

directLINK®

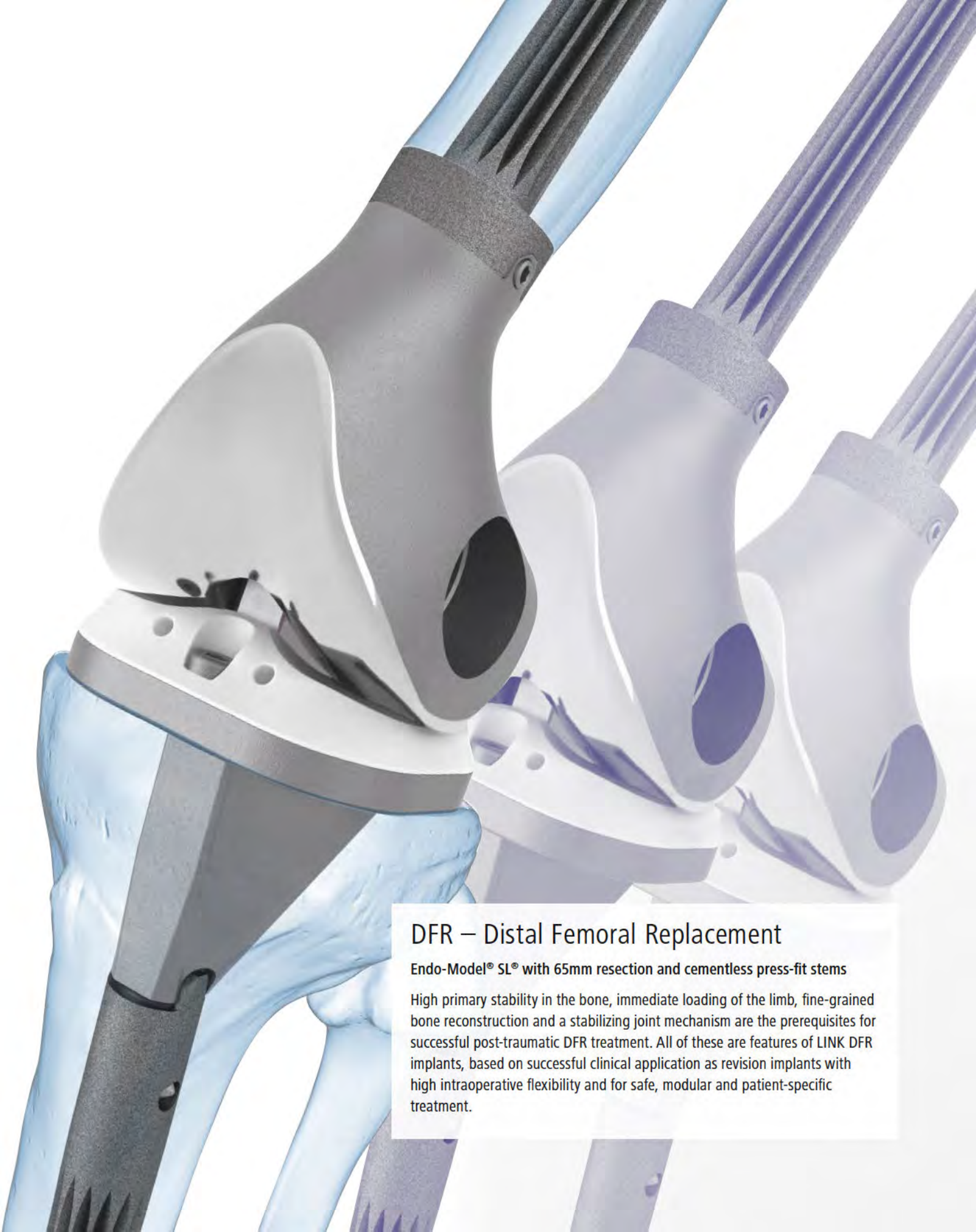
Magazine for Arthroplasty

Special Edition 01/2019

FIX OR REPLACE

Bone and Joint Replacement in Traumatology





DFR – Distal Femoral Replacement

Endo-Model® SL® with 65mm resection and cementless press-fit stems

High primary stability in the bone, immediate loading of the limb, fine-grained bone reconstruction and a stabilizing joint mechanism are the prerequisites for successful post-traumatic DFR treatment. All of these are features of LINK DFR implants, based on successful clinical application as revision implants with high intraoperative flexibility and for safe, modular and patient-specific treatment.



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Dear Readers:

A paradigm is generally understood to mean scientific achievements, rules and norms that a community accepts as its basis. Anything that does not fit into this frame is usually ignored until it is no longer possible. Only then will the old paradigm be replaced by a new one.

Traumatology carries out such a paradigm shift. Instead of creating an osteosynthesis with nails and plates in a distal femoral fracture, more and more traumatologists are deciding to implant a prosthesis such as the LINK® Endo-Model® DFR Distal Femoral Replacement at an early stage in indicated cases. These traumatologists also put the well-being of the patient first, but in some cases they override previous standards. Economic advantages, because the patient can expect fewer complications, are other positive effects in addition to rapid mobilization.


For this special edition, we spoke with renowned traumatologists and orthopedic surgeons about the principle of »megaprosthesis instead of osteosynthesis«. Read interviews with Prof. Dr. med. Axel Ekkernkamp, Mr. Alan Norrish, Mr. Jonathan Waite, Prof. Dr. Dr. med. Wolf Robert Drescher, Prof. Dr. Claudio Zorzi and Dr. Daniel Godoy Monzon.

Incidentally, the replacement of paradigms is entirely in the spirit of Albert Einstein, who made this statement: »If you think the way you have always thought, you will act as you have always acted. If you act the way you always did, you will do what you have always done.«

I hope you enjoy reading this edition of **directLINK**

Regards,

Helmut D. Link



»Most elderly people with distal femoral fractures would go for **arthroplasty.**«

An interview with Mr. Alan Norrish, MD, on the use of the LINK® Endo-Model® rotating hinge knee for trauma indications instead of open reduction internal fixation (ORIF).

INTERVIEW

Mr Alan Norrish, MD, LL.M PhD FRCS, is a consultant orthopedic surgeon at Cambridge University Hospitals in Cambridge, UK. He has a subspecialty interest in hip and knee trauma and joint replacement surgery. Mr. Norrish also has an interest in medical ethics and the law. He was awarded a Master of Laws (LLM) degree, with distinction, in legal aspects of medical practice by Cardiff University in 2007.

Mr. Norrish, joint replacement is obviously a valid treatment option for distal femoral fractures. But up until now, it has not been widely used – why is this so?

I think one reason is that we tend to have a different specialization. We have the trauma surgeons who are using osteosynthesis everyday to fix up fractures, but it's often not part of their practice to use arthroplasty. We also have hospitals that do a lot of arthroplasty, and within that scope of practice would be complex arthroplasty like distal femoral replacement. But the two disciplines are not always communicating well, and as a consequence we don't always offer early arthroplasty. Most of the published series where distal femoral replacement has been used for trauma, it's after a failed osteosynthesis or a periprosthetic fracture, where arthroplasty surgeons do get involved.

Do trauma surgeons somehow feel uncomfortable doing a joint replacement for distal femoral fractures?

I think trauma surgeons often feel much more comfortable using a plate and screws, because sometimes they are not as familiar with the techniques of complex arthroplasty. Whereas arthroplasty surgeons would say that it's much quicker to remove the bone and replace it, rather than to try to put the pieces in the correct place and get the screws to hold it. That is particularly true when the quality of the bone in elderly people isn't strong enough to take the screws as securely as you'd like. But if you have training, and you're familiar with arthroplasty, then doing the distal femoral replacement is not difficult. But if you do it without the right training, plenty of errors that can occur, which would give the patient problems.

Compared to open reduction internal fixation, what are the pros and cons?

