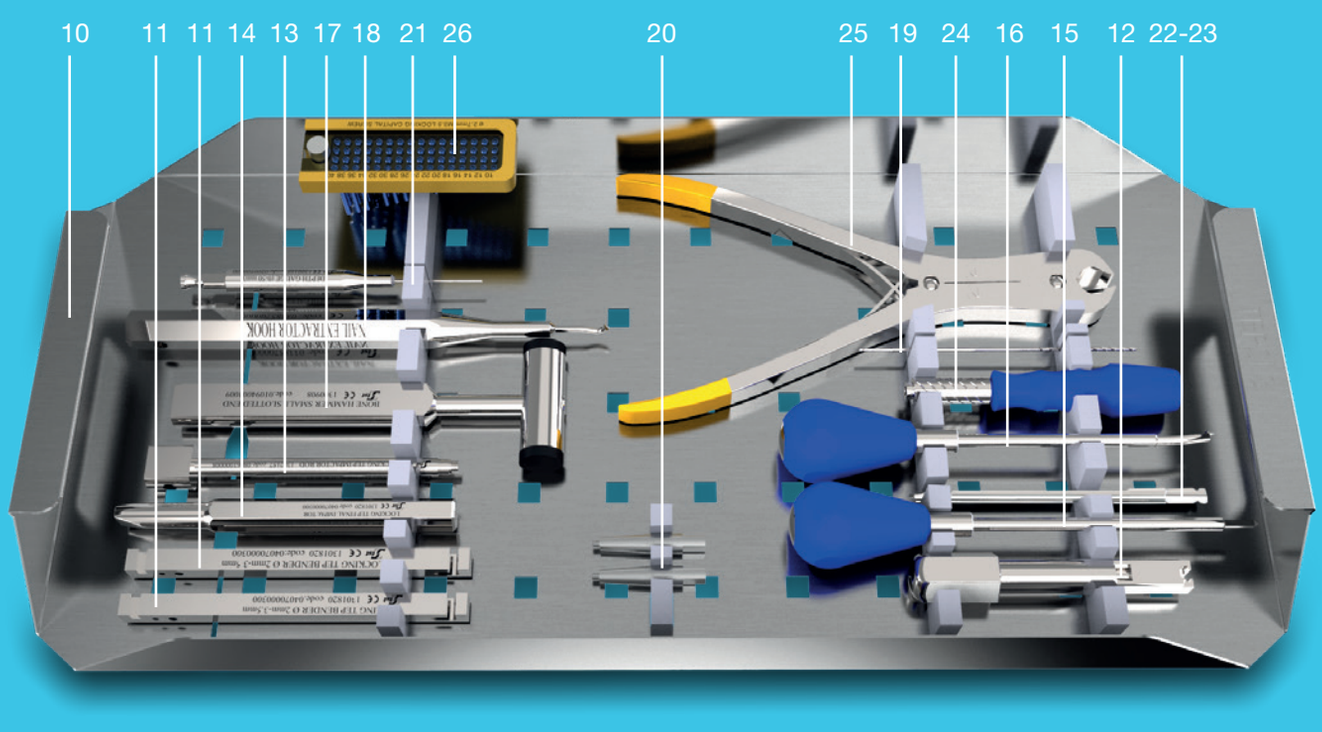
NO	CATALOG NO	UBB NO	DESCRIPTION	QTY
1	10100		1. DESIGN TRAY	1
2	83527200935	8699931020410	LOCKING TI ELASTIC PIN (M-TEP) 3.5X200 MM	2
	83527250935	8699931029437	LOCKING TI ELASTIC PIN (M-TEP) 3.5X250 MM	2
	83527300935	8699931029444	LOCKING TI ELASTIC PIN (M-TEP) 3.5X300 MM	2
	83527350935	8699931029444	LOCKING TI ELASTIC PIN (M-TEP) 3.5X350 MM	2
	83527400935	8699931020618	LOCKING TI ELASTIC PIN (M-TEP) 3.5X400 MM	2
3	83527200035	8699931009323	LOCKING TI ELASTIC PIN (L-TEP) 3.5X200 MM	2
	83527250035	8699931029376	LOCKING TI ELASTIC PIN (L-TEP) 3.5X250 MM	2
	83527300035	8699931009378	LOCKING TI ELASTIC PIN (L-TEP) 3.5X300 MM	2
	83527350035	8699931029383	LOCKING TI ELASTIC PIN (L-TEP) 3.5X350 MM	2
	83527400035	8699931019551	LOCKING TI ELASTIC PIN (L-TEP) 3.5X400 MM	2
4	82020400035	8699931029529	LOCKING TI ELASTIC PIN (STRAIGHT) 3.5X400 MM	2



