

Summary Clinical Evidence SL-PLUS[◊]

Title / Reference	Author/s	N	Survival Rate*	Follow-up	Summary
Bony Ongrowth on the Surface of HA-Coated Femoral Implants: An X-Ray Analysis Z Orthop Unfall 2012; 150: 27–31	K.A. Zweymüller	40	NA	3 years	Radiographs of 40 unselected patients after primary THA were analyzed in regards to the effect of the proximal Ti/HA coating. The analysis showed newly formed bone along the entire HA-coated implant surface. Most of them were located in positions 8, 9 and 13, 14. They provide visible evidence of osseointegration at osseo-conductive surfaces. The structures seen may be taken as a sign of improved implant stability by rapid osseointegration and of early sealing of the medullary canal. As a result, wear particles of the articulating surfaces are barred from spreading to the medullary cavity of the femur. This alone argues in favor of using coated implants.
Clinical Review of the Zweymuller Femoral Stem Joint Implant Surgery & Research Foundation, October 2011	Ch. Wright, D. Lambert, D. Brazil, K. Keggi, J. Keggi, T. McTighe	NA	NA	NA	This review summarizes published literature from a range of reputable sources with focus on the SL-PLUS and Alloclassic stems. It talks about the difference of these two stems and advantages of the 'fit without fill' Zweymüller design.
Clinical outcome of Zweymuller total hip arthroplasty for patients with high congenital hip dislocation Hip Int 2011; 21 (01): 071 – 075	Dongyang Chen, Zhihong Xu, Dongquan Shi, Xusheng Qiu, Jin Dai, Tao Yuan, Wenjie Weng, Qing Jiang	17	100%	4-7.6 years	This paper demonstrates that the SL-PLUS and BICON-PLUS work well in CDH patients due to its high primary stability leading to consistent secondary osseointegration. Primary stability is especially important in CDH cases since the cup often has not a full bony coverage.
The outcome of the cementless tapered SL-PLUS stem: an analysis of arthroplasty register data. International Orthopaedics (SICOT), December 2011	G. Labek, S. Kovac, V. Levasic, W. Janda, L. Zagra	10'684 primary 122 revisions	NA	4 years	The study analyzed the outcome of the SL-PLUS stem in arthroplasty register datasets worldwide (Australian, Lombardia (Italy), Valdoltra, Slovenia). All data-sets showed good and reproducible results for treatment with the SL-PLUS. An average of 0.31 revisions per 100 observed component years were reported, which is considerably below the worldwide average found for THA independent of the product. The SL-PLUS can be considered a high-quality product that ensures good results also in the hands of less experienced surgeons.
High medium-term survivorship and durability of Zweymüller-Plus total hip arthroplasty Arch Orthop Trauma Surg 2011	P. Korovessis, T. Repantis, A. Zafiroopoulos	376/229	98.3% 95.7%	10 years 12.6 years	This retrospective analysis of patients who underwent THA using the SL-PLUS stem and BICON-PLUS cup shows high survivorship and durability at 11 years. Osteolysis and radiolucent lines were mostly located proximally and were not necessarily associated with loss of biological fixation.

