

Radioimmunoguided Surgery (RIGS) with ^{99m}Tc -CEA. Scan in Three Patients with Primary Colorectal Cancer

Hell J Nucl Med 2001, 4: 176-178

1. Introduction

In cases where the primary site of colorectal cancer has been identified, it is important to know the sites of possible metastases especially when being too small to be visualized by the various imaging modalities. Metastatic disease not only describes the stage of the disease but also determines the kind of treatment to be followed. In colorectal cancer metastatic disease may be identified either by CT scan, MRI, CEA Scan radioimmunoscinigraphy (RIS) or by exploratory laparotomy. Recently radioimmunoguided surgery (RIGS) has been applied successfully for the intraoperative detection of metastases and residual tumor in colorectal cancer. A study comparing all four diagnostic modalities mentioned above in 11 patients showed that the sensitivity of CT scan, preoperative MoAb scan, surgical exploration and RIGS were 48%, 67%, 76% and 86% respectively¹. Since reports on the actual evaluation of RIGS are few we describe practical points from our experience in 3 more cases of rectal cancer and discuss the advantages and disadvantages of this procedure.

2. Patients and methods

Three presurgical patients, 2 men [38 years old (A) and 72 years old (B)] and one woman [73 years old (C)] with endoscopically proven rectal cancer, performing radioimmunoguided surgery (RIGS) were prospectively studied. The purpose of this study was explained to the patients who gave their oral consent. The tumors were located in less than 10 cm above the inner anal sphincter. CT scans of the abdomen and pelvis were reported normal. Serum samples were taken for testing CEA, CA 19-9 and CA 50, before the injection of ^{99m}Tc labeled CEA antibodies. The above markers were in the normal range except for Patient A who had CEA of 33 ng/ml (normal range 0-10 ng/ml) and CA19-9 of 43.6 U/ml (normal range 0-37 U/ml). Radioimmunoscinigraphy was performed 3-5 hours after the intravenous injection of 740-925 MBq of sodium pertechnetate ($\text{Na}_2 \text{ } ^{99m}\text{TcO}_4$) labeled IgG₁ fab' fragment (IMMU4, CEA-Scan, Immunomedics Inc). Planar images were normal except in Patient A who had abnormal uptake of the radiopharmaceutical in his testis due to bilateral varicocele. Unfortunately SPET

images were not obtained because of a technical problem.

The patients underwent probe-guided surgery 20-24 hours after the injection of the radiopharmaceutical. A portable probe (Scintiprobe MR 100, Biomedical Instruments) was used. The Scintiprobe MR 100 we used has 2 units. The central unit is a hand portable digital counter coupled with a variable frequency generator with adjustable volume sound threshold setting with two independent energy windows. It is of 10 kg weight, connected to a hardware with a graphic program able to give counts per second, real time visualization, counting rate visualization as a function of time, energy spectra visualization for calibration purposes, statistical calculation program and to store measurements and patient data. The probe has a NaI crystal with a total length of 160 mm, external diameter of 18 mm, lateral shielding efficiency > 99.99%, sensitivity threshold of 3.7 kBq, and gamma radiation detecting efficiency of 99%². The energy windows were set for ^{99m}Tc . A sterile dressing was drawn over the probe during surgery.

The surgical procedure was initiated with a xipho-pubic midline incision. A traditional exploration was performed by inspection and palpation. Then using the Scintiprobe, detection and evaluation of counts over different surgical tissues

was done. The threshold level of the probe signal processor was adjusted to eliminate the background sound over normal tissues. The Scintiprobe digital counter was connected to a computer, thus the measurements were



Figure 1: The Scintiprobe digital counter connected to a computer.

