THE AMERICAN SOCIETY FOR RECONSTRUCTIVE MICROSURGERY

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RECONSTRUCTIVE MICROSURGERY

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What's New in Reconstructive Microsurgery?

Introduction

The 2004 ASRM annual meeting offered a wonderful venue in Palm Springs for the presentation of some of the latest and most interesting advances in microsurgery and complex reconstruction. The following paragraphs hope to illustrate some of these advances presented at the January meeting.

Head and Neck

In head and neck surgery work continues to delineate the most appropriate means of reconstruction of maxillary, mandibular and complex facial reconstruction. Nussenbaum found that by overcorrecting the soft tissue defect with the so called "volume approach" in lateral oral mandibular defects, the rate of plate extrusion is minimal where only a reconstruction plate was used to bridge the bony defect. Coskunfirat et al have demonstrated that immediate osseointegration can be performed if skeletal stabilization is performed with a fibula osteocutaneous flap in maxillary defects. It is apparent through numerous papers presented at the ASRM that free tissue transfer holds an extremely important and reliable means of reconstruction of complex head and neck reconstruction where various donor tissues can been utilized. This is nowhere more conclusive than in the reconstruction of the cocaine nose illustrated by Beahm, Walton and Burget, who showed us that the radial forearm free flap is very flexible and able to harbor multiple skin islands yet tolerate immediate thinning and accurate shaping to maximize the precision of the reconstruction in a staged effort. Reconstruction of the oral pharynx has gone beyond providing just adequate and stable lining. Lewin and Butler described an objective protocol to quantify physiologic swallowing deficits and assess functional outcomes following oron pharyngeal reconstruction. The protocol scientifically evaluates swallowing physiology to improve surgical techniques. Chen et al similarly addressed salient factors for successful reconstruction of voice function with bowel transfer. Chen et al documented 46 cases of free bowel transfer including 27 jujunal and 19 ileocolon flaps. The most proficient voice tube

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Outgoing President Ron Zuker, MD (right) passes the torch to incoming President Robert Walton, MD (left) at the ASRM Annual Meeting.

Putting the "N" into "Microsurgery"

EDITOR'S MESSAGE

A. Lee Dellon, MD

There is no "N" in "Microsurgery". Should there be?

There used to be an "N" in "Plastic & Reconstructive Surgery", but now we are a Society that does just Plastic Surgery. The "N" is simply understood, implicit in the phrase itself.

There is an "N" in "Reconstructive Microsurgery". Finally an "N" in sight. (Sorry there is no "N" in "sight".) But if the end were in sight, what would the "N"d be?

In Microsurgery, the "N" surely would represent the concepts of "new", "novel", "newsworthy", and "noble", as these words embody the spirit with which surgeons of the American Society of Reconstructive Microsurgery create and work throughout the world. Members of this Society restore function through innovative (triple points for use of the "double N word") surgical design and techniques. In fact, this editorial appears in our Newsletter, in which we, as Microsurgeons network with each other.

In Microsurgery, the "N" surely would represent the concepts of "new", "novel", "newsworthy", and "noble"....

In Microsurgery, one could argue that there is no "N" in "blood vessel", "blood supply", or "vasculature", each critical to flap survival. But one could argue, also, that we simply view these as part of the "microcirculation", and our dilemma would be resolved.

You see, there are lots of "N's" in Microsurgery.

But I would make a plea to include more of my favorite "N" words in Microsurgery. The big "N" word. "**NERVE**." (You knew it was coming, didn't you?)

The recent ASRM meeting in Palm Springs, California marked the 20th Anniversary (another triple pointer!) of this Society. As with each such event, it gave us pause for reflection. When I reflect on my own involvement (double points for two, noncontigous {triple points for three "N"s in a single word}), in Microsurgery, I realize that it comprised surgery that at first was totally related to the blood vessels and survival of the tissues. (Is there an "N" in "survival"?) But a time for reflection is a time to look at the inner (another triple) self. Over the first years in Microsurgery, as we all collectively did that for our Microsurgery results, we realized that "survival" must not be the only outcome measure of our success. "Function" became critical to success in Microsurgery.

Success in replantation and transplantation has become synonymous with movement and sensation (as we improve our results, observe all those double "N" words!!!!!!!!!)

In the January 1984 issue of the *Journal of Reconstructive Microsurgery*, the first issue, Volume 1, #1, of the twelve articles published, there was one with the "N" word. It was a paper on the sural nerve. This was 8.5% of the articles in that first issue. In the January 2004 issue, of our *Journal*, Volume 20, #1, of the nine articles published, there were five with the "N" word, or 55% of the articles in that twentieth year publication.

The scientific conclusion is clear: Analysis with many methods (Wilcoxin signed ranked test, non-parametric statistics, non-linlinear regression) has shown and demonstrated that incorporation of the "N" word, **NERVE**, into your thinking and planning will result in increasingly excellent microneurovasculature outcomes. Infact, results will be improved to the n^{th} degree!

Notice how the prevalence of "n"s has increased in each paragraph of this editorial as our awareness of the importance of **nerves** to our daily work has increased. More about the "N" word in the next editorial.

RM

RECONSTRUCTIVE MICROSURGERY

The mission of the American Society for Reconstructive Microsurgery is to promote, encourage, foster and advance the art and science of reconstructive micro-neurovascular surgery; and to establish a forum for teaching, research and free discussion of reconstructive microsurgical methods and principles among members.

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A New Alliance to Strengthen ASRM

Dear Members,

PRESIDENT'S LETTER

Robert Walton, MD

As your newly elected president, I am grateful for the opportunity to lead the further evolution of ASRM as an educational and professional forum for aesthetic/reconstructive/experimental microsurgery. My task is facilitated by the enormous depth of talent that exists in this dynamic organization as well as by a competent and responsive administrative staff. As ASRM enters its 21st year, many new and exciting changes are occurring in our organization that reflect not only a collective spirit of innovation but also our need to adapt to a changing medical marketplace. We are faced with many challenges as we negotiate the turbulent waters of uncertainty facing our profession. The solutions to these problems are derived from our own sensibilities for "creative problem solving" which, when boiled to the core, equate to "thinking outside the box". This, therefore, shall be our credo for the upcoming year.

The contributions in reconstructive microsurgery over the past 30 years have revolutionized how we treat challenging clinical problems. Today, however, scientific and clinical progress is being stifled by excessive regulatory gauntlets, a runaway medicolegal environment, and ever-diminishing provider reimbursements for reconstructive surgery. In plastic surgery, the allure of lucrative cosmetic surgery reimbursements has drawn many talented members away from reconstructive surgery. This has resulted in a greater demand for aesthetic surgery topics and programs in our national organizations, and particularly, the American Society of Plastic Surgeons (ASPS). As a result of this economically influenced scenario, many reconstructive surgeons feel that their professional interests are being marginalized within the parent domain and have sought alternative representation.

