MSTS 2026 Abstract

Expanding Indications for Compress® Mega-prosthetic Reconstruction: Successful Management of High-Risk Patients (Age >50, Cortical Thickness <2.5 mm, or Pre-operative Smoking)

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Significance & Hypothesis/Techniques

Conventional criteria for the Compress® system generally restrict its use to "ideal" candidates: those aged ≤50 years, non-smokers, and patients with a cortical thickness ≥2.5 mm. However, for older patients or those requiring revision surgery, strict adherence to these criteria often necessitates extensive joint sacrifice or amputation. We hypothesized that expanding these indications prioritizes joint preservation without compromising mechanical stability. This study evaluates the clinical and radiological outcomes of the Compress® system in patients intentionally treated outside conventional criteria.

Innovation

This study demonstrates the clinical utility and safety of the Compress® system in a high-risk cohort, challenging conventional contraindications through meticulous surgical techniques and tailored rehabilitation protocols.

Approach (Materials & Methods)

We retrospectively reviewed 19 patients (11 males, 8 females; 23 junctions) aged 19–69 years, including 4 revisions and 5 neo-adjuvant/adjuvant chemotherapy cases, treated between March 2019 and February 2026. Eleven patients (58%) presented with traditional high-risk factors: age >50 years (n=6), cortical thickness <2.5 mm (n=7), or active smoking (n=3; treated under mandatory, sustained smoking cessation). Surgical techniques emphasized biological preservation through meticulous periosteal management and trans-muscular anchor pin insertion. Unlike standard protocols allowing full weight-bearing within 3–4 months, we implemented a conservative, patient-specific rehabilitation regimen. Post-operative radiographs were evaluated for bone reactions at the host bone–implant interface

using the Groundland et al. (2022) classification (Types 1–3).

Results

At a mean follow-up of 24 months (range, 2–64), no mechanical failures, spindle loosening, or periprosthetic fractures occurred despite the inclusion of high-risk candidates. Two non-periprosthetic fractures in the affected limb (patella and femoral neck) occurred but were successfully managed. One deep infection, occurring in a revision case performed for periprosthetic infection and loosening, was successfully resolved via DAIR (Debridement, Antibiotics, and Implant Retention). Radiologically, a Type 2 interface (no change) was observed in four junctions: the distal femoral metaphysis following intercalary replacement (n=2; 18 and 20 months postoperatively), femoral basal neck (n=1; 56 months postoperatively), and proximal femoral diaphysis (n=1; 2 months postoperatively). The remaining 19 junctions achieved a Type 3 interface (hypertrophy/widening). Among these 19 junctions, the initial Type 3 appearance was observed at a mean of 10 weeks (range, 3–31) postoperatively, with no significant difference between high-risk cases and standard candidates.

Discussion & Impact

With meticulous surgical technique and a conservative, patient-specific rehabilitation approach, the Compress® system can be cautiously and successfully utilized in patients conventionally considered high-risk (age >50 years, cortical thickness <2.5 mm, or pre-operative smoking). This expanded indication allows for greater joint preservation without compromising implant survivorship.