NO	CATALOG NO	UBB NO	DESCRIPTION	QTY
5	10200		2. DESIGN TRAY	1
6	83527200020	8699931009057	LOCKING TI ELASTIC PIN (L-TEP) 2X200 MM	2
	83527250020	8699931029338	LOCKING TI ELASTIC PIN (L-TEP) 2X250 MM	2
	83527300020	8699931009101	LOCKING TI ELASTIC PIN (L-TEP) 2X300 MM	2
7	82020300020	8699931029499	LOCKING TI ELASTIC PIN (STRAIGHT) 2.0X300 MM	2
8	83527200025	8699931009149	LOCKING TI ELASTIC PIN (L-TEP) 2.5X200 MM	2
	83527250025	8699931029345	LOCKING TI ELASTIC PIN (L-TEP) 2.5X250 MM	2
	83527300025	8699931009194	LOCKING TI ELASTIC PIN (L-TEP) 2.5X300 MM	2
7	82020300025	8699931029505	LOCKING TI ELASTIC PIN (STRAIGHT) 2.5X300 MM	2
9	83527200030	8699931009231	LOCKING TI ELASTIC PIN (L-TEP) 3X200 MM	2
	83527250030	8699931029352	LOCKING TI ELASTIC PIN (L-TEP) 3X250 MM	2
	83527300030	8699931009286	LOCKING TI ELASTIC PIN (L-TEP) 3X300 MM	2
	83527350030	8699931029369	LOCKING TI ELASTIC PIN (L-TEP) 3X350 MM	2
	83527400030	8699931019544	LOCKING TI ELASTIC PIN (L-TEP) 3X400 MM	2
7	82020400030	8699931029512	LOCKING TI ELASTIC PIN (STRAIGHT) 3X400 MM	2