The big advantage of distal femoral replacement is in elderly patients. Frail or elderly patients can start walking full-weight bearing immediately. In

both hip fractures and the fractures of the distal femur, if a person is 80-plus years old, they need to be able to walk. Because if you tell them to non-weight bear or partial-weight bear, they're going to end up in a wheel-chair again. So, the big advantage for the elderly patients is you're not waiting for any bone to heal, it's as strong on the day that you finished the surgery as it will be in six months, so they can get up and get walking. Also, that helps the hospital because the length of stay is much less. On average, in our hospital, the length of stay is 10 to 11 days for a distal femoral replacement, and 30 days for osteosynthesis of a distal femoral fracture in an elderly patient. Other benefits are that patients are in much less pain and more satisfied early on.

Can you give a sample calculation that justifies the relatively costly joint replacement?

In our institution, a plate and screws cost around €1,000, but a distal femoral replacement can cost up to €8,000. We continue to compare both these replacements alongside the difference in length of hospital stay, which is approximately 20 days at a cost of €400 to €500 a day. This very quickly makes the prosthesis a much cheaper option. But there are other savings which are more difficult to capture; for instance, when the patient gets home, how are they cared for? Do people have to do their shopping? Do people have to do their housework for them? So, all of those things must be taken into account when comparing costs.

What is the appropriate patient and fracture pattern indicating joint replacement, rather than ORIF?

We think about fractures on the AO Classification, which are in the distal metaphyseal block of the bone. It could be an extra-articular fracture, it could be partial articular or even complete articular. And it depends on the patient:

if it's a younger, more healthy patient we would try to fix it. But if it was an elderly patient, even with an extra-articular fracture, we would consider distal femoral replacement.

Would total knee replacement in situ be a contraindication?

No. If you have a periprosthetic fracture above the knee, many people would go immediately to a distal femoral replacement if they felt they didn't have enough space between the knee replacement and the fracture to get adequate fixation. Most of the series about the outcome of distal femoral replacement after fracture are in periprosthetic fractures. The new idea is really, should we just do it straight away for people who've never had any surgery on their knee before? Interestingly, when you have a knee replacement, it tends to stiffen up, and sometimes the reason that they've got the periprosthetic fracture is because the knee itself can't move, and it creates a stress within the bone at the end. If you then put a plate on, it's very hard for that fracture to heal because there's a significant amount of stress through the bone trying to make the bone move, and eventually the screws loosen, the plate breaks, and then you come to revision surgery.

What do you tell patients when the choice between ORIF and joint replacement has to be made? What do they say?

I think what most patients value, especially as they get older, is to maintain as much of their independence as they can. An absolute key part of their independence is their ability to be independently mobile. And so, mostly, when you explain to the patients there are two ways of treating a distal femoral fracture: one may have long-term consequences, for instance, you're one step closer to an amputation, but the benefit is that you can get up and walk tomorrow and you'll be home within one or two weeks

»The big advantage of distal femoral replacement is, that elderly patients can start walking full-weight bearing immediately.«

Mr. Alan Norrish, MD





LINK® Endo-Model® DFR, bone-saving implantation with only 50mm resection



Periprosthetic fracture treated with LINK® Endo-Model® DFR; tibia 135mm stem, femur 50mm augmentation and 160mm stem

(distal femoral replacement); or the other option, we have to wait for the fracture to heal, you're going to have to go slowly, and because of other problems in your body, it probably means using a wheelchair, or a frame, just to go short distances partial weight bearing, and you'll be in hospital about a month (osteosynthesis). Most elderly people want to go for the joint replacement.

How would you compare the use of the LINK® Endo-Model® rotating hinge to other new systems for distal femoral fractures?

The only two distal femoral replacements I've used for this indication have both been made by LINK: the Megasystem-C®, and the LINK® Endo-Model® rotating hinge. In my opinion, the Megasystem-C® is more technically complicated but it has significantly more options. For an arthroplasty surgeon who's just familiar with the LINK® Endo-Model® rotating hinge, the beauty about the Endo-Model® is that in some ways it's easier because of the pitfalls which relate to getting the right rotation on the femur.

To what extent is the use of a distal femoral replacement instead of ORIF supported by studies?

There are no very strong or robust studies but, by-and-large, small numbers and case studies only. None of them have shown that the distal femoral replacement is inferior to alternatives such as osteosynthesis. Based in our institution, we have started a randomized controlled multi-center feasibility trial, recruiting 46 patients in total. The results will be out in 2019. There are 23 patients in each group, elderly patients greater than 65 with a fracture; half are randomized to fixation, half are randomized to replacement. One of the fundamental parts of that trial is to try to capture all of the costs to understand, if

you do spend more money at the beginning and it saves money at the end, then is it worth spending the money?

Do you think joint replacement will become the gold standard instead of ORIF?

I think what will change it, certainly in my country, will be the understanding of the economic benefits of spending more money at the beginning to spend less later on. I think that it will depend upon the outcome of the trials. If they can show a good outcome, with low complication rates, of a treatment that costs less, then it will become the gold standard. The problem then will be organizing the trauma services to allow arthroplasty surgeons to get access to the patients who have got acute distal femoral fractures. We're going to have to think about how we're going to organize these patients. It's not impossible, but I imagine it will take a little bit of time.

Mr. Norrish, thank you very much for this interview.

»On average, in our hospital, the length of stay is 10 to 11 days for a distal femoral replacement, and 30 days for osteosynthesis of the fracture.«

Mr. Alan Norrish, MD

»The joint replacement works well in my hands – you couldn't get me to change it.«

Mr. Waite, you have done more than multiple joint replacements for distal femoral fractures with the LINK® Endo-Model® hinge knee, instead of open reduction internal fixation (ORIF). How are your results?

They are very good. We published a study that we did a few years ago, where we looked at outcomes, and length of stay. It is a great opportunity to do studies like these.

How are your results, especially in terms of infection and mortality, considering that we are dealing with very elderly patients?

Knock on wood, I haven't had a single acute periprosthetic infection. I've been very happy with my results in terms of low morbidity, low mortality, and my ability to get people up and out of hospital.

How old was your oldest patient?

I implanted a LINK® Endo-Model® hinge knee into a lady that was 102 years old at one stage. She had bilateral fractures and it was the only way she was going to get out of hospital and get on her feet again.

One of the first patients for whom you did a joint replacement for distal femoral fractures instead of ORIF was a patient with osteogenesis imperfecta. How did that work out?

The patient was in his early fifties, but when he fell and smashed his knee, it looked like someone had set a grenade off in his knee, and it was just like complete mush. It was not fixable, but he was pretty young and active, he was a working dentist. I was a bit nervous, but he has got a very good result. Although

he's had issues in that the rest of his bones are falling to bits. From that point on, I got more and more confident using joint replacement for distal femoral fractures instead of ORIF. Clearly, when I first started, it was an unusual thing to do. But now I have a very low threshold for doing it because I know they get very good results.

Do you apply an age limit for the procedure?

There isn't a specific age limit I choose for the procedure. I take all aspects of the patient into account. If a patient is reasonably young with good quality bone and no evidence of pre-injury arthritis, then I would be sticking with traditional trauma techniques. But if the patient is more elderly and their bone is of poor quality, or they have any pre-existing arthritis, then you are probably better off putting in a joint replacement that resects the damaged bone.

The implant is clearly more costly than open reduction internal fixation. How does the British National Health Service (NHS) react?

The NHS is happy to pay for the implant, based on the fact that we get people up and out of hospital quicker. We presented a matched cohort study comparing a similar group where we showed that the costs are relatively equivalent if you take into account the reduced length of stay and everything, that actually the cost [difference] between the two is really negligible.

What is your advice for surgeons first starting joint replacement in cases of distal femoral fracture?

The ideal is to do an operation that allows even the elderly patient to get up and put weight on it straight away afterwards. Joint replacements for distal femoral fractures work well in my hands, and you couldn't get me to change that. But it's very easy to get the surgery badly wrong. Putting a prosthesis in is not something to be done by somebody hasn't had the adequate training. So, we have to be careful of saying that everybody should do it because you need to be trained in the expertise, you need to be a knee surgery expert, and you need to understand the principles of getting a prosthesis to work. Then it's a very straightforward quick procedure, and it is certainly also quicker than ORIF.

Mr. Waite, thank you very much for this interview.



