Biomedical Images for Simulation and Analysis of Surgical Procedures

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Abstract
Virtual planning and preoperative simulation using computed tomography (CT) or magnetic resonance (MR) images enable quantitative, strategic planning of patient-specific surgical procedures. To perform evidence-based surgery and standardization of surgical procedures, the interest for an image-based estimator is increasing among surgeons and researchers. Statistical analysis of the surgical planning data and investigation of implicit factors affecting the decision-making are also important for designing next-generation planning/navigation system.

In this presentation, we will introduce our recent study on surgical process modeling and analysis using medical images. The concept of deformable resection process map [1] for tumor resection in abdominal/thoracic surgery is first introduced. (see Figure 1) Second, a user experiment to quantitatively analyze surgical process and decision-making in mandibular reconstructive surgery [2] is reported. Importance of simulation as a tool for coupling medical knowledge to machine learning will be discussed.

Keywords: Surgical process analysis, semi-automatic planning

Fig. 1 Deformable resection process map as an intraoperative guide.


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