Innovations in surgical oncology at Baylor University Medical Center

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It is a great pleasure to review clinical and research contributions in the field of surgical oncology under the leadership and guidance of Dr. Ronald C. Jones. He arrived at Baylor University Medical Center (BUMC) in 1987 with a national reputation as a leader in organized surgical oncology based on his role as a leader in the American College of Surgeons Commission on Cancer. He served as state chairman prior to becoming national chairman of the Cancer Liaison Program and vice chairman of the Commission on Cancer (*Figure*). This commission has created national guidelines that have led to standardized requirements for hospitals across the country as they seek certification as a Commission on Cancer–approved cancer center (1).

Upon his arrival at Baylor, Dr. Jones encouraged resident research, allowed for recruitment of dedicated research nurses, and encouraged participation in cooperative group trials. He served as a mentor and leader for the surgical staff, who became active in research trials involving breast cancer, melanoma, esophageal cancer, colon cancer, liver cancer, pancreas cancer, and head and neck and endocrine cancer.

The improvements in each disease state can best be seen by considering the changes in modern management brought about in part through the clinical and research efforts of the staff and residents in the Department of Surgery.

BREAST CANCER

In 1987, a 39-year-old patient presenting with a 2-cm breast mass would likely have undergone an open biopsy in the operating room, followed by a thoughtful discussion of lumpectomy plus complete axillary node dissection versus a modified radical mastectomy.

The innovations developed at BUMC during the late 1980s included standardized screening, awareness of the hormone status of tumors, and participation in national trials comparing

Figure. Dr. Richard Wilson giving a plaque to Dr. Ronald C. Jones in recognition of his tenure as vice chairman of the Commission on Cancer, 1982–1983.

lumpectomy and mastectomy through the efforts of Dr. Jones, Dr. Harold Cheek, and Dr. George Peters (2, 3). Cooperative clinical trials with sentinel node biopsy were introduced by Dr. Kuhn. This work led to national presentations by Dr. Kathleen Crews showing that the sentinel node is the predictive node for breast cancer patients; when these nodes are negative for cancer, patients can be spared complete node dissection (4). Several other residents presented research on the impact of micrometastases, the impact of patient weight, injection techniques around the nipple, appropriate timing for breast reconstruction, and ultimately the long-term results of sentinel node biopsy (4–13).

Magnetic resonance imaging (MRI) in patients with breast cancer was introduced at BUMC by Dr. Steve Harms (14). Continued experience led to a recent report by Drs. Tuoc Dao and Sally Knox suggesting the role of MRI as a potential screening tool for patients with early stage breast cancer (15). Other residents have emphasized the role of office-based breast ultrasound for the staging and optimal biopsy for breast cancer patients (16). Dr. Michael Grant has been a consistent leader with clinical trials of the National Surgical Adjuvant Breast and Bowel Project (NSABP) that involve breast cancer prevention and hormonal therapy of breast cancer. Strategies for periareolar fine-needle biopsy and nipple duct wash techniques to identify patients for prevention trials have also been presented by BUMC residents (8).

Recent research involving circulating tumor cells to stage systemic disease for early stage breast cancer patients has been presented by Dr. Jeffrey Lamont and others (17). Finally, the Department of Surgery is actively involved in a collaborative effort to obtain molecular profiling of breast cancer patients as a means to identify the genomic and proteomic differences between the malignancy and the normal tissue.

As a result of the above contributions and improvements, the modern treatment for the 39-year-old breast cancer patient with a 2-cm tumor would be considerably different in 2007. The surgeon would likely assess the patient with ultrasound-guided core biopsy and ultrasound evaluation of the axillary

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nodes. The patient would be informed of the protocols involving circulating tumor cells, genomic profiling with a portion of the tumor, or possible neoadjuvant hormonal or molecular therapy. The patient would undergo MRI prior to discussion of possible skin-sparing mastectomy versus lumpectomy plus sentinel node biopsy. If the patient chose lumpectomy, she would be offered the opportunity to participate in a clinical trial with intracavitary radiation dose instead of external beam radiation. Genetic testing might also be considered in this young patient before discussing the possible option of bilateral mastectomy with reconstruction. The complexity of the modern management of breast cancer is a testament to the contributions of many BUMC surgeons and residents.

MELANOMA

In 1987, the typical patient with a 2.5-mm Clark's level III malignant melanoma on the foot might be managed with a 5-cm-wide excision along with a possible complete axillary node dissection. A positive node might be managed with simple observation.

Surgeons and residents at BUMC have contributed to the management of melanoma through participation in cooperative group trials involving sentinel node biopsy techniques. Presentations have included discussion on the early and late results of sentinel node biopsy from a technical standpoint (18–22). Later reports identified the patterns of recurrence following this technique when applied to extremity and head and neck melanoma (23, 24).

