Totally Implantable Venous Access Devices
Totally Implantable Venous Access Devices

Management in Mid- and Long-term Clinical Setting

Foreword by
John E. Niederhuber
To our wives and sons, thankmg them for their endearment
When asked by the editors to contribute a few words to introduce the reader to this important new reference text on “Totally Implanted Venous Access Devices”, my mind of course drifted back in time to those initial port placements in 1981 but also to two personal experiences validating for me the great benefit to our patients. In reliving for a moment those days of designing the first “Ports” as well as my surgeon angst as to whether this idea would really work – concerns of port site infection and skin breakdown from repeated needle access of the port – I could not help but think of how much this has impacted vascular access and patient quality of life. And in that regard, my thoughts quickly went to two individuals in my life that because of the closeness of our relationship I was even more aware of the very significant benefit these small implanted devices had on their lives.

The first individual was a distinguished surgeon colleague and mentor who suffered from bouts of bacterial endocarditis requiring prolonged administration of antibiotics and who came to me each time asking that I place a port. The second was my wife who required extensive chemotherapy, repeated venous sampling and occasional administration of fluids and other support during a two year battle with cancer. One only needs to care for even a few cancer patients receiving chemotherapy to quickly understand how extremely important to their care is a well-positioned and well-functioning totally implanted central venous access. The value, safety and durability of these implanted port devices have certainly been well documented over the years since their introduction in 1982 (Niederhuber J et al., Surgery 1982, 92:706-712).

As with most advances in medicine, several prior accomplishments set the stage for developing totally implanted devices. There was of course, extensive experience using external catheters to access the central venous circulation on a chronic basis and the introduction of silicon rubber (Broviac JW et al., Surg. Gynecol. Obstet. 1973, 136, 602) as the material for making these catheters was obviously a critical step in their evolution. The introduction of the Seldinger technique with the peel away sheath for accessing the central venous system was also important to the rapid expansion of the use of vascular access devices.
It was within this background and with my personal experience of perfecting the technical aspects of surgically implanting subcutaneous, percutaneously accessible, continuous infusion pumps for the administration of hepatic arterial chemotherapy (5-fluorodeoxyuridine) that triggered the design of the “totally implantable venous access devices” frequently called “ports”. The design of the original totally implanted infusion pumps had, at our request, a “side-port” that bypassed the pumping mechanism and the main drug reservoir providing direct catheter access for radio nucleotide scans to confirm drug distribution and for the bolus administration of chemotherapy agents whose mechanism of action was better suited to bolus administration (Metal Bellows Corp., Sharron, Mass.). The central pump drug reservoir and the side port were accessed percutaneously through their small self-sealing silicone rubber septum using a special non-coring deflected point needle.

An interesting aside (see Chapter 4) is the use of the non-coring deflected point needle invented by a dentist in Seattle, Washington by the name of Ralph Lee Huber. Dr. Huber was a rather prolific inventor and in 1946 patented a modification of the original Tuohy hypodermic needle. His redesign of the needle tip resulted in a needle that would enter the tissue with less pain and more importantly would not remove a core of tissue. The Huber needle quickly became the mainstay of regional and obstetric spinal anesthesia.

As a result, the University of Michigan team had considerable experience with repeated percutaneous access of the totally implanted continuous infusion pumps through the small silicon rubber septum. I can remember sitting around one day in the hospital and talking about what if we just had the “side port” without the pump? Could we use such a device for central venous access and perhaps even for arterial access when we did not wish to use the implanted pump? We sketched out the small reservoir and the attached catheter and asked the company if they would make a few for testing. It is interesting to note that the first few, six as I recall, were actually machined from titanium metal. It was only after their initial successful use that the material of choice was of course plastic. And thus the story began and the text you have before you superbly documents their use, management and patient benefits. My thanks to the editors for their confidence in seeking my thoughts and reflections to introduce their special contribution to the literature of implanted vascular access devices.

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John E. Niederhuber, MD
Professor of Oncology & Surgery
Johns Hopkins University School of Medicine
EVP and CEO Inova Translational Medicine Institute
Inova Health System, Falls Church, VA, USA
Almost 30 years have passed since the first TIVAD insertion, and now approximately one million TIVADs are implanted each year throughout the world. Since their first clinical use, these devices have had an enormous and incommensurable impact on quality of life, especially in cancer patients, by offering them the opportunity of continuous venous access and allowing more reliable and effective treatment. To a certain extent TIVADs have also changed the approach to patients suffering from cancer, as new and more active therapies have been developed. After many years these devices are not only used for cancer patients, as they have now found a place in the treatment of many diseases where continuous intravenous therapies are required.

As with all medical fields, TIVADs evolved over time. Some aspects of TIVADs have been well studied and the problematic features solved, while others remain controversial. It is with this aim that we decided to write this book, to fully describe the consolidated aspects of TIVADs and to clarify as much as possible the controversial or debated areas.

To accomplish this goal, we invited many colleagues with tremendous experience and skill to cooperate with us. We sincerely thank all these colleagues for their highly valued support.

