The surgery of lung metastasis was performed via thoracoscopic access without any technical issues. Histopathology (D 5035/3) has shown the blastemal – epithelial type of Nephroblastoma.

The postoperative chemotherapy regimen consisted of a combination of Epirubicin, Ifosfamide, Etoposide and Carboplatin [4]. Also child had the Radiotherapy (place of removed tumor and chest).

The patient currently reached the complete recovery with 2 years follow-up.

Discussion. Transperitoneal radical nephrectomy is the main part in the treatment of WT, some advanced tumors could not be resected because of massive size, involvement of vital structures (liver, adrenal gland), and inferior vena cava invasion. In our study we have used Harmonic Focus curved shears (the part of the Harmonic family of advanced ultrasonic surgical devices) to improve prognosis in patient presenting with these problems [5, 6].

Also in our case study Harmonic Focus curved shears has accounted for minimized intraoperative blood loss (150 ml vs. 300–500 ml with conventional techniques according to our experience), minimized coagulation necrosis and absence of febrile reactions postoperatively, as well as reliable hemostasis, which allowed us to avoid postoperative retroperitoneal space drainage.

Conclusions. The Harmonic Focus Scalpel promises to be a reliable and safe option for Wilms' tumor resection in the child, lesser operative time and good postoperative recovery. Minimal lateral thermal footprint along with possibility to use it as both hemostatic and dissection tool, allows to consider this device as one of the most suitable instruments in pediatric surgery.

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MODERN SURGICAL STRATEGIES IN PEDIATRIC ONCOLOGY

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СОВРЕМЕННЫЕ ХИРУРГИЧЕСКИЕ СТРАТЕГИИ В ДЕТСКОЙ ОНКОЛОГИИ

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In review showed modern surgical strategies in selected areas of pediatric oncology. The newer energy sources have contributed to less blood and thus fewer complications following major resections. Robotic, endoscopy and stereotactic surgery have been the major advances in the treatment of pediatric tumours. There is more dependence on the use of chemotherapy, newer protocols with less toxic drugs and for shorter duration.

Key words: pediatric oncology, diagnostic, treatment, surgery

В обзоре приводятся современные хирургические стратегии, применяемые в отдельных областях детской онкологии. Использование современной электрохирургии способствует уменьшению кровопотери и обеспечивает сокращение количества осложнений после обширных оперативных вмешательств. Применение робототехники, эндоскопии и стереотактической хирургии обеспечивает большие успехи в лечении опухолей у детей. Кроме того, отмечается улучшение эффективности применения химиотерапии, благодаря использованию новых протоколов лечения, включающих менее токсичные препараты и сокращение длительности их приема.

Ключевые слова: детская онкология, диагностика, лечение, хирургия

Surgery in Pediatric Oncology has gone through significant changes in modern times. Big number of breakthrough achievements have bead obtained in energy devices, chemotherapeutic agents, radiological imaging, positron emission tomography and use of antibiotics. In addition, today we have better understanding of the biologic pathways for childhood cancers, biologic therapies like anti-angiogenesis agents, growth factor receptor inhibitors, signal transduction inhibitors, targeted antibodies and immunotherapy.

All recent achievements in radiotherapy, intensive care and anaesthetic management have also contributed in improving the outcome of patients with pediatric tumours. This review article covers recent changes in management over the last decade that has improved the surgical care of children suffering with cancers. The focus of this article would be on new methods of diagnosis and treatment in pediatric oncology; and finally highlighting improvements in selected areas of pediatric oncology.

New methods of diagnosis in Pediatric Oncology

With improvement in the array of imaging, a proper planning of surgical technique can be done. The operability of a renal tumour can be assessed by seeing the planes of the fat and muscles around the tumour. The thrombus in the renal vein and inferior vena cava in renal tumours can be seen on a colour Doppler ultrasound (US). The surrounding vital organs like pancreas and duodenum can be studied properly. The 3D reconstruction of imaging has really helped in planning the operability of a liver tumour. Intraoperative ultrasound can be planned to assess the tumour free margins. With advanced imaging even 0.5 to 1 cm of a metastatic node in the lung or liver can be picked up. There is no more need to explore the opposite normal kidney in cases of Wilms' tumour by opening the Gerota's fascia. A palpation through the peritoneum is enough as we can rely on the findings of a contrast enhanced computerized tomography (CT). Positron Emission tomography (PET) can help to distinguish a fibrosed necrotic lesion picked up on CT from an active metastasis.

Recent advances in Biopsy

Image guided biopsies with US or CT have improved the yield and accuracy of taking a tissue sample for fine needle aspiration cytology and a trucut biopsy. It also prevents injury to vital structures. Minimally invasive surgery may be beneficial in examining a neoplastic condition especially when the benign or malignant nature is not clear. It has also been used to take a biopsy of inaccessible intraabdominal or intra thoracic lesions. This has been particularly used for solid tumours in children by the Italian Group of Pediatric Surgical Oncology [1]. Perhaps the risk of bleeding and spill is less in solid tumours.

