Computer-Aided Osteotomy System that Provides a Virtual Plan for a Surgical Procedure and Ultimately Reduces Costs

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Technology description

The computer-aided orthopedic surgery (CAOS) paradigm is to first create a 3D CAD bone model from MRI and/or CAT data and use this model to virtually plan and optimize the surgical procedure within a computerized environment. Many procedures require models of the entire limb (e.g., both the femur and tibia of the leg) for making the plan but acquiring MRI/CAT images of entire limbs is time-consuming and expensive.
Second, to execute the plan infrared (IR) markers can be attached to the patient and to the surgical tools; a real-time IR sensing system can track these landmarks and register them to the pre-surgical model to provide feedback to surgeon to make precise surgical cuts. IR sensing and instrumentation is also relatively expensive. Robotically manipulated surgical tools are an alternative but also an expensive way to precisely execute the presurgical plan. To reduce CAOS costs our invention proposes to (1) create 3D CAD models directly from readily available inexpensive regular X-Ray images combined (or fused) with minimal very localized MRI/CT data and (2) employ a non-robotic/non-IR tracking surgical approach whereby the surgeon first attaches manually adjustable surgical guides approx to the patient according to the plan then feeds back intra-operative fluoroscopic images (of the guidesmounted on the patient) to the planner. The system then registers the guides to the pre-surgical model refines the plan and calculates the actual adjustments for proper alignment.

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