ASRM offers a safe haven to those who feel disenfranchised. Over the past year, the ASRM leadership has actively sought formal recognition by ASPS for a permanent seat on the ASPS Board of Directors so that our interests are adequately represented and reflected in its educational, investigative, and media venues. We are not alone in this effort as a number of other plastic surgery sub-specialty organizations share similar concerns that their interests are not adequately represented by ASPS. Recently, ASPS convened a Strategic Planning Session in Scottsdale, Arizona, that was attended by the leadership representatives of the various plastic surgery sub-specialty societies. The consensus amongst all attendees, including the ASPS, was unanimous; all plastic surgery sub-specialties should have *equal* representation in ASPS governance. In May 2004, these sub-specialty representatives will reconvene with the ASPS leadership in Chicago to formalize a working performa on how this initiative might be orchestrated. One proposal being considered is to have ASPS serve as the primary conduit for membership in all of the plastic surgery sub-specialty organizations. ASPS would function as the social/political, management, and facilitator entity for these organizations.

Over the past year, the ASRM leadership has actively sought... a permanent seat on the ASPS Board of Directors so that our interests are adequately represented and reflected in its educational, investigative, and media venues.

This reorganization would require all plastic surgery members of ASRM to belong to ASPS. Non-plastic surgeon members of ASRM would not be required to be members of ASPS and would simply continue to pay their annual member dues to ASRM as they do now. ASRM would continue to function as an independent organization with self-governance and autonomy. Membership in each of the sub-specialty organizations would be based on member interest rather than some preconceived clinical training and/or experience requirement. Membership would, therefore, be inclusive of all plastic surgeons instead of exclusive. This is a major departure from the way we have traditionally done business, but it is an important step towards the continued identity of Plastic Surgery as a recognized specialty.

The potential advantages of this management reorganization for ASRM are enormous. We would have significant political representation by the large body of ASPS plastic surgeons (over 3,000 members) as well as its societal relationship with the American College of Surgeons. Via an "economy of scale", ASPS would provide extraordinary resources for management, education, marketing and advocacy that would be impossible within the context of our current financial capabilities. The potential

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President's Letter

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Past Presidents of ASRM: (left to right) Robert Walton, MD, James Urbaniak, MD, Daniel Nagle, MD, H. Bruce Williams, MD, Joseph Kutz, MD, Julia Terzis, MD, Randy Sherman, MD, Ralph Manktelow, MD, William Swartz, MD, Berish Strauch, and Ronald Zuker, MD.

downside for ASRM would be the easing of requirements for membership to those of board certification and "interest". (From my perspective, I do not see this as a major deterrent as it would allow our ranks to increase and to become more inclusive of all individuals sharing common interests in microsurgery and complex reconstructions.)

For the above initiatives to go forward, I would like to get the perspectives of the ASRM membership on this initiative before our May 2004 meeting. Please call (773-702-4111), FAX (773-7021634), or e-mail (rwalton@surgery.bsd.uchicago.edu) with your responses.

Over the past three years the ASRM Council has forged a consensus on who can and should hold **Active Membership**. At our recent Annual meeting in Palm Springs, an important Bylaws change was adopted that extends the ranks of **Active Membership** to any surgeon, regardless of nationality, who holds board certification and actively practices microsurgery. Those active members outside the US and Canada may serve on committees of the society and vote but cannot hold office. The initial response from our many "regular" international attendees to this category change has been positive, and we anticipate a substantial increase in our Active Membership over the next several years. As experience with this new level of inclusivity grows, it is hoped that our international active members may one day assume leadership roles within the organization.

ASRM invites all surgeons having an interest in reconstructive microsurgery and complex reconstructive surgery to seek membership. A **Candidate** group is available to residents in training and board eligible surgeons in practice. Discounted meeting registration fees are available for those in the Candidate group. Active Membership requires specialty board certification, sponsorship by two active members, and a case list demonstrating experience in microsurgical and/ or complex reconstructions. Interested individuals can access our website at http://www.microsurg.org for information about ASRM, its leadership, meeting registration, bylaws, and how to become a member. One may also call or write the Administrative offices of ASRM at 20 North Michigan Avenue, Suite 700, Chicago, IL 60602, Phone: 312-456-9579, FAX: 312-782-0553, to receive application materials for membership.

Microsurgical techniques are routinely employed by many surgical specialties outside the realm of Plastic Surgery and Orthopedics, the two specialties that have traditionally comprised the majority of our membership. Over the next year, the ASRM Council and societal leaders will hold exploratory venues with notable microsurgeons in Otolaryngology, Urology, Gynecology, Vascular Surgery, Neurosurgery and Transplant for the purposes of sharing our collective technology and surgical experiences. In this effort, we hope to introduce and educate the microsurgical leaders in these other specialties on the merits of ASRM as a microsurgical "home-base". As evidenced by the panel on Composite Tissue Allotransplantation at our recent Annual Meeting in Palm Springs, the interface of different specialties holds tremendous opportunity for technological and clinical advances. This "cross-fertilization" is vital to the growth of microsurgery as a specialty and to the survival of ASRM as an organization.

Our meeting in Sanibel Island promises to be momentous. Dr. Geoff Robb, Our 2005 Scientific Program Chair, is preparing a program that will redefine the standard for all subsequent meetings of our society. The program will be educational and interactive with opportunities for all to participate... and learn. Assisting in this effort, Dr. Greg Evans, Chair of the Residents and Fellows Symposium, is organizing a flap dissection workshop for both residents and members to learn the operative nuances and technical anatomy of the "hot" flaps in reconstructive microsurgery. Because Microsurgery and Complex Reconstructions are so intimately related, ASRM will include the submission of abstracts dealing with complex reconstructions at our annual scientific meeting. This expands our horizons to further

embrace the gamut of reconstructive surgery as a societal agenda.

Through the generous support of the R.K. Davies Medical/California Pacific Medical Center in San Francisco, a new ASRM lectureship has been endowed in honor of Dr. Harry J. Buncke. It is a fitting tribute to this American Pioneer of Reconstructive Microsurgery. The ASRM Council has appointed a committee to oversee the management of

The Harry J. Buncke Lectureship, to be inaugurated in 2005, is in honor of the pioneering work of Dr. Buncke, shown here with Dr. L. Scott Levin (right) at the 2004 Annual Meeting.

the Harry J. Buncke Lectureship, which we intend to promote as the "Nobel Prize" in Reconstructive/Experimental Microsurgery. This lectureship will feature innovators in reconstructive microsurgery from all over the world. Dr. David Chang serves as the current Chair of this committee. As the inaugural lecturer, Dr. Ian Taylor of Melbourne, Australia, has been invited. Known to nearly every practicing microsurgeon for his innumerable contributions in the field of reconstructive microsurgery, flap anatomy and microvascular physiology, Dr. Taylor epitomizes the quintessential role model for the Harry J. Buncke Lecturship. Appropriately, Dr. Taylor was also the first Invited Presidential Speaker of ASRM.

I am also pleased to announce that Dr. Gary Burget has graciously accepted my invitation to be the president's lecturer at our annual meeting in January 2005. Over the past 9 years, Dr. Burget and I have collaborated on a number of total and sub-total nasal reconstructions employing his expertise in aesthetic nasal reconstruction with mine in reconstructive microsurgery. Dr. Burget has had the vision and foresight to appreciate the enormous applicability of microsurgery in this reconstructive niche. His lecture will expound on the evolution of this collaboration and his adoption of microsurgery as a key tool in nasal reconstruction.