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Performance of the Zweymüller total hip arthroplasty system: a literature review including arthroplasty register data Eur Orthop Traumatol 2010; 1:9–15	W. Janda, M. Hübl, B. Stöckl, M.n Thaler, G. Labek	1'085	97.88%	9.15 years	This paper analyzed 27 publications fulfilling the inclusion criteria which were divided into groups according to the various designs of the Zweymüller implants. The results of the diverse variants of the Zweymüller implant system currently in use can be rated as good, also in direct comparison with other endoprostheses.
Bone remodelling in proximal HA-coating versus uncoated cementless SL-PLUS femoral components. Arch Orthop Trauma Surg, 2009	W. Steens G. Schneeberger R. Skripitz P. Fennema C. Goetze			5.8 years	This prospective study of 126 THR was performed to examine clinical outcomes and changes in peri-prosthetic bone density after implantation of an SL-PLUS stem with versus without Hydroxyapatite coating. The results showed that Hydroxyapatite-coated SL-PLUS stems yield favorable radiographic characteristics, but no greater clinical benefit after 5 years implantation.
Clinical Outcome Study and Radiological Findings of Zweymüller Metal on Metal Total Hip Arthroplasty. A Follow-up of 6 to 15 Years Hip International / Vol. 19 no. 4, 2009 / pp. 301-308	I. S. Paleochorlidis, L. S. Badras, E. F. Skretas, V. A. Georgaklis, T. S. Karachalios, K. N. Malizos	96/93	98.59% 91.17	9.5 years 13 years	Between December 1993 and September 2002, 99 consecutive primary Zweymüller THAs (84 patients) were implanted and prospectively followed up. All patients received the SL-PLUS stem and BICON-PLUS cup with a MoM bearing. The most important findings of this study are the low rate of stem and cup revision for aseptic loosening, the low rate of radiographic signs of loosening, and the low rate of distal femoral osteolysis.
Good results with an uncoated grit-blasted tapered straight stem at ten years Interactive Surgery 2007; 2:197-205 (Springer 2007)	K. A. Zweymüller	229	98.3% with revision for any reason	10 years	The paper displays a very good survival rate for the SL-PLUS stem after an intermediate follow-up of 10 years. Additionally, the author showed that the cementless SL-PLUS stem works very well in elderly patients (> 70 years) which also showed significantly less radiolucent lines. One explanation for this difference may be that younger patients are more active. The authors discuss the potential advantages of HA-coating in younger patients.
Minimally invasive total hip replacement via the anterolateral approach in the supine position. International Orthopaedics (SICOT) 2007, 31 (Suppl I):S7-S11	G. Pflüger S. Junk-Jantsch V. Schöll	100	NA	Peri-operative	MIS surgery via anterolateral approach in the supine position is equivalent to standard procedure. Low complication rate and no adverse technical aspects to the MIS procedure.
Radiolucent lines and osteolysis along tapered straight cementless titanium hip stems. A comparison of 6-year and 10-year follow-up results in 95 patients Acta Orthopaedica 2006; 77 (6): 871–876	K. A. Zweymüller U. M. Schwarzinger M. S. Steindl	118 95	98% with revision for any reason	6 years 10 years	The author analyzed the outcome at 10 years and compares it with the 6-year data, to find out whether radiolucent lines progress and whether their progression predicts the long-term prognosis of the implant. RLs and RDs were mainly present in Gruen zones 1 and 7 at 6 years. In most cases they had a width of no more than 1–2 mm. At the 10-year follow-up, there was a minimal increase in the number of double contours compared to the 6-year follow-up. The consistency of RLs and RDs between the 6-year and the 10-year follow-ups can be interpreted as signaling a positive prognosis for implant survival.

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Cementless Zweymüller Hip Replacement: A Short-Term Follow-Up in Al Razi Hospital, Kuwait Medical Principles and Practice 2005; 14: 255-259	W. Pospula T. Abu Noor A. Al Rowaih	71	NA	3 years	Initial experience of the first 71 cases with the SL-PLUS in Al Razi Hospital in Kuwait. Total hip replacement using Zweymüller prosthesis gives excellent clinical and radiological results during an average period of 36 months. There are no significant radiological modifications of the prosthetic/bone interface. The complication rate was low.
The Tapered Press Fit Total Hip Arthroplasty A European Alternative The Journal of Arthroplasty 2005, Vol. 20 No. 4 Suppl. 2, 63-67	T. V. Swanson	NA	NA	NA	The tapered rectangular press fit stem remains highly successful since its inception in 1979. The longitudinal taper and rectangular cross-section provide unequalled primary stability, which promotes consistent secondary osseointegration to the grit-blasted titanium surface, even in osteoporotic bone. The fit without fill concept provides for bone conservation and preservation of the intraosseous blood supply by compaction, rather than removal, of the metaphyseal cancellous bone. The surgical technique is simple and forgiving, allowing for infinite adjustability in stem height and anteversion.
Early Results of 1000 Consecutive, Posterior, Single-Incision Minimally Invasive Surgery Total Hip Arthroplasties The Journal of Arthroplasty Vol. 20 No. 7 Suppl. 3 2005	T. V. Swanson	905	NA	3 years	In this study the author demonstrates satisfactory results in a large cohort of consecutive patients using a posterior, single-incision, minimally invasive approach. Surgical time, blood loss, length of hospitalization, and recovery time were all favorable. There were no significant increases in complication rates or component mal-positioning when compared with historic data using a standard posterior approach. Availability and use of high offset stems combined with enhanced capsular repair, which have been used in the author's last 500 THAs, have reduced the dislocation rate to less than 1%.
Bilateral Hip Joint Replacement as a One-Stage or Two-Stage Procedure for Dysplastic Coxarthrosis: A Comparative analysis of 30 Patients Orthop 2005; 143: 616-621	A. Schiessel M. Brenner K. Zweymüller	30	NA	NA	Although the single-stage procedure involved greater effort in terms of physiotherapy, patients preferred bilateral implantation of total hip endoprosthesis in a single surgical session because they needed to undergo the process of operation, mobilization and rehabilitation only once.

*revision for any cause