## GCT-56 Principles of surgical treatment for germ cell tumours in children

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**Background:** Surgical treatment is an important part of therapy for germ cell tumours. The wide variety of anatomical primary sites and varied histology result in the need for specific surgical guidelines for each location. This review will describe the rationale for surgical approach to gonadal and extra-gonadal germ cell tumours in children.
**Methods:** Recent studies regarding aspects of surgical care for germ cell tumours in the paediatric age-group and personal experience were reviewed for pertinent findings and general recommendations.
**Results:** Germ cell tumours occur in para-axial and gonadal sites and are often mixed tumours with both benign and malignant histology. Tumour markers should be sent preoperatively in all cases and complete resection is required for successful treatment. Surgery at diagnosis should include complete removal of the intact tumour with full surgical staging. Malignant tumours that are unresectable at diagnosis, or that would result in sacrifice of adjacent structures, may undergo neoadjuvant chemotherapy with good response and can subsequently undergo complete resection. Gonad sparing procedures may be used in carefully selected patients with suspected benign histology. Residual or enlarging masses with negative markers after initial treatment require surgical biopsy to direct further therapy. Teratomas most often occur in neonates and young infants and need a complete resection, because incomplete resections often result in recurrence with a malignancy rate of up to 75%. Resection in any location can be challenging with substantial complications and functional sequelae. Long-term follow-up is therefore important also for these benign tumours.

## GCT-57 Study of Magnetic Resonance with Diffusion in Patients in Childhood and Adolescents with Extracranial Germ Cell Tumours

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**Background:** To quantify the findings of Magnetic Resonance Imaging (MRI) in the diffusion sequence for malignant germ cell tumours (GCT).
**Methods:** We retrospectively analyzed patients with GCT that had MRI with diffusion-weighted sequences. The Regions Of Interest (ROI) in MRI were manually drawn by a radiologist with experience in paediatric radiology, in a single cut with greater diffusion restriction area. Appearence Diffusion Coefficient values (ADC) were extracted for each ROI. To verify the relationships between the ADC and the histological subtype, we used the Mann Whitney test. The quantitative form of the ADCm of patients with malignant GCT at different times: pretreatment, restaging and postreatment/follow-up, we used the generalized linear statistical model. The patients were analyzed (n = 37) from two Pediatric Brazilian Protocols (TCG-2008 and TCG-2017).
**Results:** In this study, the histopathological findings showed a correlation with the ADC where malignant GCT can be differentiated from benign GCT and, more specifically, dysgerminoma and teratoma. We observed that the majority of tumours presented an increase in the value of ADC after the beginning of the treatment, reflecting therapeutic response with treatment-induced cell death. However, there were no significant changes in ADCm between the time of restaging and postreatment/follow-up. GCT measured pretreatment may help in the differential diagnosis of benign or malignant GCT, as well as differentiate dysgerminomas, seminomas or germinomas in histological diagnosis. ADCm also proved to be useful when we evaluated malignant GCTs and their response to treatment.

## GCT-58 Pattern of events in children with sacrococcygeal germ cell tumours (GCT): The MAKEI-experience

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**Background:** Sacrococcygeal GCT are only appearing in neonates and children up to the age of 4 years. Whereas neonates present only with teratoma, sometimes with yolk-sac tumour (YST) microfoci, older children show most frequently either pure or mixed YST (with teratoma).
**Methods:** Between 1st January 1996 and 31st of March 2017, 2796 children and adolescents with GCT were entered to the MAKEI registry, of whom 1,895 were treated according to consecutive MAKEI protocols. 482 had sacrococcygeal tumours: 104 malignant and 377 teratoma.
**Results:** Of the 104 malignant: 10 were T1N0M0 (group 1), 26 T2N0M0 (group 2), 48 T1/2 N+M0/M+ (group 3) and 13 where stated as bulky disease (group 4). 15 events occurred: 8 in group 2, 6 in group 3 and one in group 4. All except one had received platin based chemotherapy and developed local relapses. They were treated with local deep hyperthermia including platin chemotherapy (HyperPEI) and in five patients with additional radiation. Of the 15 events, 12 achieved 2nd CR, 3 died of their disease. Of the 377 teratoma, 29 relapsed of whom 22 where malignant (YST) relapses. All relapses where treated with platinum-based chemotherapy and/or HyperPEI. Only one patient died of disease. Incomplete resection appears to be the major risk factor for relapse in malignant (14/15 events) as well as in teratoma (13/29) of the coccyx.

## GCT-59 Intraoperative MRI for complete resection in sacrococcygeal germ cell tumour

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**Background:** Complete tumour resection together with the coccyx is the cornerstone of sacrococcygeal germ-cell-tumour management.

