SPS® *Evolution*

Naturally anatomic

SYMBIOS

The SPS® stem, which was first produced in 1993, is based on a globally unique concept directly derived from the 3D Custom technology developed by Symbios. Since then, highly encouraging clinical experience with Custom stems, in the interim confirmed by results at 15 years[2] on young patients, suggested a potential for significantly improving the standard for cementless stems: this gave rise to the SPS®, which remains to this day the only standard stem entirely designed on the basis of the Custom algorithm applied to the average femoral anatomy of patients.

Since that time, following more 50,000 implantations and 19 years of clinical experience, the published results[1] for SPS® confirm the validity of its design and place it among the cementless stems used for reference.

In 2012, starting with a three-dimensional retrospective analysis of more than 600 implants, Symbios are innovating with a new version of the concept: With a design that is both simple and sophisticated, the SPS® *Evolution* allows a surgeon to perform the most effective standard reconstruction possible. Having the advantage of an extramedullary part positioned at the exact centre of the patient's anatomic distribution, the SPS® *Evolution* allows effective reconstruction in the majority of patients, while preserving the simplicity of a single monobloc stem. Thus, by using the SPS® *Evolution* as the central stem of the Symbios Hip System, supplemented with the SPS® Modular and the Custom Hip™ stems, the surgeon has the availability of an optimum solution adapted to fit each of his or her patients.

100%

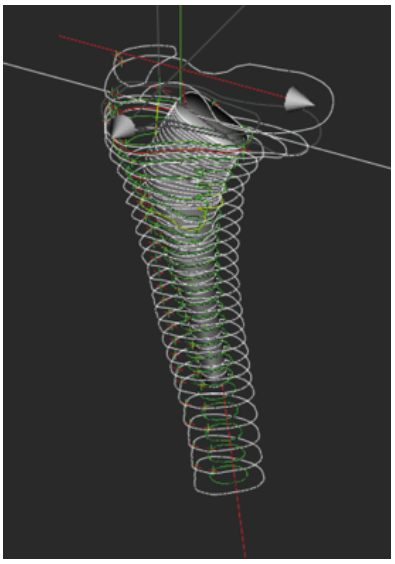
Survival after 10 years

High 10-Year Survival Rate with an Anatomic Cementless Stem (SPS)
E. Sariali and al. Clinical Orthopaedics and Related Research. Vol. 470 n°7, July 2012.

19 years

Clinical experience of the original SPS® concept

An original design derived from Custom



1989
The visionary concept of Custom

The design algorithm of the Custom stems was perfected in 1989, resulting from collaboration between surgeon and engineer, by combining the surgical skills of Prof. J-M Aubaniac* with the 3D technology developed by Symbios : the first Custom stem was successfully implanted in January 1990, thus opening up for orthopaedics a whole new field of technological possibilities.

* Sainte-Marguerite University Hospital, Marseille

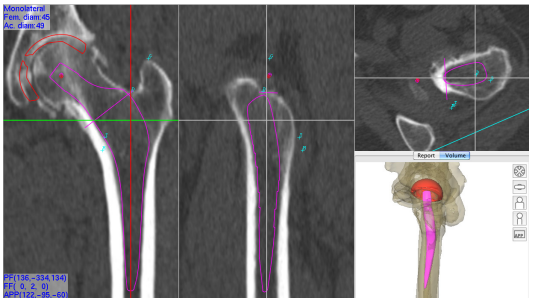
1993
Genesis of the original SPS®

Capitalising on Custom technology, the SPS® was designed by our engineers according to the same principles, by establishing an average anatomy from 300 scans of normal femurs.

Since its introduction in 1993, the SPS® remains to this day the only commercially available standard prosthesis to have been designed entirely on the basis of a three-dimensional software algorithm.

2003
Launch of SPS® Modular

Another bridge has been crossed: With its 10 modular necks, the SPS® Modular gives the surgeon a greater number of options for precise adjustment of the restored femoral offset and leg length[5] for each of his patients.



2007
Launch of HIP-PLAN™

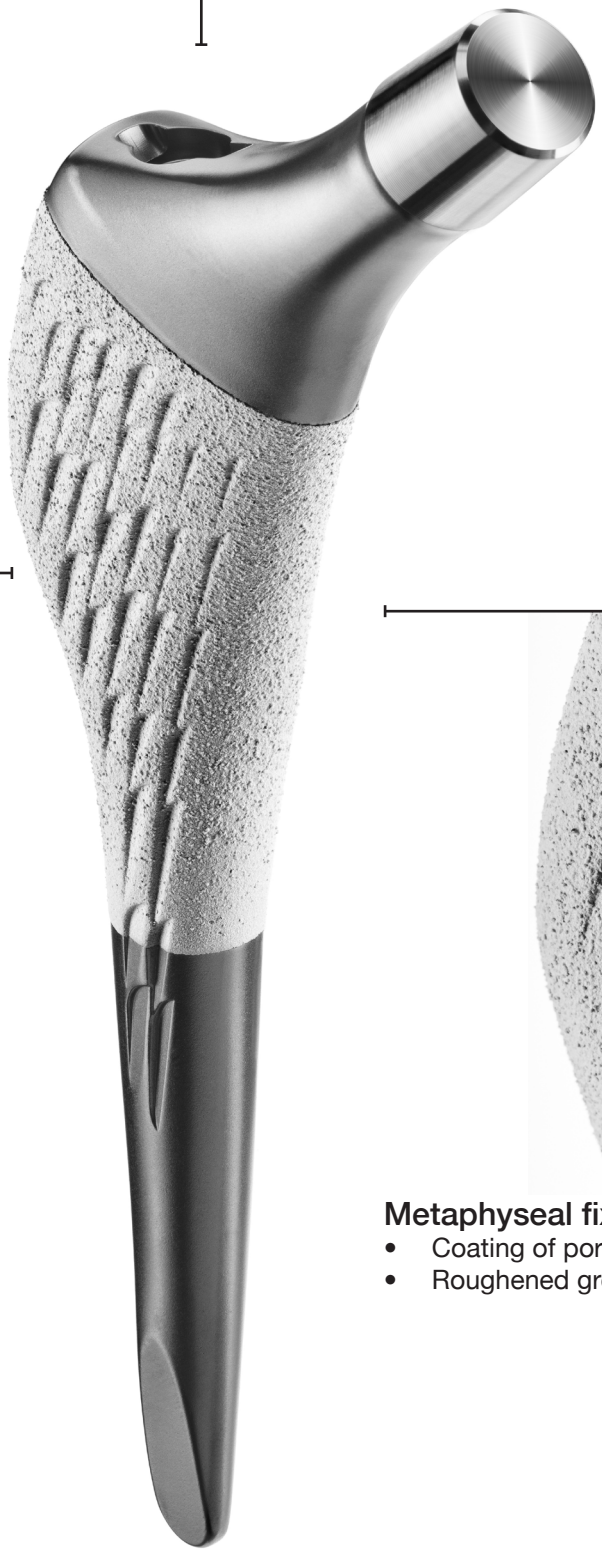
Symbios introduces the first 3D pre-operative planning software: the surgeon can now plan the Symbios standard implants with greater precision and reproducibility than with the conventional 2D technique[5][6]. HIP-PLAN™ thus enables the implant and, if necessary, the most appropriate modular neck to be determined prior to the intervention.

