Planning The Separation of Conjoined Twins with 3D Medical Imaging, Scientific Visualization and Anatomic Illustration

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Abstract:

This presentation will examine the intricate details of the visual preparation and planning to surgically separate conjoined twins. One of the rarest congenital malformations, conjoined twins occur approximately 1 in 200,000 live births. Nearly 184 surgical separations have been attempted through the year 2000. The overall success rate, where both twins survive, is approximately 25%. Within the past 24 months Mayo Clinic Rochester has cared for and performed three successful separation surgeries for three different sets of conjoined twins.

We’ll explore the circumstances surrounding one of those cases and the process of how the visual study transpired during their seventy-five days of hospitalization prior to surgery. Nearly 6,000 radiographic images where acquired, two detailed volume-rendered visualization studies were compiled, three different 3D stereolithographic models were developed and five individualized anatomic illustrations created from a vast array of medical images. All developed in an effort to educate a care team of over 70 people.

The various state-of-the-art visuals compiled of the twin’s anatomy provided a comprehensive “roadmap” for the surgeons, helping them delineate the anatomic structures and formulate an operative plan for a complex separation attempt. The large multi-disciplinary care team needed detailed structural knowledge in order to clarify preoperative preparations. For instance, accurate three-dimensional life-size models of the twins anatomy provided critical spatial planning and the anatomic illustrations, printed large, were studied and ultimately posted inside the operating room providing an accurate reference during surgery.

This presentation will provide in-depth insight into the complete visual approach to surgical planning, the resulting visuals and how they were utilized before, during and after the surgery.

References:


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