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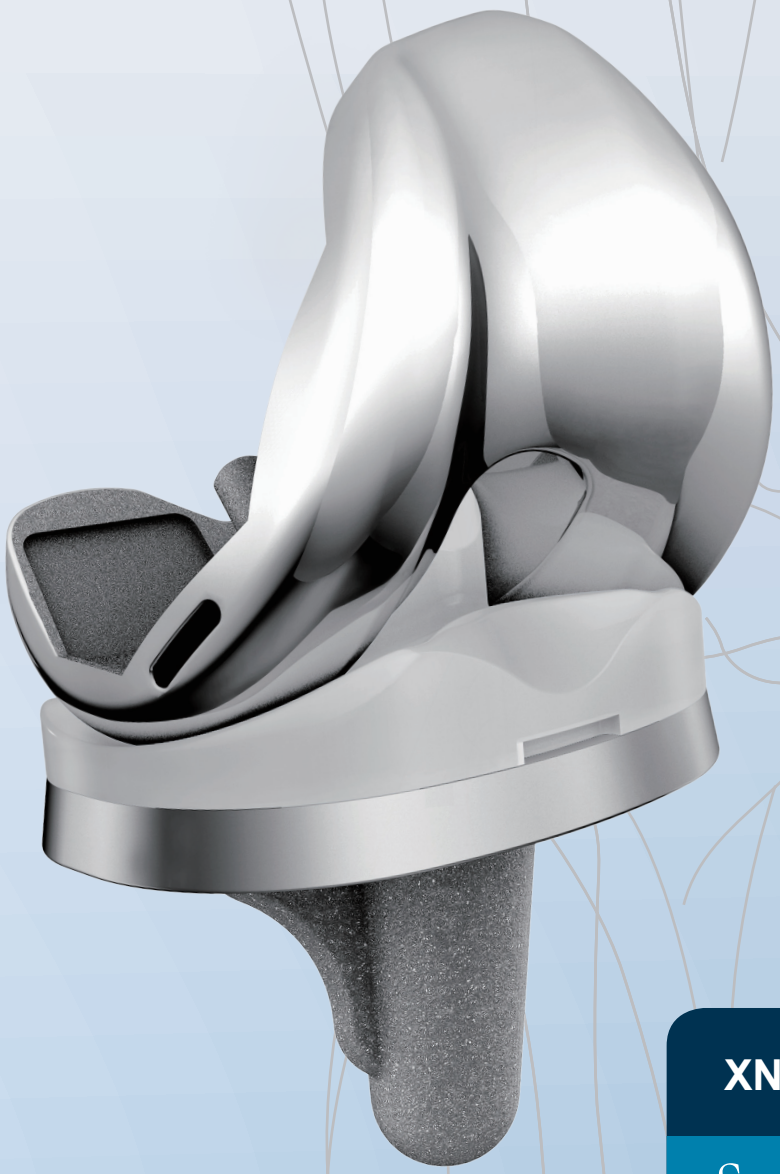


# XN Total Knee System

## Surgical Technique

Beijing Chunlizhengda Medical Instruments Co., Ltd

# CONTENTS

# Products Introduction

## 01 Femoral Design

1.Anatomic arc angle design,reduce the pressure for soft tissue.
2.The anterior condyle is thinner,is effective to avoid prepatellar pain.
3.Deeper trochlea and lengthier recess lowers loosen rate of lateral ligament and prevents patellar tendinitis.
4.Column design, increase the stability of the prosthesis during high flexion.
5.The semi-open design of the intercondylar fossa reduces the wear of the tibial plateau.
6.Extending and shortening the posterior condyle design,high flexion allow rotation and keep the stability, can reach 155 ° of high flexion.

## 02 Tibial Design(Symmetrical/Dissected/Rotated)

1.The keel wing design provides initial implantation stability.
2.5° of caster angle,prevent the frontal cortex from colliding.
3.Accurate and stable locking design reduces movement.
4.Can match with the insert of PS&CR.
5.The anatomical tibial plateau design, the tibial plateau was better covered,lower the subsidence of tibial plateau.