A remnant of the coccyx may lead to local recurrence. However, there is difficult to recognize the transition between coccyx and sacrum. Besides that, the tumour can infiltrate the sacrum and more extensive resection could be necessary. Intraoperative magnetic resonance imaging (MRI) can be used to assist resection of central nervous system tumours. We adapted this technique to sacrococcygeal tumours. The aim of this study was to discuss the operative technique of image guidance with MRI in the surgical management of sacrococcygeal tumours.
**Methods:** Retrospective analyses of the sacrococcygeal germ cell tumour operations that intraoperative MRI was used for, with a two Tesla magnet with a patient transportation system.
**Results:** There were 5 patients: 3 male and 2 female. Age at procedure was: 3 days, 4 months, 3 years, 4 years and 4 years. Two procedures were primary resection (one immature and one mature teratoma), and three for relapse (one in first year and two in second). The relapses were yolk sac tumour. MRI was used mainly to verify the coccyx resection in two cases, coccyx resection and complete tumour resection in one and level of sacrum resection in two cases. In two cases, the MRI demonstrated residual tumour and the need for more resection. In conclusion, intraoperative MRI could facilitate total resection of sacrococcygeal tumours through identification of remnant tumour in the surgical site and could help to confirm the extent of bone resection.

## GCT-60 Sacrococcygeal teratoma in children: Audit on clinical outcomes from a single centre

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**Background:** Due to anatomical location, surgical excision of sacrococcygeal teratoma (SCT) may cause neuropathic bowel and bladder. This audit reviewed our clinical practice in SCT management and assessed post-operative functional outcomes.
**Methods:** A retrospective single-institution audit performed at a tertiary centre from November 2008 to November 2018. Electronic database used to extract patients' clinical information which was recorded using a pre-designed data-collection proforma. Data were analysed and compared with the UK Children's Cancer Study Group's Experience [1].
**Results:** 21 neonates with SCTs based on imaging were audited. Only 17 patients had confirmed SCT on histopathology (11 females, 6 males). Thirteen (76%) had mature teratoma (MT), three immature (18%), one MT with focal immature elements (6%), one had a malignant germ-cell-tumour (6%). The excluded four patients had other diagnoses (perivascular myoid tumour, choristoma, yolk sac tumour, not specified). All patients survived and none had recurrence. Ten patients (59%) developed post-operative constipation mainly managed with laxatives. Of those, two had neuropathic bowel, one chronic whereas seven only had transient constipation. Six patients (35%) had post-operative urinary problems. Of those, four had neuropathic bladder managed with clean intermittent catheterisation, one had urinary frequency and one had only transient urinary problems. Two children (12%) had abnormal gait. In two cases, there was no information recorded and in one case gait assessment was not appropriate due to the patient's age. Finally, regarding cosmesis, three patients (18%) developed asymmetry, four puckering (23%) and four had wound dehiscence (23%). In three patients, no information was recorded.

### Reference

[1] Huddart S., Mann J., Robinson K., *et al.* Sacrococcygeal teratomas: the UK Children's Cancer Study Group's experience. *Pediatr Surg Int*. 2003 Apr;19(1–2):47–51.

## GCT-61 Controlled aspiration of large paediatric ovarian cystic tumours

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**Background:** Aetiology of large ovarian cystic masses in children includes physiological and neoplastic cysts. If radiology is suspicious for malignancy, cyst is usually removed via large midline incision to avoid risk of spillage, but is painful with cosmetically-unappealing incisions for young women. We present our experience of using a minimally-invasive approach first described by Ehrlich [1].
**Methods:** Retrospective review of girls with large ovarian cystic masses at our centre since 2007. Small pfannenstiel incision performed and peritoneal fluid sampled; cyst surface dried and dermabond™ glue used to stick Opsite™ dressing to cyst surface. Fluid then drained through the dressing to prevent any intra-abdominal leakage. Once aspirated, cyst and ovary delivered and ovarian-preserving cystectomy performed.
**Results:** Nineteen girls [median age 13 years (5–16 years)] were managed this way. Pre-operative imaging showed complex lesions in all patients (median diameter 16 cm and volume 2088 $cm^3$). All radiology reports described the possibility of a neoplasm. At surgery, 18/19 cysts were intact and removed without internal spillage. Histology: mature teratoma (11, including 1 bilateral), serous cystadenoma (3), mucinous cystadenoma (3, including 1 bilateral), mucinous cyst adenocarcinoma (1), retiform Sertoli-Leydig tumour, intermediate differentiation (1). The girl with a mucinous cyst adenocarcinoma had evidence of pre-operative rupture with ascites and malignant cells in the peritoneal fluid; she subsequently died. All other patients are well without evidence of recurrence. This is largest described series using Ehrlich technique and shows large cystic neoplastic lesions can be removed safely, with a minimally-invasive approach, while following oncological principles.

### Reference

[1] Ehrlich; *J. Pediatr Surg* 2007.

## GCT-62 Laparoscopic surgery in paediatric ovarian tumours

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**Background:** The laparoscopy procedure is not routine in paediatric ovarian tumour surgery. This study analysed the laparoscopy procedure in the surgical treatment of paediatric ovarian tumours.
**Methods:** A retrospective analysis of ovarian tumour patients admitted at a single institution between July 2014 and October 2018. Demographic and clinical features were reviewed.
**Results:** Twenty-nine patients, ranging from 11 to 222 months of age, were treated for 29 ovarian tumours: 19 (65.5%) malignant and 10 (34.5%) benign lesions. Median age at surgery was 12 years. The primary surgical approach was done in our hospital in 16 cases; three primary laparoscopy salpingo-oophorectomy were performed. One patient had a ruptured tumour in the initial laparotomy, laparoscopy was done post-chemotherapy (second-look surgery). For the patients who had initial surgery in other hospitals and staging information was incomplete, we performed a staging laparoscopy (four patients). We found one patient with positive peritoneal cells, one with remnant