Revitan® Straight Revision Hip System

Proven technology for customized solutions

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The Second Generation of the PFM-R System

The Revitan Straight Revision Prosthesis incorporates the knowledge gained from 20 years of clinical experience in cementless revision to meet current clinical requirements. The forged cobalt-chromium connection taper, introduced in 1990, has been intensively tested and has proven itself in over 15 years.

The modularity of the *Revitan* Straight System offers the orthopaedist a broad range of indications, versatility and an individual solution for demanding revision cases – together with a high degree of safety relating to the connection taper. The large intraoperative flexibility of the system is supported by a completely modular set of instruments that facilitates independent monitoring of the component anchoring and leg length at each stage of the surgery.

The *Revitan* Straight Stem allows the orthopaedist to exploit the advantages of the modular revision prosthesis concept optimally.

The Revitan Straight Implant System: The Distal Component

As well as diaphyseal anchorage, the distal components of the *Revitan* Straight System permit further proximal anchoring in the metaphyseal-diaphyseal areas of the femur.

Components are available in 3 lengths for diaphyseal anchorage: 140, 200 and 260 mm. These components are available in diameters between 14 and 28 mm in 2-mm increments. 8 longitudinal ribs facilitate wedging and ensure neutralisation of rotational forces. The stem is conically shaped with an opening angle of 2°, which guarantees a perfect primary anchoring, ensures harmonic distribution of axial loads and facilitates rewedging in the event of any secondary subsidence of the prosthesis.

For anchorage in the metaphyseal-diaphyseal area of the femur, a 120-mm component with a diameter of 14 mm completes the *Revitan* portfolio. For this purpose, the ribs were extended into the proximal, increasingly conical area of the prosthesis, which has an opening angle of 9°.

Positive clinical experience of over 20 years with the Wagner SL Revision Prosthesis confirms the 2° taper design for distal anchoring.

The opening angle of 9° and ribs in the proximal area of the 120-mm component ensure secure anchoring in the metaphyseal-diaphyseal area of the femur in combination with a conical proximal component.

The Proximal Component

A selection of 6 different heights in either conical or cylindrical version is available for the proximal component. The height increments are in 10-mm steps from 55 mm to 105 mm. This allows individual selection of the component that contributes optimally to the planned anchorage and permits correction of the length of the lower limb.

The CCD angle of 135° and a constant offset of 44 mm ensure good functioning of the gluteal muscles. Two holes in the medial part permit the attachment of non-metallic suture material.

The dorsal and ventral ribs allow a press-fit in the tensile and compressive stress-free zone of the proximal femur. When selecting a fixation in the metadiaphyseal zone of the femur, these pronounced ribs contribute decisively to efficient primary anchorage, together with the more voluminous and conical shape of the conical component.

