

CLINICAL APPLICATION OF AI TECHNOLOGY TO ARTHROPLASTY

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Abstract:

Current topics of computer technology application in arthroplasty are 1) compact navigation, 2) robotics, 3) digital remote rehabilitation, 4) virtual reality surgical training. Artificial intelligence (AI) technology would play an important role in routine clinical use of these computer technologies. Compact navigation focuses on a function to measure alignment of components and changes of the leg length and offset, but it can't measure pelvic tilt. AI could predict pelvic tilt from AP radiographs by learning large dataset of pairs of radiographs and CT data. Robot-assisted arthroplasty based on CT data requires precise segmentation of bone structure, which is a time-consuming procedure. AI can facilitate the segmentation process by learning segmented CT data. Digital remote rehabilitation is expected to reduce burden of medical cost and compensate for lack of manpower in the aging society. AI could propose personalized rehabilitation program based on preoperative functional data. Virtual reality technology is expected to be an efficient surgical training tool for surgeons. Individual musculoskeletal models made by AI from CT or MRI data can be used for personalized surgical training. In this talk, I would like to share our experience to develop AI for reconstruction of personalized musculoskeletal model from CT data and its clinical relevance.