Radioimmunoguided Surgery Rigs In The Detection And Treatment Of Colorectal Cancer

Christopher G. Willett



Radioimmunoguided Surgery Rigs In The Detection And Treatment Of Collorectal Cancer:

Radioimmunoguided Surgery (RIGS) in the Detection and Treatment of Colorectal Cancer Edward W. Martin,1994 *Lymphatic Metastasis and Sentinel Lymphonodectomy* P.M. Schlag,Umberto Veronesi,2012-12-06 Metastases determine malignancy The main attention so far has been focused upon organ metastases The molecular mechanisms thereof while far from being totally elucidated are increasingly well understood Modern diagnostic tools now enable detection and precise localization of small lesions In contrast our knowl edge and diagnostic capabilities regarding metastatic spread to the lymphatic system are rather limited However there have re cently been a number of interesting advances It is the aim of this volume to submit these developments to detailed analysis The therapeutic relevance of enhanced sensitivity in detection of lymph node metastases has to be considered in the light of in creased morbidity versus eventual prognostic improvements by modification of therapy An interesting concept which might im prove diagnostic accuracy while reducing operative morbidity is the sentinel node technique Surgical standards are lacking however and many fundamental questions pertaining to precise lymphatic mapping remain unanswered Whether the sentinel node concept is of general relevance or whether it is applicable in only a few organs remains to be determined This book offers intensive discussion of the concept from methodological and tu mor biological viewpoints World renowned experts with long term involvement in related basic and clinical research provide the reader with a broad survey of actual knowledge together with a critical appraisal of recent and future developments We sincerely hope this book succeeds in providing an outlook as a reference for all clinicians on future prospects and serving and researchers in this extremely important field

Radioguided Surgery Ken Herrmann,Omgo Nieweg,Stephen P. Povoski,2016-03-04 This book offers a comprehensive overview of the state of the art in the practice of radioguided surgery The opening section is devoted to the basic physics principles for detection and imaging radiation detection device technology principles of surgical navigation radionuclides and radiopharmaceuticals and radiation safety A series of chapters then address the clinical application of radioguided surgery for a variety of malignancies including breast cancer melanoma and other cutaneous malignancies gynecologic malignancies head and neck malignancies thyroid cancer urologic malignancies colon cancer gastroesophageal cancer lung cancer bone tumors parathyroid adenomas and neuroendocrine tumors For each application the recommended methodological approaches are discussed and the available cumulative clinical experiences of investigators from across the globe are reviewed A conscious effort is made to highlight recent developments and innovative multidisciplinary approaches within each clinical area Interesting issues and novel approaches are further explored through a collection of selected case reports at the end of the book The contributing authors are all experts in their own fields ensuring that the book will hold wide appeal for surgeons surgical technologists nuclear medicine physicians nuclear medicine technologists and various trainees

Nuclear Medicine in Clinical Diagnosis and Treatment Peter Josef Ell,Sanjiv Sam Gambhir,2004 An internationally

recognized team of editors and contributors present an authoritative state of the art reference on nuclear medicine and its clinical applications They focus on helping the reader to solve the challenges encountered in day to day practice including image interpretation image optimization techniques and pitfalls in image acquisition and interpretation Over 4 400 illustrations 803 in full color comprise a comprehensive visual guide to interpretation This new edition also incorporates three brand new full color atlases PET and PET CT SPECT and SPECT CT and a PET brain atlas as well as many new full color images more than 800 in all Completely revised and thoroughly updated throughout the 3rd Edition encompasses all of the latest advances in the diagnostic and therapeutic modalities available for cancer heart disease neurologic disorders and trauma as well as other diseases both common and rare

Glycans: Masters of Immunity, From Cancers to Inflammatory Disease Richard Beatson, Heinz Laubli, Oliver Pearce, Celso A. Reis, 2022-09-16 **Radioguided Surgery**

Giuliano Mariani, Armando E. Giuliano, H. William Strauss, 2010-05-10 This multidisciplinary textbook is designed to be the standard on the subject and is geared for use by physicians who are involved in the care and or diagnosis of cancer patients Comprehensive coverage is provided on all aspects of radioguided surgery Practical information is readily accessible and throughout there is an emphasis on improved decision making Tables present the indications performance and interpretation of procedures at a glance A wealth of illustrations including a full color insert enhances the application of new concepts

Microspheres and Regional Cancer Therapy Neville Willmott, John M. Daly, 2020-10-28 *Microspheres and Regional Cancer Therapy* takes an interdisciplinary approach to the subject of microspheres and regional cancer therapy It synthesizes laboratory and clinical data to demonstrate the utility of microsphere based strategies in the treatment of localized solid tumors particularly in the liver not amenable to surgery and as a component of strategies for treatment of disseminated disease Using the same techniques that show the deficiencies of delivery strategies involving antibodies liposomes and synthetic polymers clear evidence is presented describing how microspheres of appropriate size can be localized in solid tumor deposits in the liver with little exposure to other organs To exploit this phenomenon the extent and nature of the incorporation of active agents within microspheres is discussed in relation to release pharmacokinetics and tumor response achieved by intensification of therapy in the manner described This book will benefit laboratory based scientists and clinicians in pharmaceuticals pharmacology physiology surgical oncology and nuclear medicine In addition cancer clinicians interested in the value of regional therapy will be able to evaluate the underlying theory and learn the necessary methodology