## 03 Tibial Insert Design

1.The deep notch design of front of the platform pad,reduce the adverse effect on the patellar ligament because of high flexion.
2.The column of tibial insert is moved 2mm from normal position,
the crossbeam of femoral condyle can contact with the column firstly in the flexion process,reducing the impact force,preventing the column from breaking.
3.Aquiline nose - shaped column design reduces the risk of dislocation in the process of high flexion.
4.The double joint surface's bonding mechanism between the column and the crossbeam, reduces the pressure to the column, reduces the wear.
5.Two types,CR&PS.

## Indication

- Joint noninflammatory lesions,include OA,TA,FHN.
- Inflammation of the joints
- Correction of functional deformity
- Other problems suitable for TKA treatment

## Contraindication

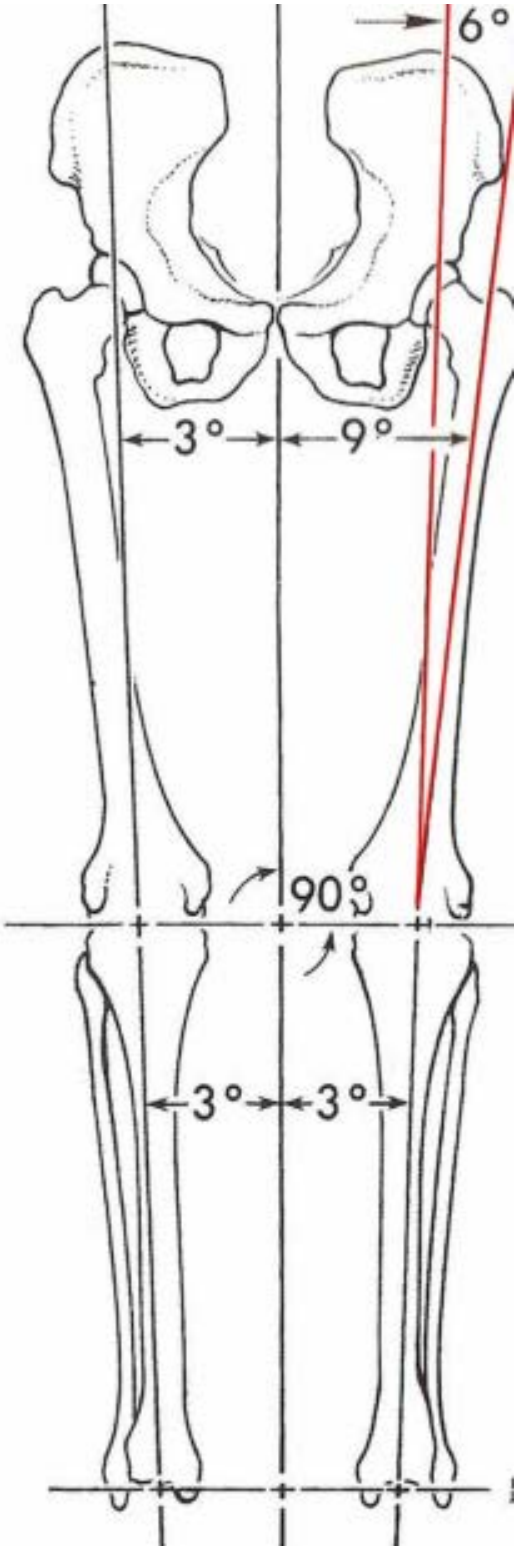
1. Apparent infection
2. A distant infection of the lesion.
3. The disease develops rapidly, manifested by the obvious joint collapse or bone absorption under the X-ray fluoroscopy.
4. Patients with immature skeletal structure.
5. Cases of insufficiency of neuromuscular function.

