President address

From Icarus to Aequanimitas

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The theme of the 35th Annual Meeting of the Congress of Neurological Surgeons is new frontiers in neurosurgery. The scientific program is replete with learned discussions of the great advances in diagnostic imaging, laser technology, neurotransmitters, and innovative surgical procedures. Our honored guest, Professor Gazi Yasargil, has demonstrated, in a virtuoso fashion, the frontiers that one may reach with chirurgie, or work with our hands, under magnification.

Rather than discuss additional technical frontiers, I will give time to reflection and perspective. We have heard the inspiring personal neurosurgical reflections of Dr. Yasargil and the historically steeped and erudite discussion of the social transformation of American medicine by Dr. Starr, further advanced by my good friend Dr. Donald Stewart. We have all looked at what has preceded in an attempt to understand the present and, perhaps, to glimpse the future.

I also have looked back, as well as within, to find a topic for my address to you. I considered what personal reflections of mine might have special meaning to most here. I found help in rereading the address delivered by Sir William Osler in 1899 to the students and faculty of The University of Pennsylvania upon his departure to then fledging Johns Hopkins University (6). He spoke to his friends of two qualities that might contribute to their success or help them in times of failure.

With the Congress dedicated to the younger neurosurgeon who is usually struggling for success, but also encompassing the older neurosurgeon who has had much greater exposure to failure, I thought it propitious to explore these two oslerian qualities as they pertain to the neurosurgeon’s professional and personal life.

The qualities Osler described were imperturbability and aequanimitas. He defined imperturbability as “coolness” and presence of mind under all circumstances, calmness amid storm and clearness of judgment in moments of grave peril. To describe the second quality, he referred to that wisest of Roman rulers, Antonius Pius. As Antonius lay dying in his home in Etruria, he summed up his philosophy of life with the watchword “aequanimitas.” It is a character trait difficult to attain, yet as necessary in success as in failure. Aequanimitas derives from the Latin words aequus, or “even,” and animus, meaning “mind” or “spirit.” therefore meaning even in mind, temperament, and composure or combined in modern parlance with imperturbability to mean “balance” or “equanimity.”

I propose, with some trepidation, to direct your attention for a few minutes to this quality of balance or aequanimitas, the importance of it, the consequences of not possessing it (I’m an expert in that field!), and perhaps a suggestion for its attainment.

In my search better to understand “balance,” Sir William’s advice sent me further back in history and mythology to the Greek myth of Daedalus and his son, Icarus—the earliest example that I could find dealing with the problems and consequences of not attaining balance or equanimity in one’s life (5).

Imprisoned by King Minos of Crete in a labyrinthine prison with no roof, Daedalus and Icarus escaped by ingeniously constructing wings of feathers and wax and flying out. Before attaining flight, Daedalus cautioned Icarus, his young, impetuous son, not to fly too low, lest the sea wet the feathers of his wings and make them too heavy to fly. Nor, Daedalus said, should Icarus fly too high, lest the sun melt the wax, scorch his wings, and cause him to fall to the earth. Above all, Daedalus warned Icarus not to be diverted by the birds he would see soaring in the sky. He might thus experience the hubris of flight, forget his limitations, and surely fall and die.

We all know that, in the exultation of the flight, Icarus failed to heed his father’s advice. Feeling the great thrill of soaring, up he flew, so near the sun that the wax binding his wings melted, and he plummeted into the sea, to be swallowed by the waves (Fig. 1).

I must confess that the full significance of this story eluded me until I entered neurosurgical practice. Like Icarus, I was young and impetuous. Eager to test my wings and fly, I decided early on to operate upon a young mother of two with an enormous left internal carotid artery aneurysm. After hours of tedious dissection, I finally clipped what I thought was the neck of the aneurysm. Then I closed the wound and departed from the operating room. I soared like Icarus, congratulating myself on my deft hands, sharp eyes, and exquisite judgment. I allowed myself proud thoughts of how few others could perform such an operation with such expertise.

Thirty minutes later, a call from the recovery room informed me of my patient’s hemiplegic, aphasic, and subsequently comatose state. An angiogram showed a complete occlusion of the internal carotid artery because of a misplaced clip. My ensuing depression and despondency matched—in a negative way—my elation and yes, my hubris, my overinflated pride, of just a few minutes before. At that moment, I painfully recalled the familiar proverb with its icarian message: “Pride goeth before the fall and a haughty spirit before destruction” (7).

