Why I choose this type of prosthesis?
F.M. Benazzo, S.M.P. Rossi

TKR: should be a work of art

What are we talking about
Nex Gen family
Why?
Our experience started with the Natural Knee

Insall's TKR goals:
• Restoration of the mechanical axis
• Restoration of the joint line
• Balancing of the soft tissues
• Equalization of flexion and extension gaps
• Restoration of patellofemoral alignment and mechanics

What are we talking about
Nex Gen family
Why?
We’ve always followed Insall’s concepts in total knee arthroplasty

• 1. Restoration of the mechanical axis
• 2. Restoration of the joint line
• 3. Balancing of the soft tissues
• 4. Equalization of flexion and extension gaps
• 5. Restoration of patellofemoral alignment and mechanics

What are we talking about
Nex gen family
Why?
Active participation in the development of:
- MIS concepts and philosophy
- New instruments
- New Implants

MIS concepts
Let’s try to avoid misuse, misunderstandings and overuse…
MIS is now something new
MIS must be considered as a current mentality and a philosophy acquired in total knee replacement

Because:
Starting from the idea of a mini-incision MIS has pushed a new philosophy of respect of tissues, giving the opportunity to develop:
- New concepts: TSS and progressive partial substitution of the knee
- New instruments: precise and friendly
- New implants
MIS/TSS and the Time Machine concept

“Time machine” surgery:
The knee is set back to the conditions existing before the OA disease occurred, with the purpose to let it work in the same manner as a fully healthy knee.

Where are we now?

Minimally-invasive (MIS)
- New instruments
- New implants
  + High-Flexion
  Fixed/Mobile Bearing
  Highly reproducible

Reproducible approach

Evolution of the technique

<table>
<thead>
<tr>
<th>Year</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2005</td>
<td>Quad Sparing 232, Mini Midvastus VMO snip 290, Trivector 125</td>
</tr>
<tr>
<td>2005-2008</td>
<td>Quad Sparing 71, Mini Midvastus VMO snip 23, Trivector 23, Quad Sparing 23</td>
</tr>
</tbody>
</table>

Reproducible approach: Mini-midvastus snip and trivector

ADVANTAGES:
- Small incision of extensor mechanism
- Frontal Approach
- Easy displacement of the patella
- Easy releases and ligament balancing

DISADVANTAGES:
- If muscular tension on the VMO possible increase of the SNIP dimensions (Trivector)

Reproducible approach: trivector

VMO SNIP of 1,5-2 cm + 1 cm parapatellar incision of the QUAD tendon

Increased patellar displacement
Useful in stiff knees or thick patella

New instruments: medial/QS
New instruments: Frontal

“Downsized customized instruments”

New instruments

Traditional – Mini
“Mini-Midvastus snap” and “Mini-Subvastus”

Fully innovative “Quad-Sparing”

New medial and lateral approaches

Innovative side cutting instruments

MIS techniques

Traditional frontal approaches less invasive

Downsized instruments

Tibial Implant: a new design

Need to introduce new implants:
- More friendly
- Easier to implant through smaller incisions
- More stability

Solution: Modularity

MINI KEEL

Modular stemmed

In our experience: for LCCK with MIS Approach in the difficult knee
Mini-keel: modular implant

- Easier implantation compared to the stemmed plate
- Technique comparable to the pegged plate (modularity)
- Increased bone-implant contact surface (mean + 5.6% compared to the stemmed plate)
- Increased primary stability

NEXGEN STEMMED VS NEXGEN MINI KEEL

Mini-keel: experience with Fixed bearing

2005-2008

345 Implants in 320 patients (25 bilateral)

200 women, 120 men.

Mean age: 72.3 anni

Mean Follow-up 2.5 anni (8 months ÷ 4 years)

Clinical and x-rays evaluation at 3-6-12 months and yearly

Flexion

3 months Mean 119.5° (110-125)

6 months Mean 124° (110-140)

Last follow-up Mean 128.2° (115-140)

Mini-keel Results
Mini-keel

X-ray results

Post-op alignment:
5.4° valgus (mean pre-op 8.3° varus → range 25° varus – 20° valgus).

KSS evaluation system:
- Tibia: mean β 89.8° (89÷91), and α 84.4° (83÷87)
- Femur: mean α 94.3° e γ d 5.1°.

Mini-keel

Complications:
6 revisions
- 1 infection
- 1 periprosthetic fracture after trauma
- 1 Instability
- 3 malpositioning
  1 case of femoral malrotation
  2 malpositioning of tibial plate
In 1 case arthroscopy for stiffness without revision

CT scan data

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CT scan evaluation:
On 30 cases

Total cement volume:
10.03 cm³ (min 6.99 max 14.4)

The measure proportionally correlates with the size of the implant but does not correlate with the bone density

Cement thickness around the drop-down:
- Proximally (just below the keel):
  - Coronal: 4.1 mm
  - Sagittal: 3.3 mm ante – 4.7 mm poste
- Medium-distal third:
  - Coronal: 2.5 mm
  - Sagittal: 2.4 mm ante – 3.4 mm poste

Cement distribution around the tibial stem was higher posteriorly

Cement thickness around the keel:
- Coronal: 4.1 mm
- Sagittal: 1.1 mm ante – 1.8 mm poste

Cement distribution around the keel was higher posteriorly

Cement thickness under the tibial plate:
- Coronal: Lateral: 2.9 mm ante – 2.8 mm poste
  - Medial: 2.7 mm ante – 2.6 mm poste
- Sagittal:
  - Anterior: 3.4 mm
  - Posterior: 2.5 mm

Cement distribution beneath the tibial plate was higher anteriorly
**Ct scan data**

ER femoral component
Mean: 3.8° (3÷5)

Rotation tibial component
Mean 1/3 TTA (tolerance 1° IR, 2° ER): 100%

Mean β angle 89.8° (89÷91)
Mean γ angle 84.2° (83÷87)

**Mis-mini keel study groups**

<table>
<thead>
<tr>
<th>Study</th>
<th>September 2006</th>
<th>February 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centers</td>
<td>Pavia, Firenze, Milano, Brescia, Cefalù</td>
<td>Pavia, Bolzano, Milano, Brescia, Cefalù</td>
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<tr>
<td>Patients</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>MIS Mini Keel</td>
<td>15 with and 15 without drop down</td>
<td></td>
</tr>
<tr>
<td>Follow up</td>
<td>3 years</td>
<td></td>
</tr>
<tr>
<td>Clinical and x-rays evaluation</td>
<td></td>
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</tbody>
</table>

**Enlarged areas:**

Femoral side: 2 Implants Gender and High Flex solutions

CR
LPS
STANDARD

CR
LPS
FLEX

LPS/CR
FLEX
GENDER

**Enlarged areas:**

Mobile bearing options, same implant design

NexGen LPS-Flex Mobile

NexGen CR-Flex Mobile

**Surgical Technique Mini-Keel - LPS-Flex**

Evolution in surgical technique: actual surgical technique

- Trivector approach, patella first
- Preliminary first distal cut (free hand)
- More information on ER based on anterior cortex

**Surgical Technique Mini-Keel - LPS-Flex**

Evolution in surgical technique: actual surgical technique

- Evaluation of posterior condyles parallelism
- Free hand removal of hypertrophic condyle
- Posterior Reference
CONCLUSIONS

My choice was based on:
• technical considerations and on known and proved surgical principles
• direct involvement in development of implants and instruments as conceptor
• possibility of grouping surgeons for multicenter studies
  Satisfactory results