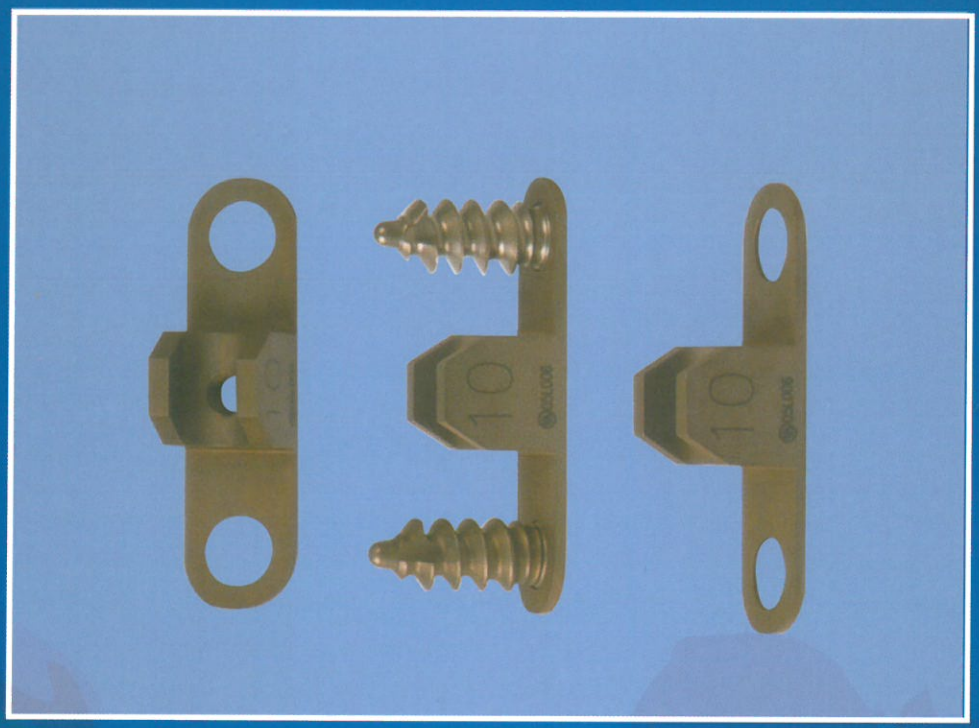
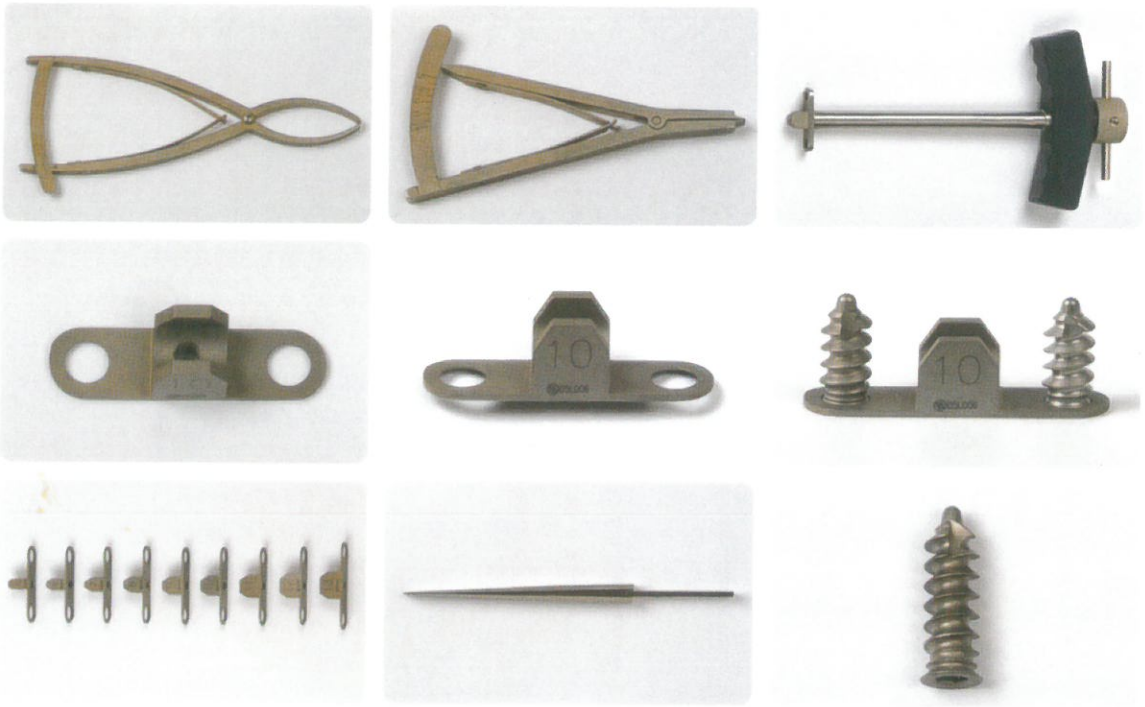
Design Concept
Surgical Technique