2012
SPS® Evolution :
Perfecting the standard reconstruction

Based on 3D retrospective analysis of more than 600 SPS® Modular implants, the innovative design of the SPS® Evolution allows the most effective standard reconstruction possible: The majority of patients can be reconstructed with a single monobloc stem.

Control of the rotational guide

Impaction hole equipped with a slotted guide to control rotation during impaction



External lateral flare

For direct abutment on the external cortical

Metaphyseal fixation

- Coating of porous titanium and hydroxyapatite
- Roughened grooves for anchoring in the cancellous bone

Perfecting of the reconstruction

- Neck-shaft angle of 129°
- Neck retroversion of 5°
- Standard 12/14 5°40’ taper

3D anatomic curvature

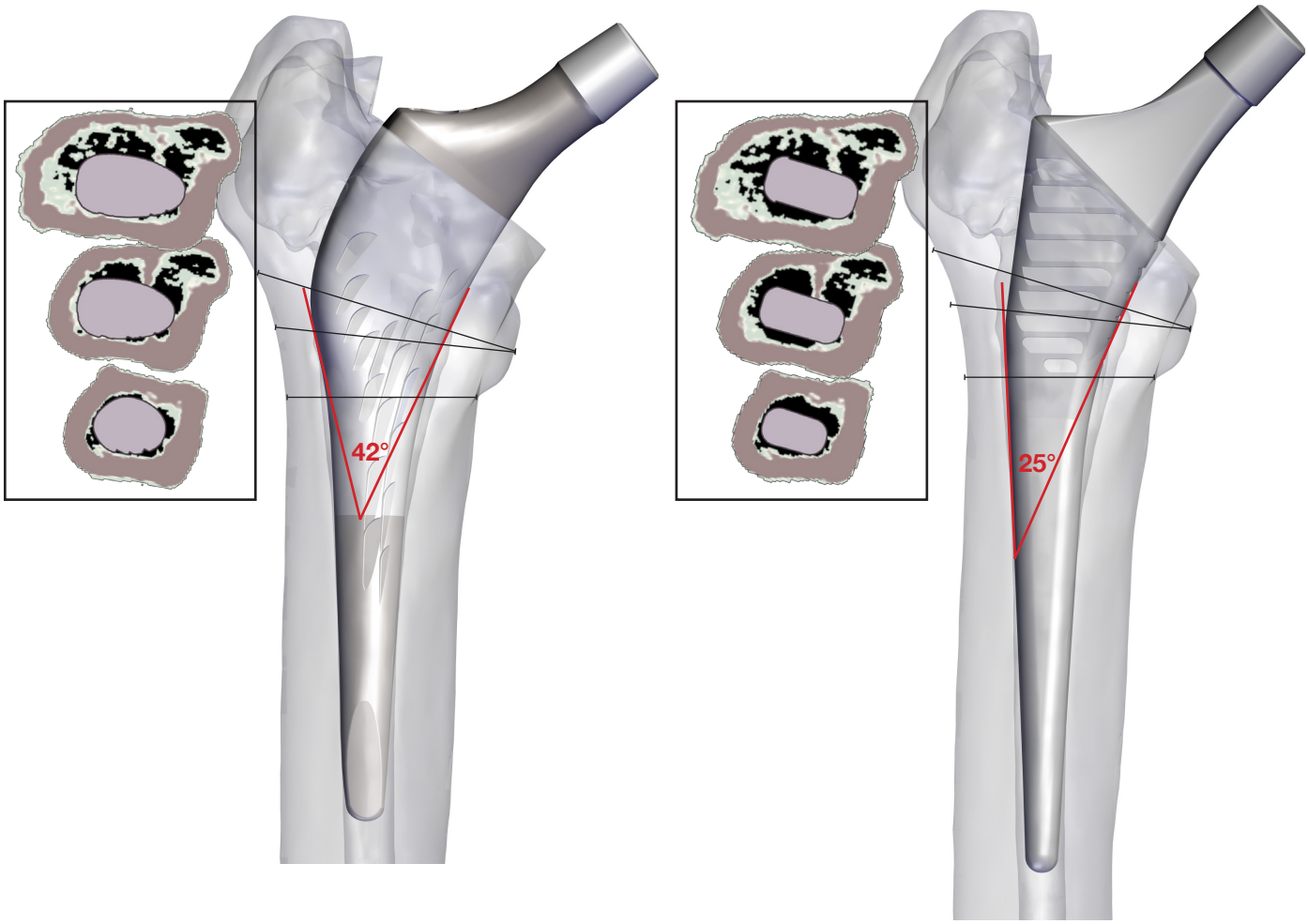
- Natural adaptation to the medullary canal
- 15° axial helitorsion within the metaphyseal zone
- Anterior sagittal curvature

Short, refined distal part

To prevent all pain associated with distal cortical contact

Anatomic
for optimal metaphyseal blocking

Improving control of the intramedullary position

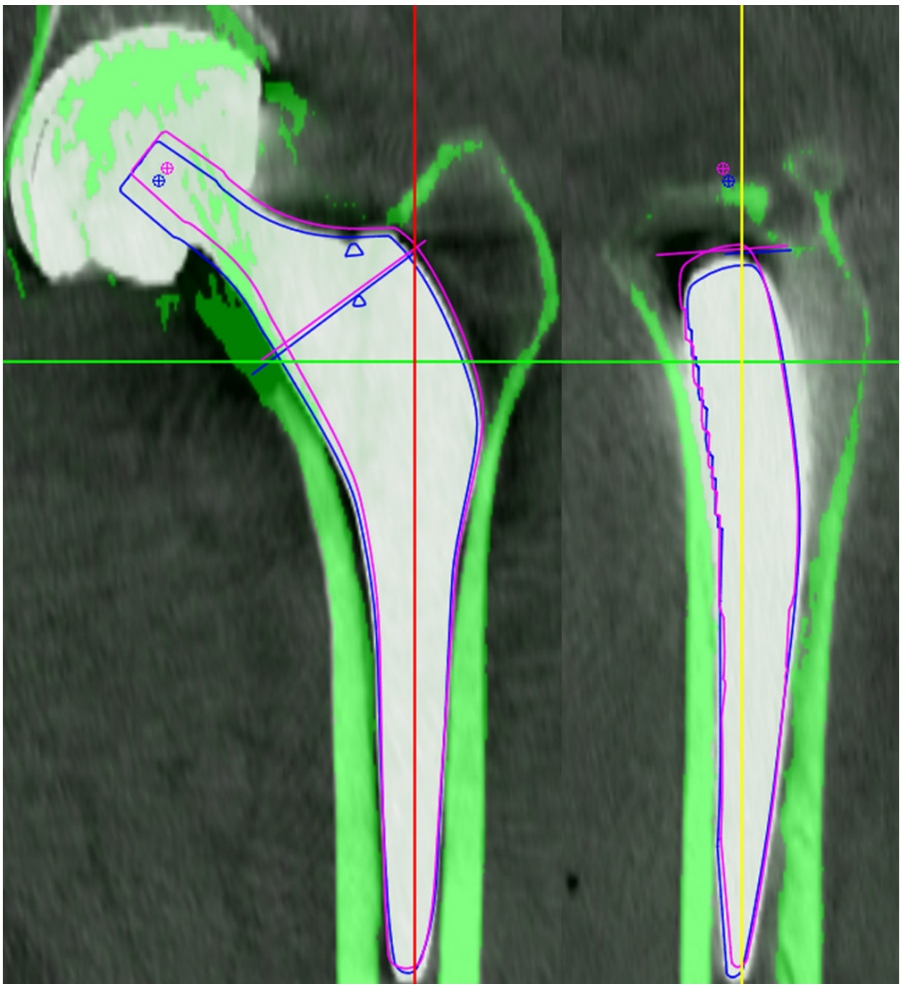


SPS® *Evolution*

Straight stem

Proximal blocking, at a predictable and reliable height

The lateral flare of the SPS® guarantees its direct abutment on the external cortical bone and forms a large splay angle with the medial curvature of 42°. Thus, the position of blocking is predictable, at a reliable height, and does not depend on the density of the spongious bone.