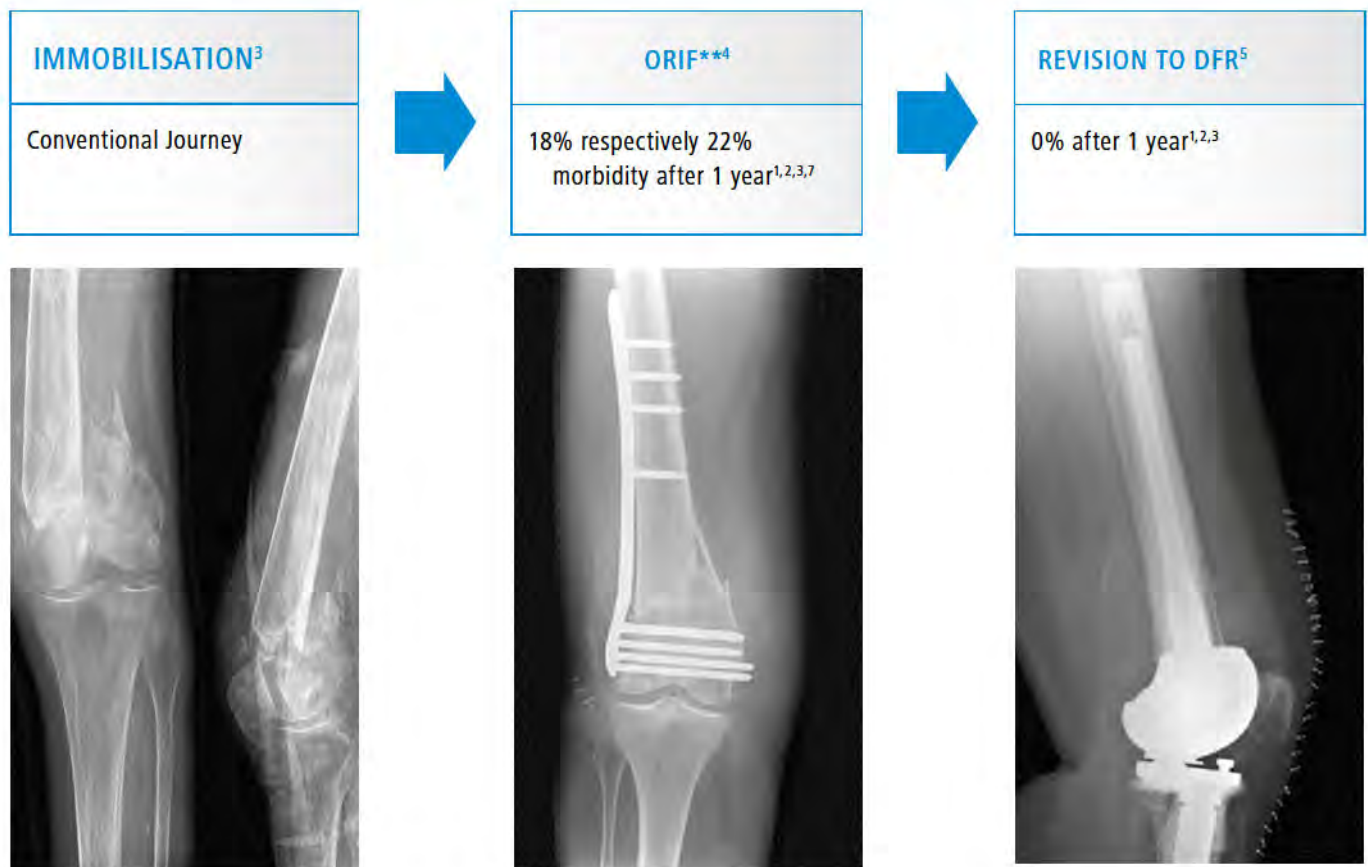
INTERVIEW

Mr. Jonathan Waite, MD, is a consultant orthopedic surgeon based in Warwickshire, UK. He is a specialist in knee, hip and sports medicine, and has a particular interest in arthritis in young adults.

Endo-Model® DFR*: The First Choice for Distal Femoral Fractures in the Elderly

Approximately 72% of older patients with distal femoral fractures have A1 or C1 fractures (see figure on page 7, below). DFR should be considered for any fracture affecting older patients, especially morbid patients who are not allowed to fully load their leg postoperatively⁶.

THE DIRECT PATH TO DISTAL FEMUR REPLACEMENT (DFR)



¹ Karpman RR, Del Mar NB. Supracondylar femoral fractures in the frail elderly. Fractures in need of treatment. Clin Orthop Relat Res. 1995;316:21–24.

² Rosen AL, Strauss E. Primary total knee arthroplasty for complex distal femur fractures in elderly patients. Clin Orthop Relat Res. 2004:101–105.

³ Butt MS, Krikler SJ, Ali MS. Displaced fractures of the distal femur in elderly patients: operative versus non-operative treatment. J Bone Joint Surg Br. 1996;78-B:110–114.

⁴ Papadopoulos EC, Parvizi J, Lai CH, et al. Total knee arthroplasty following prior distal femoral fracture. Knee. 2002;9:267–274.

⁵ Atrey, A., Morison, Z., Young, S. Waite, J. Edinburgh, 2016, presented at the Knee Society, unpublished

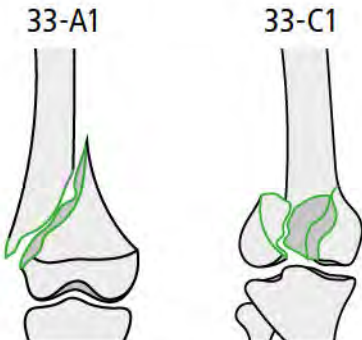
⁶ Quelle: Mr. Alan Norrish, MD, LLM PhD FRCS, Cambridge University Hospitals, Großbritannien.

⁷ Smith JR et al. Distal femoral fractures: The need to review the standard of care. Injury. 2015;46(6):1084-8. doi: 10.1016/j.injury.2015.02.016. Epub 2015 Feb 26.

* Distal Femoral Replacement – see also case studies page 8–11; ** ORIF = Open Reduction and Internal Fixation



LINK® Endo-Model® DFR; sizes S, M, L; modular cemented + cementless stems; medium monoblock option; 50 or 80mm distal femoral replacement segments; further option for extension in 10mm increments, up to complete femoral replacement



Approximately 72% of older patients with distal femoral fractures have A1 or C1 fractures

ORIF** vs. DFR*

	ORIF	DFR
WEIGHT BEARING ^{8,9}	In 6 weeks to 3 months	Immediately
LENGTH OF HOSPITAL STAY ¹⁰	29 days	11 days
TOTAL COSTS INCLUDING CARE COSTS AND PHYSIOTHERAPY ¹⁰	2,5 x more than DFR	2,5 x less than ORIF
1-YEAR MORTALITY RATE ^{1,2,3}	22%	0%
COMPLICATION RATE ⁵	50%	9%
WHEELCHAIR DEPENDENCY AFTER 1 YEAR ¹¹	23%	0%
AVERAGE TIME TO FRACTURE UNION ⁵	6 Months	Not applicable
RESULT	Unpredictable in osteoporotic bone	Predictable due to reproducible technology

⁸ Forster MC1, Komarsamy B, Davison JN et al. Distal femoral fractures: a review of fixation methods. Injury. 2006 Feb;37(2):97-108. Epub 2005 Apr 25.

⁹ Ali AM1, El-Shafie M, Willett KM. Failure of fixation of tibial plateau fractures. J Orthop Trauma. 2002 May;16(5):323-9.

¹⁰ A. Norrish, Addenbrookes Cambridge, UK

¹¹ Hart GP, Kneisl JS, Springer BD, Patt JC, Karunakar MA. Open Reduction vs Distal Femoral Replacement Arthroplasty for Comminuted Distal Femur Fractures in the Patients 70 Years and Older. J Arthroplasty. 2017 Jan;32(1):202-206. doi: 10.1016/j.arth.2016.06.006. Epub 2016 Jun 23.