As you can see, ASRM is moving forward with momentous change in its identity, membership, and mission. We are, indeed, continuing to "think outside the box" in an effort to keep ASRM at the forefront of the microsurgical arena. This promises to be an exciting year for the entire body of American Reconstructive Microsurgery. We welcome your thoughts and suggestions on how we can serve you, the membership, better. **RM**

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Julia K. Terzis, MD, PhD

What's New in RM?

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created included components of rigid cervical esophagus, a narrow opening of the voice tube into the esophagus, end-to-end anastomosis between the voice tube, and the tracheal stump.

The effects of radiation on reconstruction of the head and neck area complicate procedures because of the poor quality of tissue and potential compromise to recipient vessels. A number of reports at this years meeting indicated that meticulous debridements and adherence to the principles of microsurgery resulted in extremely high success rates for mandible and maxillary reconstruction. Gilbert et al, in review of 185 patients were reported that the single most important predictor of perioperative complications in complex head and neck reconstructions are patients with pre-morbid conditions as judged by the ASA class in Kaplin-Feinstein co-morbidity indexes.

Using the recent advances in tissue engineering and the principles behind the prefabrication of flaps, Bueno et al induced bone growth in scaffolds vascularized by a prefabricated capsular flap. Further work using mesenchymal stem cells, bone morphogenic protein, and vascular manipulation may represent important preliminary steps in designing ideal construct for tissue-engineered bone for use in various recipient defects including head and neck surgery. Chunilal et al from Memorial Sloan Kettering Cancer Center reviewed 108 patients who underwent microvascular free jejunal transfers and concluded that most patients who undergo these procedures will eventually be able to swallow, eat and maintain adequate nutritional status without the need of permanent feeding tubes. Routine intra-operative gastrostomy tube placement is rarely indicated.

Pediatrics

Organek, Klebuc, and Zuker described the indications and outcomes for free tissue transfers in the lower extremity of children. They concluded that the free tissue transfer is safe and dependable for tissue defects of the lower extremity in children. Free flaps used for the repair of defects of congenital tibial pseudoarthrosis of a high vascular success but also require an extensive rehabilitation with moderate functional success. There was no significant difference between the flap surgeries performed immediately, sub-acutely, or late after trauma. Similarly, Rinker et al confirmed the significant role of microsurgery in the management of limb-threatening injuries in children with a high rate of limb salvage and good function. Berhelle and Heymans concluded that in all age groups in selected cases of bone exposure in the lower extremity fasciocutaneous flaps were as dependable as muscle coverage emphasizing that flap vascularization and adhering to the principles of debridement and irrigation of the wound as well as obliteration of dead space are the most important factors for good outcomes.

2004 Scientific Chair Dr. Michael Neumeister.

An ASRM/ASPN combined panel included (l to r) Milan Stevanovic, MD, Dimitri Anastakis, MD and Alex Shin, MD.

Breast Reconstruction

Reconstruction of breast using free tissue transfer remains the mainstay of reconstruction at a number of institutions. Tse et al described improved sensation using a TRAM flap using the T10 intercostal nerve coapted to the anterior sensory branch of T4 on the breast. In macromastic breasts Alkon, et al described the use of the modified Robbins inverted "T" incision bringing the skin paddle out through the nipple-areolar complex area as a means of flap monitoring. The vascular territory of the superficial inferior epigastric artery flap was delineated by Buchel, et al. The superficial inferior epigastric artery lowers the abdominal wall morbidity but should be limited to mostly the ipsilateral lower abdominal wall skin and fat. The arterial perfusion in the skin extends across the midline but the fat below the Scarpa's fascia is not reliably perfused on the contralateral side which may clinically extrapolate to fat necrosis in a reconstructed breast. The deep inferior epigastric artery flap has shown greater benefit to the muscle sparring free TRAM. Nahabedian and Tsangars demonstrated abdominal wall contour and preservation to be increased with the DIEP flap. This flap was also noted by Garvey, et al to be more reliable in the overweight and obese patient. Gagnon, et al performed double DIEP flaps for single breast reconstruction in select cases. Tran, et al concluded in discussing the microvascular complications of the DIEP flaps that intra-operative venous congestion in the deep flaps occurs in 12%, but persistent congestions was noted in only 5%. DellaCroce, et al described the largest experienced to date with bilateral simultaneous gluteal artery perforator flap for breast reconstruction. With a team approach the average surgical time was 7 hours with

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What's New in RM?

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INVITED SPEAKERS

ASRM President Ron Zuker, MD (left) presents Founders Lecturer Ralph Manktelow, MD with a token of the Society's appreciation.

Presidents' Invited Lecturer John W. McDonald, III, MD, PhD

2004 Godina Lecturer Milomir Ninkovic, MD, PhD (left) with incoming ASRM President Robert Walton, MD.

an average hospital stay was 4 days. Schoeller and Wechselberger described a new alternative for breast reconstruction; the free transverse musculocutaneous gracilis flap. Their experience encompassed 12 patients each with excellent results. This flap appears to hold promise with small to moderate breast reconstructions.

Transplantation

Izycki & Siemionow, et al demonstrated that vascularized composite tissue allografts treated with a b-T cell receptor monocloral antibody and cyclosporine-A for 7 days could develop to tolerance across the MHC barrier. A further study demonstrated that the tolerogenic activity of the thymus permits stability of hemopoietic chimerism within limb recipients. Controversy continues on the effectiveness of vascularized -vs- non-vascularized bone marrow on hemopoietic chimerism. Cohen et al concluded that vascularized bone marrow within a limb allograft is not more effective than exogenous bone marrow at inducing hemopoietic chimerism in a hind limb model. Siemionow, et al, however, using a composite skin/vascularized bone allograft, demonstrated an increase in stable, donor specific chimerism. Siemionow, et al reported the first composite face/scalp transplant in an animal model. This model may aid in further studies of composite tissue transfers.

Gonzales, Breidenbach, et al described the factors influencing donor and recipient selection in hand transplantation. The donor criteria included 1) aged matched as closely as possible 2) optimal skin color and sex matching with recipient is needed 3) matching of bone length and diameter is mandatory 4) living-related donors are not accepted at this time 5) a history of any malignancy (recent/remote or treated) is an absolute exclusion criterion 6) at organ procurement, the donor hand is dissected last but harvested first 7) the donor family consent process includes a discussion of cosmetic prosthesis for open casket funerals. The hand transplant recipient criteria includes: 1) must be in good state of health 2) must be between 18 and 65 years of age 3) congenital hand defects are currently not candidates 4) blindness is currently an absolute exclusion criterion 5) thorough pre-transplant psychological work up is mandatory for all

Dining (left) and dancing (below) at the 20th Anniversary Gala.

hand transplant candidates 6) use of or attempted use of prosthesis prior to transplant is required 7) ability to undergo rigorous rehabilitation to achieve good functional results 8) level of amputation is important in recipient selection.

Complex Reconstruction – Alternative to Free Flaps

This year at the ASRM annual meeting, a new category of complex wound reconstruction was added. The negative pressure VAC® has gained popularity as an adjunct or even replacement of free tissue transfer. The micro anatomy of local/regional muscle or fasciocutaneous flaps has fostered a greater use of these flaps in complex wounds obviating the need, in some cases, for free tissue transfers. Alkon, et al demonstrated the safety and reliability of the rectus femoris muscle flaps for complex groin wounds even in the face of peripheral vascular disease. Rissin and Sigh revisited the indication for cross leg flaps in lower extremity salvage.