Imaging and Visualization in The Modern Operating Room Yuman Fong, Pier Cristoforo Giulianotti, Jason Lewis, Bas Groot Koerkamp, Thomas Reiner, 2015-05-19 This text provides a state of the art overview of tools for guiding surgeons in the modern operating room The text explains how many modalities in the current armamentarium of radiologic imaging have been brought to the operating room for real time use It also explains the current use of near infrared fluorescent and chemo luminescent imaging to guide minimally invasive and open surgery to improve outcome The book is

separated into two sections The first discusses the biologic principles that underlie novel visualization of normal organs and pathology The currently available equipment and equipment anticipated in the near future is covered The second section summarizes current clinical applications of advanced imaging and visualization in the OR Novel means of visualizing normal anatomic structures such as nerves bile duct and vessels that enhance safety of many operations are covered Novel biologic imaging using radio labeled and fluorescent labeled molecular probes that allow identification of inflammation vascular abnormalities and cancer are also discussed Authored by scientists who pioneer research in optics and radiology tool makers who use this knowledge to make surgical equipment and surgeons who innovate the field of surgery using these new operative tools Imaging and Visualization in the Modern Operating Room is a valuable guide for surgeons residents and fellows entering the field *Nuclear Medicine in Clinical Diagnosis and Treatment* Ian Provan Cathcart Murray, Peter Josef Ell, Hans Van der Wall, 1998 **Modern Management of Cancer of the Rectum** Riccardo A. Audisio, James G.

Geraghty, Walter E. Longo, 2012-12-06 Modern Management of Cancer of the Rectum is intended to provide a comprehensive overview of all aspects of rectal neoplasms It addresses such topics as epidemiology biology screening and chemoprevention the role of imaging in diagnosis staging and prognosis radiation therapy medical and surgical treatment as well as new modalities of therapy including laparoscopy and transanal endoscopic surgery A greater understanding of prognostic factors patterns of spread and natural history has occurred during the past decade together with new diagnostic modalities this has led to significant changes in the management of patients with rectal cancer This book will be invaluable for all those who treat rectal cancer Topics in Colorectal Surgery Prof. P. Sivalingam, 2023-11-28 Colorectal Surgery has gained significant recognition in Western countries and is steadily advancing in India The book Topics in Colorectal Surgery published in 2010 marks a pioneering effort in India Its second edition now boasts updates across all 38 topics and the addition of new chapters covering Diverticulosis Appendix related issues Anal Intraepithelial Neoplasia Anal lesions in HIV patients Colonic ischemia and Anal condylomata Notably it has incorporated discussions on Clostridium difficile colitis within the context of ulcerative colitis and has embraced the concept of Enhanced Recovery After Surgery ERAS in addressing carcinoma of the colon Anticipating the growth of the field the National Medical Council is on the verge of introducing a Mch or Fellowship program in colorectal surgery As a result this comprehensive book on various aspects of Colorectal Surgery is a valuable resource tailored to cater to the needs of postgraduates in Surgery medical college educators surgeons with an interest in colorectal surgery and students preparing for the NEET examination Cancer of the Lower Gastrointestinal Tract Christopher G. Willett, 2001 Written for specialists in colorectal disease this atlas features numerous illustrations photographs and radiographs that show tumours as they manifest to offer an expert overview of colon and rectal cancer **Atlas of Lymphoscintigraphy and Sentinel Node Mapping** Giuliano Mariani, Gianpiero Manca, Federica Orsini, Sergi Vidal-Sicart, Renato A. Valdés Olmos, 2012-12-23 Although lymphoscintigraphy was originally introduced into clinical routine

