

data to inform scenario selection and debriefs. We developed learning resources including a faculty information sheet, pre and post course questionnaires, scenario descriptions and an introductory presentation. We procured an OGD and colonoscopy simulator and invited a patient actor to contribute to scenarios and debriefs. Video feedback was used to inform peer-led discussions. We collected quantitative and qualitative pre and post course data including participant demographics, and Likert scores for course enjoyment, usefulness, relevance and realism. Data was analysed descriptively.

Results A total of 47 endoscopy staff participated in the courses (course size 8–15), including 32 nurse assistants, 11 endoscopists, 3 health care assistants and 1 porter. 70% were female, 55% were aged 35 to 50 and 60% had less than 5 years experience in endoscopy. Post course data analysis showed high Likert scores across all measured domains (1 poor – 5 excellent): 4.74 (enjoyment), 4.81 (usefulness), 4.80 (relevance), 4.33 (realistic). 85% felt that their confidence in managing similar situations in real life had improved. Qualitative data was universally positive, and included: “quality feedback”, “makes you reflect on better practice”, “shared learning”, and “there is a real need for courses such as this”.

Conclusion Endoscopy teams value simulation based multiprofessional learning platforms for human factors training. We believe that 3 key features enhanced learning and course effectiveness: in-situ delivery of courses with established teams, empowering team members of all professional backgrounds to voice clinical concerns, and active participation with supported feedback. We believe that multiprofessional learning platforms have an important place in healthcare improvement and endoscopy teams are well placed to benefit.

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Disclosure of Interest None Declared.

PTU-014 THE USE OF KINEMATIC ANALYSIS OF BILE DUCT CANNULATION AS A MEANS OF OBJECTIVELY ASSESSING ENDOSCOPIC SKILL AT ERCP

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Introduction Training in ERCP has become more challenging due to a reduction in diagnostic cases following the introduction of MRCP. There is a need to explore options to assist with basic training and the assessment of competency. There are currently no validated objective tools for this purpose. Simulators have been shown to enhance surgical skill and some there is some evidence to suggest that they can assist training in ERCP.¹ Kinematics, the study of motion, has been used in the objective assessment of surgical skill and endoscopic skill during colonoscopy on simulators but no studies have been done on ERCP.²

Methods 23 candidates perform bile duct cannulation on a modified ERCP simulator. Endoscopic experience ranged from complete novices to HPB consultants. Radiofrequency sensors were attached to the duodenoscope tip and catheter, and the procedures were videoed. Six parameters were measured from a starting point at the pylorus until bile duct cannulation was achieved. These included mean speed, total distance travelled,

trajectory corrections, time to cannulation, time spent planning and number of papilla contacts. A performance score was calculated so that, with the exception of mean speed, a decrease in each parameter equated to an exponentially higher score, equating to greater skill.

Results Kinematic data showed that HPB consultants performed better than other participants at all 6 measures used to calculate the objective performance score. The greatest difference noted was for distance travelled (mean 3976 mm v 720 mm for novices and HPB consultants respectively) and procedure time (318s v 50s for the same two groups). The overall objective performance scores attained by subjects correlated well with their level of experience, and produced significant differences between the three least experienced groups ($p < 0.05$). The mean performance scores were; HPB consultants: 18.9 ($n = 5$), HPB trainees: 17.5 ($n = 5$), general gastroenterology trainees: 13.0 ($n = 7$), novices: 11.1 ($n = 6$).

Conclusion Kinematic analysis of a simulated bile duct cannulation enables the endoscopist's skill to be measured objectively. This method could be used to assist with the training and assessment of this advanced endoscopic procedure.

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Endoscopy I

PTU-015 COMPARATIVE STUDY OF HYBRID TECHNIQUE (HT) VERSUS FLUOROSCOPIC TECHNIQUE (FT) FOR INSERTION OF SELF EXPANDING METALLIC STENTS (SEMS) IN NON TRAVERSABLE OESOPHAGEAL TUMOURS

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Introduction SEMS is an accepted palliation for dysphagia in patients with oesophageal cancer. Endoscopic technique (ET) for SEMS insertion has previously been shown to be safe, effective, less time consuming with improved positioning especially of the proximal end of the stent. The obvious limitation of ET is in non-traversable tumours (with standard endoscope), requiring ultraslim scopes which are not widely available. We employ a hybrid approach, using fluoroscopy for dilatation followed by direct endoscopic insertion of SEMS. Aims: To evaluate the outcomes following HT versus standard FT for oesophageal SEMS placement.

Methods Retrospective case note review of all patients undergoing SEMS placement from Nov 2011 to Oct 2013 was performed. Data was collected on patient demographics, endoscopic and other outcome variables including re-intervention rates and survival. Statistical analyses were performed on GraphPad Prism Version 6 and Epi Info 7.