Ischemia Reperfusion

Ischemia reperfusion experiments to curtail the deleterious effects of ischemia reperfusion on muscle function continue. Ischemic preconditioning of tissues continues to show benefit through various pathways including continuation of the NF-kB activation and TNF alpha expression. Ischemic preconditioning appears to be in part influenced by nitric oxide and regulated through the posphorylatin of the P38 MAP kinase pathway. Continued work on the timing and parameters of ischemic preconditioning will further delineate its role in clinical applications of free tissue transfer. The deleterious affects of ischemia reperfusion may have regulation by nitric oxide, although each distinct nitric oxide synthase isoform may have different regulatory roles. Wong et al reported that adenosine is likely not the initiating factor for remote preconditioning. To attenuate the muscle damage in ischemia reperfusion, hypothermia in the early reperfusion period may provide a benefit to flaps subjected to a second ischemia insult. Wei noted that dizoxide ameliorants ischemia reperfusion injury in tissues through a selective mitochondrial ATP sensitive potassium channel mechanism. Dizoxide also decreases L-selectin expression.

Paralysis

In the clinical treatment of paralysis single stage gracilis transfer and nerve coaptation to the nerve to the masseter muscle is gaining favor with improved results over the 2-stage sural nerve grafting procedure. The single stage procedure offers a faster return of facial animation without the need for secondary procedures. Functioning muscle transfers can be used successfully in later obstetrical brachial plexus palsy's offering improved function for elbow flexion, finger extension and flexion. This is accomplished by using a variety of donor nerves such as the spinal accessory intercostals musculocutaneous nerve in a central C-7 spinal nerve.

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ASRM 2005 PROGRAM COMMITTEE

Invitation to Attend

As program chairman I cordially invite all members, candidates and guests to the 2005 meeting of the American Society for Reconstructive Microsurgery. The 20th Annual Scientific meeting will be held at the Sanibel Harbour Resort and Spa in Sanibel Island, Florida in co-ordination with the American Association for Hand Surgery and the American Society for Peripheral Nerve meetings. Newly formatted combined sessions will facilitate a unified educational experience on a variety of topics for all attendees.

A special focus is planned on furthering multidisciplinary research and clinical collaborations with our national and international microsurgical colleagues. Within the 2005 program's new format are more in-depth panel discussions and Q and A time, invited discussants for presentations, and instructional courses in basic immunology for plastic surgeons. The feasibility of a Resident and Fellow Flap Dissection Workshop is being actively explored.

Please consider submitting an abstract online to our microsurgery meeting and taking full advantage of the warm and inviting Florida climate, ideally experienced at this Sanibel Island Resort with its beautiful location and extensive amenities January 15-18, 2005.

Geoffrey Robb, MD
2005 ASRM Scientific Program Chair

What's New in RM?

continued from page 9

Intra-operative electromyography may help predict neurolysis results in peripheral nerve injury. In an experimental model the group from the Medical College of Wisconsin successfully demonstrated improvement of action potential amplitudes following external neurolysis in 85% of cases.

Although by no means all encompassing, the above synopsis is a brief glimpse into some of the latest experimentation and clinical work in the field of microsurgery and complex reconstruction presented at the annual meeting of the American Society of Reconstructive Microsurgery in Palm Springs this past January. Future studies to further extrapolate on this research will continue to intrigue all of us interested in reconstruction. The future will hold further refinements in head and neck and breast surgery, new flap designs, fostering transplant physiology, the use of robotics in microsurgery and general reconstruction, the use of tissue-engineering through the common characteristic of our members, curiosity, inspiration and perseverance.

Michael W. Neumeister, MD, FRCSC, FACS
2004 ASRM Program Chairman **RM**

Golf tournament winning foursome: (l to r) Jeffrey Freidman, MD, William Swartz, MD, Lawrence Colen, MD and David Drake, MD.

The ASRM Council, Technical Exhibits and the 2004 Annual Meeting Program Committee would like to thank the following companies for their support and participation:

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The Plasticity of Microsurgery

Gabriel M. Kind, MD

Microsurgery is in many ways very "plastic". Plastic Surgery began as a specialty in response to surgical challenges not able to be solved by then-conventional means. The name itself, of course, suggests the malleability or transformability of the subject matter, in this case, the human body. Unlike most other surgical specialties, the scope of plastic surgery was (and is) not easily defined. The early tenets of plastic surgery – careful handling of tissue; the anatomic basis of soft-tissue reconstruction using available tissue; the development of the "flap" concept - were expanded and applied to essentially the entire body. Plastic surgery encompasses treatment from head to toe, from cradle to grave. As new techniques emerged, plastic surgeons readily adapted them into clinical practice, where further refinements were made.

"Microsurgery" is a descriptive term frequently used to encompass a wide variety of techniques, including microscopic repair of nerves or vascular structures, and soft-tissue or bone reconstruction using microvascular transplantation or replantation of tissue. Although microscopes are used by many specialties to enhance visualization, within Plastic Surgery microsurgery has attained a role as one of the top "rungs" of the reconstructive ladder. This is due to the many choices available to the microsurgeon. Tissue can be transplanted on its vascular tree in almost any size, and in an almost endless array of combinations: skin alone; skin with fascia; fascia alone; skin with underlying muscle; etc. This allows the microsurgeon a far greater degree of freedom to solve the problem at hand. In this sense microsurgery may be the most "plastic" of the techniques available to plastic surgeons.

Figure 1 is a photograph of the right hand of a 30-year-old cabinetmaker who had caught his long finger in a power drill several days earlier. As the x-rays (figure 2) show, the injury destroyed the proximal aspect of the distal phalanx and the distal interphalangeal joint, but the volar tissues, including the neurovascular bundle, were intact. The most expeditious treatment would have been amputation; the patient was strongly interested in other options. In order

Figure 1

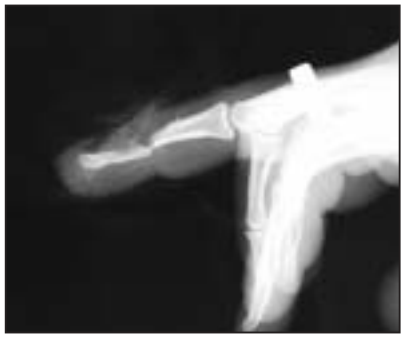

Figure 2

to restore length to the finger, a bone graft was necessary. It was anticipated that the soft-tissue deficit once length was restored would be far too large for a local flap such as a cross-finger or thenar flap. Although a pedicled (tubed) flap from the groin, abdominal or chest wall would provide coverage, it would also involve several disadvantageous factors, including leaving a bone graft partially open, and the high likelihood of secondary procedures for soft-tissue revision (thinning).