## Preoperative preparation

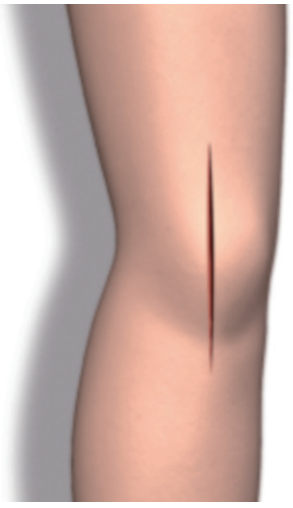
1. Make the preoperative X-ray, the straight line between the center of the femoral medullary cavity and the midpoint of the knee joint, is the anatomical axis of the femur;the connection between the center of the femoral head and the midpoint of the knee joint, is the mechanical axis.The angle of these two lines is valgus angle.

2. The valgus angle should be measured ,it is usually between 3°-8°,the valgus angle should be confirmed well before the distal femur osteotomy ,generally,choose 5°-7°.

3. It should be confirmed the size of each component and the thickness of osteotomy by using prosthetic template before operation.



# Surgical Technique



- Supine position.
- Anterior midline incision.If there is a local old incision, use the original incision, or further extend the old incision to reduce the risk of skin exfoliation.
- The joint capsule was incised by the medial patellar approach.

# Tibial Preparation

## Confirm femoral force line

**Purpose.**

Ensure that the osteotomy plane of the tibia is perpendicular to its mechanical axis.

# Tibial extra-medullary location

- XN tibial cutting guide has L and R,two sizes,and general cutting guide,aim to avoid soft tissue collision.
- The extra-medullary tibial cutting guide is an assembly including a ankle attaching device, adjustable rod, alignment guide and tibial resection block.
- Tibial resection block has two types,caster angle 3° and 5°

- Tibial cutting guide is assembled and installed on the tibia.Confirm direct tibial resection block,L or R.

- First stable the tip of the alignment guide which is two pins in between the two tibial eminenc or one-third after intercondylar ridge.

## Flexion and extension alignment

- Be sure the alignment guide should be parallel to the tibia, and center of ankle attaching device should be towards the middle of ankle joint, then loosen the knob nut at the distal end of the cutting guide for adjusting posterior slope.
- When the long axis of the proximal end of the extramedullary positioning rod is parallel to the coronal plane of the tibia, the correct anterior-posterior alignment is achieved.

## Internal and external inversion alignment

- Loosening the distal knob of the ankle attaching device, the distal component can slide on and out to adjust the internal and external inversion alignment line until the tibial center is aligned with the extramedullary positioning rod.
- When the long axis of the proximal end of the extramedullary positioning rod is parallel to the coronal plane of the tibia, the correct anterior-posterior alignment is achieved.

- After obtaining the triaxial alignment, tighten the knob on the ankle attaching device.

## Tibial posterior angle adjustment

- Remark:If the long axis of the proximal end of the extramedullary positioning rod is parallel to the tibia,confirm the caster angle according to tibial resection block.The posterior angle can be 3° and 5° .If the tibial resection block is 0° of posterior angle,the posterior angle of osteotomy is 0° , 3° is same.
  Pull the rod by back and forth,can adjust posterior angle.

## Internal and external rotation alignment

- Rotate the assembly to confirm that the base is aligned to the center of the ankle. In general, the center of the ankle is aligned with the second metatarsal. It is best to mark the second metatarsal, the midline of the tibia, and the tubercle of the tibia to ensure the correct force line.

# Tibial Preparation

## Purpose

Proper osteotomy of tibial for implanting prosthesis

## Measure tibial osteotomy

- With the tibial resection gauge, the surgeon can decide how much of the thickness of proximal tibia will be cut simply putting the gauge in the slot of tibia resection cutting block. The resection gauge provides either 2mm or 10mm resection choices.
- 2mm gauge:if not severe medial plateau chondrosis, simply put the tip of the 2mm gauge on the lowest point of the medial plateau.
- 10mm gauge:if severe cartilage loss on one plateau, we suggest a 10mm gauge be on the less damaged plateau.