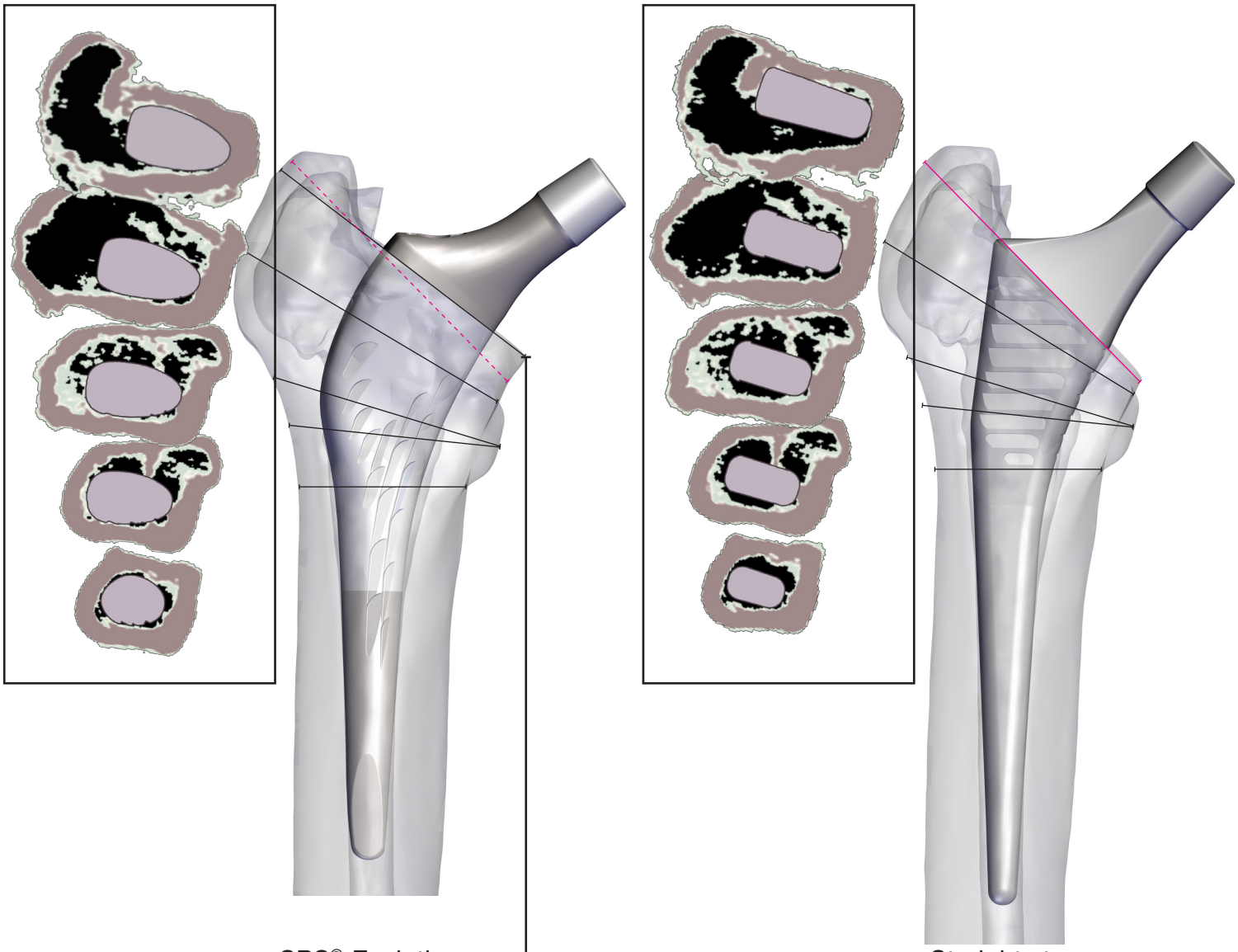


Frontal and sagittal sections (HIP-PLAN™) superimposing the preoperative and post-operative scans on the basis of the bone references. The 3D planning of the SPS® *Evolution* (pink) and the effective postoperative position (blue) illustrate the predictability of the SPS® intramedullary design.

"The component implanted was the same as that planned in 94% for the stems."

Sariali et al, Journal of Bone and Joint Surgery Br. 2009[5]

Improve the transmission of stresses proximally



SPS® *Evolution*

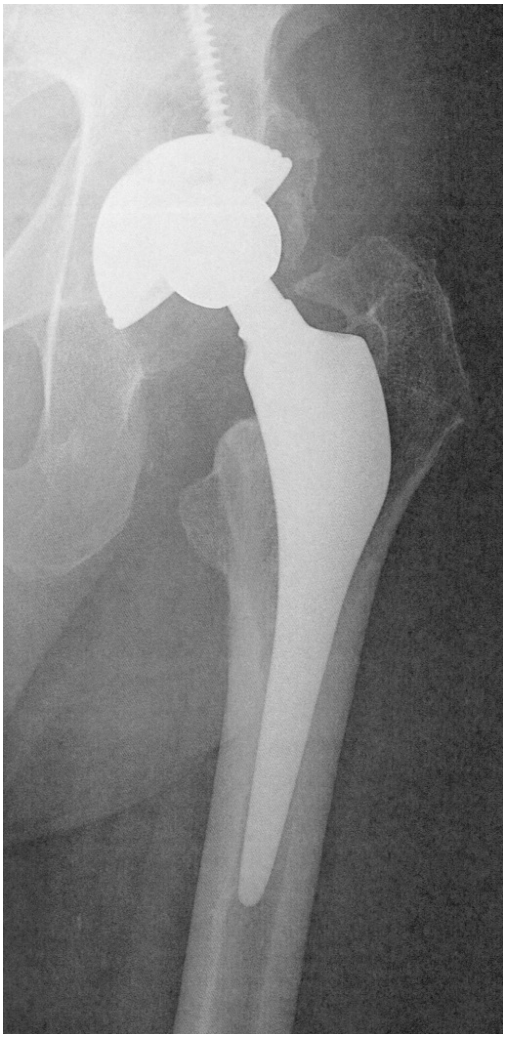
Straight stem

Osteotomy at 30°
Metaphyseal preservation for improved rotational stability

Optimal metaphyseal contact

Due to its three-dimensional anatomic design, the SPS® benefits from a better-fitting antero-posterior dimension the entire length of the metaphysis. In this way it obtains the best possible metaphyseal contact following the natural torsion of the femur on the sagittal and axial planes, which gives it superior rotational stability and ensures load transmission within the proximal zone.