Distal Femoral Replacement in Fractures with LINK® Endo-Model® DFR



LINK® Endo-Model® – M (with 50mm segment)

Fractures of the distal femur carry a mortality risk comparable to that of hip fractures. The mortality ranges from 6% at 30 days and 18% at six months to 25% at one year after surgery¹. The LINK® Endo-Model® DFR-Fx is a cost effective solution to improve the clinical outcome for these patients.

Distal femoral fractures mainly occur in low-energy trauma in elderly patients and high-energy injuries in young adults. The annual incidence is 4.5 per 100,000 adults, with a male-to-female ratio of 1:2. Fifty per cent of the fractures occur in patients older than 70 years old¹. This number is expected to increase with an aging population².

In distal femoral fractures, restoration of function is particularly difficult in older patients, as it is often associated with low physical activity pre-injury, poor bone quality, and additional serious medical problems such as heart, lung, and kidney diseases and diabetes. Results after open reduction and internal fixation (ORIF) are poor in older patients, with a one-year mortality rate of 22% and a late amputation rate of 9%^{3, 4, 5}.

ORIF can lead to prolonged bed stay

Patients with distal femur fractures of all ages should be able to get up and move as soon as possible after surgery. Treatment that allows early knee movement reduces the risk of knee stiffness and prevents problems caused by prolonged bed rest, such as respiratory problems, decubitus ulcer, thrombosis, and others.

Traction, casting, and bracing do not allow for early knee movement, so they

are used less often than surgical treatments. ORIF treatment can lead to prolonged bed stay as the patient cannot bear weight.

LINK® Endo-Model® Rotating Hinge Knee is a fast and cost effective solution

Implanting a LINK® Endo-Model® Rotating Hinge Knee instead of ORIF has various advantages:

- It is a one-stop ultimate solution for severe post-traumatic knee surgery for elderly people where a patient would otherwise have to recover for weeks.
- While the immediate costs are higher, the shorter hospital stay, less costly rehabilitation, and better results easily compensate for the costs.
- Hip replacement is routinely indicated in hip fractures. Surgeons are realizing that the same applies to knee fractures.
- The LINK® Endo-Model® acts like a hip in the knee due to the possible anchoring.
- Bone sparing: often a unique minimum distal resection of just 50mm is required.
- Readily available due to low implant and instrument inventory.

¹ Court-Brown CM, Caesar B. Epidemiology of adult fractures: a review. *Injury*. 2006;37:691–697

² Bell KM, Johnstone AJ, Court-Brown CM, et al. Primary knee arthroplasty for distal femoral fractures in elderly patients. *J Bone Joint Surg Br*. 1992;74:400–402

³ Karpman RR, Del Mar NB. Supracondylar femoral fractures in the frail elderly. Fractures in need of treatment. *Clin Orthop Relat Res*. 1995;316:21–24.

⁴ Rosen AL, Strauss E. Primary total knee arthroplasty for complex distal femur fractures in elderly patients. *Clin Orthop Relat Res*. 2004;101–105.

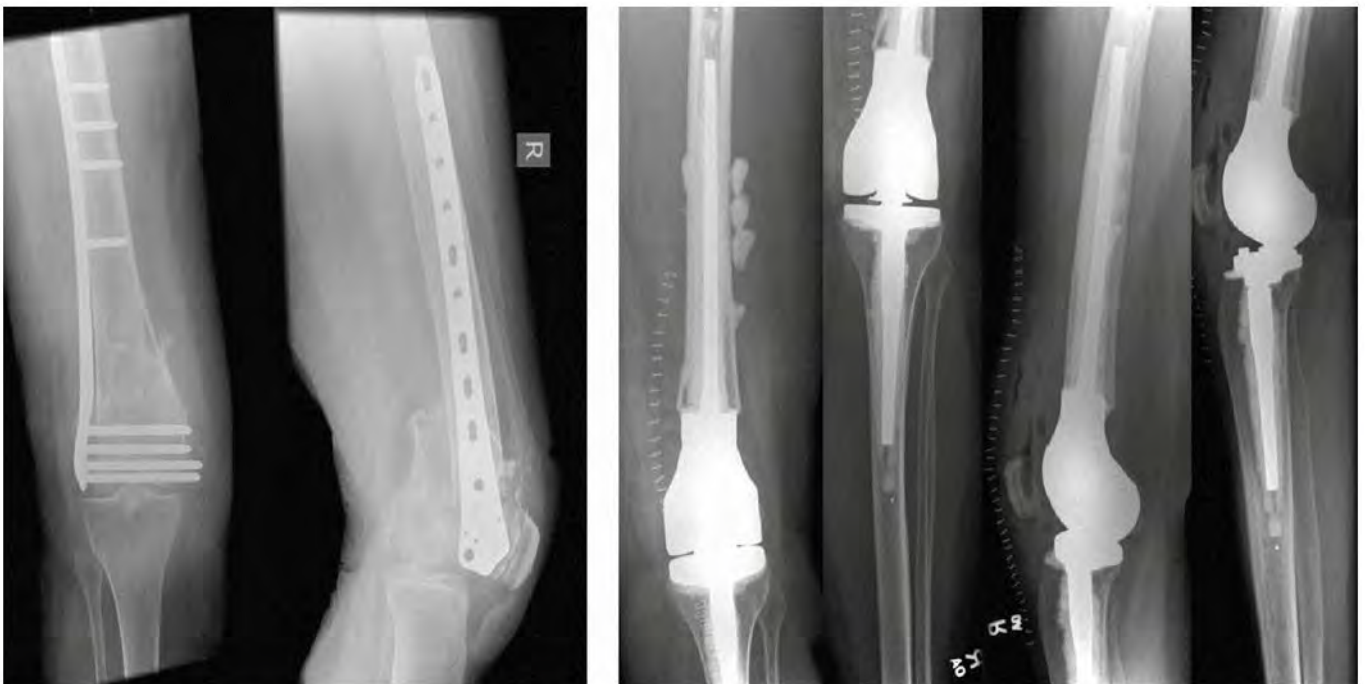
⁵ Butt MS, Krikler SJ, Ali MS. Displaced fractures of the distal femur in elderly patients: operative versus non-operative treatment. *J Bone Joint Surg Br*. 1996;78-B:110–114.

I. Supracondylar Fracture



Treatment of supracondylar fracture (left and center) with LINK® Endo-Model® DFR (right)

II. Revision of Failed ORIF I



Replacement of failed ORIF by distal femoral replacement; 74-year-old patient; Note: Cement leakage visible through original ORIF screw holes. Length of stay: five days after the exchange, the patient was mobile without any aids and was able to climb stairs.

III. Revision of failed ORIF II



Removal of the osteosynthesis plate (left, center-left); reconstruction with a small distal femoral replacement; 80mm Tilastan® augmentation and modular stems

IV. Periprosthetic fracture



Implantation of a LINK® Endo-Model® – M DFR Medium; tibia: 160mm stem, femur: 50mm femoral augment and 200mm stem

V. Bilateral periprosthetic fracture



75-year-old patient with periprosthetic fracture; bilateral hip and knee replacement in situ; implantation of LINK® Endo-Model® – M DFR Medium; tibia: 135mm stem, femur: 50mm augmentation and 200mm stem



»Older trauma patients particularly benefit from DAA and fast-track mobilization.«

Interview with Prof. Dr. Dr. med. Wolf Robert Drescher about the Direct Anterior Approach (DAA) in traumatology, the advantages of combining it with the fast-track scheme and a way to save resources.

Professor Drescher, the DAA has been your standard approach for the implantation of hip prostheses for five years. Can the DAA also be used in trauma cases?

Yes, I'm convinced of that! The benefits are the same: less blood and muscle loss, faster rehabilitation and recovery of the patient with less pain, and cost advantages over the classic approaches.

The DAA is popular with younger patients because of the small incision. What makes it interesting for elderly people?

The great advantage of the DAA is that you can proceed through the gap between M. tensor fascia latae and sartorius. Especially in older patients with a femoral neck fracture, this means less blood loss and preservation of the often low muscle mass. With every implantation of a hip prosthesis in older patients, we see that the muscle mass has clearly decreased. A muscle incision in these patients with a large, classical approach

would mean that even more muscle mass will be replaced by scar tissue. This can lead to limping or even hip instability.