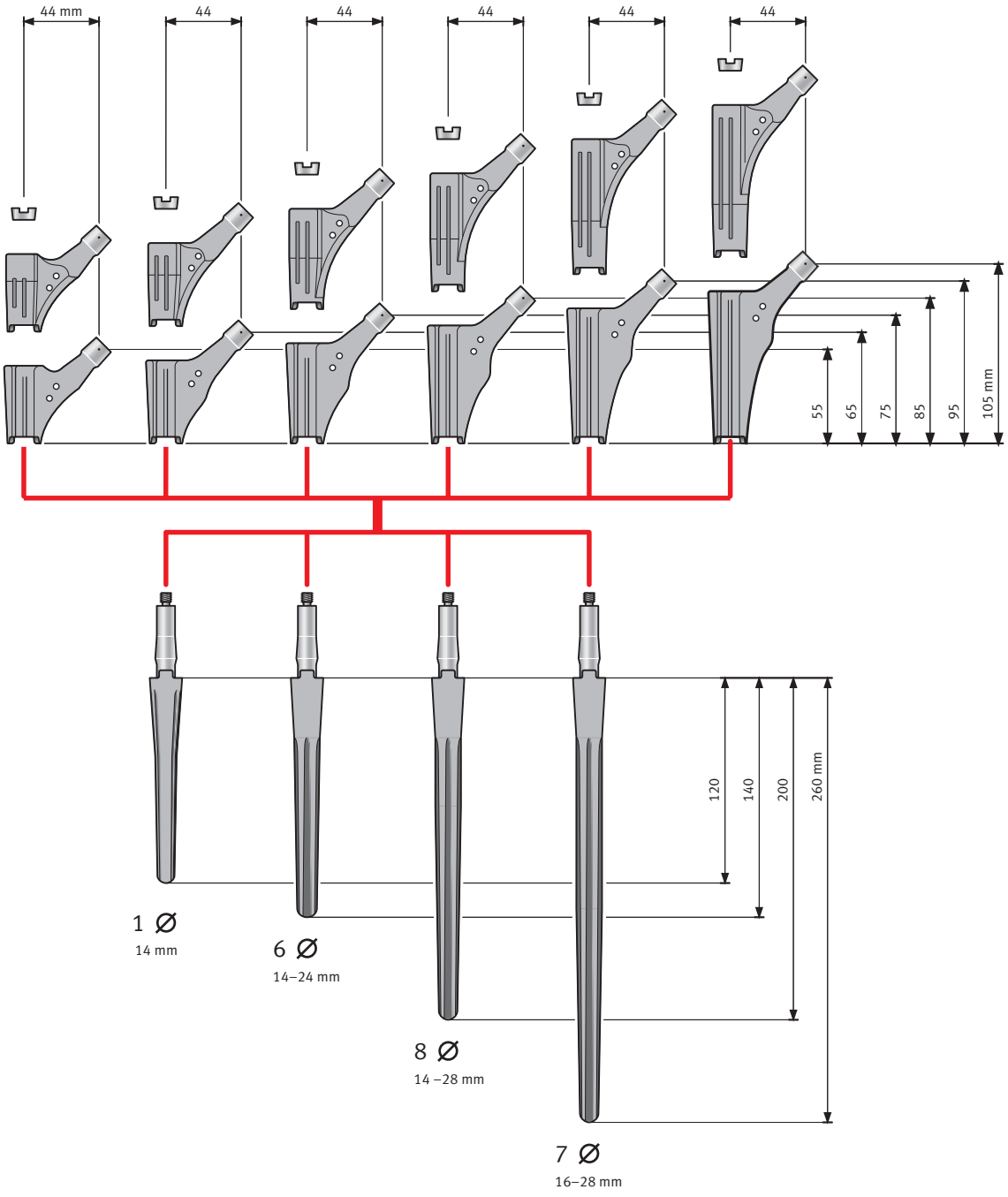
Cylindrical Component
Less pronounced ribs at sagittal level, otherwise slim design to prevent unwanted jamming.

Conical Component
Conical design and lateral ribs enable anchorage in the metaphyseal section of the femur.

The Revitan Straight Implant System: A Customized Solution for Every Case

The longitudinal structure of the proximal and distal *Revitan* Straight components allows to create a prosthesis length in 10-mm increments within the range from 175 mm to 365 mm.

This concept and the possibility of free combination allow the user to achieve the optimal leg length without having to compromise on the anchorage.



Revitan Connection Taper: Flexibility and Safety Thanks to Proven Technology

The concept of distal press-fit anchorage from Prof. H. Wagner requires reliable connection technology and intraoperative flexibility for the assembly of both implant components in a modular prosthesis system.

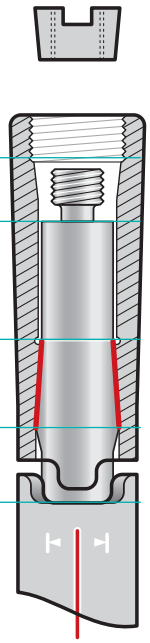
The *Revitan* Connection Taper has been tried and tested clinically for 15 years and is distinguished by the use of a forged CoCr alloy (*Protasul*® 21WF) and high precision in manufacturing.