SPS® postoperative x-ray



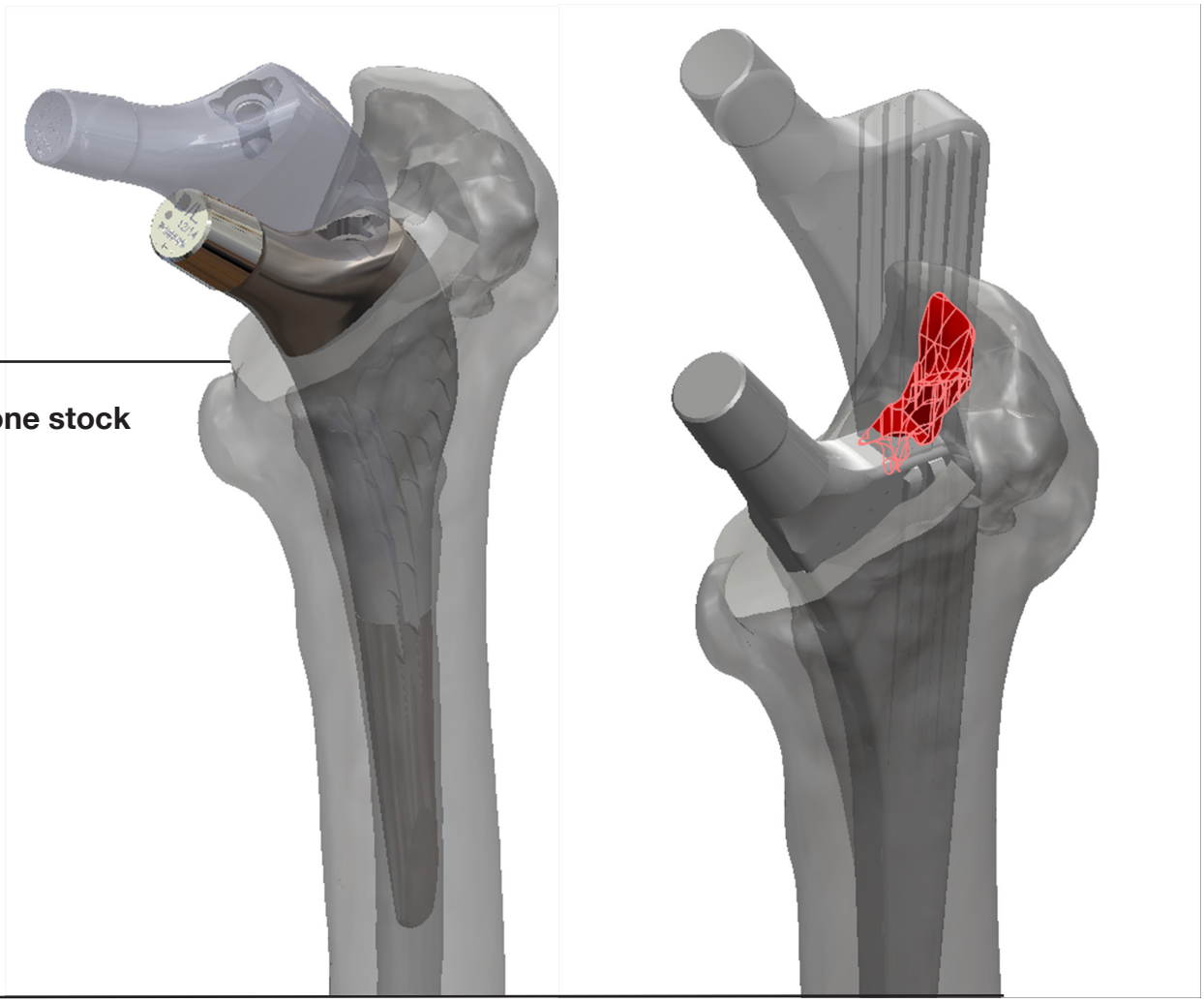
SPS® postoperative x-ray (14 years)

"The anatomic SPS allowed correct transmission of physiologic loading to the Metaphyseal cancellous bone, minimizing proximal stress-shielding and enhancing bone remodelling around the stem in the proximal femur."

Sariali et al, Clinical Orthopaedics and Related Research, 2012[1]

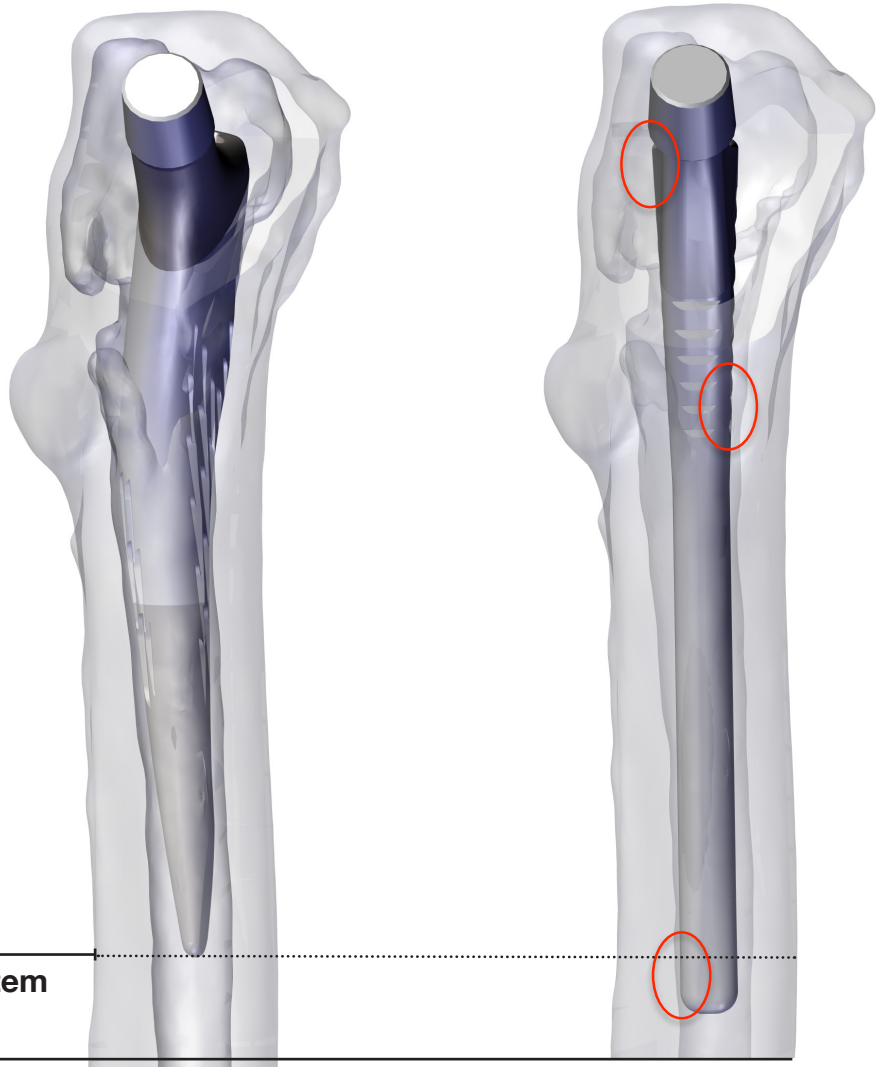
Anatomic
for naturally mini-invasive surgery

