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***A new radiological classification system of the distal femur as a predictor for aseptic loosening in rotating hinge implants***

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Levent et al. have analyzed the risk factors for aseptic loosening (AL) following primary total knee arthroplasty with a rotating-hinge implant (1). The authors found, that the inner diaphyseal diameter of the femur at a point 20 cm proximal to the knee joint had a high correlation with aseptic loosening of the isolated femoral component loosening of the rotating hinge implant. In another study by Levent et al., the wider femoral inner diaphyseal diameter was also a risk factor for AL in the setting of revision arthroplasty using the rotating hinge prosthesis (2).

In this context, we identified a novel classification system of the distal femur. According to the novel index ratio of the inner diameter of the femoral canal at 20 cm proximal of knee joint to the inner diameter of medullary canal at 2 cm proximal of adductor tubercle in the anteroposterior knee radiographs, three anatomical classification groups were constructed. The novel classification presents three different types of the distal femur for male and female patients. Type C has a wider inner diaphyseal diameter and had a higher risk for aseptic loosening following rotating hinge knee prosthesis compared to Type A with a narrow inner diaphyseal diameter.

We applied the novel classification system to our previous described group of 33 aseptic loosening and 30 control cases of primary rotating hinge prosthesis by Levent et al (1). We found a higher incidence of implant failure in type C cases according to the novel classification. Using logistic regression, we modeled the likelihood of aseptic loosening as a function of the anatomical classification group based on the newly described index. The area under the curve for the model was 0.93. The odds ratios of failure were 0.05 in Group A and 23.99 in Group C compared to Group B.

In summary, we here present a novel classification system of the distal femur. The novel classification presents three different types of distal femur anatomy for male and female patients. Type C has a wider inner diaphyseal diameter and demonstrated a higher risk of aseptic loosening. This novel classification system should be used for decision making of implant selection for rotating hinge implants. Future projects are required to prove the classification as a predictor for aseptic loosening in revision TKA with different prosthesis designs and its effect on implant survivorship.

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## References

1. Levent A, Suero EM, Gehrke T, Citak M. Risk Factors for Aseptic Loosening After Total Knee Arthroplasty with a Rotating-Hinge Implant

– A Case-Control Study. J Bone Joint Surg Am Dec 24. doi: 10.2106/JBJS.20.00788

2. Levent A, Suero EM, Gehrke T, Bakhtiari IG, Citak M. Risk factors for aseptic loosening in complex revision total knee arthroplasty using rotating hinge implants. Int Orthop. 2020 Nov 14. doi: 10.1007/s00264-020-04878-2.

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