

TOTAL KNEE ARTHROPLASTY WITH PROVEN NICKEL ALLERGY

Introduction

Cutaneous and local reactions to metals used in orthopaedic implants have been documented in case reports, case studies and by the FDA Report (2019).¹ The relationship between metal hypersensitivity reactions and implants is still largely not understood. In their meta-analysis, Hallab et al.² report a prevalence of metal hypersensitivity in the population of 10%, 25% in patients with well-functioning implants and 60% in patients with poorly functioning implants. Nickel, cobalt and chromium are the most common allergens and are reported as a cause of revisions in total knee arthroplasty.³

Medical history and diagnosis

A 74 year old female patient presented to our hospital with left-sided knee pain, limited mobility and diagnosed osteoarthritis of the knee. Radiological and magnetic resonance imaging (MRI) diagnostics were performed (Fig. 1). The patient was found to have medially emphasised pangonarthrosis with symptoms also in the lateral femoral-tibial compartment. The clinical examination of the cartilage situation resulted in painful findings of chondropathia patellae (positive sign according to Zohlen⁴). The anamnestic survey of allergic dispositions revealed an existing and proven nickel allergy. Nickel is a typical allergenic metal.⁵ The patient had an allergy passport. There was no intolerance to bone cement components.

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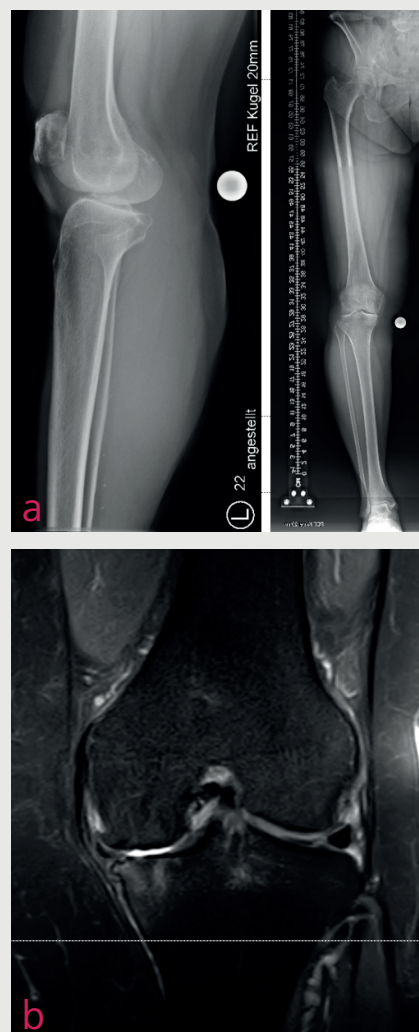


Fig. 1 Preoperative radiographs, lateral and whole-leg image on the left, a.p. projection (a) and MRI imaging (b).

Treatment

In accordance with the preoperative planning (Fig. 2), the hypoallergenic BPK-S Integration Ceramic knee endoprosthesis (femur size 3, tibia size 4, deep dish insert 3/11 mm, PETER BREHM GmbH) was implanted (Fig. 3). This primary total knee arthroplasty design is metal-free and consists of biologically inert all-ceramic material with high immuno-allergological compatibility, which is safe with regard to the release of metal ions.⁵ The intraoperative radiological control confirmed the correct implant position (Fig. 4).



Fig. 3 Hypoallergenic BPK-S Integration Ceramic knee system



Fig. 2 Preoperative planning with determination of axis ratios and component selection, whole-leg radiograph in a.p. projection.

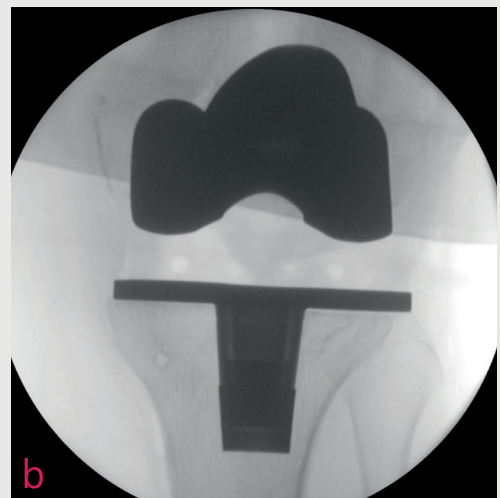


Fig. 4 Intraoperative radiological control to check the correct implant position (a) in lateral and (b) frontal view.

Result

The postoperative course was free of complications (Fig. 5). After the normal course of the operation, the operated leg was fully weight-bearing. The patient was mobilised under full weight-bearing with accompanying physiotherapeutic guidance from the postoperative second day. A range of motion of 0-0-100° was observed

in the clinical follow-up examination. The patient was discharged to outpatient rehabilitation on the seventh postoperative day. A total knee arthroplasty with the hypoallergenic BPK-S Integration Ceramic knee system proved to be a successful and reliable treatment option for the patient with a proven nickel allergy.

