

Department of Pediatric Surgery

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OVERVIEW

The clinical research issue of the Dep. of Ped. Surgery is the further development of innovative surgical techniques that make the daily pediatric surgical work less invasive, more efficient and safer. Especially the single-incision pediatric endosurgery (SIPES) is now well established in the department. New indications and technical innovations are currently investigated.

The use of telemedicine as a time- and cost-saving method is the focus of several studies. Aim is to show the non-inferiority in comparison to classic follow-up care.

Our translational research focuses on multiphoton microscopy for intraoperative imaging. Fields of application are Hirschsprung's disease, necrotizing enterocolitis and tumors in childhood.

HIGHLIGHTS

MULTIPHOTON MICROSCOPY (MPM)

Multiphoton Microscopy has been proposed as a real-time microscopic imaging modality that may be a useful adjunct for the surgeon in the operating room. We documented the ability to accurately determine the distribution of ganglion cells in mice with Hirschsprung's disease. The evaluation of ischemic damage in the intestinal wall caused by necrotizing enterocolitis is another promising field for intraoperative imaging: the decision for resection of damaged intestines could be based on objective parameters. In pediatric surgical oncology three-dimensional real time imaging of tissue could provide immediate feedback to the surgeon on resection margins. We are currently evaluating the method's applicability for these indications.

SINGLE-INCISION PEDIATRIC ENDOSURGERY (SIPES)

SIPES is accomplished through only a single small incision in the navel, minimizing the visible scar and potentially reducing incisional pain associated with the multiple points of entry used during traditional laparoscopic surgery. Within our department, a variety of novel laparoscopic procedures were first described early childhood, and are now routinely and safely performed with this method. The aim of new research projects is to establish this method for minimal invasive tumor surgery in comparison to standard laparoscopy.

TELEMEDICINE

Telemedicine is the use of telecommunication and information technologies in order to provide clinical health care at a distance. Telemedicine can be broken into three main categories: store-and-forward, remote monitoring and (real-time) interactive services. Real-time interactive service using the Adobe Connect Software is evaluated for routine outpatient care with great success. Trauma projects and telemedical cooperation with outpatient physicians are goals of further research work. We are currently evaluating telemedical tools for pediatric surgical outpatient follow-up in a randomized, controlled study.

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FUTURE DIRECTIONS

Our future goal is the expansion of already initiated projects:

After – through initiative of our clinic – an interdisciplinary telemedical working group was established at the University Medical Center Mainz we are now developing further telemedical projects together with the IZKS. For multiphoton microscopy a longterm goal is the development of a laparoscopic MPM device to improve accurate determination of resection margins in Hirschsprung disease, necrotizing enterocolitis and a variety of pediatric neoplasias. In 2015 the first project will be the investigation of direct mutagenous impact of the NIR-Laser used for imaging. The aim is to show that there are no mutagenous DNA-damages within bacterial colonies. Concerning the investigation of tumors we are collaborating with the Department of Pathology to establish imaging-lead-points for the Nephroblastoma as a first tumor-entity.



FIG. 1: The team of the Department of Pediatric Surgery
FIG. 2: Ganglion cells in mouse intestines imaged by MPM. Visible is the changeover from longitudinal to transversal muscle-layers.
FIG. 3: Left side: Nephroblastoma (imaging by MPM).
In the middle the corresponding location after h.e. staining.
Right side: Normal tubuli and collagen tissue (imaging by MPM).
FIG. 4: Telemedical follow up of one of our patients in Beijing, China from our office in Mainz

Examination of tissue of different origin in comparison to conventional histopathology in childhood PROJECT MANAGER: Prof. O Muensterer, Dr. J Gödeke <u>FUNDING:</u> Else-Kröner-Fresenius Foundation <u>PROJECT DURATION:</u> 2014 - 2019 Multiphoton Microscopy as an alternative to intraoperative frozen section biopsies for pediatric surgical oncologic diseases PROJECT MANAGER: Dr. J Gödeke, Dr. S Waldron <u>FUNDING</u>: Else-Kröner-Fresenius Foundation <u>FUNDING</u>: IPEG Research Fund <u>PROJECT DURATION</u>: 2014 - 2019 Telemedicine in the diagnosis and treatment of pediatric surgical patients PROJECT MANAGER: Dr. J Gödeke, Dr. M Schwind <u>FUNDING:</u> University Medical Center of Mainz <u>SUM:</u> € 5,000 PROJECT DURATION: 2014 - 2019