Functional Knee Brace for OA & Instability

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Liganment, Meniscus, Cartilage, Muscle, Alignment
(I) Ligation: Fixed gear belt

- Torn ACL (Rubber)
  - 180°: Tight
  - 90°: Relaxed

- Torn PCL (Rubber)
  - 180°: Relaxed
  - 90°: Tight

- Torn LCL

- Meniscus Tear

- Tibia

- Thigh bone
(II) Meniscus: Supporting the axis of consolidation of the cushion

Vascularity of Meniscus
Using 3-points leverage to transfer the weight bearing to normal size, so the affected side will not come apart and will regeneration.
(a) Meniscus: Floating cushion (Pier and ship isolated pad)

(b) Meniscus: Central pressure function (e.g. Anal muscle [sphincter])

Ring pressure on the meniscus: Disperses body pressure

After meniscus injury: Ring pressure disappears, upper body pressure is concentrated on the tibial plateau
(III) Cartilage: Smooth layer avoid friction (Clothing)
(No Artery, No Lymph, No Nerve)

Cartilage under the microscope

The simulated structure of cartilage collagen fibers
(IV) Muscles: Provide Knee Stability

1. Quadriceps

2. Hamstrings
(V) Alignment: Weight-bearing pillars

Inspection alignment: Judgment of foot type and pain point

Anatomical line

Normal Loading alignment

Normal

“O” Varus Knee

“X” Valgus Knee

Pain

Pain
Knee Instability:

(I) Ligamental Tear

1. Isolated Tear: ACL(4*), PCL(*), MCL(2*), LCL(*)
2. Multiple Tear:
   (a) ACL + MCL ± medial meniscal tear
   (b) ACL + LCL ± lateral meniscal tear

(II) Meniscus tear or removal

(III) Weak knee muscle
Causes of Ligamental Tear
Triad Injury
Non-surgical Treatment

- ACL partial tear
- Cast/K19 (+ or - 6 weeks)
- K19 Post-op Knee Brace
- K20 Protective Knee Brace
1. Old knee injury
2. Risky sports or work
3. Weak knee muscles (Ladies)

Functions:

- Maintain Good Alignment
- Provide Knee Stability
- Physical Support
Options of Post-op braces after ACL Reconstruction

Option 1: Casting

Option 2: Post-op Knee Brace K19b

Option 3: ACL Light Brace K07b

Option 4: Free of brace or cast
<table>
<thead>
<tr>
<th></th>
<th>ACL</th>
<th>PCL</th>
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</thead>
<tbody>
<tr>
<td>Knee extension 180°</td>
<td>Tight</td>
<td>Relaxed</td>
</tr>
<tr>
<td>Hyper extension &gt;185°</td>
<td>Tear</td>
<td>Tight</td>
</tr>
<tr>
<td>Flexion 90°</td>
<td>Relaxed</td>
<td>Tight</td>
</tr>
<tr>
<td>Hyper Flexion &gt;135°</td>
<td>Tight</td>
<td>Tear</td>
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</tbody>
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Cause of Osteoarthritis

**Trauma**
1. Ligament torn or reconstructed
2. Meniscal injury or repair
3. Articular fracture or damage

**Mechanical problem**
1. Malalignment
2. Joint Instability
3. Gear Slip

**Pathology**
Osteoarthritis

Railcar and track will become gear worn when a train goes over bad track.
K39 OA Corrector

Before Correction

Unbraced OA of a 50-year old metal worker

During Correction

Braced by OA corrector of the same metal worker

Malalignment

Loading Pain

- Stabilize the joint
- Realign malalignment
- Prevention of OA
- Relieve loading Pain

Pain Free

3-points leverage
Journal of clinical research has proven that OA corrector was a mechanical intervention designed to reduce pain.
Gaining:

- No Sedan Chair
- No Crutch
- No Wheelchair

- Improvement of life quality:
  - Walking Pain Free
  - Non-drugs

- Surgery free or delay surgery

K39

>100y
±80y
±60y
±20y
Patient Selection:

- Not suitable for overweight patients
- Not suitable for swollen knee
- Not suitable for serious OA
- Not suitable for psychosis patients
- Patients need cooperation, clinical follow-up