Aescula Open Wedge Plate



Open Wedge High tibial Osteotomy
with Aescula plate

Aescula Open Wedge Plate

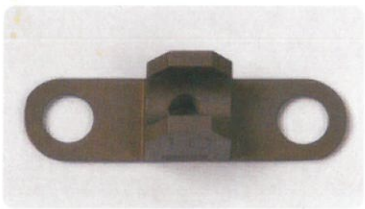


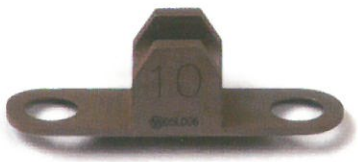
Content

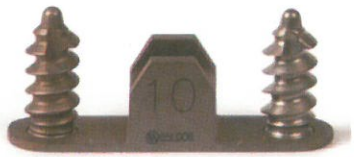
Background for development

High tibial osteotomy(HTO) is an established treatment for unicompartmental osteoarthritis of the knee with malalignment. The classic procedure for correcting varus deformity is the lateral closed wedge osteotomy.
Open wedge osteotomy is interesting because its procedure is simple and there is no need for fibular osteotomy or TF joint disruption, so peroneal nerve injury risk can be eliminated. The other advantages of open wedge osteotomy include (1) restoration of anatomy of the diseased medial side, which will provide better bone stock for later TKA, (2) the ability to achieve predictable correction in coronal and sagittal planes, (3) tightening the lax MCL.
Currently, implants, used for open wedge osteotomy, are relatively bulky and need many long fixation devices for the stability, which made these implants unfavorable for combined surgical procedures such as ACL, PCL reconstruction with HTO.
Furthermore, posterior slope of proximal tibia tends to increase after operation. As a result, anterior tibial translation and tensile loads on the ACL are increased also.
The new open wedge osteotomy devices are designed which are simple, secure, easy to achieve the expected amounts of opening on the coronal and sagittal plane, and facilitate to combine other procedures.

Design concept







Low profile
- minimize soft tissue irritation
- can be accompanied by other procedures

Malleable
- adaptability to various surface of bony geometry

Easy management of an expected amount of osteotomy openings
- coronal and sagittal
- 5-13mm sized plates

Stable 3 points fixation
- no need of external immobilizer

Convenient insertion
- slender and tapered leading nose

Indications

1. Unicompartmental osteoarthritis with a well-maintained range of motion in a stable knee-classic indications
   - Less than 65 years old
   - Non obese patient
   - Less than 10 to 15° of flexion contracture
   - At least 90° flexion
   - Less than 15° of varus or valgus deformity
2. Varus deformed knee which combined ligament surgery is necessary for.
3. Pain in the medial aspect of the knee resulted from varus deformity with meniscus defects, articular cartilage defects, or osteochondritis dissecans.

These conditions often require HTO to unload the affected compartment in either a combined or staged procedure.

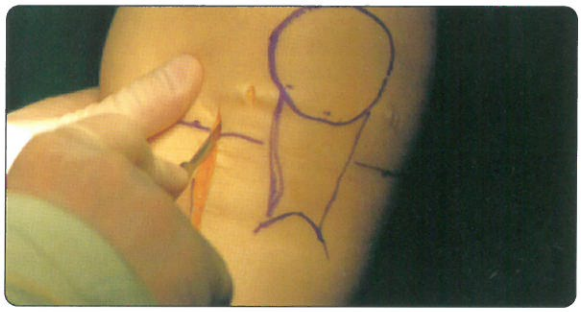
Surgical Technique

1. Patient positioning & routine arthroscopic examination

The surgery is performed with the patient supine. A radiolucent table is used to allow fluoroscopic visualization of hip, knee, and ankle joints for alignment assessment intraoperatively. A tourniquet is placed around the thigh and the involved limb is prepared and draped. The opposite leg is abducted and flexed 45°, so the surgeon stands between two legs. Visual instruments (arthroscopic device or navigation system) are placed on the opposite side of operated knee and C-arm is placed on the same side of operated knee.
To ensure an intact lateral joint compartment and to treat additional intra-articular lesions, a knee arthroscopy is performed. And intraarticular lesions are treated.