You combine the DAA with the fast-track scheme. What's it all about?

The fast-track scheme originates from Denmark. It includes measures for the optimal preparation of the patient for the surgery, for his reduced impairment during the surgery and for the quickest possible preparation for discharge from hospital after the surgery. This means, among other things, optimizing primary bleeding limitation, fluid management and pain control through regional and general procedures as well as systematic physiotherapy. In addition, there is appropriate training for all healthcare professionals who work with the patients.

The DAA requires extensive knowledge of anatomy and a high degree of cutting safety, which young doctors do not yet have. When do you teach the DAA?

Our young surgeons in training see the DAA almost continuously, but also the other approaches for revision surgery. Those who want to become surgical specialists can already learn the DAA during their further training.

Which LINK implants do you use in combination with the DAA?

In primary arthroplasty I use the LINK® C.F.P. stem and the bone-preserving LINK® SP-CL®. The anatomical design of the SP-CL® is very much in line with the minimally invasive DAA. The bone preservation and durability of the C.F.P. have a leading position among the short stems.

How do you rate the instruments?

I believe that they are very suitable and competitive instruments for the DAA. For the stem implantation, I need a double bayonet-shaped impactor, which must be sufficiently slim and have a practical pick-up mechanism for the stem or the rasp. In

my opinion, LINK has done a great job with the instruments for the DAA.

When do you decide on a cemented or a cementless implant with the DAA?

In making this decision, I am following the results of the Swedish and Norwegian arthroplasty registers. For women and men aged 75 and over, I almost always cement at least the stem. For women between 65 and 75 years of age, I consider cementing, depending on secondary diseases such as osteoporosis, use of antidepressants or cortisone and slim physique. If the bone on the stem appears fragile during preparation, I decide to cement it.

What about the cementation especially for the DAA?

The cementation is very well feasible with the DAA. Patients at an advanced age who are more likely to be associated with osteoporotic, thin bone particularly benefit from cementation and DAA.

Can cement pose a risk to elderly patients due to heat and pressure?

We know about the danger of pulmonary embolisms. But this has not happened to me because I work very well with the anaesthetist. I also prepare the cement very well, use cement stoppers and fill the cement from below with little pressure.

You don't use an extension table for your surgeries via the DAA, but a conventional operating table?

I use a table with a lowerable footrest (see photo). This allows the patient to lie down with his hip on the hinge of the table already during the anaesthetic introduction. I can then proceed as described over the muscle gap. I prepare a C-shaped capsule door, which I close at the end. This gives me a very good overview and allows me to insert the cup with a straight impactor without special instruments. In combination

with the fast track system, this results in an average of one haemoglobin point less blood loss compared to dorsal access. This is essential because it helps to mobilize patients more quickly. Ultimately, this makes discharge into rehabilitation possible after only five days.

Is an assistant still mandatory for this procedure?

Not necessarily. I imported this idea from Scandinavia. There, I often operated on femoral neck fractures at night with instrumenteur alone – at that time, with the patient in lateral position and with Charnley frame via the anterolateral approach. In Germany, however, this has not yet become generally accepted practice. The advantage would be the savings in personnel, and one could operate at night on the freshly incoming patients with femoral neck fractures, which would otherwise have to wait for the day team. This means that the patient is more likely to be operated on within the first 24 hours after the fracture.

Does the DAA have a great future for hip joint replacement in trauma cases?

I absolutely agree. I think we're still at the beginning, especially because the idea is not yet widespread. A study in Bournemouth with 2,000 patients showed that the fast-track scheme for very old patients reduced the length of hospital stay from nine to five days. The reason is that the impairment was less and the targeted measures mobilized the patients earlier. Early mobilization, however, is the keyword of this decade in traumatology. With the DAA, we are creating a very anatomical care method for patients that is very accommodating to the goal of early mobilization and thus the well-being of the patient, even in trauma cases, and reduces risks.

Professor Drescher, thank you for the interview.



Positioning of the patient for Direct Anterior Approach (DAA) on a conventional operating table with lowerable footrest

INTERVIEW

Prof. Dr. Dr. med. Wolf Robert Drescher, BSc., is Head of the Clinic for Orthopaedic Surgery of the Lower Extremities and Arthroplasty at the Rummelsberg Hospital in Schwarzenbruck, Germany.

»The LINK® MP® is our standard for revision in CMN failure.«

Dr. Godoy, what is the rate of intertrochanteric hip fractures fixed with a cephalomedullary nail (CMN) in Argentina?

According to the American Board of Orthopaedic Surgery, 3% of intertrochanteric fractures were treated with CMNs in 1999. However, this proportion rose to 67% in 2006, and it is still increasing. The figures in Argentina roughly correspond to those in the USA.

What is the failure rate of CMNs in intertrochanteric femoral fractures?

According to our recent studies, the overall failure rate for CMNs is between 10 and 15%, which corresponds to the results of other studies^{1,2,3}. In our experience, 9% of cases in more than 300 CMNs required revision.

Could the failed CMN be revised with a stronger or stronger CMN and bone grafting?

Yes, but this would mean repairing a failure with the device that caused the problem in the first place. The failure mechanism has multiple causes, i.e. non-union, cut-off, protrusion, secondary arthrosis, avascular necrosis, making the conversion of CMN to total hip replacement a true revision procedure.

You have revised several CMNs with a modular Wagner revision stem. Why did you choose the LINK® MP®?

There are reports about monoblock components resulting in a high risk of dislocation. This is due to a distortion of the proximal femur shape with anatomic landmarks erased, offset disturbance, and consequent difficulty to achieve prosthetic stability, adequate limb length, and fixation. In regular CMNs, the distal screws are stress raisers that,

with a regular stem, will be in the tip of the prosthesis, and the proximal screws or blade will conditionate the implant selection, making the use of cemented stems difficult. With this in mind, we started using the modular stem LINK® MP® Reconstruction Prosthesis that solves these problems. The MP® allows for good limb length control and a good anteversion check with the implant in-situ. It also bypasses the stress raisers.

What kind of cups do you use?

When we began applying these procedures, we used morselized bone graft to fix damages to the acetabulum and cemented cups. Now, as a general rule, we use uncemented cups because they have good long-term results, they can be used even with bone graft for defects, and the modularity allows for different bearings combinations and configurations.

What are your results?

We treated 28 patients, with a minimum follow-up of four years. The functional results improved from an average of 42 points on the Harris Hip Score (HHS) to 80 points. The complication rate, at 14%, was similar to that of revision surgery; there were two dislocations, one infection, and one significant abductor deficiency. All implants remained in situ according to the last follow-up.

Will the use of a modular revision stem like the LINK® MP® become a standard for the revision of CMNs?

Yes, I think so. There is already a small tendency to adopt the method. However, its widespread use depends on the availability of sources and surgical education.

Dr. Godoy, thank you for this interview.



LINK® MP®
Reconstruction Prosthesis

¹ Albareda J et al. Complications and technical problems with the gamma nail. *Int Orthopaedic*. 1996; 20:47-5.00

² Gotze B et al. Belastbarkeit von Osteosynthesen bei instabilen per- und subtrochanteren Femurfrakturen: experimentelle Untersuchungen mit PFN, Gammanagel, DHS—Condylenplatte und UFN/Spiralklinge. *Akt Traumatol*. 1998; 28:197-204.

³ Hohendorff B et al. Treatment results and complications after PFN osteosynthesis. *Unfallchirurg*. Jun 24, 2005



INTERVIEW

Dr. Daniel Godoy Monzon is an Orthopedic and Trauma Surgeon at the Hip Surgery Unit of the Orthopedic and Traumatology Service, Hospital Italiano de Buenos Aires (HIBA), Argentina.



Revision of an intertrochanteric fracture after CMN failure with a LINK® MP® Reconstruction Prosthesis: X-ray images 1–3 show the fracture left; X-ray images 4–8 show the CMN in situ; X-ray images 9–10 show the LINK® MP® Reconstruction Prosthesis in situ.