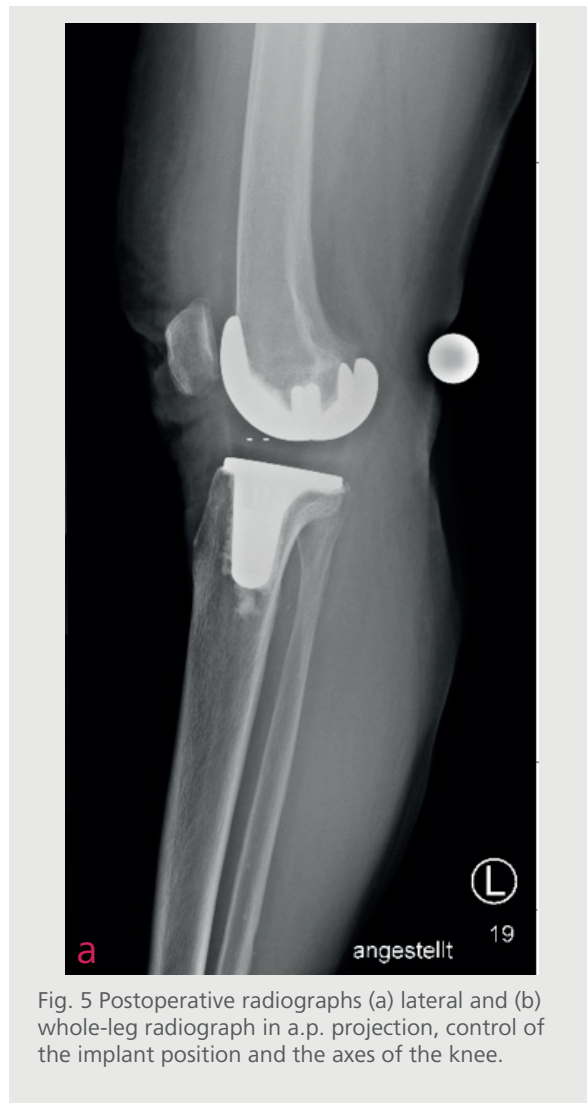
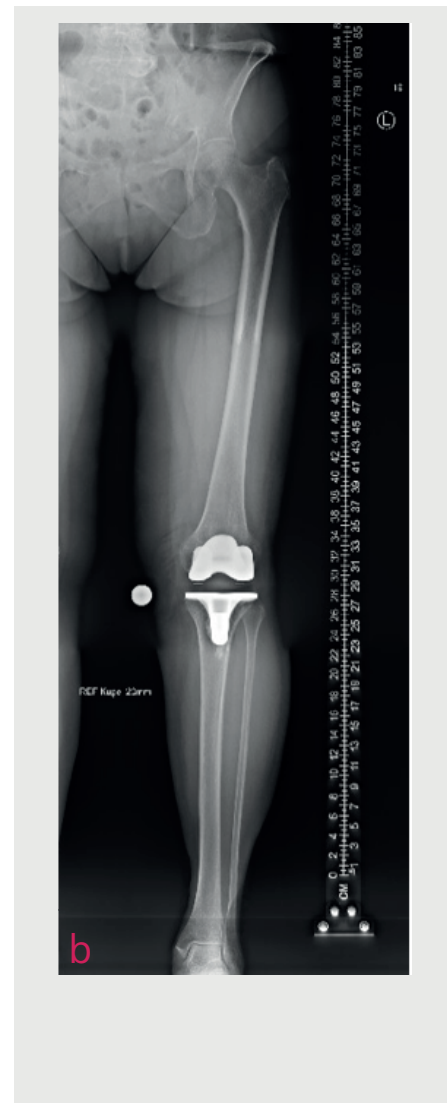


Fig. 5 Postoperative radiographs (a) lateral and (b) whole-leg radiograph in a.p. projection, control of the implant position and the axes of the knee.



References

- ¹ Biological responses to metal implants. Paper of the U.S. Food & Drug Administration (FDA), September 2019:1-143.
<https://www.fda.gov/media/131150/download>
- ² Hallab N, Merritt K, Jacobs JJ. Metal sensitivity in patients with orthopaedic implants. J Bone Joint Surg Am. 2001;83-A:428-436.
- ³ Thakur RR, Ast MP, McGraw M, et al. Severe persistent synovitis after cobalt-chromium total knee arthroplasty requiring revision. Orthopedics. 2013;36:e520-e524.
<https://doi.org/10.3928/01477447-20130327-34>.
- ⁴ Zohlen E. Chondropathia patellae, über ihre Bedeutung und ihr Wesen. Bruns Beitr Klin Chir 1943;174:69-88.
- ⁵ Thomas P, Roider G, Beraudi A, et al. Metal Implant Allergy and Immuno-Allergological Compatibility Aspects of Ceramic Materials. Springer-Verlag Berlin Heidelberg 2015.

Image sources

Fig. 1, 2, 4, 5 SHG: Clinic Idar-Oberstein
Fig. 3 PETER BREHM GmbH