Preserve bone stock and soft tissues



A high section to conserve bone stock

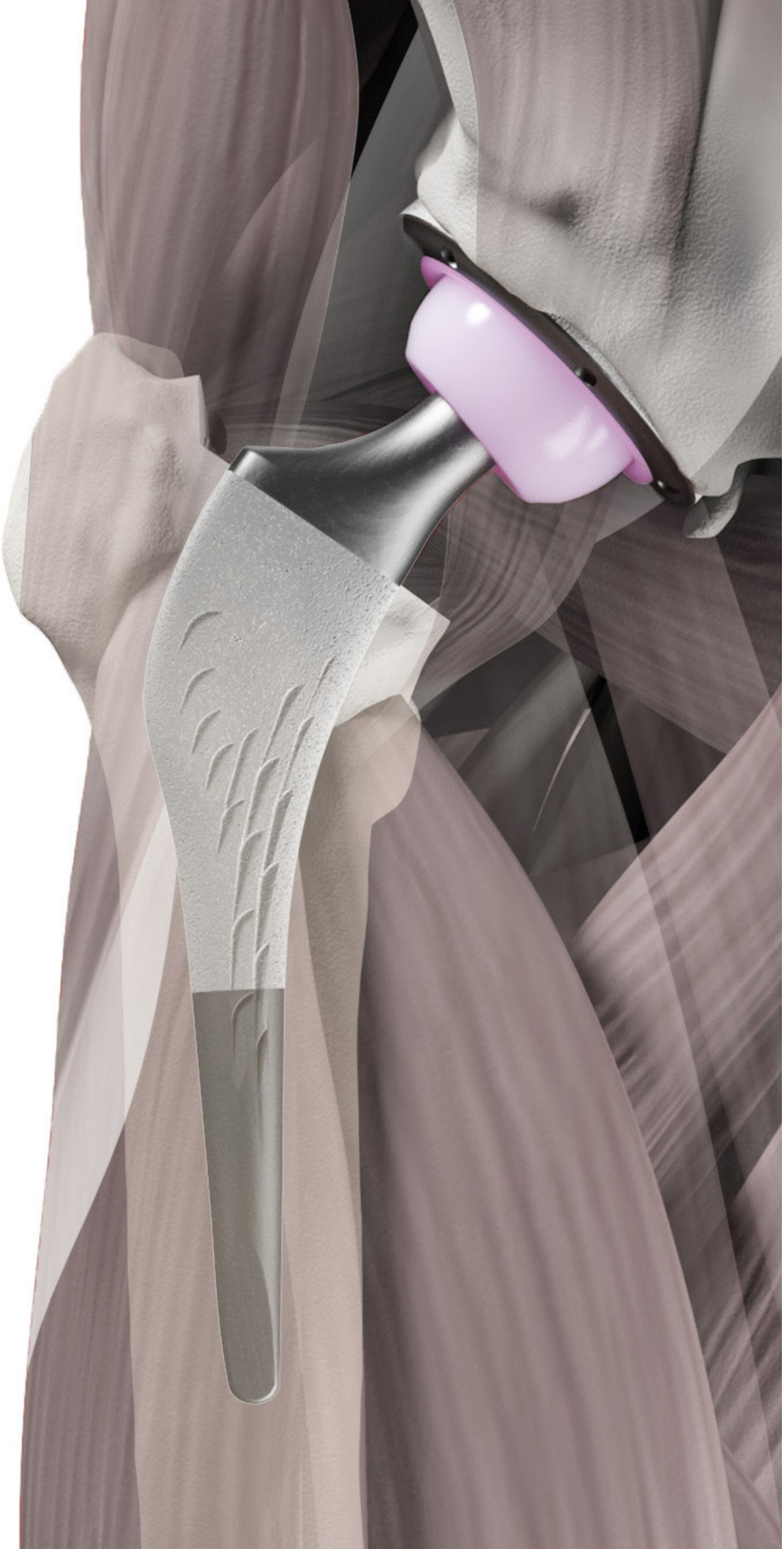
A refined outer shoulder
The outer shoulder of the SPS® has been designed so as to facilitate the introduction and descent of the stem, and enables to avoid any conflict within the trochanteric zone. Therefore no opening at the level of the greater trochanter is necessary.