- Confirm osteotomy with measuring guide,locking the nuts below the tibial resection block, fix the resection block with two pins on the holes marked with “0”

## Tibial posterior angle adjustment

- Installation of frame of measuring force line on tibial resection block.Using rod of force line to check the alignment again to be sure it is correct.

- Remove the alignment guide with only resection block left in place.

- Confirm osteotomy with measuring guide again,(if need,can adjust osteotomy by adjusting holes,implant one toenail to fix resection block.

- Use the saw of 1.2mm to finish osteotomy.

- Remove toenail and resection block,keep 2 long screw.

- Use the saw to repair the tibial surface. The resection of tibia is completed.

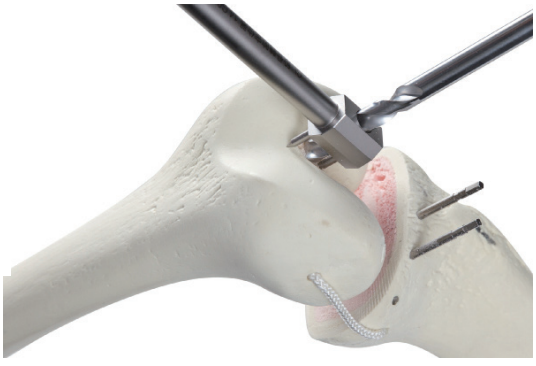
# Femoral Preparation

## Femoral intramedullary localization

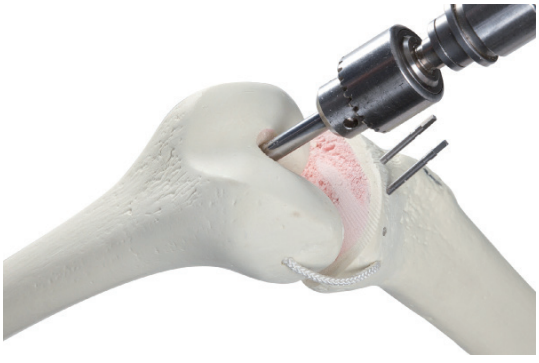
### Purpose

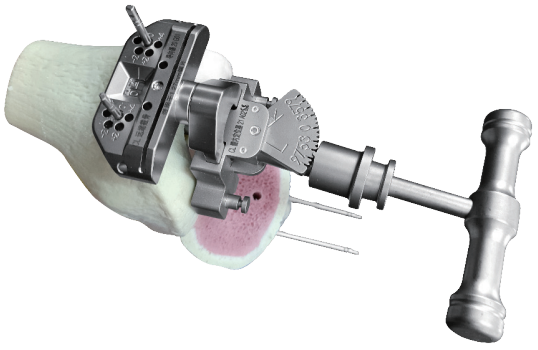
The osteotomy plane of the distal femur was determined at the correct the angle of valgus.

- Opening the femoral canal: locate the entry portal of femoral canal at a point about 0.8cm-1.5cm anterior to the femoral insertion of PCL.



- Use the 8mm of provided drill to open the canal.





The Rod of Femoral Medullary Guide have two types.Suggest:choose the long rod in order to correct anatomical axis. According to the interpretation of preoperative radiographs, adjust the guide knob, select the appropriate valgus angle (note check "R" "L" position is correct, usually choose 5-7 degrees) femoral medullary guide plug in medullary cavity slowly until fully fitted to the distal femoral surface.