A venous flow-through flap was designed on the volar surface of the distal forearm to allow for single-stage reconstruction with complete coverage of the wound (figures 3–5). A small iliac crest bone graft was used to fuse the distal interphalangeal joint. One vein of the flap was used as a flow-through arterial interposition graft (A-V-A) with the radial digital artery. A second vein of the flap was anastomosed to a dorsal digital vein. The flap survived completely, and there has been good restoration of function. The patient is pleased with the result, and is not interested in further soft tissue revision (figures 6-8).

This case illustrates the ability of microsurgery to provide the needed amount and type of soft tissue necessary to reconstruct a complex

continued on page 12

Figure 3

Figure 4

Figure 5

Plasticity of Microsurgery

continued from page 12

wound. Conventional techniques would have worked, but would likely have required multiple steps, and/or several revisions to achieve the contour provided by the thin cutaneous microvascular flap.

Figure 6

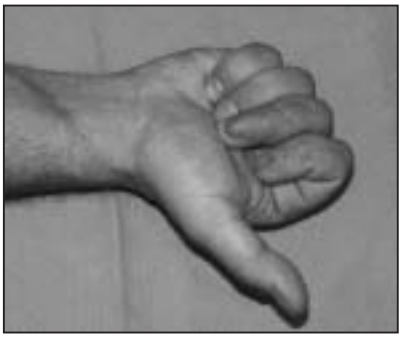

Figure 7

Figure 8

This case also illustrates the ability of soft tissue to survive via arterialization of the venous system. This concept is not new. Carrell[1] arterialized the veins of a painful ischemic extremity as early as 1902. This salvage procedure never gained widespread use, likely because of the significant side effects when used in the lower extremity. More recently reports have suggested its application may be beneficial in the upper extremity. This is a salvage technique used when there is no way to restore antegrade arterial flow. There is some

Figure 10

Figure 11

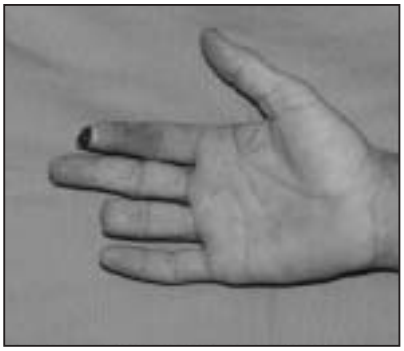

Figure 9

experimental evidence that arterialization of the venous system results in neovascularization[2] of the soft tissues. It has been shown to have clinical application in small cutaneous flaps such as in this case[3]; there have also been reports of successful replantation[4] and toe-to-thumb transplantation[5] based solely on arterialized veins.

Figure 9 is the hand of a 35-year-old male with insulin dependent diabetes mellitus, end stage renal disease, and severe hand ischemia. He obviously had significant vascular insufficiency, but his chief complaint was pain. Arteriography (figure 10) revealed patent flow to the hand, but minimal digital blood flow, with diffuse small vessel atherosclerotic disease. There were no reconstructable vessels distally.

Arterialization of the dorsal venous system of the hand was performed by anastomosing the cephalic vein end-to-side to the radial artery in the forearm (figures 11-12). Multiple side branches were ligated, directing flow to the hand. A valvulotome was used to the level of the dorsum of the hand. There was immediate improvement in the

Figure 12

Figure 13

appearance of the soft tissues of the fingers. Postoperatively there was excellent pain relief. The necrotic fingertips were debrided and the wounds healed (figures 13–14). The patient requested the procedure be done on the contralateral hand.

These cases demonstrate the ability of a surgical tool—an operating microscope and microsurgical technique—to adapt and refine procedures to solve clinical problems. This

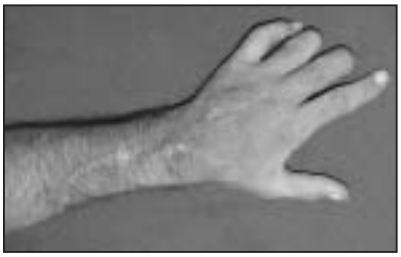

Figure 14

"plasticity" of microsurgery is one of its greatest strengths, and gives those of us practitioners comfortable with this tool a wide and ever-expanding array of clinical choices. **RM**

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"Plan B": What to do when your lower extremity free flap fails?

Matthew J. Concannon, MD FACS

Soft tissue coverage of the lower extremity, usually required within the scenario of trauma (either acute or remote) remains one of the more challenging arenas for reconstructive surgeons. Often the zone of injury extends beyond the obvious skin deficit, and these injuries have a high incidence of concomitant arterial and especially venous injuries and thrombosis. Free flaps placed in this setting have perhaps the highest rate of flap loss, when compared to flap coverage in other parts of the body and for other indications.[1]

Traditional coverage algorithms guided us to reach for the gastrocnemius flap for injuries of the proximal 1/3 of the leg, the soleus for the middle third, and anything in the distal third or beyond would (most of the time) need to be covered with a free flap, since no local flap options existed. Free tissue transfer is often an elegant solution to these problems, allowing early coverage of important structures or hardware and subsequently earlier mobilization and rehabilitation. The problem lies with what to do if (when) the free flap does not survive, and we are faced with the same issues as when we met the patient: soft tissue loss, with exposed bone or hardware.

Certainly, a second free flap procedure is an option after the first flap fails. However, the same factors that perhaps contributed to the first flap's demise (edema, induration, vascular injury with probable deep venous thrombosis etc.) will still be present. Additionally, the induration and inflammation associated with the recent flap surgery will also add a level of difficulty to the case, obscuring tissue planes and making dissection difficult. These factors further increase the odds for additional complications such as flap loss after a repeat free flap.

A wise man (not in the medical field) once taught me: "If plan A doesn't work, don't make Plan B the same as Plan A". This is a valuable guide to investment management, home construction, and especially medical decision making. The "Plan B" that I have come to utilize for lower extremity reconstruction is the use of fasciocutaneous flaps for soft tissue and hardware coverage. As it turns out, the guidance that I once received that there are no local flaps in the distal extremity was not exactly correct. The following cases illustrate my personal evolution in the development and application of these flaps for lower extremity coverage.

Case 1: A fifty year old gentleman who was referred by orthopedics for soft tissue coverage of the middle/distal leg. He had longstanding osteomyelitis from a motorcycle accident 20 years earlier; the orthopedic service planned to debride the involved tibia, and needed soft tissue coverage over the anterior exposed

Figure 1

bone. Our answer to this problem was a free latissimus flap, using the uninjured vessels of the posterior leg for vascular supply[2]. In order to get the muscle flap to the anterior leg, a large tunnel was created on the medial aspect of the leg. This tunnel was dissected just above the level of the muscle fascia, and was made very

continued on page 14

Plan "B": Free Flap Failure

continued from page 13

wide to prevent compression of the tunneled flap. The surgery was a resounding success in most all categories, except that the flap did not survive (Figure 1). The patient was taken back to surgery for debridement; at that time I was not excited about the prospect of attempting a second free flap for this problem (but what else to do)? After the necrotic latissimus was debrided, it became apparent that the skin elevated to create a tunnel to pass the flap under was in fact a "bucket-handle" (bipedicle) flap: it could be transposed anteriorly and sutured directly to the skin on the far side of the defect, providing coverage of the entire length of exposed bone (Figure 2). Figure 3 shows the final result several months after this surgical revision. This case represents the first use in my practice of a fasciocutaneous flap, and I largely forgot about it until I met Case 2.

