Augmented Reality in Arthroplasty: An Overview of Clinical Applications, Benefits, and Limitations

AR can improve the safety, efficiency, and clinical outcomes of arthroplasty, provided that it is optimally integrated into the surgical workflow.

Benefits
- Increased surgical efficiency
- Improved limb alignment and implant position
- Advanced training opportunities for surgeons

Limitations
- Challenges in setup, and registration of AR
- Possible tissue disruption during surgery
- Limited literature on the success of AR in clinical settings

Components of the AR environment
- Robust and secure WiFi network
- Preoperative imaging (usually CT scan)
- Registration for overlaying and orienting the CGI and tracking for adapting to the surgeon’s movement
- Head-mounted display to visualize AR

Current clinical applications
- Total hip arthroplasty
  - Acetabular cup placement
  - Hip resurfacing
  - Arthroplasty simulation/education
- Total shoulder arthroplasty
  - Baseplate fixation
  - Telemedicine
- Total knee arthroplasty
  - Implant positioning
  - Proximal tibial cut