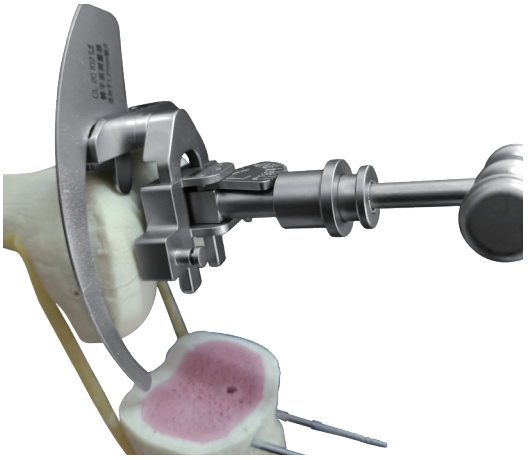
Impact the fixed screw of femoral medullary guide.

## Resection of distal femur

### Purpose

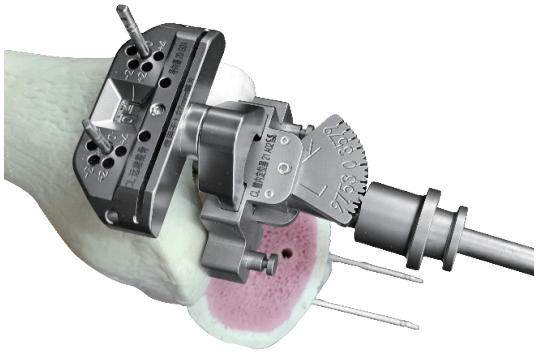
Cutting distal femur at the correct the angle of valgus.

- Insert Distal Femur Cutting Guide into the Femoral



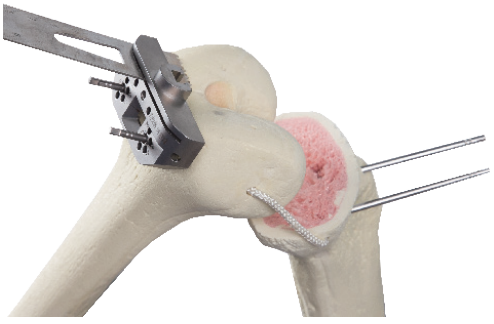
- Measure the bone resection with the resection guide , the position of resection is “0”,so the thickness of planned resection bone will be 8mm (if adjust the bone resection, we can adjust by the hole position of “±2”, “ ±4”).

- Impact two toenails to fix in the holes of position "0".



- Be sure the correct alignment: Installar the line corrector,insert the alignment rod , should be through the center of femoral head and center of the knee joint.

- Finish the osteotomy of distal femur.Confirm the osteotomy with measuring guide again.(if adjust the bone resection, we can adjust by the hole position of “±2”, “ ±4”),fix the resection block with toenail,use 1.2mm-1.5mm of saw to cut bone.



- Examine the osteotomy plane with flat file.

- Remove the cutting guide,keep the 2 screw in the bone.

- Measure the extension space with the spacer block (10#, 12#, 14#, 16#, 18#), if the thinness one 10# can not be put in the space then recut should be done either on the distal femur or proximal tibia.

# Measurement of femur size and osteotomy

## Purpose

Determine the size of the femoral prosthesis; perform anterior, posterior and oblique osteotomy to achieve the shape for the installation of the femoral prosthesis specimen.

- Use electrotome mark Insall line and Whiteside line.
- Refer to Insall line and Whiteside line to confirm femur external rotation angle.Choose the correct external rotation angle,(0° ， 3° ，5° ，L/R) usually select 3° .

- The femora dimension measuring device was attached to the distal femur osteotomy and the pterygoid was attached to the posterior femoral condyle.
- Move the probe mounted on the measuring device and adjust the length of the slide probe until it reaches the highest point of the anterior femoral cortex,and the numbers in the probe are as the reference.
- Reading the figure(show the size) of Measuring Femoral Sizing Guide.In same time,you should put the angle block for fixing the pins.Here is 0° /3° 、5° /7° ,usually we choose 0° /3° .
- Remove femoral dimension measuring device.

- Assemble the chosen 4 in 1 resection block , the size is same with measuring size, then measure the anterior condyle osteotomy with the resection guide. Avoid the NOTCHING. Fix the 4 in 1 resection block with two cap screws or toenail.