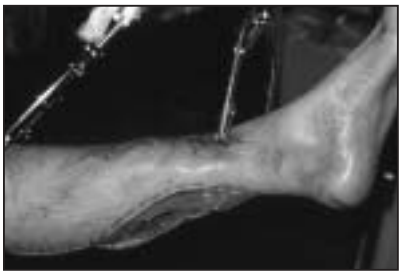

Figure 2

Figure 3

Figure 4

Case 2: This patient was a 59 year old woman with a 75 pack-year smoking history and multiple medical problems, including preexisting cardiac and pulmonary disease. She was involved in a car vs. pedestrian injury, and we were consulted for her bilateral exposed distal tibia comminuted fractures (Gustilo classification IIIc, Figure 4). Our initial plan was for bilateral free rectus coverage of these fractures, since this was in the distal lower extremity. Surgery was postponed after she developed Pseudomonas pneumonia; it was ultimately decided that a lengthy operative procedure would be too risky in this individual.

Recalling the success in Case 1, we considered local flap coverage; to maximize vascularity I designed the flaps as bipedicle (similar to Case 1) and also performed a surgical delay on them prior to final elevation. A flap after transposition is shown in Figure 5; her final results (pictures obtained in the rehabilitation unit) are shown in Figure 6.

As I became more comfortable with the viability of these flaps, I began to expand their use in my practice involving lower extremity salvage and reconstruction (beyond "plan B" if free flaps failed or were not feasible).

Figure 5

Figure 6

Case 3: This gentleman had a chronic wound along the anterior border of the tibia, which undermined under the skin. The ultimate wound was 13 cm in length after debridement, with exposed tibia along the entire defect (Figure 7). A proximally based fasciocutaneous flap was elevated and transposed to cover the bone (Figures 8 & 9); the donor defect was skin grafted. The final healed limb is shown in Figure 10.

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

Case 4: A 66 year old woman was referred for treatment of a chronic lateral malelolar wound with exposed bone. This was treated on an outpatient basis with a proximally and dorsally based fasciocutaneous flap (Figure 11). The dorsalis pedis was not taken with the flap; the final healed result is shown in Figure 12.

Case 5: A 50 year old woman who was 4 weeks status post Achilles tendon repair after spontaneous rupture noted wound dehiscence with exposed tendon (Figure 13). This very distal defect was covered with a proximally based fasciocutaneous flap (design shown on Figure 14); the donor site was skin grafted. The final result is shown in Figure 15.

Figure 13

Figure 14

Figure 15

Figure 16

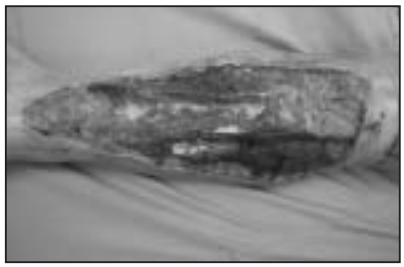

Figure 17

Case 6: A 25 year old male was involved in a motorcycle accident, and suffered the loss of essentially all of the skin and soft tissue coverage of the anterior leg, with exposure of approximately 13 centimeters of fractured tibia (Figure 16; Figure 17 shows the results after several surgical debridements). Coverage of the exposed bone was accomplished with a large proximally and laterally based fasciocutaneous flap that consisted of essentially the entire lateral aspect of his distal leg (Figure 18); the remainder of the wounds and the donor site were skin grafted. The distal flap did not survive: if one does a significant number of these flaps, this event will definitely be encountered. The treatment of is always expectant observation: while certainly the outer escar was not viable, granulation tissue will form beneath this "biologic dressing". Ultimately, the escar separated, revealing well formed granulation beneath. This remaining area was skin grafted as an outpatient; the final results are shown in Figure 19.

Figure 18

Figure 19

Figure 20

When I started this essay, the point was how the fasciocutaneous flap was a handy "plan B" in case your free flap failed. However, in truth, in my practice these flaps have replaced free tissue transfer as my first choice for lower extremity soft tissue reconstruction: the free flap that has become my "plan B". Advantages to this approach include the ease of flap elevation, the ability to perform this surgery routinely on an outpatient basis, the respectable viability of these flaps and the lack of significant donor site morbibity.

RM

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REPORT FROM THE FIELD

How to Interpret Outcomes Studies in the Reconstructive Microsurgery Literature

Kevin C. Chung, MD, MS

Outcomes studies are being published with increasing regularity in the literature, particularly in the reconstructive fields. Because mortality is relatively rare in reconstructive microsurgery, the enhancement of function and health-related quality of life is of paramount concern when evaluating the effectiveness of reconstructive procedures. However, because outcomes studies rely heavily on patient-related questionnaires, the interpretation of outcomes data may be difficult. The purpose of this newsletter article is to provide helpful tips in deciphering the quality of outcomes studies in the reconstructive microsurgery literature. The format of this discussion is based on the widely disseminated *Users' Guides to the Medical Literature* series published in the *Journal of the American Medical Association*.[1]

Does the study contain an appropriate study design?

Outcomes studies are not a special type of study that do not need to adhere to the hierarchy of study designs. Because "outcomes" have become a fashionable word in the titles of medical literature, many authors have used this word in lieu of appropriate study designs. Study designs are categorized into the levels of evidence they will provide. For example, a *case report* provides the lowest evidence because the conclusion is based on a single report and the outcome may be due to spurious events or an exceptional technical triumph. A *case series* gives stronger evidence, based on the cumulative experience of a surgeon or a center. Because it is not compared to a control group, a case series may be prone to selection bias. For example, younger, motivated subjects are selected for microvascular limb salvage procedures while older, sicker patients are chosen for amputations. This selection bias will demonstrate superior functional outcomes of microvascular limb salvage, but because a control group was not available, the evidence is still weak. However, the knowledge gained from a rich case series that demonstrates surgical techniques and unique treatment plans is valuable.

A prospective cohort study is in the next level of evidence hierarchy. This study design is used mainly in epidemiology studies whereby study subjects without a particular disease are recruited into the study. Some study subjects are subjected to an exposure (cases) while others are not (controls). This cohort of subjects is followed over time to see who develops the disease. A risk ratio is calculated to estimate the risk of developing the disease, given the exposure. Equal in the evidence hierarchy chain are case-control studies, whereby the disease has already developed and the amount of exposure is investigated retrospectively. This type of research design is suited to study rare diseases, which may take years to develop; for example, mesothelioma from asbestos exposure. The long latency period prior to disease detection is not suitable for a prospective cohort study design because of the high expense and the long delay in obtaining sufficient data for analysis.

The highest level of evidence is the randomized controlled trial, which is exceedingly difficult to conduct, particularly in surgical trials. Patients generally do not like to be assigned to surgery or no surgery and enrollment targets for surgical randomized controlled trial may be difficult to reach. Nevertheless, the random allocation of treatment assignments eliminates many of the biases inherent in other study designs. The unequal distribution of confounding variables is generally not systematic and can be controlled statistically.

While outcomes studies are useful to evaluate patients' perceptions, a poorly designed study, regardless of how rigorous the outcomes instruments are applied, cannot generate conclusions that are meaningful.