Despite this and the subsequent scorching of my wings on many other operative occasions, it took me a long time to realize the wisdom of my colleague, Dr. Robert Selker, who
stated that “complications are God’s way of keeping surgeons humble.” For several years, I rode the surgeon’s roller coaster. I soared to the peaks with my surgical successes and plummeted into the valley of depression with my failures. A balance of sorts came only when I realized that, despite the skills and training required of us, the Golden Rule still applies. For surgeons, it is to do unto others with the same surgeon’s skill, the same judgment, and, above all, the same compassion with which we would want something done unto us. Furthermore, I found it helpful to remember the words of the barber-surgeon Ambrose Paré. in the 1500s: “We dress the wound,” he said, “and God cures the patient.” Complications and cures—they both come from God. Maybe it’s better that way. It certainly leads to better balance.

As neurosurgeons, we are constantly inclined to test the frontiers of possibility: the giant basal meningioma, the cervical intramedullary tumor, and the giant aneurysm. In operating on all of these, there is the unmistakable strain of nonacceptance, which is the primal mark of Icarus in our nature. The rewards of neurosurgical nonacceptance may be great—a cured patient or perhaps a new technique that could benefit many future patients. But the consequences may just as easily be disastrous, with paralysis or death from violating neuroanatomical laws, akin to the violation of the laws of physics by Icarus.

We must constantly seek the balance between good judgment, experience, and our technical abilities. Good judgment comes from experience, but, unfortunately, experience comes most often from poor judgment. Unlike Icarus, however, we are able to learn from our experiences and not drown in our mistakes if the osterian qualities of hard work, scholarship, and humility characterize our practice.

But equanimitas in our profession is only part of the balance that we must attain if we wish to be successful. For even if we succeed in getting our professional lives under control, we have only just begun. We still have vital personal issues to confront—physical fitness, spirituality, and family—before we can achieve a truly balanced life. Unfortunately, I was a very slow learner. It was only quite recently that I discovered the interrelated nature of these other aspects. Only then did a more complete understanding of the full meaning of equanimity—or balance—become apparent to me.

A recent experience I had with my children greatly helped with this understanding. One night I was reading a book entitled I Dare You, by William Danforth (3). The book not only challenges the reader so superior accomplishment, but also demonstrates that the only way to true success is through a balanced life. I showed it to my daughter, Laura, not quite 11, and my son Michael, 15, hoping to encourage them into persevering during these most difficult years. The book requires each reader to consider the four major areas of personal commitment: professional (or educational), family/social, spiritual, and physical. Then a “picture” is drawn of one’s life to determine how four-squared it is (Fig. 2), with the length of each arm proportional to the degree of commitment. I asked Laura and Mike to draw their squares.

They then said, “It’s your turn.” After comparing my “square” to theirs, it was obvious that their responses (and lives) were in much better balance than mine. I also immediately recognized, with this simplistic approach, that many of the principles and ideals I had wanted to impart to my own children had, in me, become weakened or lost altogether, as seen in my square.

I challenge each of you with the same task. Take 30 seconds and draw your own square. In the quiet moments that you reserve for yourself, think about its configuration and the best way to balance it.

Now, one further request. Think just a minute about your most valued possession—that thing without which, as Shakespeare wrote, “life would be bound in shallows and in misery” (11). Many would agree that it is good health. Yet, when most of us look at our squares, we see how little importance is placed on the physical side. The challenge that each of us must face is to understand the relationship of our squares (our goals), to equanimity (to balance), especially to health, both mental and physical.

Let us now examine a typical neurosurgeon’s square (Fig. 3). We’ll look at each side and some of the consequences of over- and underemphasis, or imbalance.

We shall begin with the professional. As many will agree, this component frequently is out of proportion to the other three sides. Yet, when professional interests replace the others, then, as night follows day, the family/social, spiritual, and physical sides all atrophy. Such impropriation may translate into tragedy—or, in fact, several tragedies. Often, it creates neurosurgical widows—women who know that they have husbands somewhere, but who also know that sighting them

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![Fig. 1. The flight of Icarus.](image1)

![Fig. 2. The relationship of professional/educational, family/social, spiritual, and physical components as depicted in a “square.”](image2)

![Fig. 3. The typical neurosurgeon’s square.](image3)
is best accomplished at airports between neurosurgical meetings. An overemphasis on the professional also affects children, whose material affluence—coupled with parental neglect—makes them susceptible to the temptations of drugs, alcohol, and delinquency. Perhaps worst of all, overvalued professional interests detaches the family from the spiritual moorings so necessary for daily life. Finally, the imbalance promotes the hypotonic corpus and adiposity somewhat characteristic of our profession.