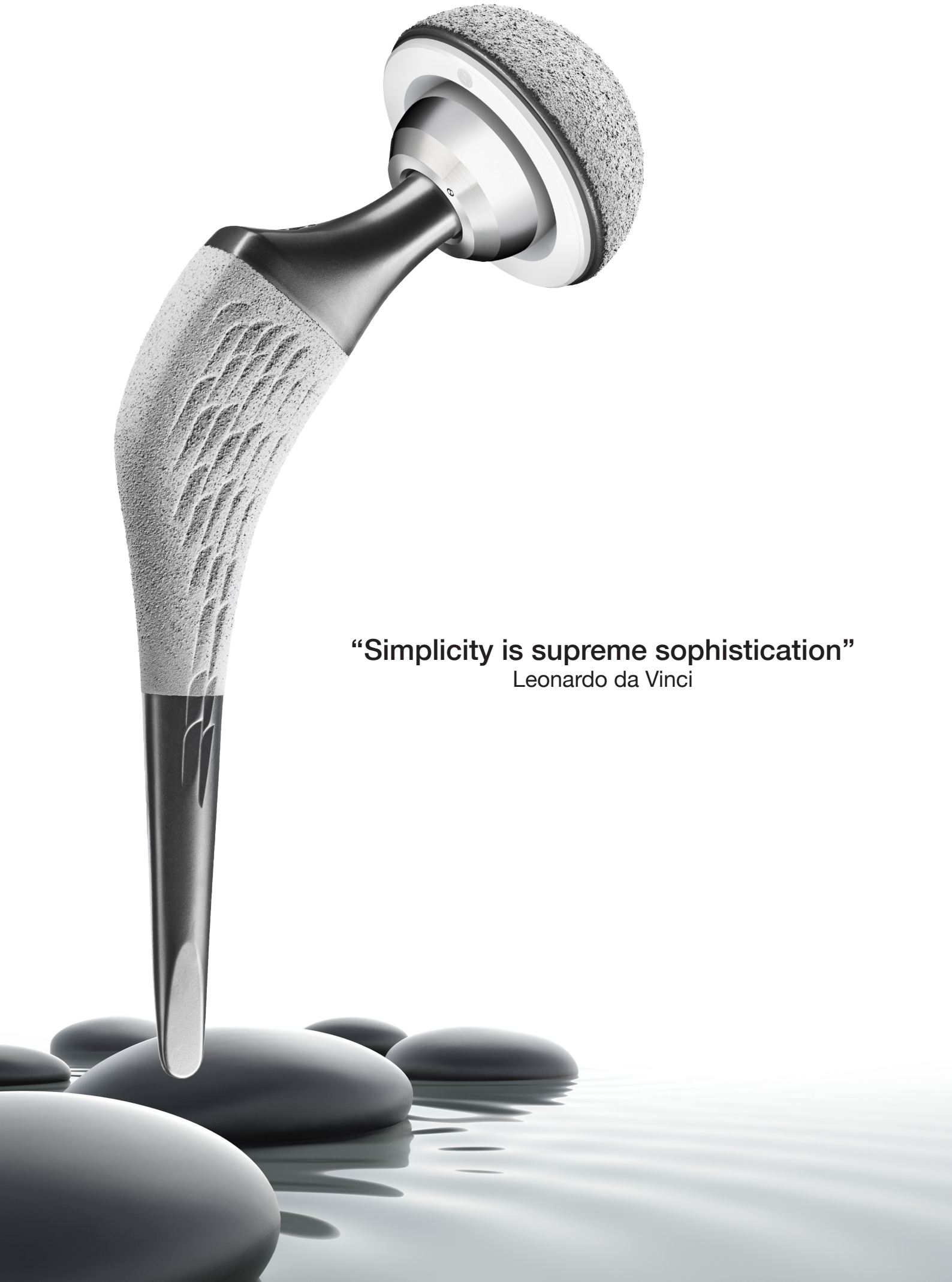
A short and refined stem

Naturally anatomic anterior insertion

The anatomic sagittal curvature allows introduction into the canal to be approached via the anterior femur without having to work the posterior part. This naturally anatomic insertion also enables the soft tissues to be preserved during this surgical step.



Anatomic
for an optimal reconstruction

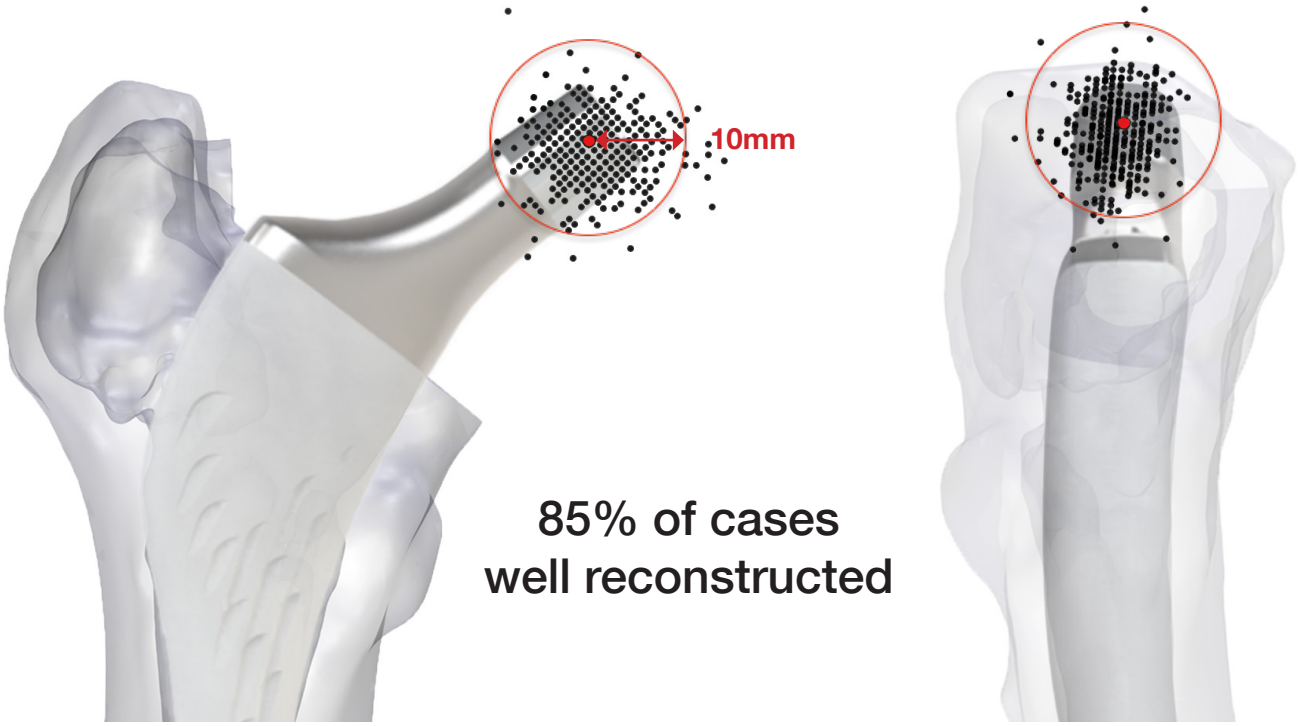


“Simplicity is supreme sophistication”
Leonardo da Vinci

The simplicity of an efficient standard reconstruction

The culmination of 20 years of continuous evolution of the concept

The SPS® *Evolution* design is underlain by the study of 640 cases of implanted SPS®, for which the preoperative and postoperative scans were analysed in 3D. For each of these implanted SPS® cases, the centre of rotation of the prosthesis was aligned with the definitive and correctly dimensioned intramedullary position of the stem. In other words, for a statistically significant number of femurs, each of the points obtained represents the target objective of optimal reconstruction for a correctly dimensioned SPS®, the intramedullary position of which is, according to Sariali et al[5], predictable and reproducible. The study reveals that this unprecedented 3D anatomic distribution is distributed normally, and that 95% of these centres of rotation are distributed within a sphere of 10 mm radius.



The simplest and most effective reconstruction possible

In being based on the results of this study, the extramedullary part of the SPS® *Evolution* has been designed for reconstruction precisely at the centre of this true prosthetic distribution: The SPS® *Evolution* thus allows reconstruction which is the most effective possible statistically. Thanks to the options of offset of the femoral heads (-4mm to +8mm), our results show that you can reconstruct up to 85% of your patients without compromising the final reconstruction, and all by means of one simple-to-use monobloc stem.

SPS® *Evolution*
The heart of the system for normal indications

Because it was designed to match the average patient anatomy, the SPS® *Evolution* is at the centre of the SPS® prosthetic system. Thus, you can optimally reconstruct the majority of your patients with the same monobloc implant.

