Turn, Turn, Turn

Alan B. Copperman, M.D.,[a] *and Alan H. DeCherney, M.D.*[b]

[a] Department of Obstetrics, Gynecology, and Reproductive Science, Mount Sinai Medical Center, New York, New York; and
[b] Department of Obstetrics and Gynecology, University of California at Los Angeles, Los Angeles, California

Twenty years have passed since the publication in these pages of the oft-quoted editorial "The leader of the band is tired." At that time, the passing was mourned of the era of laparotomy for reconstructive pelvic surgery and the arrival of the laparoscope was heralded. Another transformation has occurred. Just as laparoscopy replaced laparotomy, all traditional treatments for infertility are being rendered obsolete by advanced reproductive technologies. (Fertil Steril® 2006;85:12–3. ©2006 by American Society for Reproductive Medicine.)

Key Words: IVF, infertility, laparoscopy, assisted reproductive technologies, genetics

To everything (Turn, turn, turn)

In the chorus of "Turn! Turn! Turn!" the Byrds used the sentiments of Ecclesiastes 3:8 to convey the concept that everything has its time and place. Similarly, in reproductive medicine, patients have been treated with different strategies and tools depending on what is currently in vogue. The modern reproductive endocrinologist is faced with the formidable challenge of staying informed of the latest advances in cellular and molecular biology. It is comfortable to use our traditional tools, but we must continue to insert advances into our practice. The late science fiction humorist, Douglas Adams, remarked, "[H]uman beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so."

Twenty years have passed since publication in these pages of the oft-quoted editorial "The leader of the band is tired." At that time, the passing was mourned of the era of laparotomy for reconstructive pelvic surgery and the arrival of the laparoscope was heralded. Debate raged between classically trained surgeons and modern "pioneers," the former extolling the virtues of the grand and tactile satisfaction of laparotomy, the latter extolling the virtues of a less invasive view of the pelvis. Landmark innovations in the 1980s involved use of CO_2 lasers, and exciting uses were proposed for new Argon beams and Nd:YAG laser fibers. The disparities between these two surgical approaches were but progressive steps toward surgically accomplishing more and more through wielding rapidly evolving, more minute, and more precise technology. In fact, today, surgical targets are more often than not microscopic: our "scalpel" is an intracytoplasmic sperm injection needle, and lasers are used less to obliterate islands of endometriosis and more to pierce the zona pellucida.

The transition from laparotomy to laparoscopy has proven to be but one of many small steps that reproductive medicine has taken in the past century. The twentieth century began by providing us with an understanding of anatomic principles and laid the foundation for upcoming surgical innovation and instrumentation to correct anatomic aberrations. As medical science progressed in the 1960s, we collected huge volumes of urine to understand the endocrine system through high-performance liquid chromatography. Several decades of surgical advances followed, specifically the advances and application of microsurgical techniques in laparotomy in the 1970s and laparoscopy in the 1980s. Significant advances in cellular biology were achieved in the 1990s, and, as we stand at the precipice of subcellular and genomic discovery, we are reminded that the era of routine laparoscopic tubal surgery has now passed.

A time to gain, a time to lose

Human reproduction has always been a matter of philosophical debate and social controversy, a debate that has grown more complicated by continued technical evolution. Both hopes and concerns have been raised simultaneously about the legitimacy of preembryo research, the slippery slope of preimplantation embryo diagnostic testing and eugenic implications, and the fundamental and philosophical problem of the status of the embryo. The practitioner must not be reduced to a technician "operating" in a vacuum but must recognize his greater social, psychological, and human-

Received March 20, 2005; revised and accepted July 18, 2005.
The opinions and commentary expressed in Editor's Corner articles are solely those of the author. Publication does not imply endorsement by the Editor or American Society for Reproductive Medicine.
Reprint requests: Alan B. Copperman, M.D., Department of Obstetrics and Gynecology, Mount Sinai School of Medicine, 635 Madison Avenue, 10th floor, New York, New York 10022 (FAX: 212-756-5770; E-mail: acopperman@rmaofny.com)

0015-0282/06/$32.00

doi:10.1016/j.fertnstert.2005.07.1297

istic roles. General Eric Shinseki, Former White House Chief of Staff warned, "If you don't like change, you're going to like irrelevance even less." But change must be cautiously approached and, when appropriate, conscientiously adopted.