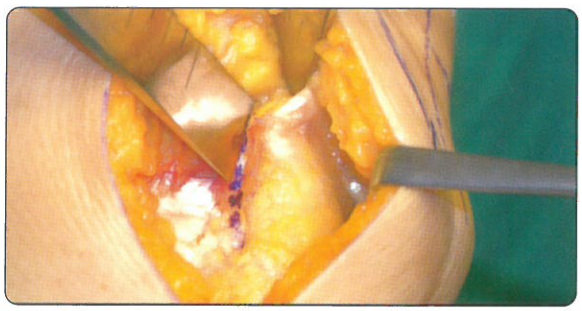
2. Skin incision

A 5cm longitudinal incision is made extending from 1cm below the medial joint line midway between the medial border of the tuberosity and the posteromedial border of the tibia.



3. Tibial tuberosity osteotomy

The medial border of the patellar tendon is identified. A short longitudinal incision is made to allow a retractor to be placed deep to the patellar tendon just proximal to the tuberosity and retract it laterally. Short oblique osteotomy of tibial tuberosity is made by osteotome for protection of patellar tendon insertion & facilitation of high tibial osteotomy.



4. Soft tissue dissection

The sartorius fascia is exposed by sharp dissection. The Pes Anserinus tendon is identified and incised with Z-plasty fashion and then retract it forward and backward. This Z-shape incision of conjoined tendon of Pes Anserinus provides an excellent exposure of proximo-medial aspect of tibia and the clear view of superficial fiber of MCL. (Fig. 4-1, 2, 3) The anterior border of the medial collateral ligament is identified, and is elevated subperiosteally using a periosteal elevator(Fig. 4-4,7). A blunt Hohmann retractor is then passed deep to the MCL, around the posteromedial corner of the proximal tibia, to protect posterior neurovascular structures(Fig. 4-8).
Sometimes, the Pes Anserinus can be retracted distally with a blunt retractor, exposing the superficial fibers of the medial collateral ligament(Fig. 4-5, 6)

