Long term results of cemented, hydroxyapatite coated distal femoral replacements. Has aseptic loosening been abolished and if so, why do they fail?

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Background: Distal femoral replacement is the most common type of Endoprosthesis used for primary bone tumours in orthopaedic oncology. These prostheses tend to be inserted into young people who may often be very active. In the past, aseptic loosening was the most common form of failure. Since 1992 we have used cemented rotating hinge prostheses with a hydroxyapatite collar to encourage bone ingrowth and thus reduce the risk of aseptic loosening.

Aim: To establish if the hydroxyapatite collar used in distal femoral replacements at the bone prosthesis junction has solved the problem of aseptic loosening, also to establish what the other causes of failure are.

Method: All patients with a custom made (by Stanmore Implants) cemented, rotating hinge distal femoral replacement inserted between 1992 and 2011 were included in this study. Both primary and revision prostheses were analysed so patients who had a revision procedure and a new prosthesis inserted could be counted more than once. The clinical notes and Xrays for all patients were reviewed to identify problems that had arisen and the need for any further surgery. Failure was defined according to the criteria suggested by Henderson et al. Kaplan-Meier analysis was used to estimate survivorship without any of these causes of failure as well as cumulative risk analysis

Results: 327 prostheses were included in this study, with an age range at insertion of the prosthesis ranging from 10 to 88 (median 26 yrs). 235 of the procedures were primary implants and 92 were inserted at the time of revision, 69 for aseptic failure and 23 at the second stage of a 2 stage revision done for infection. Median follow up for all patients was 8.3 years. 123 of the patients have died but 204 remain alive. The five, ten, fifteen and twenty year survival of the implants without failure according to the Henderson criteria is shown below:

We did not find any difference in total failure rates between age (age under or over 20), diagnosis, decade of surgery (pre or post 2000) or indication (primary vs revision). Revision procedures had a lower risk of Type 5 failure (tumour recurrence) but slightly higher infection risk, especially those having revision for infection. Finally competing risk analysis was carried out. This showed that when death was taken into account as a competing risk the overall survival of the implants without Types 1-5 failure at 20 years was 72%.

Conclusion: The Stanmore cemented, rotating hinge distal femoral replacement has approximately a 1.5% failure rate per year throughout the first 20 years. The main problems are mechanical breakage and infection. The success rate of revisions is almost identical to that of primary replacements. Approximately 70% of patients will not develop a major complication prior to their death or survival to 20 years. The incidence of complications was greatest in the first 5 years and there was not an observed increase with time. Aseptic loosening has been virtually abolished by the use of the hydroxyapatite collar.

	5 year	10 year	15 year	20 year
Type 1 (soft tissue failure)	100%	99%	99%	99%
Type 2(Aseptic loosening)	97%	95%	93%	93%
Type 3(structural failures)	93%	87%	79%	77%
Type 4(Infection)	92%	89%	88%	88%
Type5(Tumour Progression)	94%	91%	91%	91%
Amputation	92%	88%	88%	87%
Any failure (KM analysis)	77%	67%	59%	58%
Any failure (Competing risk)	80%	75%	72%	72%