for identification of the cause of peripheral edema more recently it has been widely applied for radioguided biopsy of the sentinel lymph node in patients with solid cancers The procedure is now considered crucial for adequate planning of oncologic surgery in a growing number of cancers This atlas presents a collection of richly illustrated teaching cases that demonstrate the clinical relevance and impact of lymphoscintigraphy in different pathologic conditions After introductory chapters on the anatomy physiology and pathophysiology of lymphatic circulation the role of lymphoscintigraphy in differential diagnosis of peripheral edema and characterization of intracavitary lymph effusions is addressed The principal focus of the book however is on the use of lymphoscintigraphic mapping for radioguided sentinel node biopsy in cutaneous melanoma and cancers at a range of anatomic sites The most commonly observed lymphoscintigraphic patterns are depicted and anatomic variants and technical pitfalls of the procedure receive careful attention The role of tomographic multimodality imaging is also considered The atlas will be an excellent learning tool for residents in nuclear medicine and other specialists with an interest in the field

Gastrointestinal Oncology James L. Abbruzzese, 2004 In 74 chapters Gastrointestinal Oncology brings together a diverse group of specialists to provide the most authoritative up to date and encyclopedic volume currently available on the subject The first part of this text introduces a series of concepts and topics that are important to gastrointestinal malignancies in general These topics include epidemiologic principles prevention screening familial GI cancers developmental and molecular biology pathobiology general therapeutic principles emerging therapies and palliative care The second part of the book covers each of the specific cancers affecting the human gastrointestinal tract These chapters are introduced by state of the art discussions outlining our current understanding of the pathobiology and molecular biology relevant to each cancer Subsequent sections describe the multidisciplinary management of specific clinical situations By organizing the treatment related chapters around clinical scenarios the reader will readily find the information necessary to effectively manage the complex clinical situations encountered by patients with gastrointestinal malignancies

Peritoneal Carcinomatosis: Principles of Management Paul H. Sugarbaker, 2012-12-06 Paul Sugarbaker and his colleagues have persevered in the study and treatment of peritoneal carcinomatosis The peritoneal cavity has many unique and incompletely appreciated properties These properties coupled with the biologic behavior of many cancers results in the seeding and growth of these cancers on the peritoneum Many of these cancers remain localized to the peritoneum only never metastasizing to other sites One possible reason for this may be the obstruction of the afferent lymphatics on the undersurface of the diaphragm The mucopolysaccharides produced by many of these neoplasms are probably viscous enough to obstruct these lymphatics leading to the syndrome of pseudomyxoma peritonei Many of the neoplasms taking residence on the peritoneum have extremely long cell cycle times and are resistant to radiotherapy and many chemotherapeutic agents How ever much can be done for these patients resection of primary cancers omentectomies to reduce ascites formation management of recurrent ascites management of intestinal obstruction nutritional care and hopefully intraperitoneal

chemotherapy We have reviewed many of these problems in the past 17 Dr Sugarbaker and his colleagues have organized the current state of knowledge and technology for continuing use The book provides a basis for thoughtful prospective research planning John S Spratt M D F A C S Professor of Surgery The James Graham Brown Cancer Center University of Louisville Louisville Kentucky References 1 Long RTL Spratt JS Dowling E *Colorectal Cancer* Elaine Swan,2006-02-03 Nurses should have the most up to date knowledge to provide accurate information and competent nursing care to patients with colorectal cancer Swan addresses those issues in a very thorough and comprehensive manner Chapters on the role of the colorectal nurse specialist epidemiology and genetics diagnosis investigations and different treatments make this book essential reading for any colorectal nurse specialist Colorectal cancer is the third most common cancer in men and the second most common cancer in women in the UK Colorectal Cancer is a very important book in this field As mortality statistics continue to rise this book addresses the issues surrounding colorectal cancer It is vital to care for and attend to the needs of these patients **Biotherapy** Paula Trahan Rieger,2001 Rieger U of Texas M D Anderson Cancer Center synthesizes knowledge about this rapidly expanding field to help other nurses understand its biological basis and clinical indications Targeted at oncology nurses the text will also be of interest in other specialties using biological agents to treat *Cumulated Index Medicus* ,1989 **Annual Report** National Cancer Institute (U.S.). Division of Cancer Biology, Diagnosis, and Centers,1995 *Adjuvant Therapy for Colon and Rectum Cancer* Karen Patrias,1990

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