Abstract The purpose of total hip replacement (THR) is the restoration of a painless functioning hip joint with the main focus on the biomechanical properties. Advances in surgical techniques and biomaterial properties currently allow predictable surgical results in most patients. Despite the overwhelming success of this surgical procedure, the debate continues surrounding the optimal choice of implants and fixation. Femoral and acetabular implants with varying geometries and fixation methods are currently available. Problems inherent with acrylic bone cement, however, have encouraged surgeons to use alternative surfaces to allow biologic fixation. Optimal primary and secondary fixation of cementless hip stems is a precondition for long-term stability. Important criteria to achieve primary stability are good rotational and axial stability by press-fit fixation. The objective of the cementless secondary fixation is the biological integration of the implant by bony ingrowth. Nevertheless, current investigations show excellent results of cementless fixation even in older patients with reduced osseous quality. The main advantages of cementless fixation include biological integration, reduced duration of surgery, no tissue damage by cement polymerization and reduction of intraoperative embolisms. In comparison to cemented THR both, cementless sockets and stems provide good long-term results.