- If the position of the osteotomy plate needs to be adjusted (forward or backward), it can be adjusted through the holes (hole spacing 1mm).

- It is recommended for osteoporosis patients to use 4mm pin matching osteotomy plate for fixation to ensure the stability of osteotomy.

- Start to cutting femur,in order:Anterior condyle-Posterior condyle-Posterior chamfer-Anterior chamfer.




- After cutting well， remove the pin.

# Intercondylar resection

## Purpose

If confirm use PS prosthesis, it is necessary to make Intercondylar resection.

- Select the femoral condyle trial according to the size of 4 in 1 cutting plate. Use the femoral condyle holder to implant the trial, and use long pins to fix.

- Impact the osteotomy into cutting groove in the above of condyle trial by hammer.
  (For patients with hard bone, firstly can use the saw or osteotomy to cut the inner and outer walls of the condylar fossa, and then do above process)

- Use reciprocating saw blade attach the inside edge of resection block to cut bone, then remove out osteotomy by hammer.

- The osteotomy is taken out and remove the pins,then install the block to check the osteotome.

- With a limiting bit drill holes on the femoral condyle trial.

# Tibial Preparation

## Dimension choice and place confirmation of of tibial prosthesis

### Purpose

Choose right tibial tray, and place into right position.

- Choose the same size of tibial tray with femoral condyle trial(According to the coverage of tibial,can adjust the corresponding size.

  After the assembly reduction, the flexion and extension were repeated 3 to 4 times to evaluate the space of extension and flexion area and ligament stability.

  Then measure the force line of lower limb.

- Check the alignment of the tibial resection, use electrotome mark two sides of the handle, to help confirm the position of the prosthesis.

- Remove the trials of tibial tray and femoral condyle.

# Tibial Shape

## Purpose

### Prepare tibial base

- Place tibial trial platform according to previous tibial mark, assemble alignment rod to check tibial resection, use pins to fix onto tibial base.

- Assemble appropriate guide of tibial medullary drill on the tibial trail platform, insert drill into tibial medullary cavity.

- Remove drill, use corresponding tibial medullary rasp to shape the medullary cavity.

- Remove rasp and tibial trial platform, clean tibial medullary cavity.

# Patella preparation

## Patella osteotomy

### Purpose

Check the thickness of patella osteotomy

- Use same thickness of patella after cut patella
- Use patella measurement clamp to measure thickness of patella.
- Assemble osteotomy guide on the clamp, hold patella, confirm the osteotomy thickness by adjust the guide.
- Use measurement template to confirm the diameter of patella prosthesis, the available sizes are 26, 28, 30, 32mm.
- Choose proper template and insert into clamp, use patella drill to drill out three fixed holes.

## Trial patella estimate

### Purpose

Estimate movement locus of patella

- Clean remaining cartilage, and washing. Insert proper size of patella prosthesis on the bony patellar.
- Estimate patella locus through flex and extend in the full range of activity. The patella locus should be keep proper motion in the whole activity, to avoid incline and lateral subluxation.

# Implantation of Prosthesis

## Prepare prosthesis

### Implantation of Prosthesis

- Impact the tibial tray: fill cement in the prepared medullary canal, with the impactor hammer the tibial tray in position then remove the excess cement.