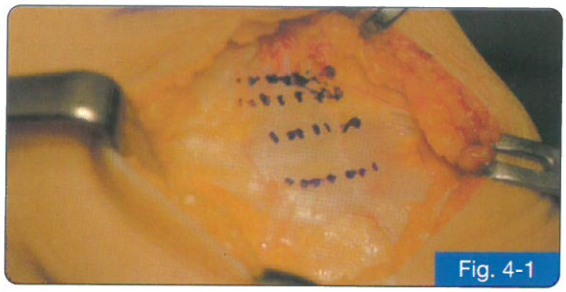


Fig. 4-1

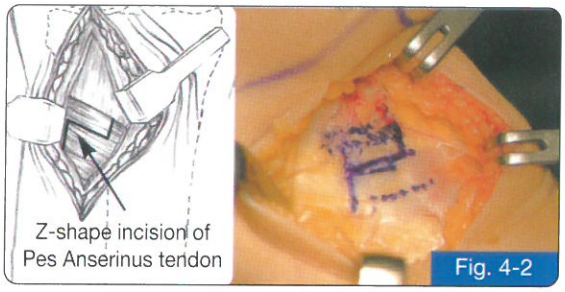


Fig. 4-2


Fig. 4-3

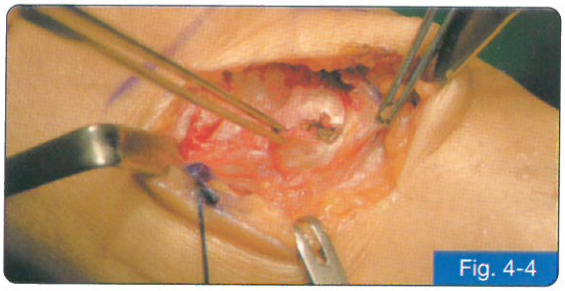


Fig. 4-4

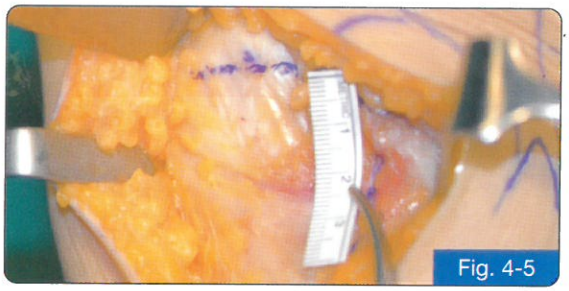


Fig. 4-5

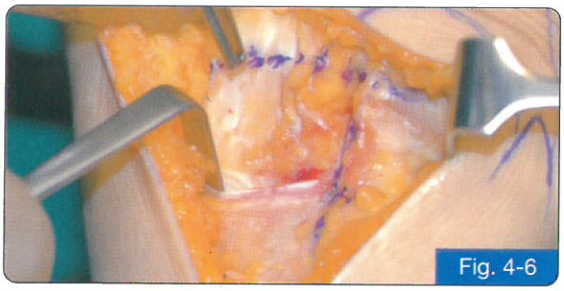


Fig. 4-6

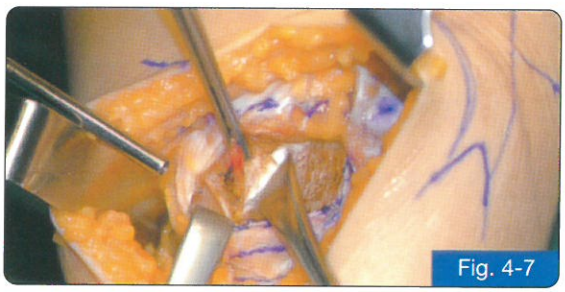
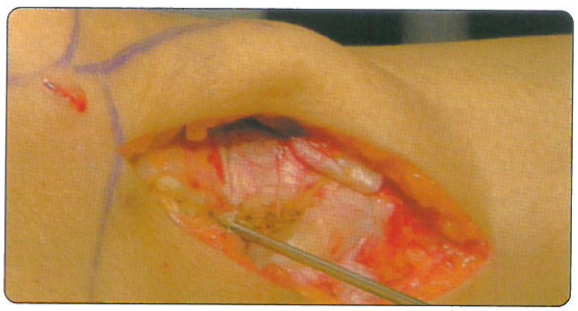


Fig. 4-7


Fig. 4-8

5. Guide pin insertion

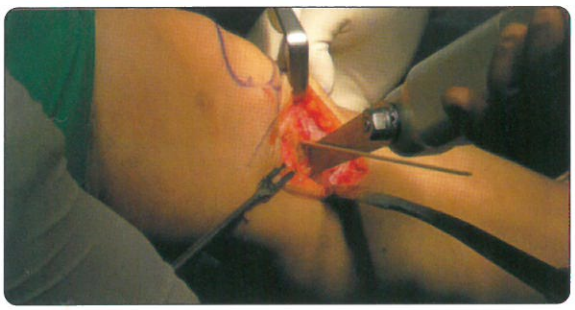
The guide pin starts on the medial tibia approximately 3cm distal to the medial joint line which is around level of tibial tuberosity. Under the guidance of fluoroscopy, guide pin is advanced laterally just mid level of the TF joint to the lateral cortex

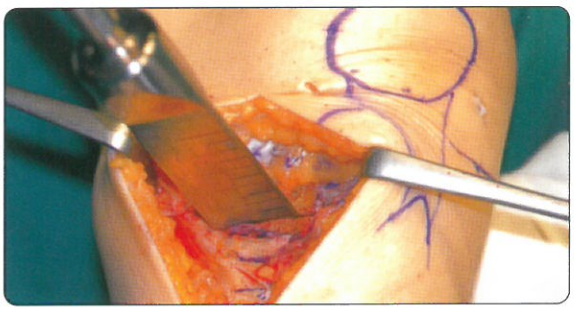


6. Osteotomy

The tibial osteotomy is performed just distal to the guide pin. With the previously placed retractors protecting the soft tissue anteriorly and posteriorly, oscilliating saw is used to cut the tibial cortex. The osteotomy should and stop within 1cm of the lateral tibial cortex. This osteotomy done with saw is completed using solid, broad but thin osteotomes. While performing the osteotomy, it is important to check it's progression with a fluoroscope to ensure the appropriate depth and direction of the osteotomy.