Other technical advancements were introduced by Dr. Alexandra Dresel with use of the node biopsy skin as the graft source with extremity melanoma (25). Nodal and local failure was shown to be similar for shave versus excisional biopsy of the primary melanoma (26). In addition, active involvement in the Sunbelt Melanoma Trial led to greater understanding of the role of polymerase chain reaction for detection of minute amounts of melanoma DNA in the sentinel node and circulating plasma of melanoma patients. Recent work with circulating tumor cells has revealed detection of occasional positive cells in patients with metastatic melanoma. Surgeons at BUMC have collaborated on innovative dendritic cell research for metastatic melanoma as well as various gene therapy trials (27).

Modern management of the above example would entail wide excision with a 2-cm margin and a simultaneous sentinel node biopsy. With a positive sentinel node, the patient would be invited to participate in a clinical trial with circulating tumor cell measurement and would be offered interferon in addition to genomic and proteomic assessment.

ESOPHAGEAL CANCER

Surgeons at BUMC have been active participants in the development of transhiatal esophagectomy and endoscopic ultrasound for optimal staging of esophageal cancer (28). The department also participated in the American College of Surgeons Oncology Group clinical trial investigating the role of positron emission tomography (PET) scans for preoperative staging of esophageal cancer. Surgeons have been involved in

experimental research involving gene therapy for esophageal cancer with injection of a gene construct allowing for intratumoral release of tumor necrosis factor (29). Recent work with laparoscopic esophagectomy was presented by Drs. Shawn Steen and Kuhn (30).

Improvements in management of esophageal cancer have led to better staging, less invasive surgical options, and unique adjuvant therapy options that didn't exist 20 years ago.

COLON CANCER

Drs. Warren Lichliter, Robert Jacobson, and R. D. Dignan have been key contributors to colorectal surgical innovations through participation in NSABP protocols and improvements in technique (31). Presentations by residents and fellows have included innovative strategies for the role of PET scans, a PET probe, and the gamma detection probe with monoclonal antibodies (32–34). Dr. James McLoughlin presented the early work of Drs. Kuhn and Lamont related to the role of intraperitoneal hyperthermic chemotherapy for colon carcinoma with peritoneal metastases (35–37). Other residents have presented research work involving laser ablation or stenting of obstructive rectal cancer. Dr. Lichliter and colleagues participated in institutional studies and a national protocol investigating molecular biomarkers in young patients with colorectal carcinoma (38). The institution continues to participate in studies of genetic testing in high-risk patients.

LIVER MALIGNANCY

The changes in clinical management of liver tumors continue to evolve through the efforts of surgeons in the BUMC Department of Surgery and the Baylor Regional Transplant Institute. Technical aspects of caudate lobe resection, cryosurgical ablation, hepatic artery pumps, and radiofrequency ablation have been presented by surgical staff and residents (39–43). Improved imaging strategies with MRI, intraoperative ultrasound, and PET scans have contributed to optimal staging and optimal surgical approaches (44, 45). Recent work with stapled liver resections and laparoscopic resections has characterized the types of innovations through the department (56). Surgeons have taken an active role in the introduction of focused radiation with the CyberKnife system (47) and SIR-Spheres via the hepatic artery. Collaboration with the Mary Crowley Medical Research Center has led to participation in several clinical trials involving gene therapy products designed to work preferentially with liver tumors (48).

PANCREAS CANCER

Technical proficiency in the surgical management of pancreas malignancies has always been a strong component of the surgery department, with an early presentation by Dr. Jeff Stephens regarding the role of portal vein resection (49). Improved imaging with endoscopic ultrasound or intraoperative ultrasound offers better staging and diagnosis (50). Surgeon-directed focused radiation therapy (CyberKnife) and gene therapy with tumor necrosis factor release and radiation therapy have been areas of unique strength at BUMC.

HEAD/NECK/ENDOCRINE CANCER

The surgeons and residents at BUMC have helped to modify and improve the surgical management of head and neck cancer through the aggressive acceptance of the multidisciplinary organ-preserving efforts of Dr. John O'Brien and others. Participation in novel gene therapy protocols has been possible through collaboration with the Mary Crowley Medical Research Center (51, 52).

The surgeon's role in the optimal staging of parotid and thyroid lesions based on office ultrasound has been presented at regional meetings (16, 53). The department was an early adopter of the parathyroid hormone assay as a means of less-invasive parathyroidectomy (54). Recent work with the technique of thyroid biopsy has been presented by Drs. Ernesto Garza and Kuhn, showing the preferential value of a 25-gauge needle (55).

SUMMARY

The pathway to innovation and clinical changes in the management of the cancer patient has been directly related to the leadership, vision, and support of the chairman of surgery, Dr. Ronald C. Jones. He has encouraged the surgical staff to become involved with the residents and resident research. He has recruited and funded the research nurse position at BUMC, leading to a greatly more efficient process. He has encouraged residents to be involved with research and has supported travel to appropriate meetings. He has actively reviewed virtually every abstract that has left the department, leading to an improved research product in the Department of Surgery.

The formula for continued innovation in the Department of Surgery can be tied to the enormous strides made over the past 20 years. Stay current. Go to meetings. Read journals. Assume that there is always a better way. Participate in national trials. Work under a great chairman, like Dr. Jones.

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