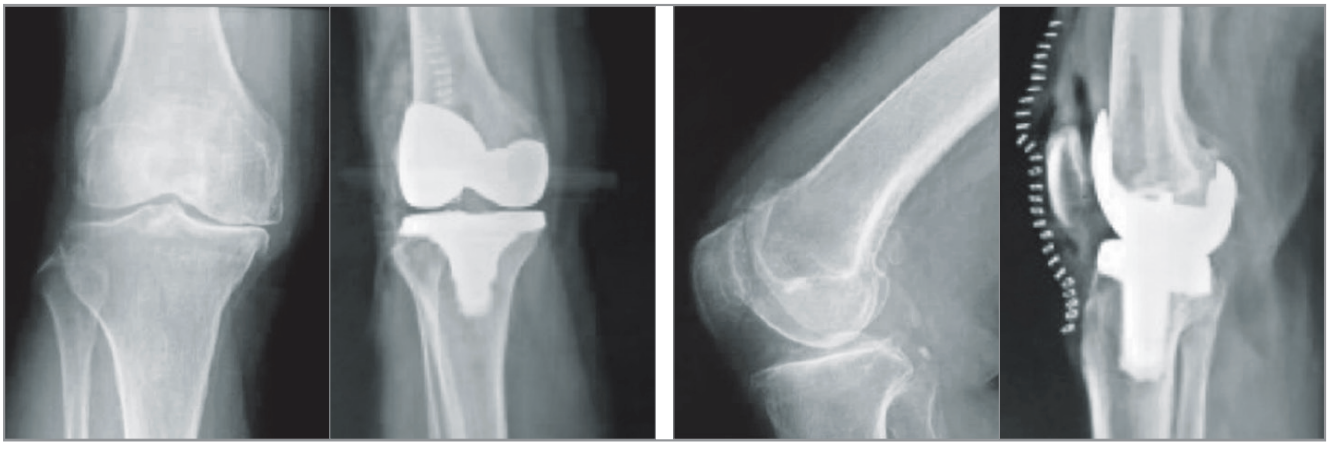
- Pre-fill the cement on the femoral implant and be sure the posterior condyles of implant should be covered by cement, impact the femoral implant into position and remove all the excess cement. Do the ROM of knee for one or two times, keep the knee in extension until cement solidified.

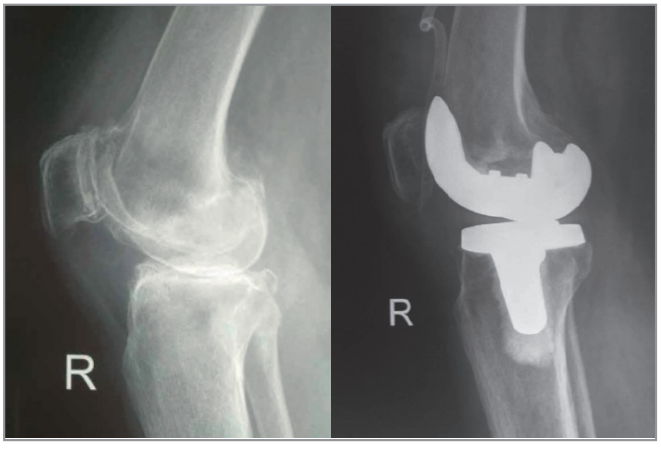
- Put the insert trial, in position then test the soft tissue balance and still can do some more release if necessary. Then put in the true insert.

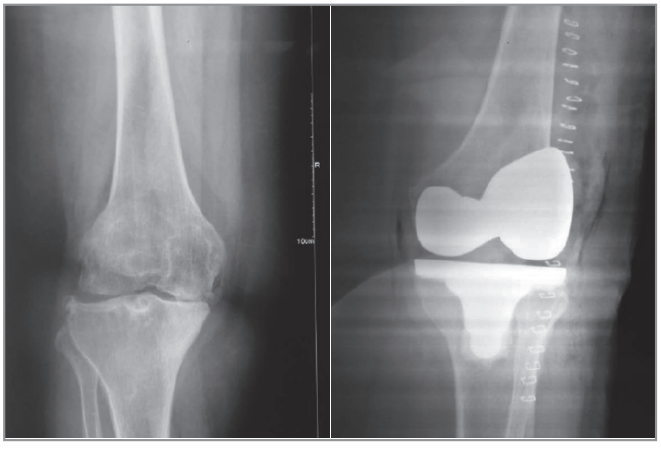
## Incision suture

After solidification of cement, lavage and clean the joint thoroughly, then close the incision according to different layers.