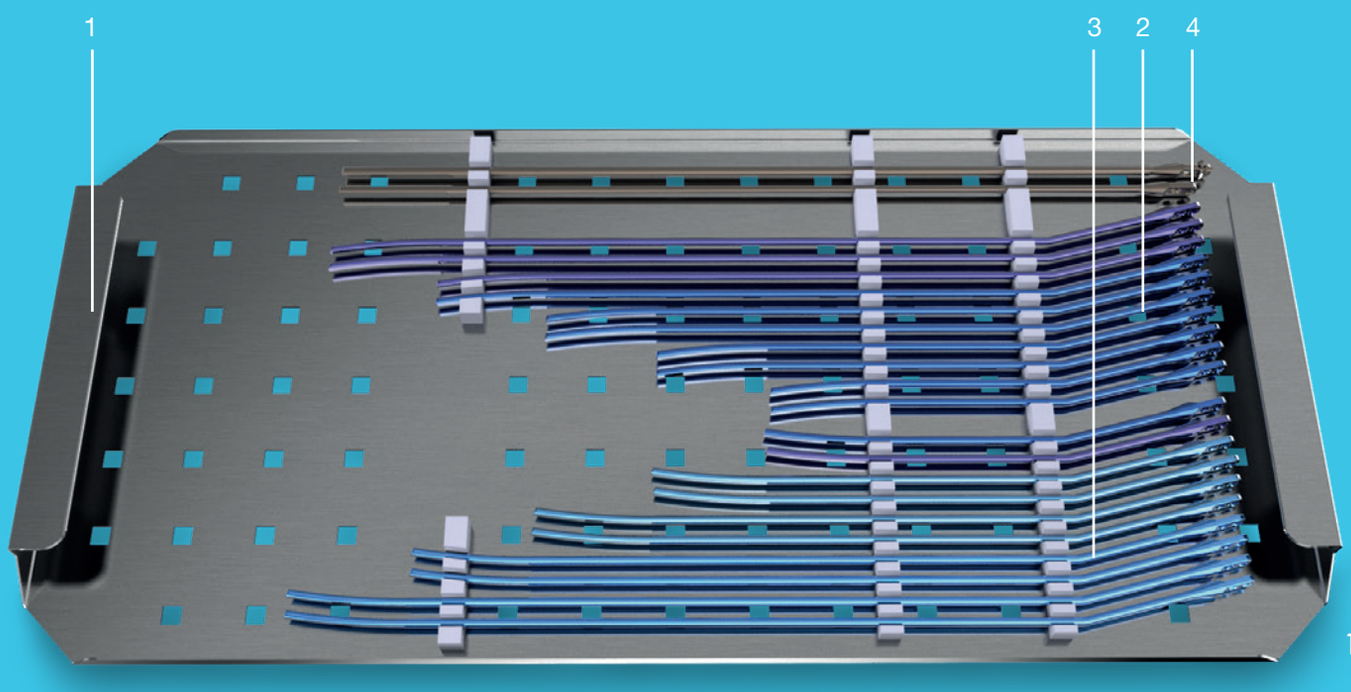
NO	CATALOG NO	UBB NO	DESCRIPTION	QTY
10	10300		3.DESIGN TRAY	1
11	08210002035	8699931029758	LOCKING TEP BENDER Ø 2 MM – Ø 3.5 MM	2
12	08310002035	8699931029772	LOCKING TEP INSERTER Ø 2 MM- Ø 3.5 MM	1
13	08061000008	8699931029925	LOCKING TEP IMPACTOR-EXTRACTOR ROD	1
14	04070000300	8699931029918	LOCKING TEP FINAL IMPACTOR	1
15	08210000004	8699931029710	AWL 4 MM	1
16	08310000004	8699931029734	CURVED AWL 4 MM	1
17	01194003009	8699931028157	BONE HAMMER SMALL WITH SLOTTED END	1
18	03385700000	8699931029611	LOCK. NAIL EXTRACTOR HOOK	1
19	22310130020	8698673450400	BONE DRILL 2.0X130 MM	2
20	02005800020	8699931029581	THREADED DRILL SLEEVE Ø 2 FOR SMALL HEAD SCREWS	2
21	02005000500	8698673497023	DEPTH GAUGE (0-50 MM)	1
22	02000452017	8699931029048	SCREW DRIVER QUICK TIP HEXAGONAL 1.7XØ4X52 MM	1
23	02101452017	8699931029055	SCREW DRIVER HEX.QUICK TIP WITH HOLDER 1.7XØ4X52MM	1
24	02010101001	8698673441187	SOFT SCREW DRIVER QUICK SMALL	1
25	02271000002	8699931000122	PIN CUTTER UP TO Ø 5	1
26	10400		L-TEP SCREW TRAY Ø 2-3.5 MM	1
	21227001027	8680858420131	NAIL FIXATION SCREW 2.7 X 10 MM	4
	21227001227	8680858420155	NAIL FIXATION SCREW 2.7 X 12 MM	4
	21227001427	8680858419500	NAIL FIXATION SCREW 2.7 X 14 MM	4
	21227001627	8680858403721	NAIL FIXATION SCREW 2.7 X 16 MM	4
	21227001827	8680858403738	NAIL FIXATION SCREW 2.7 X 18 MM	4
	21227002027	8680858403745	NAIL FIXATION SCREW 2.7 X 20 MM	4
	21227002227	8680858403752	NAIL FIXATION SCREW 2.7 X 22 MM	4
	21227002427	8680858403769	NAIL FIXATION SCREW 2.7 X 24 MM	4
	21227002627	8680858403776	NAIL FIXATION SCREW 2.7 X 26 MM	4
	21227002827	8680858403783	NAIL FIXATION SCREW 2.7 X 28 MM	4
	21227003027	8680858403790	NAIL FIXATION SCREW 2.7 X 30 MM	4
	21227003227	8680858420285	NAIL FIXATION SCREW 2.7 X 32 MM	4
	21227003427	8680858420292	NAIL FIXATION SCREW 2.7 X 34 MM	4
	21227003627	8680858420308	NAIL FIXATION SCREW 2.7 X 36 MM	4
	21227003827	8680858420315	NAIL FIXATION SCREW 2.7 X 38 MM	4
	21227004027	8680858420322	NAIL FIXATION SCREW 2.7 X 40 MM	4
	00560270125	8699931010275	CONTAINER 560X270X150 MM	1