2. Are the outcomes instruments used reliable?

Outcomes instruments are held to the same standard as any tool that is used in clinical practice. For example, a temperature probe used for flap monitoring needs to measure the same temperature consistently for a healthy flap. Reading fluctuation that is inherent in the instrument (noise) can obscure the true temperature reading (signal). This analogy can be applied to outcomes instruments. A reliable outcomes instrument needs to have high signal to noise ratio. The signal comes from real difference between patients, while the noise results from the inaccuracy of the instrument. The signal to noise ratio is also termed responsiveness—the ability to detect real changes.

For example, in a recent *New England Journal of Medicine* article, the authors reached a conclusion that the two-year outcomes were the same for patients who underwent leg amputations as compare to patients who underwent reconstructions.[2] The Sickness Impact Profile was used as the main outcomes instrument. While there were other limitations in this study, it is unclear whether this rather generic instrument was responsive enough to detect differences in outcomes between the two groups. In other words, there may be too much noise in this instrument, which does not fully measure lower extremity function, to override the signal from the treatment intervention in the two groups. Other reliability measures, such as internal consistency, are used to measure how the items relate to each other in the outcome instrument.[3]

3. Are the outcomes instruments used valid?

Validity indicates whether the instrument is measuring what it is intended to measure. For example, if one wishes to study outcomes after head and neck reconstruction, an outcomes instrument should be chosen that contains items asking about the ability to eat and to swallow. This concept is face validity, whether the questionnaire asks appropriate questions to measure the outcomes parameter pertaining to a research question. If one is to study outcomes after toe-to-hand reconstruction, choosing an outcomes instrument such as the SF-36 may be inappropriate to measure hand function. The SF-36 contains relatively few questions on hand function and cannot cover the many aspects of hand performance, such as the ability to perform activities of daily living, work performance, and pain. Therefore, the face validity of the SF-36 for outcomes studies relating to hand surgery is rather limited.

Construct validity is the most often studied area of validity testing of instruments. It involves examining the logical relationships that should exist between measures.[1] For example, a patient who had thumb replantation at the level of the metacarpophalangeal joint should have better scores in simulated hand activities compared to a patient with an amputation at the same level.[4] The questionnaire scores should show the same trend as the simulated hand activities scores. This concept is similar to criterion validity, whereby the questionnaire score is compared to a "gold" standard. Because outcomes questionnaires evaluate the intangibles about how the patients feel in general, a criterion is often not available to judge the validity of the outcome instrument. Rather, a circumspective approach is often used to evaluate construct validity and often, this process does take years to establish the construct validity of a questionnaire for different conditions.

4. Are the change in scores clinically significant?

Outcomes questionnaires are often based on questions that are based on ordering response categories; for example, five response categories ranging from excellent to poor. For ease of scoring, the items in a scale are pooled to generate a summary score. Although some purists may argue over the statistical validity of this approach, the psychometric literature has used this method for years. The question is the implication of a change in score from 25 before surgery to 45 after surgery, based on a scale from 0 to 100. This 20-point difference is most likely statistically significant, but is it also clinically significant? This is the difficulty of evaluating the clinical significance of outcomes scores. One of the ways to circumvent this difficulty is to evaluate the change of score by the standard deviation of the baseline score. For example, if the change of score is 20 and the standard deviation of the baseline score is 20, then the effect size will be 20/20= 1.0. Cohen, who wrote the classic book on scoring methods for psychometric literature,[5] defines the importance of effect sizes as >0.8 as large effect, 0.5 as medium effect, and <0.3 as small effect. Although clinical experience will dictate this definition, it serves as a reasonable guide for most situations.

This discussion is a brief summary of what to look for in an outcomes related article. The important point is that outcomes studies are clinical studies that need to adhere to the science of clinical research. Simply having an outcomes flavor does not assure that the study is well-performed. **RM**

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MICROSURGICAL PEARLS

Flaps in Autogenous Breast Reconstruction

Joseph M. Serletti, MD, FACS
Education Committee Chair

TIP #46

Transitioning from the fTRAM flap to the DIEP flap and SIEA flap for autogenous breast reconstruction.

The TRAM flap has become the most common method of autogenous breast reconstruction and is unmatched in its ability to create a soft, ptotic, and natural breast mound with excellent potential for symmetry with the contralateral breast. Probably most of the membership of the American Society for Reconstructive Microsurgery are advocates of the free TRAM flap as opposed to the pedicled TRAM flap for autogenous breast reconstruction. For the last ten years, the free TRAM flap has been our flap of choice for breast reconstruction having used it in over 700 patients with extremely consistent results. The major advantage of the free TRAM flap technique is that it allows for a much broader patient selection as compared to the pedicled technique. Smokers and the obese are the most common contraindications for the pedicled TRAM flap. In our free TRAM population, over 50 per cent of the patients qualified as obese and 20 to 25 per cent have been smokers. Flap complications have not been significantly different comparing smokers to non-smokers and obese with non-obese. Other advantages of the free TRAM technique include less abdominal dissection and a potential for faster recovery, and improved long term abdominal donor site function as compared to the pedicled TRAM flap.

The abdominal donor site in TRAM flap breast reconstruction has been a controversial issue among general surgeons, plastic surgeons, and patients. This controversy has been expressed in the debates by proponents of implants versus TRAM flaps as well as proponents of the free versus pedicled TRAM flap technique and more recently the fTRAM versus the DIEP flap. A guiding principle in reconstructive surgery has been that when given a choice, we select tissues which minimize the functional and aesthetic impact on the donor site. This principle has been the impetus to the development of muscle preserving procedures like the DIEP flap and more recently, the superficial inferior epigastric artery (SIEA) flap. We offer the following as some guidelines for surgeons interested in transitioning from a muscle sparing fTRAM flap to the DIEP and SIEA techniques.

It is important to limit yourself to unilateral reconstructions when beginning an experience with either of these techniques. Using a new technique will almost certainly require more operative time and a unilateral reconstruction provides for a more relaxed learning experience than in the bilateral reconstructive setting. Particularly for the DIEP flap, a unilateral reconstruction allows for learning the DIEP technique on one side while having the opposite side as a "safety net" in case a technical error makes the DIEP flap unusable.