SPS® Modular
The modularity option

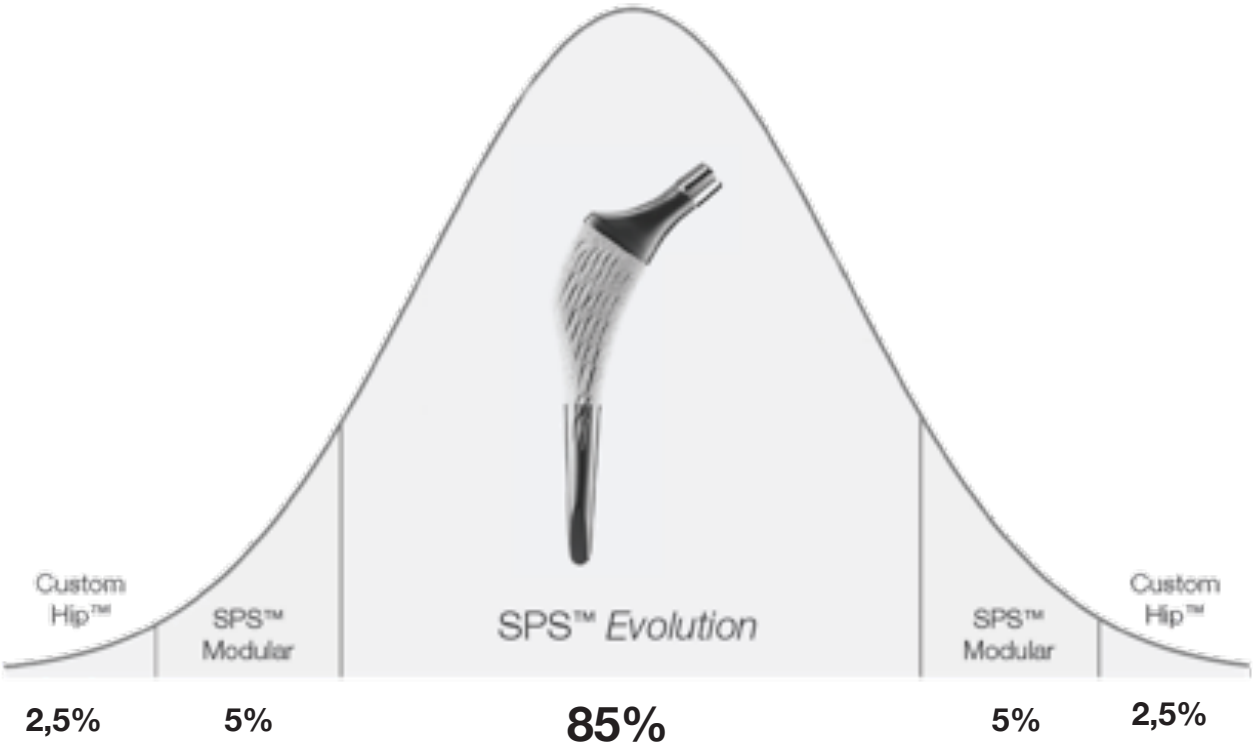
In indications which, although non-dysplastic, are close to the limits of distribution, the SPS® Modular offers 18 options for supplementary reconstruction, while still preserving the same, common SPS® instrumentation.
The modularity of the neck thus provides a proportionate and justified response to target indications.

Custom Hip™
Security for complex indications

From its results published 15 years post-operatively [2], the Custom Hip™ stem has demonstrated an especially effective response in the treatment of complex indications, such as severe dysplasias[3] or young patients[4].

A solution adapted to each of your patients

Based on a complete range of implants, the Symbios Hip System in all cases offers the most adapted solution in terms of treatment efficacy and cost, in this way proportional to the anatomic distribution of your patients' indications.



Optimise recovery in the short term

Improve function thanks to a closely controlled reconstruction

Thanks to the system composed of the SPS® *Evolution*, the SPS® Modular and the Custom Hip™, there is always a solution available to you for restoring optimal function to each of your patients.

- Rapidly restore the efficiency of the abductor muscles [11][12]
- Reduce the risk of leg length discrepancy and limping
- Reduce the risk of postoperative dislocation

Minimise the risk of pain and promote rapid osteointegration

The immediate stability achieved with the SPS®, the absence of micromovements, as well as shortness of the distal part contribute towards reducing the risk of postoperative pain. Osteointegration is thus promoted, allowing rapid and durable biological fixation.

Benefit from an anatomic stem suitable for mini-invasive surgery

Thanks to its anatomic design, the SPS® favours the conditions for surgery that is less aggressive for the greater trochanter as well as for the soft tissues, thus facilitating the postoperative recovery of the patient.

Prepare the conditions for maximum longevity

Preserve bone stock

In favouring high osteotomy (30°), the SPS® permits the calcar conservation, which represents a bone stock that is important for long-term stability of the implant.

Promote metaphyseal bone remodelling without “stress-shielding”

The excellent metaphyseal contact achieved with the SPS® ensures distribution of the mechanical stresses within the proximal zone[1][14]. Metaphyseal bone remodelling is thus favoured throughout the lifetime of the implant, thus preparing the conditions for maximum longevity.

Optimise wear of articular surfaces

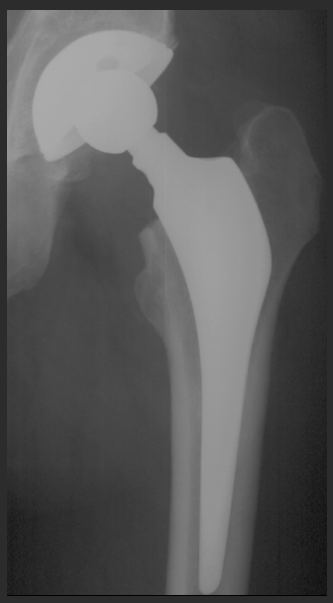
Optimisation of extramedullary reconstruction allows improved distribution of stresses overt the articular surfaces[13] : Wear of components is reduced, improving their longevity; debris resulting from joint friction is minimised, reducing the risk of osteolytic reaction.