Last but not least, we would personally like to express our appreciation along with the co-authors for the foreword by Prof. John Niederhuber. He was the first surgeon to implant a TIVAD in the world, and by writing the foreword to this book he has bestowed upon us a great honor.

September 2011

Isidoro Di Carlo
Roberto Biffi
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Luca Aldrighetti Department of Surgery, Hepatobiliary Surgery Unit, San Raffaele Hospital, Vita-Salute San Raffaele University, Milan, Italy

Roberto Biffi Division of Abdomino Pelvic Surgery, European Institute of Oncology, Milan, Italy

Paul L. Blackburn Clinical Education, Bard Access Systems, Salt Lake City, Utah, USA

Kathleen Bubb Department of Anatomical Sciences, St. George’s University, School of Medicine, Grenada, West Indies

Markus W. Büchler Department of General Visceral and Transplantation Surgery, University of Heidelberg, Heidelberg, Germany

Marco Catena Department of Surgery, Hepatobiliary Surgery Unit, San Raffaele Hospital, Vita-Salute San Raffaele University, Milan, Italy

Rita Celli Medico Legal Institute. University of Turin, Turin, Italy

Pierre A. Clavien Department of Surgery, University Hospital Zürich, Zürich, Switzerland

Johan Coolen Department of Radiology, UZ, Leuven, Belgium

Eric Desruennes Department of Anesthesiology, Gustave Roussy Cancer Institute, Villejuif, France

Bree D. Dewing University of North Dakota School of Medicine and Health Sciences, North Dakota, USA
Isidoro Di Carlo Department of Surgical Sciences, Organ Transplantation and Advanced Technologies, University of Catania, Cannizzaro Hospital, Catania, Italy

Markus K. Diener Department of General Visceral and Transplantation Surgery, University of Heidelberg, Heidelberg, Germany

Lisa Dougherty Nurse Consultant IV Therapy, The Royal Marsden NHS Foundation Trust, Surrey, UK

Walid Faraj American University of Beirut, Medical Center, Department of Surgery, Beirut, Lebanon

José Luís Fougo Breast Centre and Department of General Surgery, Hospital de São João, Porto, Portugal

Joel D. Harris Department of Surgery, Aurora Wilkinson Clinic, Summit, Wisconsin, USA

Roland Hennes Department of General Visceral and Transplantation Surgery, University of Heidelberg, Heidelberg, Germany

Hasan Karanlik Department of Surgery, Institute of Oncology, Istanbul University, Istanbul, Turkey

Phillip Knebel Department of General Visceral and Transplantation Surgery, University of Heidelberg, Heidelberg, Germany

Sidika Kurul Department of Surgery, Institute of Oncology, Istanbul University, Istanbul, Turkey

Gennaro D. LaBella Hatton Research Center, Good Samaritan Hospital, Department of Medical Education, Cincinnati, OH, USA

Hong-Shiee Lai Department of Surgery, National Taiwan University Hospital, Taipei, Taiwan

Marios Loukas Department of Anatomical Sciences, St. George’s University, School of Medicine, Grenada, West Indies

Jason Malenfant Department of Anatomical Sciences, St. George’s University, School of Medicine, Grenada, West Indies
Antonio Nocito Department of Surgery, University Hospital Zürich, Zürich, Switzerland

Franco Orsi Unit of Interventional Radiology, European Institute of Oncology, Milan, Italy

Alexandra Ozimek Department of Surgery, University Hospital Zürich, Zürich, Switzerland

Michele Paganelli Department of Surgery, Hepatobiliary Surgery Unit, San Raffaele Hospital, Vita-Salute San Raffaele University, Milan, Italy

Zhang Qinming Pediatric Surgery, Beijing Children’s Hospital affiliated to Capital University of Medicine, Beijing, China

Francesca Ratti Department of Surgery, Hepatobiliary Surgery Unit, San Raffaele Hospital, Vita-Salute San Raffaele University, Milan, Italy

Marguerite Stas Department of Surgical Oncology, UZ Leuven, Leuven, Belgium

Christoph M. Seiler Department of General Visceral and Transplantation Surgery, University of Heidelberg, Heidelberg, Germany

Makoto Sonobe Department of Thoracic Surgery, Kyoto University Hospital, Kyoto, Japan

Robert P. Sticca University of North Dakota School of Medicine and Health Sciences, North Dakota, USA

Julius Tang Department of General Surgery, Good Samaritan Hospital, Cincinnati, OH, USA

Adriana Toro Department of Surgical Sciences, Organ Transplantation, and Advanced Technologies, University of Catania, Cannizzaro Hospital, Catania, Italy

R. Shane Tubbs Section of Pediatric Neurosurgery, Children’s Hospital, Birmingham, AL, USA

Ton J. H. van Boxtel Training and Consultancy, Infusion Innovations (infu-In), Bilthoven, The Netherlands
Alena Wade  Department of Anatomical Sciences, St. George’s University, School of Medicine, Grenada, West Indies

Rik Willems  Cardiovascular Diseases, UZ Leuven, Leuven, Belgium

Ahmad Zaghal  American University of Beirut, Medical Center, Department of Surgery, Beirut, Lebanon