The DIEP flap is begun by outlining the typical TRAM skin island over the lower abdomen. Although you can preliminarily identify perforators with a hand held doppler, we have not found a reliable relationship between the signal intensity and the size of the perforator. The ipsilateral skin island is elevated to the lateral row of perforators as in a muscle sparing free TRAM flap. The cautery is used on a low cutting setting to carefully separate the attachments of the fat from the anterior rectus sheath. This dissection begins inferiorly and proceeds towards the umbilicus. Most of the usable perforators are located in the upper part of the overlying rectus muscle so freeing the lower skin island attachments first gives improved visualization to the upper perforators, particularly the medial ones. Next, the superior edge of the skin island is dissected with the cautery, looking for paraumbilical perforators. The largest perforators are typically in the upper center of the overlying rectus muscle, or along the medial edge of the muscle, or just lateral to the umbilicus. During this dissection and identification of perforators, we will divide only very small perforators, keeping intact all major perforators and preserving the ability to still perform a muscle sparing free TRAM flap on this same side. Our preference is to identify and use only

IN MEMORIUM

Microsurgery Pioneer Remembered

Zhong Wei Chen, MD, one of our great founders of the world of reconstructive microsurgery, passed away on the 23rd of March, 2004. Dr. Chen was one—if not THE— first person to do a successful digital replantation. Dr. Chen was honored on a postage stamp in China for this accomplishment. Dr. Chen trained numerous orthopaedic surgeons in the techniques of micro neurosurgery. He was a co-editor of the textbook entitled, *Atlas of Microvascular Surgery*. Over the years, he became friends and colleagues with plastic and orthopedic surgeons around the world. He will be sorely missed. The Society and its members extend the deepest sympathies to his wife and family.

a single large perforator. The perforator must have a palpable arterial pulse and have a single large vein. The diameter of the artery to the vein should be 1:2 or even better 1:3. We specifically avoid an artery with two small venae comites. We have also avoided taking two or more smaller perforators. We feel that this dissection can significantly impair the subsequent muscle function and this dissection is unnecessarily tedious. If we cannot find a suitable single perforator, we move ahead with the muscle sparing free TRAM flap. If we find two or more large, suitable perforators, we select the one perforator which is closest to the center of the flap as opposed to a perforator at the periphery. Once a perforator is selected, the anterior rectus fascia is incised both inferiorly and superiorly, extending from the perforator obliquely in a lateral direction to the lateral edge of the rectus abdominis muscle. A laterally based flap of anterior rectus fascia is elevated to expose the muscle and held in a retracted position with skin stables to the external oblique fascia. The selected perforator is dissected through the muscle, splitting the muscle in the direction of its fibers as short as possible such as to allow dissection to where the perforator joins the inferior epigastric vessels. At this point, the lateral edge of the inferior rectus muscle is elevated to expose the inferior epigastric vessels. They are dissected off of their muscle attachments and can be dissected down to the external iliacs for additional length. All motor nerves to the muscle are preserved during this dissection. The inferior epigastrics can be divided at the iliacs and pulled through the split in the muscle at the level of the perforator. The epigastric vessels just proximal to the perforator are divided and the flap is then separated from its remaining attachments to the abdominal wall. Be careful to note the orientation of the perforator and the inferior epigastric vessels so as to avoid twisting of these vessels.

The superficial inferior epigastric artery flap harvests the typical TRAM skin island without any abdominal wall dissection, just skin and subcutaneous tissue. This flap certainly avoids any debate regarding the quality of the remaining abdominal wall as compared with the pTRAM, fTRAM, and even the DIEP flap. The superficial inferior epigastric artery flap is actually easier to dissect than the DIEP flap. The most important step to this flap is to look for these vessels. Before we recognized this potential blood supply to the typical TRAM skin island, we usually dissected this portion of the flap quickly, cauterizing or clipping these vessels during that dissection. The superificial inferior epigastric vessels are usually located just medial to the iliac crest and usually (but not always) deep to Scarpa's fascia. As we approach the incision along the lower edge of the abdominal skin island, care is taken to gently spread through the subcutaneous tissue around the area medial to the iliac crest. The vessels are almost always found just deep to Scarpa's fascia but on occasion, a significant branch of these vessels will be more superficial and should be preserved. The size of these vessels has ranged from considerably less than one mm to 2 to 3 mm. The vein is larger and more obvious than the artery although one should always be able to palpate an arterial pulse if these vessels are to be used. The decision to use these vessels is based solely on their adequate size. We consider a vein diameter of 2mm or greater as adequate and again, the presence of a palpable arterial pulse. These vessels are dissected through the inguinal subcutaneous tissue, dividing or cauterizing small branches. On occasion, these vessels will come in close proximity to a lymph node and it can be a bit tedious separating them from the node. Other than the occasional lymph node, this dissection is quite straightforward, and can be followed down to the femorals for sufficient length. With experience, this flap can be dissected more quickly than the fTRAM flap or DIEP flap. Although we have seen the SIE vessels perfuse the TRAM skin island across the midline, most who use this flap limit its use to the ipsilateral half of the skin island. The preferred recipient vessels for the SIEA flap are the thoracodorsals. The thoracodorsal vessels can be dissected to a point beyond the take off of the branch to the serratus muscle. At that junction, the diameter of the remaining thoracodorsal or the serratus vessels is smaller than the proximal thoracodorsals and is a good size match with the proximal portion of the superificial inferior epigastrics. The internal mammary vessels can certainly be used as recipient vessels as well. The internal

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ASRM
FUTURE ANNUAL MEETINGS

2005

JANUARY 15–18, 2005
Sanibel Harbor
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2006

JANUARY 14-17, 2006
Loews Ventana Canyon Resort
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2007

JANUARY 13–16, 2007
Westin Rio Mar Beach Resort
Rio Grande, Puerto Rico

2008

JANUARY 12-15, 2008
Century Plaza Hotel and Spa
Los Angeles, CA

2009

JANUARY 10-13, 2009
Grand Wailea Resort
Maui, HI

Microsurgical Pearls

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mammary vein is usually a good match with the superficial inferior epigastric vein. The internal mammary artery is usually considerably larger than the superficial inferior epigastric artery. Despite this difference, end-to-end anastomosis of these arteries is usually performed. When there is a considerable size mismatch, we have sutured the superficial inferior epigastric artery end-to-side into the internal mammary artery. For most microsurgical reconstructions of all varieties, we almost exclusively use 3.5X loupe magnification for the anastomoses. For the SIEA flap, however, we always use an operating microscope because of the smaller diameter of these vessels.

Finally, it is important to outline how we select which of these techniques to use in a particular patient. If a patient's breast reconstruction can be accomplished using only one half of the typical skin island, than any technique can be used. For such a patient, we first look at the SIE vessels since there is no issue regarding abdominal wall function, and considerably less postoperative pain and a more rapid recovery as compare to fTRAM and DIEP flaps. If the SIE vessels are not adequate, we proceed with dissecting a DIEP flap. If a single large perforator cannot be identified, then we proceed with a muscle sparing free TRAM flap. For most patients, either a SIEA flap or DIEP flap can be performed. Relative contraindications to the SIEA and DIEP flaps include smoking and obesity although we would emphasize the word "relative" here. With experience, these flaps are certainly usable in some of these less than ideal patients. For patients that will require zones 1, 2, and 3 for volume, the SIEA flap is contraindicated and unless a very large central perforator is present, the DIEP flap should not be performed as well. For patients that we know will have postoperative radiation therapy, we prefer a muscle sparing fTRAM flap because of its increased blood supply and presumed better tolerance of the radiotherapy.

Although no large prospective study has been performed to definitively answer which flap leaves behind the best abdominal wall function, it is certainly obvious that the SIEA flap should result in no functional change to the abdominal wall musculature. Also, in performing DIEP flaps, we cannot help but feel that we leave behind a better abdominal wall then in the fTRAM flap. These flaps are becoming more and more popular among our membership and among our patients as well. We offer these technical considerations for those considering performing these muscle preserving techniques. It is worthwhile to emphasize that these techniques have been described in a setting where if an error occurs during the learning curve, a muscle sparing free TRAM flap can still be performed. Thank you.

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