The slope of the osteotomy in the sagittal plane is critical and should parallel to the proximal tibial joint slope.





7. Opening the osteotomy site and checking the alignment

The opening of the osteotomy is initiated by stepwise insertion of the three coupled chisles to avoid intra-articular fractures(Fig. 7-1,2) and then mechanical axis is checked by fluoroscopy. With the bovie line placed over the center of the hip and ankle joints, it should lie at 60% to 65% of the tibial width, usually at the lateral edge of the lateral tibial spine. To obtain the adequate radiography without causing displacement at the osteotomy site, a thigh not a calf should be rotated internally (Fig. 7-3).

After adequate correction, measure the size of osteotomy opening with spacer measurement anteriorly and posteriorly (Fig. 7-4). Usually the size of the wedge anteriorly around the tuberosity should be less than that at the posteromedial corner.

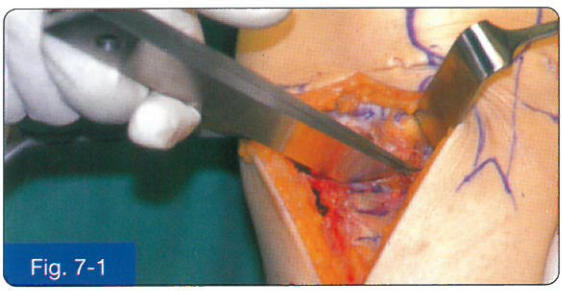


Fig. 7-1

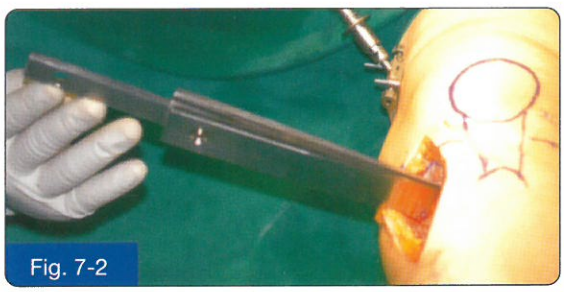


Fig. 7-2

Fig. 7-3

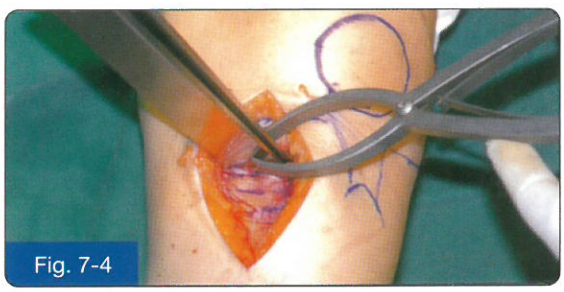
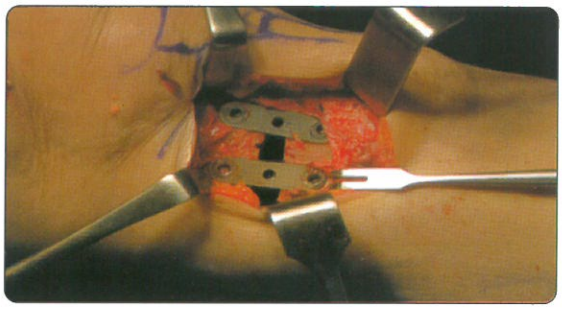


Fig. 7-4

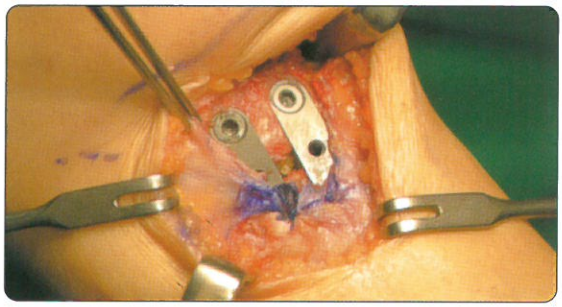
8. Aescula open wedge plate insertion

Aescula open wedge plate is first inserted posteromedially with gentle valgus force. And screw is fixed to the near cortex only. Predrilling is needed with 4.5mm and 5.0mm drill bit for the proximal and distal hole. Then a smaller plate is inserted anteromedially. Final fluoroscopic assessment is done to ensure alignment of lower extremity & adequate position of the Aescula open wedge plate.