Today we are faced with ever-increasing high-tech opportunities to help patients achieve reproductive success. But as we conquer male factor infertility and other disease entities, new hurdles are presented through political and economic rather than scientific causes. New battlefields have emerged as objections have arisen to not only embryo research, but to even basic clinical embryology. Proteomics and DNA microarray technologies are at our doorstep, but when will they be incorporated into everyday practice? Are we ready to be the genetic engineers of the future?

A time to rend, a time to sow

Twenty years ago, we reported that the reproductive surgeon was faced with deciding whether all gynecologists should be trained to operate with the laparoscope or whether it should or would remain within the province of a few. Today, laparoscopy is a standard part of training. For the Reproductive Endocrinologist and Infertility Specialist, the surgical field of today, however, is less often the pelvis and more often the Petri dish. In fact, indications for diagnostic laparoscopy in the infertile patient are nearly obsolete, while rapid progression to assisted reproductive technologies (ART) has demonstrated its clear benefit. It is our belief that the time to "rend" (operate) will continue to fade, as we improve our "sowing" techniques in fertilizing oocytes in vitro.

In just over two decades, IVF has evolved from a laboratory curiosity to a commercialized, industrialized technology responsible for millions of births worldwide. More than 45,000 babies were born in the United States as a result of ART procedures done in 2002, an increase of approximately 10% over 2001.

A time to love, a time to hate

The last quarter of the twentieth century witnessed several major advances in reproductive medicine. Developments in the field of ART have intensified the hopes and wishes of infertile people to overcome their infertility. Within the past decade alone, we have noted a dramatic evolution in the availability and use of reproductive technologies. But around the globe, politics, religion, and economics often supersede science and medical experience in determining numbers of embryos to be transferred and who can be treated. While developments in ART have evolved rapidly, so have the ethical, social, and political controversies that surround nearly all aspects of ART. Few other areas in medicine have posed so many social and ethical questions and have attracted so much public attention as ART.

Our goals moving forward are neither simple to define nor easy to accomplish. We must vigilantly monitor scientific advances in hope of avoiding potential abuses of these new technologies, while striving to maximize individual and societal benefits. As physicians and scientists we need to not only innovate, but to critically analyze the efficacy of our innovations. Reproductive endocrinologists must become both regulators and regulated. We must continue to take responsibility for our actions and work to limit higher-order multiples, and we must work with our colleagues in legislation and ethics to operate within appropriate ethical guidelines, never losing site of the ideal of having 100% of our patients deliver healthy babies.

A time for peace, I swear it's not too late

Just as laparoscopy replaced laparotomy, so will all traditional treatments for infertility be rendered obsolete by advanced reproductive technologies. Patient work-up will be minimalized and will be primarily targeted toward whether the couple can produce reproductively competent gametes and then followed immediately by treatment with a course of IVF and ET. Frozen eggs, frozen embryos, frozen blastomeres, libraries of genetic stem cells, and embryo genetic engineering will be the tools of the future. Aldous Huxley was clairvoyant when he prophesied, "our civilization has chosen machinery and medicine and happiness." But what will be the role of the doctor then in the future? Will patients input their symptoms and their DNA samples into a computer and walk away with a printout of their differential diagnosis and treatment plan? Will procreation involve genetically engineering and choreographing the unification of a desired oocyte and spermatozoan?

In our haste to increase focus on our haven, the embryology laboratory, we must not overlook societal values, ethical concerns, scientific integrity, and respect for the individual and individuality. The reproductive endocrinologist's level of responsibility has suddenly increased exponentially. We should be proud of the smooth and swift transition that our field has undergone, improving reproductive outcome by moving patient care from the operating room to the embryology laboratory. The next steps must be made with even greater caution as we begin to enter the realm of genetic engineering. Future medical historians are destined to scrutinize how we take these steps, as the choices we make today will have consequences that will last well beyond our lifetimes.