Implants & Instruments

4.0-5.0 mm Locking TEP

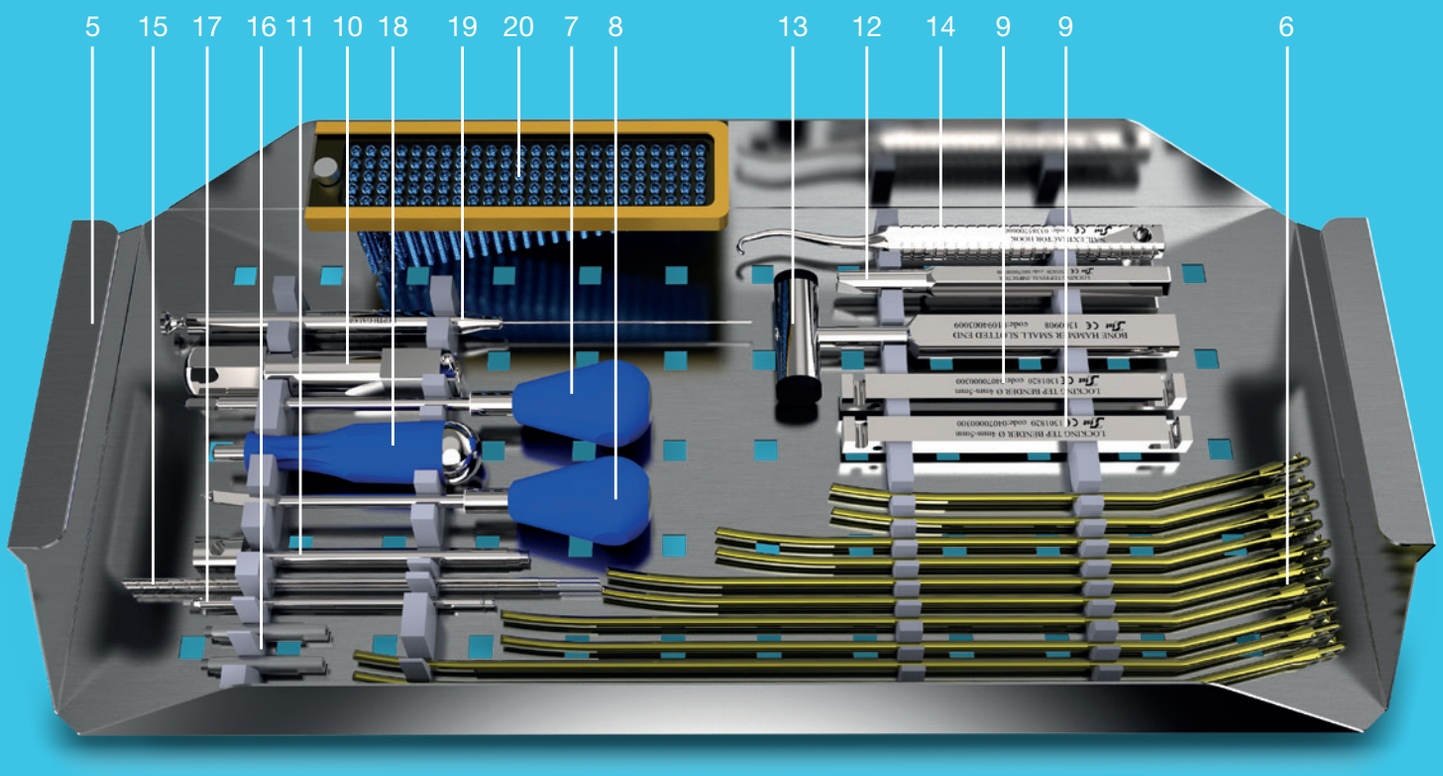
NO	CATALOG NO	UBB NO	DESCRIPTION	QTY
1	11100		1.DESIGN TRAY	1
2	83527200940	8699931020427	LOCKING TI ELASTIC PIN (M-TEP) 4X200 MM	2
	83527250940	8699931029451	LOCKING TI ELASTIC PIN (M-TEP) 4X250 MM	2
	83527300940	8699931020526	LOCKING TI ELASTIC PIN (M-TEP) 4X300 MM	2
	83527350940	8699931029468	LOCKING TI ELASTIC PIN (M-TEP) 4X350 MM	2
	83527400940	8699931020625	LOCKING TI ELASTIC PIN (M-TEP) 4X400 MM	2
3	83527200040	8699931009415	LOCKING TI ELASTIC PIN (L-TEP) 4 X200 MM	2
	83527250040	8699931029390	LOCKING TI ELASTIC PIN (L-TEP) 4 X250 MM	2
	83527300040	8699931009460	LOCKING TI ELASTIC PIN (L-TEP) 4 X300 MM	2
	83527350040	8699931029406	LOCKING TI ELASTIC PIN (L-TEP) 4X350 MM	2
	83527400040	8699931019568	LOCKING TI ELASTIC PIN (L-TEP) 4X400 MM	2
4	82020400040	8699931029536	LOCKING TI ELASTIC PIN (STRAIGHT) 4X400 MM	1
	82020400050	8699931029543	LOCKING TI ELASTIC PIN (STRAIGHT) 5X400 MM	1