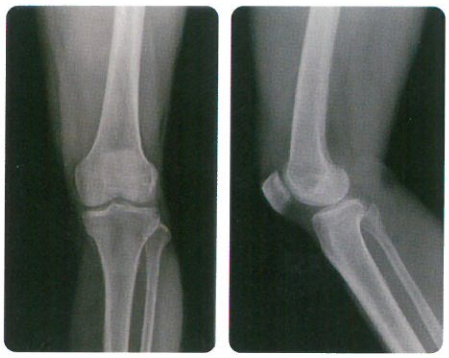


9. Closure

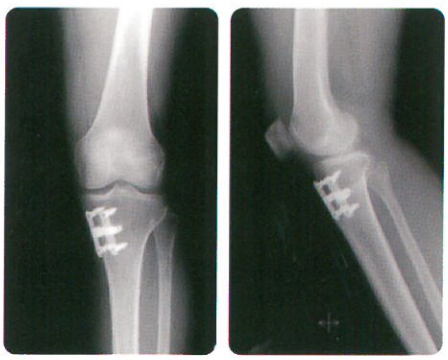
The defect may be grafted using the prepared bone graft when defect is 10 mm or greater. Z-shape incised Pes Anserinus is sutured end to end. Suction drain is placed and the wound closure is completed in layers.



Radiogram



preop



postop

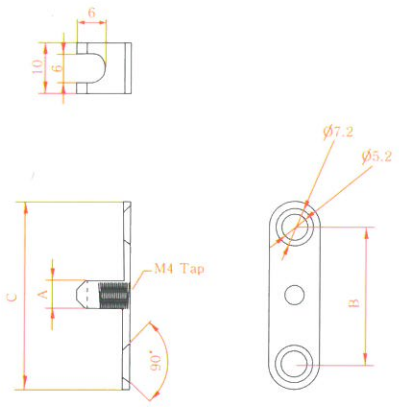
Postop. Rehabilitation

External immobilization is not necessary because 3 point fixation(intact lat. cortex, medial 2 point fixation with plate) is rigid enough to maintain stability of osteotomy. The day after operation, the patient is encouraged to achieve full range of motion and mobilizes with non weight bearing crutch. After 6-8 weeks, partial weight bearing is allowed and is progressed gradually to full weight-bearing.

Tips and pearls for preventing unintended posterior slope change

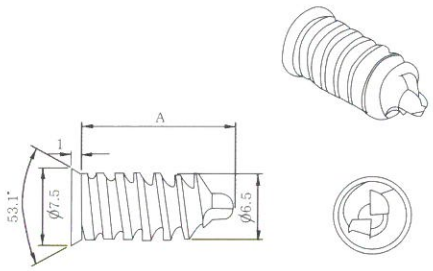
1. The osteotomy should be parallel to the joint line.
2. Posteromedial soft tissue should be released adequately.
3. The size of the wedge at the tuberosity should be less than that of the wedge at the posteromedial corner. In average, anterior plate is 1mm shorter than posterior plate when opening angle is less 5°, 2mm shorter when opening angle is between 6° and 9°, and 3mm shorter when opening angle is more than 10°.
4. The posteromedial plate should be placed as posteriorly as possible.

Implant components



Aescula open wedge plate

Part No.	Size	A	B	C
OI02110	5	5	28.0	38.0
OI02120	7	7	28.0	38.0
OI02130	9	9	28.0	38.0
OI02140	11	11	28.0	38.0
OI02150	13	13	32.0	42.0
OI02160	15	15	32.0	42.0
OI02115	6	6	28.0	38.0
OI02125	8	8	28.0	38.0
OI02135	10	10	28.0	38.0
OI02145	12	12	28.0	38.0



Aescula screw

Part No.	Size	A
OI05110	10	10
OI05120	15	15
OI05130	20	20
OI05140	25	25
OI05150	30	30
OI05160	35	35