

Kenneth W. Gow, M.D.

• Pediatric Surgical Oncology



Associate Professor of Surgery

Childhood cancer is one of the leading causes of mortality in the pediatric population. Over the last several decades, however, survival rates have been steadily improving, with surgeons playing an important role in this upward trend. Specifically, surgeons insert central venous lines, biopsy for diagnosis, resect tumors, and follow up to assess for complications or recurrence. We are striving to study each of these areas of contribution.

Central Venous Catheters

Insertion of a central venous catheter (CVC) is one of the most commonly performed procedures in children. For a child with cancer, the CVC is key to effective administration of chemotherapy. The CVC was developed at the Fred Hutchinson Cancer Research Center in Seattle. We are currently reviewing the steps in the insertion and the management of CVCs. With improvement in the process of insertion, we have succeeded in creating an enhanced system of delivery. We are also standardizing other aspects of catheter insertion and management to try to reduce the rates of thrombosis and infections. Ultimately, this process will be the basis for further study that should improve patient care and reduce costs.

Biopsy

In terms of obtaining tissue for diagnosis, surgeons have two goals. First, surgeons need to be able obtain sufficient tissue. Second, they must do so via the least invasive means. Some situations require additional, specialized tools for securing the proper tissue. We have collaborated with our Nuclear Medicine Department to establish a sentinel lymph

node biopsy program that focuses on guided lymph node biopsy for patients with skin neoplasms and sarcomas, thereby establishing optimal staging for these patients [1, 2]. Further, we use ultrasound guidance to allow for better identification of some lesions, which previously have been difficult to isolate. One condition that might particularly benefit from ultrasound guidance is that of deep-seated lung lesions, for which we have pioneered the application of minimally invasive thoracoscopic ultrasound (MITUS) [3]. This is just one of the many ways that we have utilized minimally invasive surgical techniques to improve biopsies, and ultimately outcomes, in children with cancer [4]. Our center has been prominent in advocating the role of minimally invasive surgery (MIS) for biopsy of masses in children as well as resection [5].

Resection

As discussed above, the role of MIS in resection of childhood solid tumors is a new area that we are helping to advance [5], specifically as applied to thoracic and abdominal sites. Excellent results have been obtained, and we continue to push the envelope in this area. Also, because some tumors have indistinct margins, we are also studying new tools and techniques that may further help pinpoint the tumor and allow for complete resection. Such cutting-edge tools include a hand-held positron emission tomography (PET) probe and beta probes that optimize real-time intra-operative localizations. Finally, robotically assisted methods have been used to help surgeons to resect lesions in difficult to reach locations such as the chest and pelvis [6].

One condition that might particularly benefit from ultrasound guidance is deep-seated lung lesions, where we have pioneered the application of minimally invasive thoracoscopic ultrasound.

Support

While surgeons play an important role in obtaining tissue for diagnostic and therapeutic purposes, we also serve as a valuable resource for supportive care during therapy. Support includes evaluation of patients having complications during chemotherapy, radiotherapy, or hematopoietic stem cell transplantation (HSCT). We have recently reviewed the Extracorporeal Life Support (ECLS) Registry to review the use of ECLS for children and adults with neoplasms or HSCT [7-9].

Follow-up

While we have made remarkable progress in the treatment and management of children with cancer, there has been a rise in long-term survivors. This has led to a relatively newer area of study, in which patients are tracked for long-term functional outcomes following therapy, as well as for the development of secondary malignancies.

Children's Oncology Group

While we study our local results, we actively participate in the Children's Oncology Group (COG), which is the national organization that develops the protocols for childhood cancer. Seattle Children's Hospital is well represented throughout all of the major study groups in COG, which gives us the footing to review previous databases and to raise questions for future study.

Education

As an institution, one of our tasks is to disseminate current and new techniques to the families and to the next generation of surgeons. To do this, we have utilized novel methods that leverage the new learners and their unique needs for visual education [10].

RELATED PUBLICATIONS

1. Gow KW, Rapkin L, Olson T, Durham M, Wyly B, Shehata B. Sentinel lymph node biopsy in the pediatric population. *J Pediatr Surg* 43:2193-2198, 2008.
 2. Ghazi B, Carlson GW, Murray DR, Gow KW, Page, Page A, Durham M, Kooby DA, Parker D, Rapkin L, Lawson DH, Delman KA. Utility of lymph node assessment for atypical spitzoid melanocytic neoplasms. *Ann Surg Oncol* 17:2471-2475, 2010.
 3. Gow KW, Saad D, Koontz C, Wulkan M. Minimally invasive thoracoscopic ultrasound for localization of pulmonary nodules in children. *J Pediatr Surg* 43:2315-2322, 2008.
 4. Cribbs RK, Wulkan ML, Heiss KF, Gow KW. Minimally invasive surgery and childhood cancer. *Surg Oncol* 16:221-228, 2007.
 5. Waldhausen JH, Tapper D, Sawin RS. Minimally invasive surgery and clinical decision-making for pediatric malignancy. *Surg Endosc* 14:250-253, 2000.
 6. Meehan JJ, Sandler AD. Robotic resection of mediastinal masses in children. *J Laparoendosc Adv Surg Tech A* 18:114-119, 2008.
 7. Gow KW, Wulkan M, Heiss KF, Haight AE, Heard ML, Rycus PT, Fortenberry JD. Extracorporeal life support for support of children after hematopoietic stem cell transplantation: The extracorporeal life support experience. *J Pediatr Surg* 41:662-667, 2008.
 8. Gow KW, Heiss KF, Wulkan M, Katzenstein HM, Rosenberg ES, Heard ML, Rycus PT, Fortenberry JD. Extracorporeal life support for support of children with malignancy and respiratory or cardiac failure: The extracorporeal life support experience. *Crit Care Med* 37:1308-1316, 2009.
 9. Gow KW, Lao OB, Leong T, Fortenberry JD. Extracorporeal life support for adults with malignancy and respiratory or cardiac failure: The Extracorporeal Life Support Experience. *Am J Surg* 199:669-675, 2010.
 10. Gow KW. Visual learning: harnessing images to educate residents optimally. *J Surg Educ* 66:392-394, 2009.
-