Implants & Instruments

4.0-5.0 mm Locking TEP

NO	CATALOG NO	UBB NO	DESCRIPTION	QTY
5	11200		2.DESIGN TRAY	1
6	83527200050	8699931009507	LOCKING TI ELASTIC PIN (L-TEP) 5 X200 MM	2
	83502725050	8699931029413	LOCKING TI ELASTIC PIN (L-TEP) 5 X250 MM	2
	83527300050	8699931009552	LOCKING TI ELASTIC PIN (L-TEP) 5 X300 MM	2
	83527350050	8699931029420	LOCKING TI ELASTIC PIN (L-TEP) 5X350 MM	2
	83527400050	8699931019575	LOCKING TI ELASTIC PIN (L-TEP) 5X400 MM	2
7	08210000055	8699931029727	AWL 5.5MM	1
8	08310000055	8699931029741	CURVED AWL 5.5MM	1
9	08210004050	8699931029765	LOCKING TEP BENDER 4MM-5MM	2
10	08310004050	8699931029789	LOCKING TEP INSERTER 4MM-5MM	1
11	08061000008	8699931029925	LOCKING TEP IMPACTOR-EXTRACTOR ROD	1
12	04070000300	8699931029918	LOCKING TEP FINAL IMPACTOR	1
13	01194003009	8699931028157	BONE HAMMER SMALL WITH SLOTTED END	1
14	03385700000	8699931029611	LOCK. NAIL EXTRACTOR HOOK	1
15	22310200027	8698673450431	BONE DRILL 2,7 X 200 MM	2
16	02005800027	8699931029574	THREADED DRILL SLEEVE Ø 2.7 (40 MM)	2
17	02020101025	8698673493315	SCREW DRIVER QUICK TIP 2.5XØ5X120 MM	1
18	02010101001	8698673441187	SOFT SCREW DRIVER QUICK SMALL	1
19	02005000100	8698673497047	DEPTH GAUGE - LOWER EXTREMITY PLATES	1
20	11300		L-TEP SCREW TRAY Ø 4-5 MM	1
	24427140040	8698673490123	CANCEL. LOCK. SCREW TI 4 X 14 MM	5
	24427160040	8698673490130	CANCEL. LOCK. SCREW TI 4 X 16 MM	5
	24427180040	8698673457614	CANCEL. LOCK. SCREW TI 4 X 18 MM	5
	24427200040	8698673490154	CANCEL. LOCK. SCREW TI 4 X 20 MM	5
	24427220040	8698673490161	CANCEL. LOCK. SCREW TI 4 X 22 MM	5
	24427240040	8698673457621	CANCEL. LOCK. SCREW TI 4 X 24 MM	5
	24427260040	8698673457638	CANCEL. LOCK. SCREW TI 4 X 26 MM	5
	24427280040	8698673490192	CANCEL. LOCK. SCREW TI 4 X 28 MM	5
	24427300040	8698673490208	CANCEL. LOCK. SCREW TI 4 X 30 MM	5
	24427320040	8698673490215	CANCEL. LOCK. SCREW TI 4 X 32 MM	5
	24427340040	8698673490222	CANCEL. LOCK. SCREW TI 4 X 34 MM	5
	24427360040	8698673490246	CANCEL. LOCK. SCREW TI 4 X 36 MM	5
	24427380040	8698673490253	CANCEL. LOCK. SCREW TI 4 X 38 MM	5
	24427400040	8698673490260	CANCEL. LOCK. SCREW TI 4 X 40 MM	5
	24427420040	8698673490277	CANCEL. LOCK. SCREW TI 4 X 42 MM	5
	24427440040	8698673457645	CANCEL. LOCK. SCREW TI 4 X 44 MM	5
	24427460040	8698673490307	CANCEL. LOCK. SCREW TI 4 X 46 MM	5
	24427480040	8698673490314	CANCEL. LOCK. SCREW TI 4 X 48 MM	5
	24427500040	8698673490321	CANCEL. LOCK. SCREW TI 4 X 50 MM	5
	24427550040	8698673490338	CANCEL. LOCK. SCREW TI 4 X 55 MM	5
	24427600040	8698673490345	CANCEL. LOCK. SCREW TI 4 X 60 MM	5
	00560270125	8699931010923	CONTAINER 560X270X125 MM	1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RADIOGRAPHIC CASES

