P2-2-4-D

Augmented Reality技術を使用したナビゲーションシステムの腹腔鏡手術への応用

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Application of Augmented Reality Navigation System for laparoscopic surgery

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Purpose: We have been developing a navigation system using augmented reality technology and have reported clinical application in laparotomy for the system. We here report our commencing of the clinical application of the system to laparoscopic surgery and building a system fitted for laparoscopy. Method: We conducted the clinical application to a case of laparoscopic hepato-biliary-pancreatic surgery. We conducted the operation using 3D super impose display. We examined the system's accuracy and usability. Result: In cases of deformation, anatomical deviation and fixed organ, the navigation was useful in comprehending blood vessels. We calculated its accuracy by FRE and average accuracy was 7.0mm. Even in the liver, we were able to set up various points by using a tool with a geometrical pattern. In addition, we developed the system so that we could repeatedly achieve registration in a short period. Conclusion: Although the laparoscopic navigation surgery has room to improve in registration method and accuracy, we discovered that there is a possibility of improving surgical efficiency by repeating registration and without the need to correspond to the change in target organs.

P2-2-5-D

ローカル操作型鉗子マニュピュレータの手元スイッチ型5自由度インタフェースの開発

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Development of handy switch interface with five-dofs for locally operated forceps manipulator

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A handy switch interface has been developed to allow a single surgeon in a sterilized area to control a locally operated forceps manipulator with five-DOFs. The proposed ergonomic interface is designed based on the size and the moving area of human hand, and the two-point discrimination threshold of gloved finger. Three prototypes made by a 3D printer were a double trigger type, a separate type and a cross-shaped push type. They could be attached to commercial forceps and be pushed some switches at a time. The control time and the assignment of switches were evaluated while performing a task model approved by the ethics committee at Osaka Institute of Technology.

P2-2-6-D

腹腔鏡下手術におけるポート位置決定支援システムの開発

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Development of port placement planning system for laparoscopic surgery

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In laparoscopic surgery, the decision of where to set up the port position on the abdominal wall to inject surgical instrument has an impact on the ease of surgery. When setting up ports in 2 places, it is said that the position of the ports and the surgical target part should form close to a regular triangle as much as possible. But it is difficult to confirm the 3D shape of a triangle during surgery and much is dependent on the surgeon’s experience. We have developed a navigation system using AR technique. We applied this technology to develop a system that supports to determine port positions. The system overlays the 3D triangle onto the patient’s abdominal region as a stereoscopic image.