to create the kidney parenchyma containing the tumor with functional arterial, venous, urine drainage systems.

MECHANICAL TESTING: Uniaxial compression: An Instron MTA was used to compress 40 samples from fresh porcine kidneys and compared to 4 different conditions of PVA. Perfusion closure pressures: To replicate the closure forces during renorrhaphy, 5cm longitudinal defects were created in 4 porcine and PVA kidneys. Suture tensions, required to achieve hemostasis and to rip through the parenchyma, were measured.

DETERMINING ANATOMICAL ACCURACY: 8 PVA kidney phantoms were reimaged (CT scan) and segmented to generate duplicate sets of STL files that were overlaid to perform a detailed quantitative analysis to determine distance errors in millimeters. Predictive validity: Full procedural rehearsals were performed on models of 8 complex cancer patients (nephrometry score $>$ 8) after surrounding them with relevant organs defined by patient imaging. Warm ischemia time (WIT), estimated blood loss (EBL) and positive surgical margins were measured in the rehearsal and live cases.

RESULTS: Stress-strain relationship for PVA at a concentration of 7% after 2 cycles produced the lowest root mean square error (RMSE = 0.0003) compared to fresh porcine kidney tissues. The average RMSE discrepancy between the phantom and patient anatomy were -0.26mm, -0.2mm, 3.10mm, 0.61mm and 3.33mm for kidney parenchyma, tumor, artery, vein and calyx, respectively. Partial nephrectomy was successful in all 8 complex cases after rehearsals. A positive correlation was found in WIT and EBL between the simulated and live surgeries. Rehearsals improved surgeon's confidence in predicting outcomes of these complex cases.

CONCLUSIONS: Software that incorporates patient imaging into 3D printing applications, together with hydrogel molding techniques, are capable of creating human kidney phantoms with authentic anatomical, physical, and functional properties. Application of this versatile and reproducible technique may translate to improved clinical performance.

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USABILITY AND TECHNICAL FEASIBILITY EVALUATION OF A TETHERED LAPAROSCOPIC GAMMA PROBE FOR RADIOGUIDED SURGERY IN PROSTATE CANCER: A PELVIC PHANTOM AND PORCINE MODEL STUDY

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INTRODUCTION AND OBJECTIVES: In prostate cancer, radioguided surgery (RGS) is used for sentinel node biopsy (SNB) and holds potential for 99mTc-PSMA-guided surgery of lymph node metastases. Rigid laparoscopic gamma probes currently used for (robot-assisted) laparoscopic RGS procedures have limited manoeuvrability and control which restricts nodal identification. To address this a tethered laparoscopic gamma probe was developed (Lightpoint Medical Ltd). The usability and initial performance of this device were assessed in a pelvic phantom and in a porcine model.

METHODS: The probe, 35 mm in length and 12 mm in diameter, was tested by 7 urologists using a 3D-printed custom-build pelvic phantom containing anatomical structures and nodal packages of clinical dimensions. To ensure accurate and reproducible gripping, three grip concepts (multi-orientation off centre, multi-orientation cross cable, and single orientation off centre) were designed specifically for use with the da Vinci Prograsp, and tested for ease of gripping and handling on a 3-ranked system. Four graphic user interfaces (GUIs) were also evaluated.

The favoured grip and GUI was then evaluated in a porcine model containing 4 vials of clinically representative sentinel node volumes (0.2 ml) and 99mTc activities (range 33 - 134 kBq). Prior to surgery the vials were placed on the skin of the lower abdomen, and locations monitored by CT scanning. Manual laparoscopic surgery was performed by two urologists and 1 nuclear medicine physician tasked to identify the vials in vivo by scanning the pelvic peritoneum. Upon completion participants were asked to score the overall design on a 5-point scale.

RESULTS: The multi-orientation off-centre grip was favoured over the other two grip designs (average rank: 1.1 vs 2.4 vs 2.4), and considered most versatile. In the porcine study, all activity concentrations could be successfully detected. All 3 participants identified the 134 kBq vials, while the 65 and 33 kBq vials were identified by 2 and 1 participants, respectively. All 3 participants found the GUI simple and easy to interpret, and the overall design of the probe was scored as 4.2/5.

CONCLUSIONS: The usability studies demonstrate that the tethered laparoscopic gamma probe meets the usability requirements for manual laparoscopic and robotic prostate cancer surgery. Learnings from these studies greatly influenced the design of the probe and its GUI, and clinical studies to evaluate the performance of this probe in SNB and 99mTc-PSMA RGS of LN metastases are scheduled for 2019.

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MESH SLING COMPLICATIONS: FEASIBILITY OF ACCESSING DATA FROM PATIENTS INVOLVED IN MESH LITIGATION

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INTRODUCTION AND OBJECTIVES: Controversy exists about the safety of synthetic mesh slings (SMUS). The aim of this feasibility study is to avail ourselves of a potential cohort derived from approximately 130,000 patients who filed lawsuits against mesh manufacturers. We aim to evaluate the prevalence, severity, diagnostic and treatment outcomes of SMUS complications. Ultimately, the data may be used to estimate the proportion of litigation cases with proven mesh-related complications and the nature of mesh complications.

METHODS: This is a retrospective observational study of a deidentified database extracted from the medical records of mesh litigation cases that have been reviewed by at least one expert witness who had access to all available medical records, including expert witness reports for both the plaintiff and defense. A panel, consisting of two expert witnesses each for the plaintiff and defense and a neutral "tiebreaker" was convened and devised criteria defining definite, possible and non-mesh complications. Disagreement between experts was resolved by the tiebreaker who had access to the deidentified records. Plaintiffs with insufficient records were excluded. Recorded definite and possible complications are listed in Table 1. The following information was extracted: type of synthetic sling, time interval between implantation and first complication, number and type of complications, number of surgeries to treat complications from implantation surgery and outcome of treatment from each complication at the time of the last record.

RESULTS: 47 cases were reviewed and 2 excluded because of incomplete medical records. Mean age at surgery was 49 (range 28 - 76) years old. The mean interval between SMUS implantation to the first definite and possible complication is 27 (SD 29) and 17 (SD 23) months, respectively (range 0 - 120 months). Table 1. depicts other results.

CONCLUSIONS: Patients who have filed lawsuits against mesh manufacturers may provide a rich database for clinical research because complete medical records are usually available. In this feasibility study appropriate medical records were available in 96% of patients of whom 73% had definite and 24% had possible mesh