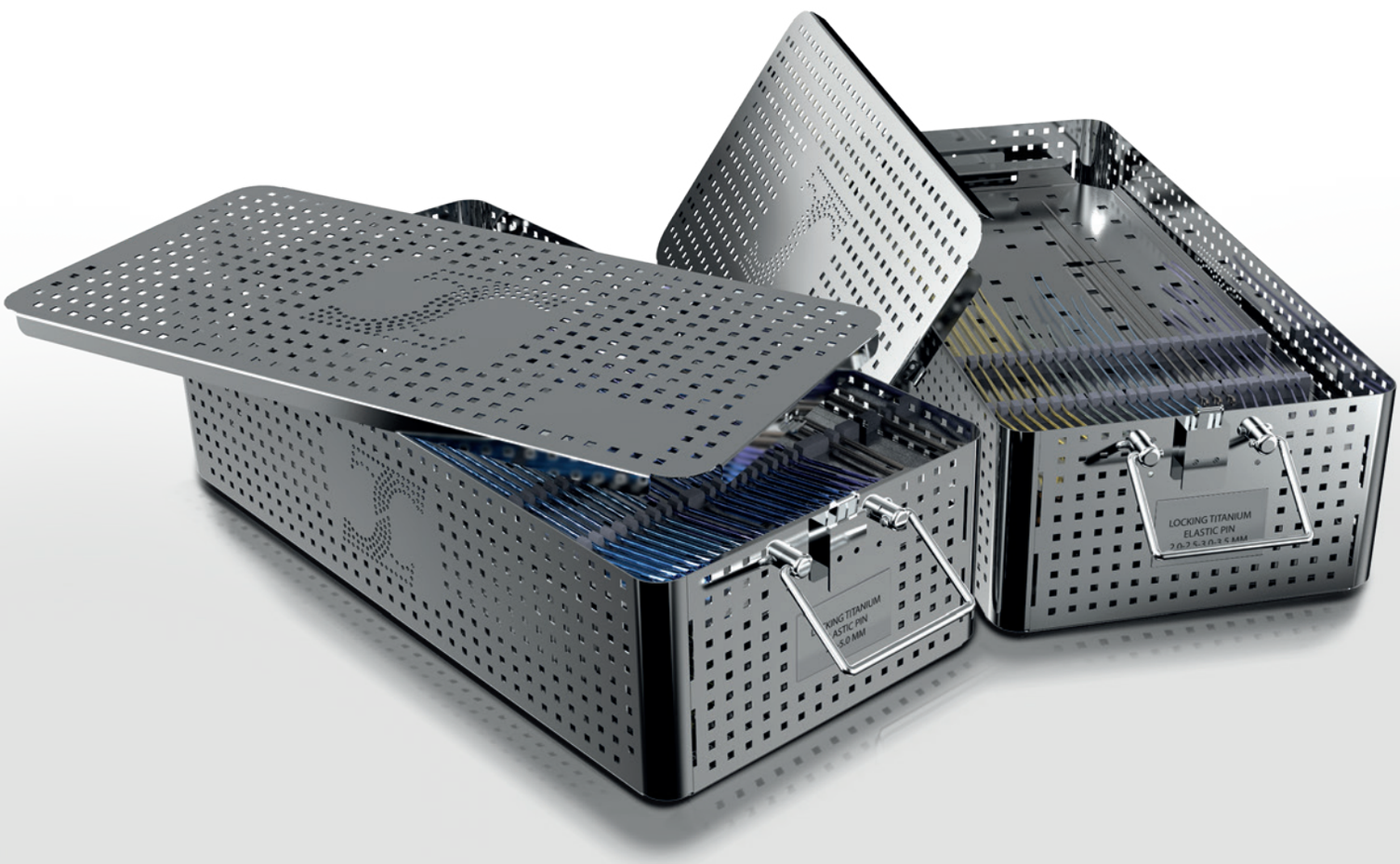
Pre-op AP

Pre-op Lateral

Post-op AP

Post-op Lateral

Notes



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