Advances in Histopathology

Immunohistochemistry and biomarkers have improved the accuracy of diagnosis. Fine needle aspiration can also help to make a fairly accurate diagnosis that can help in planning the management strategy. A frozen section during the operation can confirm the malignant nature of the tumour and needful surgery can be done accordingly.

New methods of treatment in Pediatric Oncology

Portal vein embolization prior to partial hepatectomy for liver cancer

Ligation or embolization of the branch of portal vein draining into the ipsilateral liver side of the tumour prior to surgery has been utilized as a way to reduce the tumour mass and promote hepatic regeneration of the contralateral liver side. This technique is very popular for hepatocellular carcinoma [2]. Patients with hepatocellular carcinoma who underwent preoperative portal vein embolization and hemihepatectomy had a comparable long-term prognosis as patients with up front hepatectomy despite having a significantly larger resected liver volume on admission. Also, it has been hypothesized that portal vein embolization might decrease the extrahepatic recurrence. However, for hepatoblastoma chemotherapy often helps to make the lesion operable.

Emergency Surgery in Pediatric Oncology

With advances in anaesthetic management of a sick child, even huge ruptured tumors can be treated appropriately in the emergency room and give a chance for survival to patients with advanced malignancy. Monitoring of the central venous pressure and arterial pressure has improved the per-operative management of the cases. Warm blankets under the babies undergoing surgery prevent hypothermia and its complications. Adjunctive measures such as intermittent Pringle maneuver and low central venous pressure anaesthesia are also useful operatons that can help to reduce the risk of haemorrhage.

Newer Energy Devices

An important factor for better outcome for liver resection is reduced blood loss due to improvement in surgical techniques. Newer energy devices like the Harmonic Scalpel offers a good means of vascular control in the surgery of solid tumours. It is very beneficial is dividing the adhesions around the tumour from the abdominal wall. In Harmonic device, the electrical energy is converted into mechanical energy and no electricity is transferred to or through the patient. The blade vibrates at 55,500 times per second to simultaneously cut and coagulate tissue. By optimizing the temperature and time of activation on tissue, the instrument serves as a secure and reliable vessel sealer. Another generation of this device, enabled with Adaptive Tissue Technology utilizes an advanced algorithm, which dynamically optimizes energy delivery in response to changing tissue conditions. It provides better heat management with less thermal spread. It enables advanced hemostasis, modulating energy to provide strong and secure sealing in all vessel sizes up to 7 mm in diameter. The radiofrequency device, Harmonic Scalpel and the Cavitron Ultrasonic Surgical Aspirator (CUSA) are also helpful in liver resection [3]. Vascular staplers are now available for transection of major intrahepatic vascular trunks. Similarly intestinal anastomosis staplers have become popular for intestinal

lesions. The Harmonic Scalpel is particularly useful in liver transection during laparoscopic liver resection especially for resection of peripheral lesions, because of the difficulty in using CUSA or water jet in the laparoscopic setting [4]. However, these must be used with care. Recently the use of Harmonic Scalpel has been reported to be associated with a significantly increased rate of postoperative bile leakage, raising the concern that Harmonic Scalpel may not be effective in sealing bile ducts [5]. While the benefit of the use of Harmonic Scalpel in open liver resection remains uncertain, it is commonly used in laparoscopic liver resection. The water jet dissector employs a pressurized jet of water .The instrument may also have a limitation in dissecting the liver parenchyma around the main trunk of hepatic veins, since it is difficult to achieve sufficient control of bleeding from large vessels using the Harmonic Scalpel alone [6]. However, when combined with the use of ultrasonic dissection, Harmonic Scalpel may reduce blood loss [7]. The disadvantages of both CUSA and water jet in liver transection is the need for ligation or clipping individual vessels and also a remote risk of venous air embolism with either CUSA or water jet technique, although this appears to be a clinically rare problem [8–10]. However, both CUSA and water jet techniques are quite good for dissecting out major hepatic veins when tumour is in proximity. A new technology using saline-linked Radio Frequency (RF) energy has been developed for liver transection. In this instrument, saline runs to the tip of the electrode to couple RF energy to the liver surface and achieve coagulation [3]. The combined use of a Floating Ball coagulator using this principle with Harmonic Scalpel has been shown to reduce blood loss compared with the conventional technique of clamp crushing transection of the liver.

Organ transplantation

Liver and renal transplant have become viable options and have improved results over last decade. Heroic liver resections with a high probability of leaving residual tumour are now avoided whenever possible as liver transplant offers good cure for patients with (i) multifocal or large solitary PRETEXT IV (PRE Treatment EXTent of disease scoring system) hepatoblastoma involving all four sectors of the liver and (ii) unifocal, centrally located tumours involving main hilar structures or main hepatic veins [11].