Clinical cases

Case no. 1 : SPS® with HILOCK cup at 14 years

Preop x-ray

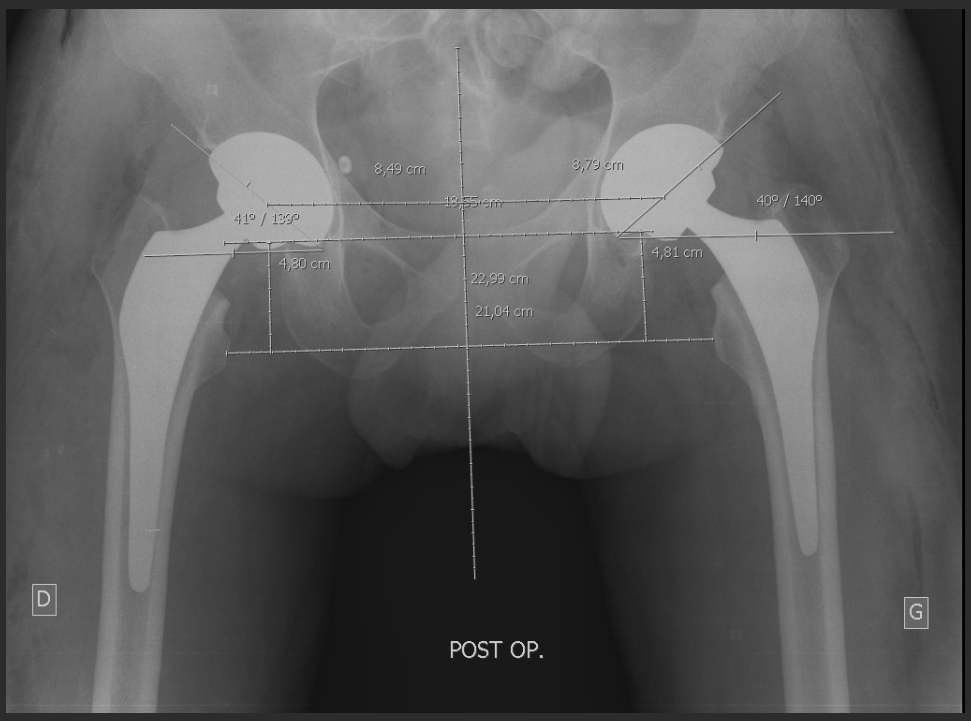
Postop x-ray



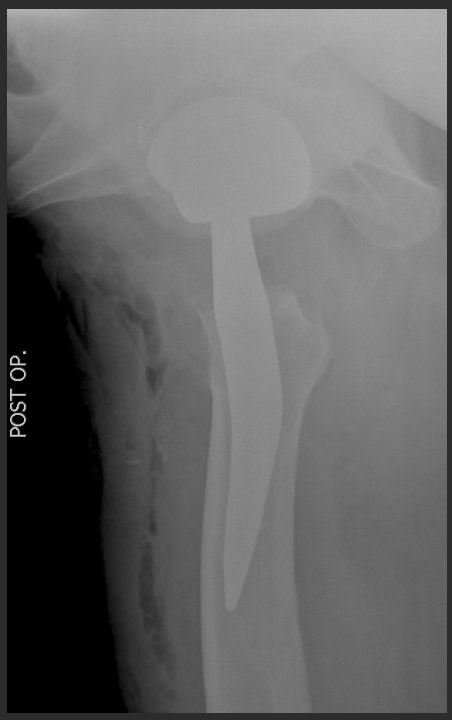
Postop x-ray (1 year)

Postop x-ray (13 years)

Case no. 2 : Bilateral SPS® *Evolution* with APRIL cup, postoperative control



postop frontal x-ray

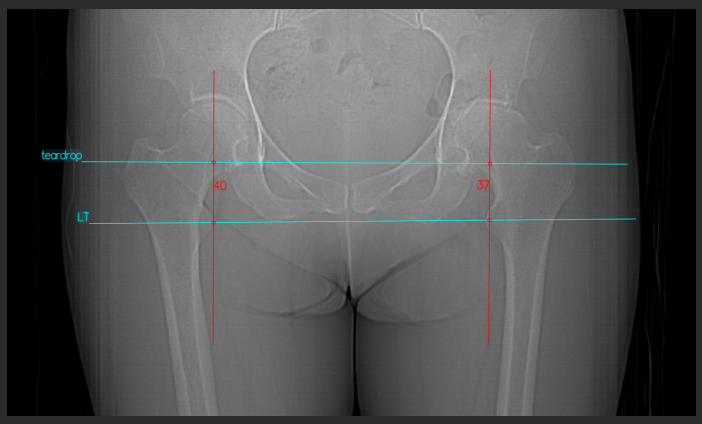


postop sagittal x-ray

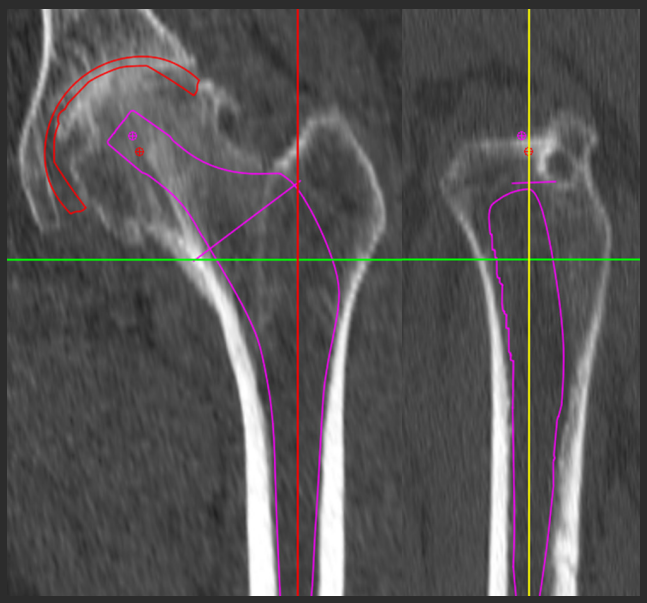
Plan SPS® in 3D for greater precision

Case no. 3 : SPS® *Evolution* with APRIL cup planned and monitored in 3D with HIP-PLAN™

Preoperative planning



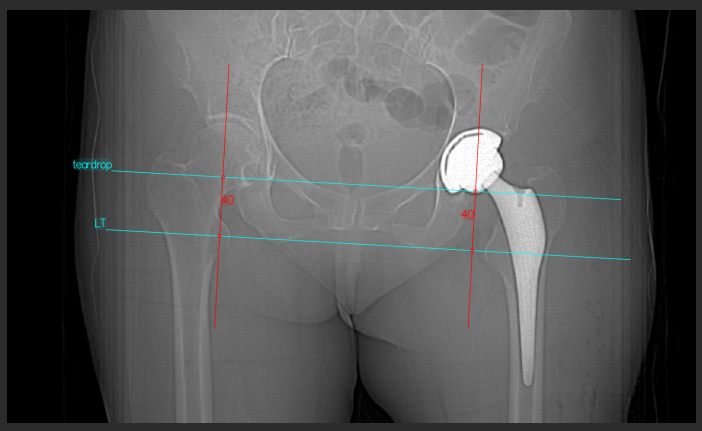
2D planning: Left arthrosis with a leg length difference of -3mm (intra-articular) on the side to be operated on.



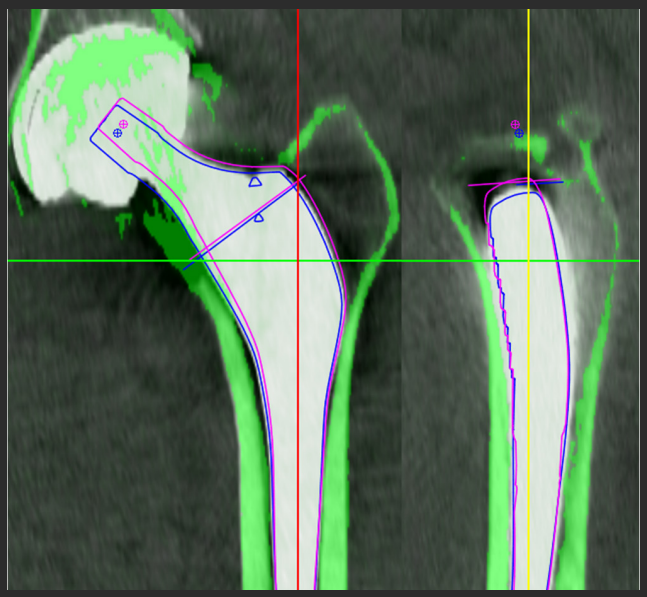
3D planning (HIP-PLAN™) :

- Femoral offset of 41mm
- Planned lengthening of +4mm
- Planned lateralisation of +1mm
- Planned implants:
  - SPS® *Evolution* E
  - APRIL 52
  - BIOLOX® Delta head +0mm

Postoperative control



2D postop: Control x-ray reveals correct positioning of the implant. The asymmetry of intra-articular lengths has been corrected.



3D postop: Matching preop / postop CT scans (HIP-PLAN™)

- Achieved lengthening of +3mm for +4mm planned
- Achieved lateralisation of +2mm for +1mm planned
- Implants used :
  - SPS® *Evolution* E
  - APRIL 52
  - BIOLOX® Delta head +0mm

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(14) The effect of a lateral flare feature on uncemented hip stems.
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