»I have used the LINK® Lubinus SPII® in trauma cases since 2010.«

An Interview with Dr. Rami Madanat about the LINK® Lubinus SPII® being the »trauma hip« in Finland, and what advantages this brings for surgeons, nurses and hospitals.

Dr. Madanat, the LINK® Lubinus®SPII® has been used in Finland since 1985, and its use has more than doubled since 2010. What is the reason for this?

Currently, the majority of hospitals in Finland use the SPII® as their implant of choice for hemiarthroplasty in hip fracture cases; there are more than 2,000 cases done annually with this implant. I have used the SPII® in trauma cases since 2010. The main reasons for widespread use are the numerous advantages of this implant.

Why did the SPII® become the »trauma hip« in Finland?

The most important reason is that the SPII® has a very good track record. Already, in 2007, the data from the Swedish Registry¹ had shown excellent long-term survivorship. That has been one of the main guiding factors.

What are the implant-specific advantages of the LINK® Lubinus SPII®?

The SPII® is anatomically shaped, and the design is aimed at preserving the bone substance in the intramedullary cavity. Due to the design, the SPII® resists rotational torsional forces of the stem. Also, the stem has a built-in physiological anteversion, which is a great benefit. The implantation technique and the design enable a very central position in the femoral canal, so you get a uniform cement mantle.

For which patients is the SPII® the best choice?

We use it for nearly all hemiarthroplasty

cases; we also use it in some cases when we perform total hip arthroplasty for femoral neck fractures. We occasionally use the SPII® in combination with additional fixation in some of the more complex hip fracture cases which are not suitable for internal fixation.

What do the scientific data say about the SPII® that are implanted in trauma cases?

A study² from Finland published in 2013 looked at the outcomes of 250 hip fracture patients treated with the SPII®. All cases were performed through the posterior approach. In a four-year follow up they showed very good outcomes and a low complication rate. The dislocation rate was 4.8% and the post-operative periprosthetic fracture rate about 1%. Intraoperative iatrogenic fractures were less – about 0.8%. And very few patients had to be revised or converted during that time to a total hip arthroplasty. We conducted a similar study at the hospital where I worked previously. We were using a cemented collarless tapered stem and reported a dislocation rate of almost 6%.

What does the accounting department say about using the SPII® in trauma cases?

A recent study³ showed that the total institutional care costs, which include primary treatment, rehabilitation, and post-rehabilitation hospital care, are valued between €13,000 and €17,000 in Finland, depending on the type of rehabilitation. Total healthcare costs one year



SP II® hip prosthesis long stem and short stem

INTERVIEW

Dr. Rami Madanat, MD, FEBOT is a Consultant Orthopaedic Surgeon in the Department of Orthopaedics and Traumatology at Helsinki University Hospital. He has completed a post-doctoral fellowship at the Harris Orthopaedic Laboratory in Boston, USA and is currently an adjunct professor of the University of Helsinki, Finland.

¹ Annual Report 2007, The Swedish Hip Arthroplasty Register, www.shpr.se/en/.

² Ekman E. et al. Finnish Orthopaedic and Trauma Journal, 2013;36(2):126-130.

³ Lahtinen A. et al. Clinical Rehabilitation, 2017;31(5):672-685.



after the fracture were nearly €50,000. It shows that the implant cost per se is a relatively small proportion of the overall costs involved in the care of hip fracture patients. If you have implanted a high-quality prosthesis after a hip fracture that enables early mobilization and doesn't cause problems or need to be revised, you are being cost effective.

Are you teaching young surgeons to use the SPII® in the first year of their careers?

Yes, all surgeons need to learn the basics of the SPII® because it is one of the procedures that they need to master at a relatively early stage in their orthopaedic residency. At Helsinki University Hospital, all young surgeons are trained to implant the SPII®. We also regularly organize, in collaboration with LINK representatives, saw bone training, where the young residents learn the SPII® surgical technique and get to practice cementing the stem into a saw bone.

When do young surgeons start to implant the LINK® Lubinus SPII® without direct supervision?

In Finland, residents do a fairly large proportion of the hip fracture cases. Initially they are supervised by the consultant, but as soon as they are trained and master the surgical technique they do the implantation on their own.

Is the SPII® easy to implant?

Yes, the SPII® is quite easy to implant. When teaching residents to perform the procedure, I find the built in physiologic anteversion to be a huge advantage especially with regards to preventing dislocation. Furthermore, the instrumentation is very simple and straightforward. Recently, we received new instruments from LINK, which are a further improvement to previous instruments as the handles and grips are better, and the rasp handle locking mechanism is highly reliable. Furthermore, one of the big advantages is that you can do this procedure with a minimal number of instrument trays, which is great since many trauma cases are done on call. Often the nurses in the OR have to work with many instrument systems from multiple different implant manufacturers so simple instrumentation is in

everyone's interest. And one also has to bear in mind that hip fracture patients are usually very frail. So, you want to streamline the process and want the surgery to go very smoothly without unpredictable elements or unnecessary delays.

Will the use of the SPII® in trauma cases become widely accepted?

Yes, the SPII® has many obvious advantages, the main ones being the ease of use, and also the simple instrumentation, combined with a great track record for the implant. In terms of becoming internationally accepted, I think that dissemination of the data regarding implant performance, combined with surgeon education, are really important components of increasing awareness of the benefits of the SPII® in the treatment of hip fractures.

Dr. Madanat, thank you very much for this interview.

Overview of Acetabular Solutions

II. Post-traumatic situations

The acetabular fracture of the elderly

The increase in fractures near the hip in geriatric traumatology has also increased the frequency of acetabular fractures. However, their fracture patterns differ significantly from the fracture patterns of young patients. The involvement of the anterior pelvic pillar and quadrilateral surface as well as the medialization of the femoral head are characteristic components.

The CT should be used generously

Fractures that are not dislocated are often not clearly visible on standard X-rays. Therefore, the CT should be used generously if the relevant clinical signs are present.

The classic approaches are not very suitable for an adequate overview and reconstruction in surgical indications. For this reason, the modified stoppa access and, more recently, the Pararectus access have become widespread. They enable the essential injury components to be directly reached and be repositioned or stabilized.

It is also possible to reduce prognostically relevant impacts such as the supero-medial dome fragment through the fracture. Impacts on the bearing area or the head calotte as well as destruction of the dorsal pillar are, however, regarded as prognostically unfavourable signs. The primary implantation of a total hip prosthesis can be a good

alternative in these cases. However, the aim here is not anatomical repositioning of the acetabulum, but adequate primary stability of the pillars, especially the dorsal pillar for cup anchorage. Combinations of osteosynthesis and support shells can be an option for surgical treatment. The femoral head can serve as an autograft for the biological construction of the acetabulum base.

The primary implantation of a total hip prosthesis may be an alternative

The management of cup defects analogous to revision arthroplasty can serve as a blueprint for surgical supply tactics. Long-term observations after osteosynthesis of the acetabular fracture in the elderly show that conversion to secondary hip arthroplasty is only necessary in 20–30% of cases. Although conservative treatment methods have also been described, long-term results show that the decision to undergo surgery does not increase one-year lethality. However, sarcopenia manifested at the time of surgery is a relevant risk factor.

Periprosthetic acetabular fractures

Periprosthetic acetabular fractures have long been considered relatively rare events. Systematic studies with CT diagnostics after primary total hip arthroplasty with cementless cup anchoring show that occult fractures can occur in almost 10% of cases during primary implantation and represent a pacemaker

function for cup migration, especially with involvement of the cranio-lateral cup margin. At a later stage, periprosthetic fractures, especially traumatically induced fractures of the acetabulum, are significantly less common than periprosthetic femoral fractures. Fractures induced by osteolysis are more common (e.g. due to wearing products or infections).

The differentiation of stable and unstable implants is of decisive importance

The differentiation of stable and unstable implants has been decisive because of its relevance for therapy and has been the basis for early classification approaches. Wayne Paprosky et al. have described an elaborate classification that should not be confused with the widely used classification of acetabular defects. The Unified Classification System, published in 2014, allows the complete description of periprosthetic fractures on all topographies of the body and shows essential analogies to the AO classification. It can also describe the numerous variants of periprosthetic acetabular fracture.