The connection peg is configured so that it can resist the forces resulting from distal anchorage without proximal support.

The implant components can be easily assembled in situ in just a few steps using handy instruments. The antetorsion of the proximal component can be freely set in a range of plus/minus 40°.

In the event of a repeat revision, the connection permits intraoperative disassembly of individual prosthesis components and flexible adaptation of a new implant component to equalize leg length or optimize antetorsion.

The Revitan Connection Taper is Divided into 4 Zones.



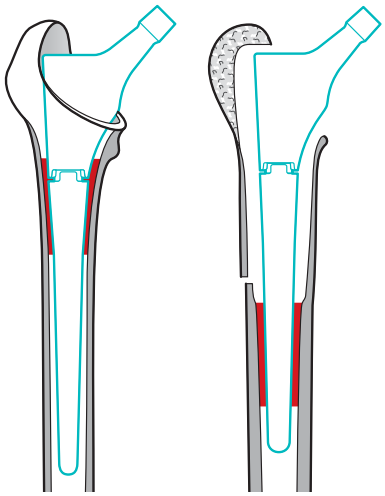
Screw thread for the safety nut

Cylindrical zone for centering the two components on assembly

Conical zone with fine grooves for mechanical connection of the two components

Zone with reduced cross-section for concentrating flexion forces in this area and thereby preventing metal abrasion due to micro-movements

The Anchorage: as Physiological as (still) Possible



The design of the *Revitan* Straight Implants and the full modularity of the instrument set allow the user to achieve efficient primary stability by press-fit in either the metadiaphyseal or just the diaphyseal area of the femur. The objective of an anchorage as proximal and, therefore, as physiological as possible can thus be achieved even in different defect cases.

Ventro-dorsal flat sections give the *Revitan* Prosthesis the necessary elasticity to avoid excessive stiffening of the femur. Complete filling of the medullary cavity is also avoided in this way.

Primary stability by press-fit in the area of the diaphysis can be achieved on a length of around 5 cm, which permits a limitation of the contact zone between the bone and implant. This fulfils elementary prerequisites to reduce the risk of stress-shielding.

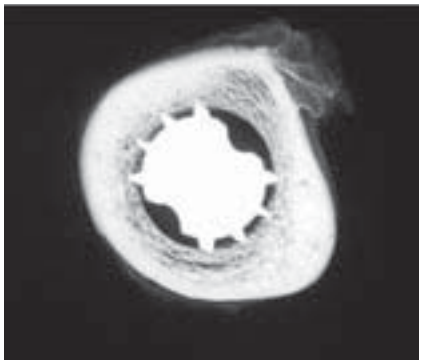
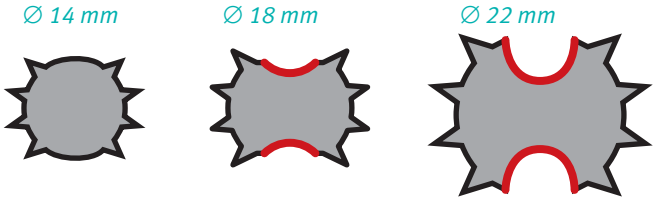


Photo: B. Fink et al.[1]

The ribs are in the frontal plane, i.e. the tensile and compressive stress-free zone of the femur diaphysis to ensure optimal conditions for rapid osseo-integration and, therefore, long-term anchorage.



The ventro-dorsal flattening increases with the diameter of the prosthesis and, thus, gives the implant the elasticity required to prevent stress-shielding even with a large prosthesis diameter.

[1] Unfallchirurg 2005 – 108: 1029–1037
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B. Fink et al: Fixationsprinzipien des zementlosen modularen Hüftrevisionsschaftes Revitan – Eine anatomische Studie, Abb. 6

Conservation and Regeneration of Bone Substance

Secure primary anchorage of the revision implant, independently of the extent of the loss of bone substance, is essential. A harmonic transfer of forces must also be ensured; proximally also, if possible. To keep the risk of stress-shielding to a minimum, excessive stiffening of the femur by the implant must be avoided.