Results 110 procedures were carried out on 96 patients (28 women, 68 men) with a median age 77.5 years (IQR 69–83.25, Range 52–99). 75 patients had adenocarcinoma, 19 squamous

cell carcinoma and 2 benign diseases. SEMS deployment was successful in all 110 procedures. Of the 46 traversable tumours, 22 underwent ET and 24 FT for SEMS placement. 64 patients had non traversable tumours (with standard endoscope). HT was used in 21 and FT in 43 patients. Length of the stent deployed was not statistically different in both groups (HT 11.4 ± 0.5 cm, FT 11.0 ± 0.5 cm, $P = 0.98$). Good dysphagia alleviation was seen in both groups (dysphagia scores, HT cohort pre-stent 2.7 ± 0.16 , post-stent 0.53 ± 0.87 $P < 0.001$; FT cohort pre-stent 2.53 ± 0.09 , post-stent 0.44 ± 0.11 $P < 0.001$). Cumulative complications (reflux, pain, bleeding, food bolus obstruction) were similar for both techniques (HT 0.28 ± 0.1 , FT 0.34 ± 0.1 , $P = 0.62$). There was a tendency towards higher re-intervention for tumour overgrowth in the FT cohort (FT 7/43 patients, 129.4 ± 35.5 days; HT 2/21 patients, 215 ± 60 day, $P = 0.33$). Neither the stent length ($P = 0.89$) nor the technique used, had an influence on the need for re-stenting for tumour overgrowth ($P = 0.68$). Median survival was 141 days (IQR 46–180) in the HT group and 121 days (IQR 27.75–188.5) in the FT group. There were no instances of stent migration in the non-traversable group.

Conclusion Outcomes following SEMS insertion in both techniques were similar. Hybrid approach is an acceptable alternative to fluoroscopy only, in patients with non-traversable tumours, with the added advantage of more accurate positioning of the proximal end of the stent under direct endoscopic visualisation. Limitations of the study are its retrospective nature, lack of data on diameter of stents.

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PTU-016 WIRELESS CAPSULE ENDOSCOPE LOCALISATION BASED ON VISUAL ODOMETRY

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Introduction The localisation of a wireless capsule endoscope (WCE) within the small-bowel is typically performed by wearable radiofrequency sensors triangulation. The accuracy of this approach is low.¹ Only a few approaches have been proposed for WCE localisation based on visual features. These include methods addressing the estimation of the rotation angle of the capsule^{2,3} and temporal video segmentation methods.⁴ We present a WCE localisation method, based only on visual information extracted from conventional WCE recording.

Methods Automatic detection of points of interest (POI) in WCE video frames, matching of the detected POI between consecutive frames, and determination of actual correspondences between subsets of these POI based on the random sample consensus (RANSAC) algorithm was performed. Maximally stable extremal regions (MSER) algorithm, instead of the speeded up feature extraction (SURF) algorithm, was used. Based on the scaling and the rotation of the content of the consecutive WCE frames, it is possible to estimate the displacement and the rotation of the capsule within the GI tract. For the ex-vivo experiment; a standard simulated intestinal environment was created. Markers were sewn (at set, pre-recorded distances) onto the luminal surface of porcine small-bowel through which a capsule (MiroCam®, IntroMedic Co Ltd, Seoul, Korea) was propelled.

Results Comparative experiments using both SURF and MSER features, which indicated the superiority of the former over the latter, we conducted. We worked on a corpus of 1070 WCE

frames (634 indicating forward motion, 436 indicating backward motion). The accuracy using SURF features was 81.5% (87.2% on forward motion, 73.2% on backward motion), while using MSER was 67.2% (79.8% on forward motion, and 48.9% backward motion). Noteworthy, the proposed algorithm often fails when using MSER (6.7% of frames while <0.1% when using SURF) and a transform is not estimated due to the lack of adequate correspondences between interest points.

Conclusion Visual odometry is a promising technique and – potentially – a feasible alternative to other localisation approaches in WCE.

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PTU-017 THE USE OF SMALL BOWEL CAPSULE ENDOSCOPY IN THE OCTOGENARIANS GROUP; THE EDINBURGH EXPERIENCE

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Introduction Over the last 13 years, the clinical use of capsule endoscopy (CE) has revolutionised the investigation pathways for the small-bowel. Although non-invasive (as procedure), there are reports of capsule aspiration in certain patient-groups.¹ Moreover, CE video review is a time-consuming process and – on occasions – with limited diagnostic yield (DY). There is scarcity of data on the use of CE in octogenarians.^{2–4} We aim to report our centre experience in using CE in octogenarians.

Methods Retrospective study; the SBCE data base of our unit was interrogated for patients >80 years of age who underwent CE. Categorical data are reported as mean \pm SD. The *Fischer's* exact, the *chi-square* and the *t* (unpaired) tests were used to compare datasets. A two-tailed *P* value of <0.05 was considered statistically significant.

Results 1,477 patients underwent small-bowel CE between 2005 and 2013. 93 CE were performed in 84 (35M/59F) octogenarians; mean age 84 ± 2.9 years. PillCam®SB1/SB2 and MiroCam® were used in 61 and 32 CE examinations, respectively. Ten (11.9%) patients had more than 1 CE. One patient was unable to swallow the capsule, and in another the capsule was retained in the stomach. The CE report was unavailable in one case. Indications for small-bowel CE were IDA: 44, OGIB: 29, OBIG+IDA: 6, diarrhoea 4, small-bowel varices: 1. Forty-five (53.6%) patients subsequently died. The mean time from SBCE to death was 23 months (SD 20.9, range: 0.13–83 months).

The DY (all findings) of CE in our octogenarian cohort was 56.8%. Vascular lesions (any P class)/active bleeding were found in 33, inflammatory pathology in 9, and other in 4 CE. No neoplastic pathology was identified. The DY was independent to the indications for the procedure ($P = 0.166$), the small-bowel CE system used ($P = 0.068$), the patient final outcome i.e. deceased/alive ($P = 0.051$) and/or the time from CE to death ($P = 0.053$).