Unstable fractures require individualized concepts

While stable periacetabular fractures can usually be managed nonoperatively, unstable periacetabular fractures, especially those with accompanying defects, present surgical challenges. They require individualized concepts, whereby the choice of procedure and implant is usually based on the defect management of the acetabular cup exchange situation.

Fracture arthroplasty of the elderly

Although medium-term and larger long-term studies and meta-analyses suggest that patients over 65 years, after

a dislocated femoral neck fracture, have better functional results and a higher quality of life with total arthroplasty than after hemialloarthroplasty, a differentiated approach should be taken.

The patient group over 65 years of age is not a uniform collective and the physical and cognitive performance at the time of the accident or the expectation of the functional outcome should be included in the indication for the choice of procedure. Hemialloarthroplasty is still a valid procedure for geriatric dislocated femoral neck fractures, although no significant difference between mono- and bipolar prostheses was found based on evidence. The lower dislocation rates after hemialloarthroplasty compared to total hip joint replacement account for about 50%. Few long-term studies after bipolar prostheses with long-term progression underline favorable long-term results.



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»Fracture treatment can increasingly be carried out using arthroplasty.«

An interview with Prof. Dr. med. Axel Ekkernkamp about gold standards, megaprotheses in trauma surgery and why young surgeons should visit China.

INTERVIEW

Prof. Dr. med. Axel Ekkernkamp is Medical Director and Managing Director of the Trauma Hospital Berlin, Germany and Full Professor of Trauma Surgery at the Ernst-Moritz-Arndt-University Greifswald in Greifswald, Germany.

Professor Ekkernkamp, osteosynthesis is the gold standard for periprosthetic fractures close to the joint. Why is that so?

The idea still prevails that as much of the body's own substance as possible must be preserved. But the crucial question, however, is not how to treat a fracture, but what treatment can I impose on the patient?

In what way?

In most osteosynthesis procedures, the patient is not allowed to fully load for a longer period of time and they therefore use walking aids, a rollator or a wheel-

chair. The longer this relative immobilization lasts, the more potential complications occur. If an osteosynthesis even fails at some point, this is a huge failure. Often an infection results, which would be very bad for an arthroplasty.

An alternative to osteosynthesis is the implantation of a megaprosthesis. How do you feel about that?

We often speak of individualized, digitally backed, triggered medicine algorithms – but in the end you look at each patient individually. One is best provided with the smallest possible surgery, the other needs a larger surgery. For

»The crucial question is not how to treat a fracture, but what treatment can I impose on the patient?«

Prof. Dr. med. Axel Ekkernkamp

patients who, due to their age or constitution, can only tolerate a single surgery, the implantation of a megaprosthesis could produce a good result. If the effort is manageable, the blood loss and the potential complications are low and an early resilience and thus independence is possible – then I find the use of megaprotheses very good.

Which patients would be eligible?

A megaprosthesis is suitable for patients who will not have a very good fracture healing due to osteoporosis, for example, and who will benefit most from a definitive solution without subsequent interventions and further hospital stays.

Is an osteosynthesis easier than the implantation of a megaprosthesis?

It depends on how skilled the surgeon is. The general surgeons of the 80's and 90's were experienced only in osteosynthesis; Whereas orthopedic trauma surgeons were only experienced in arthroplasty. Today's patients are now benefitting due to improved collaboration, training and experience.

What about the next generation of surgeons?

It is important that young colleagues also receive international training, for example, within the framework of a fellowship from organisations such as the Arbeitsgemeinschaft Endoprothetik (AE). I recommend to all young people that they gain experience in different countries, including China, where technologies and procedures are state of the art. LINK has been very active in China for years with a large program.

Is the care of geriatric trauma patients covering its costs?

Not so much for larger hospitals. We are assuming that our costs will be covered by 75%. As billing options have improved in recent years through the introduction of additional charges. In arthro-

plasty, we have a very well-coordinated program that makes patients who have had an elective joint replacement as fit as possible in a short time and it mobilizes them early. We are investigating how this program of rapid mobilization can be transferred to fracture treatment. After all, fracture treatment can increasingly be carried out using arthroplasty – not only in elderly patients with femoral neck fractures.

Is there a significant difference between rehab after osteosynthesis and rehab after the implantation of a megaprosthesis?

Rehabilitation is faster with a prosthesis because the patient is clearly mobilized earlier and is able to fully load. The cost calculation is probably higher with osteosynthesis, also because it takes longer and rehabilitation begins later.

How important is support by medical product consultants for complex fracture treatments?

Very important! If, for example, a knee is stiffened due to a long-term infection and the knee prosthesis has to be removed, complex, modular implant systems are used. It's then a significant advantage that I have someone with me who knows the systems very well.

Professor Ekkernkamp, thank you for the interview.



» We use the LINK® Endo-Model® for all distal femoral fractures.«

An Interview with Prof. Dr. Claudio Zorzi and Dr. Gianluca Piovan about why the LINK® Endo-Model® functions like a hip prosthesis in the knee.

Professor Zorzi, you use the LINK® Endo-Model® Hinge Knee Prosthesis preferably for the treatment of distal femoral fractures. Why?

Professor Zorzi: One reason is that an osteosynthesis is difficult to perform in older patients with distal femoral fractures. The quality of their bone is usually poor. With an osteosynthesis, the patient will have prolonged pain and cannot stand or walk for months without crutches. To avoid this, we implant an Endo-Model® in distal femur fractures. Even if the patient is over 80 years old, he can start walking after two days and have a good quality of life for another 15 years or more.

Dr. Piovan: We use the Endo-Model® for all distal femoral fractures. There has

been an increase in patients with peri-prosthetic fractures due to injuries from activities such as skiing. A perfect osteosynthesis would not only be difficult to make, but these patients who love to lead an active life will also not be able to walk for a long time. It's easier for the patient to implant an Endo-Model® right away so that they can walk again immediately.

How did you develop this preference?

Dr. Piovan: Over the years we had gained experience with these patients. The first patient in whom we implanted an Endo-Model® instead of performing an osteosynthesis was a former surgeon of this hospital.

Professor Zorzi: He was 90 years old at

INTERVIEW

Prof. Dr. Claudio Zorzi and Dr. Gianluca Piovan are Orthopedic and Trauma Surgeons at the Ospedale Sacro Cuore – Don Calabria in Negrar (Verona), Italy.

the time, and a few days after the surgery he was already up and walking through the house again. In all these cases we had no problems, as it is quite easy to implant an Endo-Model®.

What are the special advantages of the LINK® Endo-Model® Hinge Knee?

Professor Zorzi: The Endo-Model® provides good stability through the rotating hinge. This is what makes it so interesting for our needs.

Dr. Piovan: The Endo-Model® is a design that has been proven over many decades and still works very well. Stability is guaranteed by the construction and the results we have got over the years are incredible.

Professor Zorzi: We had a very interesting case of a woman whose knee stiffened at the age of 25 and she could no longer walk properly. 34 years later, we implanted the Endo-Model®, and now she is able to flex her knee joint 40 degrees. However, our target is flexion of 90 degrees or more.

Professor Zorzi, you are quoted to have stated that the LINK® Endo-Model® functions like a hip prosthesis in the knee. What do you mean by that?

Professor Zorzi: For example, if an older patient has a hip fracture, nobody performs an osteosynthesis, but implants a prosthesis (stem & bearing) immediately so that the patient can walk again in a few days. Why don't we apply the same principle to a distal femur fracture? The task is the same: a prosthesis (stem & bearing) mobilizes the patient again sooner. This would not be possible with an osteosynthesis.

Do you follow this principle in patients that are only above a certain age?

Professor Zorzi: Normally and in acute cases this only applies to the elderly. However, we operated on a girl who was born with an achondroplastic deformity. She had already undergone 17 surgeries

to lengthen her legs. During the last surgery, her knee literally imploded.

Dr. Piovan: The patient had severe pain for several years. Four years ago we implanted an Endo-Model®. Today she lives her life without many complaints.