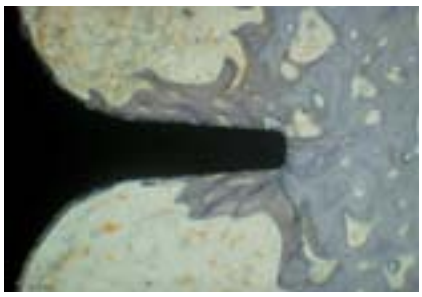
Optimal Material and Surface Quality

The *Revitan* Straight Prosthesis is manufactured from a titanium-aluminium-niobium alloy (*Protasul*®-100), the biocompatibility of which is documented in numerous histologies and explants. The roughly blasted surface promotes bone formation, which provides reliable secondary stability by osseointegration. The elasticity modulus of the titanium alloy *Protasul*-100 is a decisive advantage in revision hip arthroplasty in particular. This parameter has a central biomechanical role in that it visibly promotes bone regeneration proximally.

Histologies Prove the Concept

Histologies* using the *Wagner SL Revision*® prosthesis prove the biomechanical anchoring principle of the parameters taper angle, longitudinal ribs and materials, which are also used for *Revitan* Straight Prosthesis.

Overview of the cross section in the distal anchoring wedge in a 65-year-old patient who died of a pulmonary embolism 5 1/2 months after a revision.



Primary contact points created intraoperatively; osseous conversion processes of the almost completely dead cortex are clearly discernible.

* R.K. Schenk, K. Wehrli, "Zur Reaktion des Knochens auf eine zementfreie SL-Femur-Revisionsprothese", Orthopäde 1989.

The Set of Instruments: The Right Tools to Achieve your Goal Safely

One very important element of the *Revitan* Straight System is its efficient and extremely useful set of instruments. This consists of reamers, modular rasps and modular trial prostheses.

Thanks to its complete modularity, the set of instruments offers intraoperative flexibility appropriate to the implant and permits controlled preparation of the anchoring bed to achieve an efficient press-fit. Trial repositions are possible at each stage of the intervention to ensure optimal restoration of the leg length.

The *Revitan* instrument system meets all requirements to be able to fulfil the concept of modular prostheses optimally: Complete decoupling of anchoring, adjustment of antetorsion and leg length equalization, without any loss of quality or safety.

The instruments also facilitate the simple replacement of proximal components, if an intraoperative correction should prove necessary or subsequent revisions are due.

A minimum of sophisticated instruments in three well arranged trays make demanding revision procedures with implantation of the *Revitan* Straight components possible in only few, safe, controlled steps.

Sample Cases

Before every revision operation, it is essential to specify the operation strategy using the X-rays. This means choosing the approach to the femur that makes it possible to overcome the identified obstacles and simultaneously respect the objectives established by the press-fit concept. The flexibility of the *Revitan* System helps the surgeon to implement this situation-specific strategy consistently.

Endofemoral Procedure

A loosened cementless primary prosthesis surrounded by minor defects in the cortex permits short anchorage in the metadiaphyseal area of the femur in the adjacent example. The not very pronounced femur curvature does not require osteotomy.

Aseptic loosening of a cementless prosthesis 20 months after implantation.

Anchoring a Revitan Straight Prosthesis in the metadiaphyseal zone via endofemoral access. Stable situation after 3 months.

Transfemoral Procedure

The very thin cortex in zones 2 and 3 and, defects in zone 6 in the adjacent example require diaphyseal anchorage. A transfemoral approach permits the correction of femur curvature, easy cement removal and, in particular, ensures free access to the planned anchorage zone. This strategy is therefore used in 75% of straight revision implant cases.

Aseptic loosening of a straight stem 3 years after implantation.

Situation after 3 months. Distal anchorage of a short Revitan Straight Stem via transfemoral approach.

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