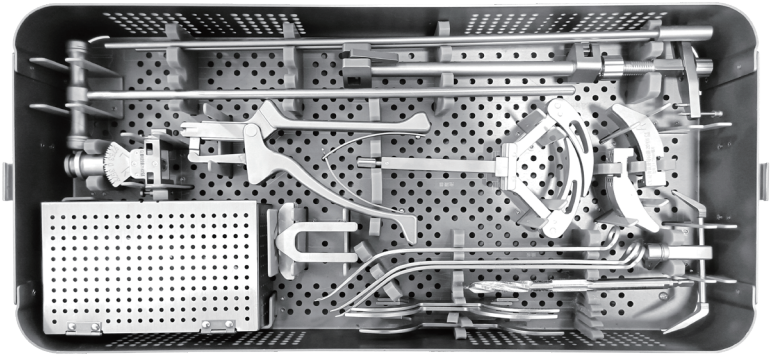
# Case Show

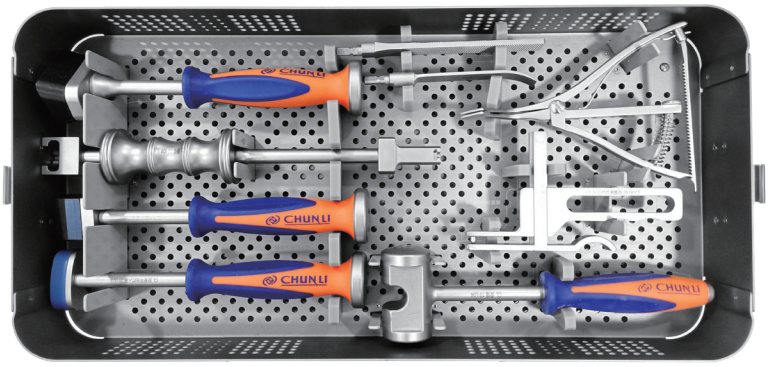


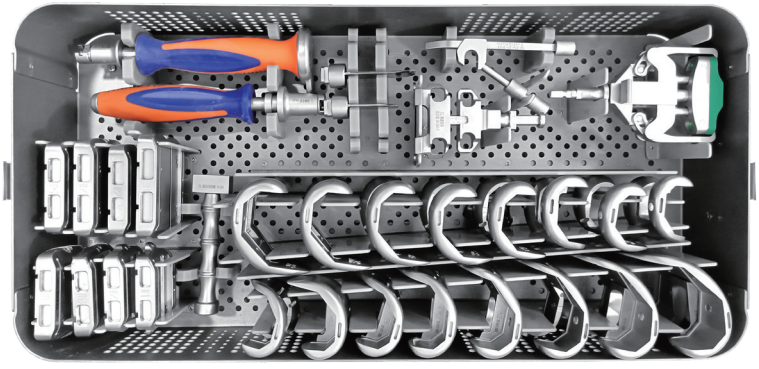


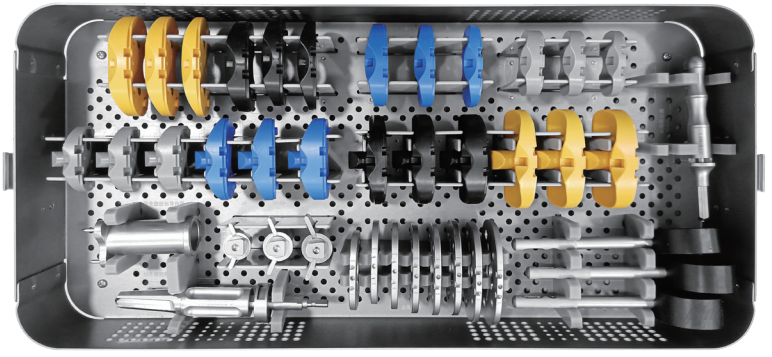



# Instruments Set







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