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The development of a 3D anatomical atlas of the pelvis: Taking the next step in enhancing surgical anatomical education and clinical guidance

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Background: The surgical anatomy of the pelvis is very complex. Due to the funnel-shaped pelvis there is an intricate anatomical arrangement. In case of rectal cancer, surgeons are challenged to perform a total mesorectal excision (TME), involving radical en-bloc removal of tumour and surrounding structures, and preservation of autonomic nerves. Excellent anatomical knowledge of the pelvis is essential to obtain good oncological and functional results in TME. However, contradicting descriptions on the arrangement of fasciae and nerves create confusion. As incomplete mesorectal excisions and iatrogenic nerve disruption are still reported, there is a need to optimise treatment by enhancing the anatomical knowledge among surgeons. We aimed to develop the Virtual Surgical Pelvis (VSP): an anatomical atlas representing the female pelvis in a virtual 3D context. Cadaveric specimens were histologically analysed to reveal the precise arrangement of fasciae and autonomic nerves.
Methods: 910 slices comprising the whole pelvis from the Visible Korean Female (VKF) dataset were selected and anatomy of interest was manually segmented using Amira. Additionally, two female cadaveric pelvic exenteration specimens were obtained through the Leeds GIFT Research Tissue Programme, sliced at 1 cm intervals and dissected to fit into mega blocks. These were sectioned at 5 μm and stained histologically. All stained glass slides were digitally scanned with an Aperio XT slide scanner at 200x magnification. The Unified Anatomical Human software was used to integrate 2D and 3D anatomical data in one single atlas and allow registration of anatomical content onto patient-specific radiologic images.
Results: Microscopic analysis of the cadaveric specimens revealed that autonomic nerves ran laterally to the mesorectal fascia. The autonomic nerves were segmented as risk zones in the VKF. The VSP is an anatomical atlas of various synchronously linked 2D anatomical data and a 3D pelvic reconstruction. Currently, the relationship between risk zones, fasciae and other surgically relevant structures are shown, but the VSP can be constantly enriched with new heterogeneous anatomical data. Risk zones that were visible in the VSP can be mapped onto patient-specific MR images. The Online Anatomical Human (OHA) was developed, allowing online interactive exploration of the VSP.
Conclusions: The VSP can be of great value in surgical education by interactive (online) exploration of the 3D female pelvis, showing fasciae and risk zones where nerves are prone to damage. Patient-specific registration onto MR images helps surgeons to focus on specific anatomy that is not visible in MR images. The VSP is work in progress, but has great potential in education, surgical planning, and providing an anatomical context for image-guided surgery and radiotherapy.
No conflict of interest.

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Clinical features and management of anorectal cancer in Crohn's disease: Japanese single centre study

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Aims: Some epidemiological studies showed that patients with long-standing Crohn's disease (CD) are at a high risk of development of anorectal cancer, however, the clinical features of anorectal cancer complicating CD are still uncertain. The aim of the present study was to clarify the clinical features of anorectal cancer complicating CD.
Methods: The medical records of patients with CD who required surgery at our hospital between 1995 and 2014 were reviewed. A detailed review of the medical records of patients with anorectal cancer complicating CD was undertaken.
Results: From 1995 to 2014, 345 patients with CD were performed intestinal surgery in our hospital. Of the 345 patients, 11 patients (male, 6; female, 5. 3.2%) were diagnosed with anorectal cancer. The median age at diagnosis of anorectal cancer was 40 years (25−72 yrs). The median time interval between the diagnosis of CD and diagnosis of anorectal cancer was 20.2 years (0−40 yrs). All the 11 patients were preoperatively diagnosed with anorectal cancer. Seven patients (64%) had fecal diversion because of their severe perianal disease. Eight (73%) out of the 11 patients had cancer-related symptoms (anal pain, 5; palpable tumour, 3; mucus discharge, 2; bowel obstruction, 1; hemorrhage, 2). The other 3 patients (27%) had no cancer-related symptom and were diagnosed by cancer surveillance biopsy. The primary tumour was located in the anal canal in 8 patients and the rectum in 3. No patient received neoadjuvant chemotherapy or radiotherapy. In terms of surgical procedures, total pelvic exenteration was performed in 3 patients, abdominoperineal resection in 3, total proctocolectomy with end ileostomy in 2, loop ileostomy in 1, and exploratory laparotomy in 1. UICC staging was as follows: stage I, 1; stage II, 3; stage III, 4; stage IV, 3. Eight patients had mucinous adenocarcinoma and three patients had differentiated adenocarcinoma. After the surgery, chemoradiotherapy was performed in 3 patients, radiotherapy in 2, and chemotherapy in 2. Five patients achieved R0 resection and the 5-year overall survival rate of the 5 patients was 80%, with a median follow-up period of 9.6 years (2.6–15.1 yrs). There were 6 patients who had R1/R2 resection. The 1-year and 2-year overall survival rate of the 6 patients was 66.7% and 16.7%, with a median follow-up period of 16 months (4−93 mo).
Conclusions: The present study showed that anorectal cancer was not rare in the patients with long-standing CD. Most patients with anorectal cancer complicating CD had perianal disease and 64% of the patients had fecal diversion, which makes it more difficult to detect anorectal cancer. We recently started a surveillance program (scheduled tumour maker test and annual anorectal biopsy) for anorectal cancer in long-standing CD. There is a pressing need to develop strategies for the early detection of the anorectal cancer.
No conflict of interest.

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Response to chemotherapy allows to identify mCRC patients most likely to benefit from maintenance immunotherapy: A post-hoc analysis from the IMPACT study

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Background: Presence of tumor infiltrating lymphocytes (TIL) in primary colorectal (CRC) tumors was found to be an important prognostic biomarker even more relevant than TNM staging (Galon et al., 2006). Additionally, in a confirmatory series presence of high TIL densities at metastatic CRC lesions was shown to strongly predict the likelihood of response to chemotherapy (Halama et al., 2011). These data highlight the importance of an active immune response at sites of CRC primary and metastatic lesions. Conversely, objective response to initial chemotherapy may signal the presence of a more immunogenic disease, potentially benefiting from immunomodulatory therapies. To verify this hypothesis, we assessed the benefit in patients with an objective response to prior induction treatment who participated in the phase 2 IMPACT trial.
Methods: In the IMPACT study, 59 mCRC patients who achieved stable disease or response after 1st-line induction therapy were randomized to maintenance treatment with the immunomodulator MGN1703, a potent Toll-Like Receptor 9 (TLR9) agonist, or placebo. Final analysis showed a superior effect of MGN1703 compared to placebo with a hazard ratio (HR) for the primary PFS endpoint of 0.55. At final study analysis OS data were still not mature, as only 35% and 50% of MGN1703 and placebo patients, respectively, had an event. The preliminary HR for OS of the ITT population was 0.63. The treatment was well tolerated and 3 patients without progression are still receiving MGN1703 for more than 3−4 years.
Results: Exploratory analyses of pretreatment characteristics identified patients with objective response according to RECIST, normalization of CEA, and the presence of activated NKT cells to derive the largest benefit from maintenance MGN1703 therapy. The subgroup of patients with