Improvements in selected areas of pediatric oncology

Advances in Surgery for Thyroid Tumours

In a national multicenter retrospective review of 250 pediatric patients in Italy treated for papillary thyroid carcinoma in a 14-year period, it was concluded that total thyroidectomy seems to be an overly radical approach [12]. The rate of recurrent disease was 12 % (30/250) with the vast majority of recurrences (96.6 %) occurring in the total thyroidectomy group. Total thyroidectomy was associated with a complication rate 20.8 %, including transient and permanent hypoparathyroidism (13.6 and 4.4 %, respectively), and vocal fold palsy (2.8 %). The approach in children should be individualized as children are likely to benefit from a tailored surgical strategy. Total thyroidectomy can be reserved for patients with extensive disease with metastasis at presentation.

It is now possible to identify persons with inherited multiple endocrine neoplasia (MEN) syndrome types 2A and 2B based on the presence of missense mutations in the RET proto-oncogene. It has been reported that most patients with MEN 2A or 2B who undergone thyroidectomy in childhood for Medullary thyroid carcinoma have persistent or recurrent disease long-term [13]. Thus, genetic diagnosis of these syndromes may allow for prophylactic surgery before the development of biochemical or clinical evidence of Medullary thyroid carcinoma.

Stereotactic surgery and Gamma Knife for brain tumours

Stereotactic surgery has seen the light of the day in brain tumours. The lesion is mapped during surgery and guided resection with safe margins is performed. Gamma knife radiation is very accurate in directing the radiation beams to the exact site of the lesion. Thus the prognosis and postoperative results have improved.

Robotic Surgery for Urologic malignancies

Rhabdomyosarcoma of the bladder and prostate can be managed with robotic surgery that gives a good control and visibility over a difficulty to access area like behind the bladder neck deep in the pelvis. Urologic malignancies can be dealt in a minimally invasive manner with partial nephrectomy for Wilms' tumour [14, 15]. However the pros and cons should be weighed and in bigger lesions, an open surgery is safer.

Advances in surgery for bony tumours

With new material available as prosthesis, bone implants and bone graft, a complete cure can be offered to patients with huge bone tumours. En block resection of spinal tumours like osteosarcoma that were otherwise devastating is now being carried out successfully [16].

Plastic Surgery in Pediatric Oncology

Face and Neck lesions in children have now become operable with technical innovations in flap and reconstructive surgery. With proper planning, most cases can be brought within the treatable sphere. Free tissue transfer has been reported as highly successful in children. In a metanalysis of 646 children who received 694 free flaps, the pooled survival rate among all free flaps was 96.4 % [17]. The fibula free flap (fibula) and subscapular system free flaps (scapula) were the most commonly used flaps.

Conclusions. To conclude, there have been many newer modalities of diagnosis including imaging with 3D reconstruction CT and PET. Immunohistochemistry and biomarkers have revolutionized the histopathological accuracy. A frozen section during surgery can help to get negative margins. The newer energy sources have contributed to less blood and thus fewer complications following major resections. Embolization of major vessels have also reduced major blood and helped to reduce tumour size prior to surgery. Robotic, endoscopy and stereotactic surgery have been the major advances in the treatment of pediatric tumours. Amputations and exenterations are the things of the past. There is more dependence on the use of chemotherapy, newer protocols with less toxic drugs and for shorter duration. Radiotherapy is better avoided or the dose is reduced if found necessary. The future seems promising in the field of pediatric oncology with the combined approach of the oncologists, surgeons, radiotherapists, and the supportive departments involved in long term care including the fund raising organizing associations.

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NEUROTOXICITY CAUSED BY ANESTHETICS IN PEDIATRIC ANESTHESIA

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НЕЙРОТОКСИЧНОСТЬ, ВЫЗЫВАЕМАЯ ОБЩИМИ АНЕСТЕТИКАМИ У ДЕТЕЙ

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In a review of the current literature assesses the recently discovered phenomenon and the toxicity of anesthetics in the developing child brain. The ways of diagnostics of morphological and functional abnormalities of brain activity in children. Provides indisputable data on the possibility of this type of interactions taking into account the mechanism of action of anesthetics. Comparative characteristics of strength toxic effects on children's brain different types of inhalation and non-inhalation anesthetics. There is a comparison of the degree of toxic impact on the brain at single and repeated exposure of anaesthesia. Emphasizes the lack of information and especially objective data visualization of degenerative changes in children's brain due to ethical constraints and the impossibility of obtaining samples for biopsy. The conclusion about the appropriateness of expectant surgical tactics in the absence of urgent indications for surgical intervention to 4 years of a child's life. Also, our patients need more researches in this direction.

Key words: anesthesia, newborns, children, pediatric surgery, neurotoxicity, neurodegeneration, cognitive disorders

В обзоре дается оценка недавно обнаруженному феномену токсичности анестетиков для развивающегося детского мозга. Определяются способы диагностики морфофункциональных нарушений мозговой активности у детей. Приводятся неоспоримые данные о возможности такого вида взаимодействий с учетом механизма действия анестетиков. Дается сравнительная характеристика силы токсического воздействия на детский