How does this principle work from an economic point of view?

Dr. Piovan: The total cost of an immediately implanted prosthesis is significantly lower. The cost of a man who can't walk for four months and lives alone is high by comparison. Where would the man go? What about complications like pneumonia, ulcers etc. He needs help at home or has to stay longer in the hospital and his rehabilitation takes longer as a result. The implant may initially seem more expensive, but it is actually cheaper in the long run.

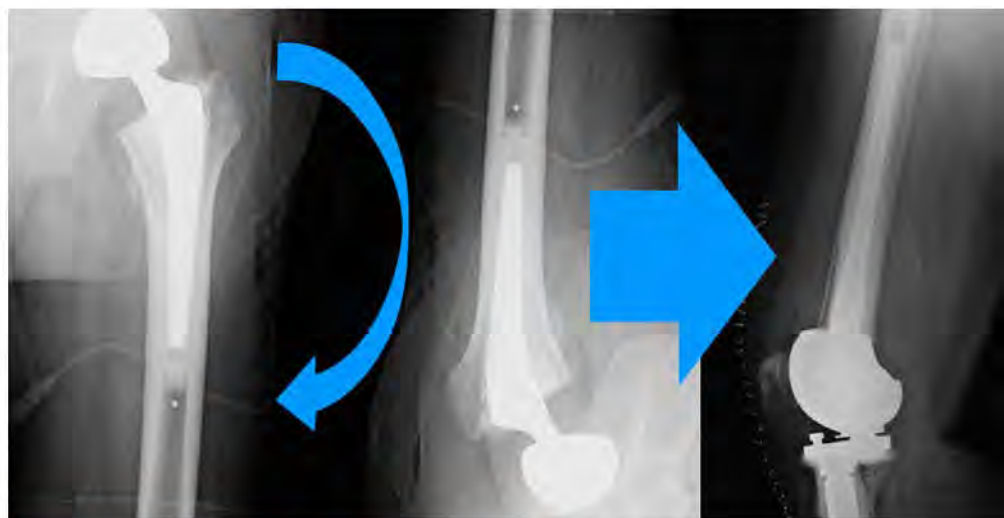
Professor Zorzi, Dr. Piovan, thank you very much for this interview.

»The total cost of an immediately implanted prosthesis is significantly lower.«

Dr. Gianluca Piovan

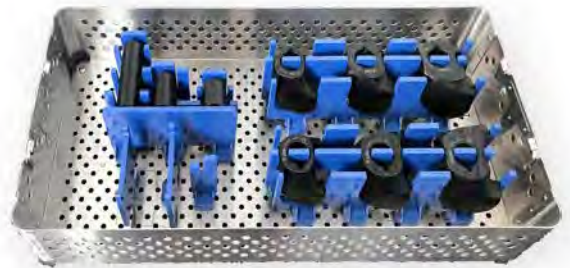


LINK® Endo-Model® – M Modular knee joint prosthesis system with bone replacement segments, cementless



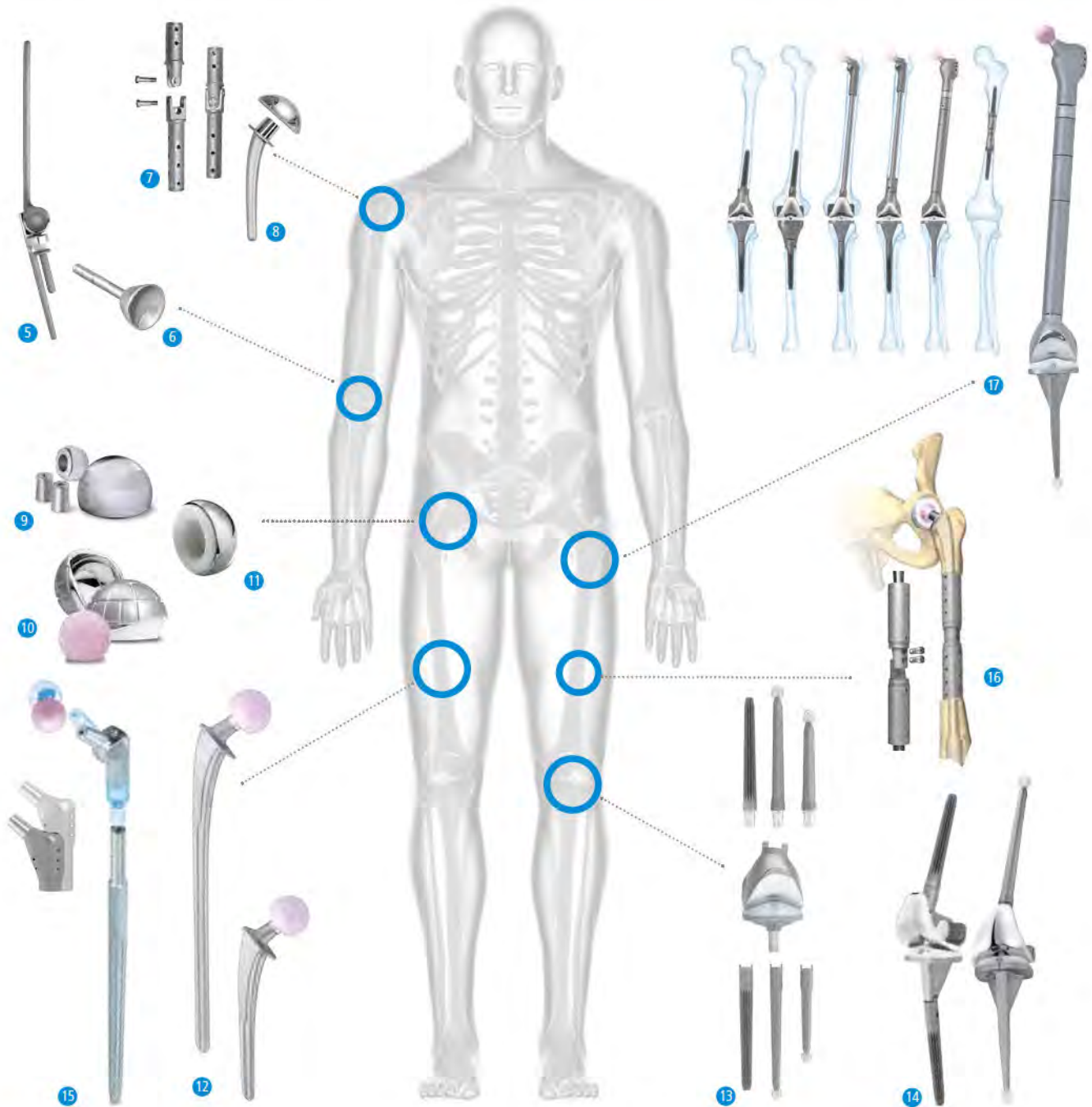
»The LINK® Endo-Model® functions like a hip prosthesis in the knee« – Prof. Dr. Claudio Zorzi

Endo-Model® DFR Trauma Knee Products



1) Solution for distal femoral fracture with 50mm resection replaced by one segment 2) LINK® Endo-Model®- M Modular knee prosthesis for primary and revision surgery, cemented + cementless 3) LINK® Endo-Model®- M: distal femoral bone replacement segments made of Tilastan® 4) LINK® Endo-Model® DFR trial instruments for distal femoral replacement

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* Available as custom-made

Trauma Hip & Trauma Knee



LINK® SP II®
with bipolar head



LINK® Endo-Model® DFR
with 50 mm resection replaced
by a modular segment

Rapid Mobilization & Lower Rehabilitation Costs

When compared to Open Reduction and Internal Fixation (ORIF), Distal Femoral Replacement (DFR) is a valid treatment option for distal femoral fractures in the elderly:

- Elderly patients can start walking full-weight bearing immediately after the surgery¹
- Patients are in much less pain and more satisfied early on¹
- The DFR may cost less when all expenses are considered¹

¹ Atrey et al, A 3 year minimum follow up of Endoprosthesis Replacement for Distal Femoral Fractures – An alternative treatment option, Journal of Orthopaedics, 2017