Next, take a closer look at the physical side of our square and consider the physiological consequences of neglect in this area. Specifically, let’s look at the breakdown of physical equanimity. Let’s look at the dangers of stress.

One of the first modern physiologists to speak of equanimity and stress in health was Claude Bernard (1). In the late 1800s, he stated, “it is the fixity of the milieu intérieur which is the primary condition for a free and independent life. All the vital mechanisms of the body, varied as they are, have only one object: that of preserving balance and equilibrium.” There can be little doubt that this was Bernard’s greatest biological generalization. Fifty years later, building on Bernard’s observations, the American physiologist Walter Cannon suggested that the coordinated physiological processes, which maintain an organism’s milieu intérieur, should be called homeostasis, or physiological equanimity (2). Is this concept now beginning to sound familiar?

In the 1930s, Hans Selye went several physiological steps further. He demonstrated that animals subjected to prolonged severe stress suffered from hypertrophy of the adrenal glands, atrophy of the thymus and lymph nodes, and the appearance of gastrointestinal ulcers (10). It was Selye who formulated the now classic “adaptation syndrome,” which deals with the body’s positive and negative reactions to stress.

During the last several years, scientists in such diverse fields as immunology, neuroendocrinology, neurochemistry, neuropharmacology, and the behavioral fields have all added observations related to the physiology of stress. Yet, for all their advances—and some are profound—they have all rediscovered what Galen stated in the Second Century A.D. He said that the emotional state of an individual can cause and, in some cases, relieve disease. Specifically, Galen said that cancer struck far more frequently in melancholy than in sanguine persons, something we’re just beginning to reconsider today (13).

The belief that disease was a consequence of psychic or spiritual imbalance governed medicine—in both theory and practice—in the Orient and the Occident until well after the 17th century rise of modern science, with its mechanistic view of physiology. Yet, some of the old theories weren’t so far-fetched. It wasn’t until the last 20 years, for example, that immune system alteration was documented in patients suffering from stress. It was observed, for example, that during the first few months of bereavement, widows and widowers were highly susceptible to disease and that people hospitalized for severe depression, usually resulting from psychic stress, often had a hampered immune system (9).

So, while we’re looking for balance, let us look at how the immune system normally functions. Then perhaps we can determine the ways in which mental or physical imbalance may cause disease. As you know, our white blood cells constitute a highly effective army of defenders against those substances—living and inert—that are not part of the human body.

Normally, when a virus, bacterium, or other foreign substance first enters the body, it is engulfed by a macrophage (Fig. 4). The macrophage then secretes lymphokines and interleukin-1 (IL-1), and they activate the T cells, which join the fight. The activated T cell then produces interleukin-2 (IL-2) which, in turn, stimulates other T cells to grow and divide. The T cells also secrete a lymphokine called B cell growth factor (BCGF), which causes B cells to multiply and produce antibodies. Finally, the T cells produce a lymphokine called γ interferon (IF) with protein defensive capabilities. Of tremendous importance, we now know there are bidirectional circuits between the central nervous system and this phenom-inal immunological system (Fig. 5). Lymphokines, thymosins, and certain complement proteins, called immunotransmitters, all seem to transfer information from the immune centers to the brain (4).

A major conceptual shift has thus occurred in neuroscience with the discovery that the linkage among the brain, the glands, and the immune system is modulated by numerous chemicals, mostly peptides, in addition to classical neurotransmitters.

This all adds up to a wholly mechanistic substantiation of a self-correcting, functional circuit that ties the behavioral activity of the brain to the neuroendocrine and immunological systems of the body—Bernard, Cannon, and Selye would be ecstatic! So, what does all this have to do with the physical side of our square?
Physical fitness and exercise now make tremendous sense—and not just because we feel good doing it. We now know that exercise stimulates the brain to release chemicals such as endorphins and enkephalins, which reduce anxiety and create a sense of well-being—naturally, without extraneous pharmacological influences such as drugs.

Even more startling are studies that indicate that exercise affects macrophages and T cells and results in increased levels of interleukin-1 and interferon, both of which strengthen our immune system defenses. In fact, both substances are presently being used experimentally in the treatment of cancer, a disease recognized 1900 years ago by Galen to be associated with excessive stress and depression, which we now know suppress our immune system and peptides like interleukin-1 and interferon. So, we benefit not solely from the good feeling that one derives from running through green pastures or swimming in still waters, although that feeling is both potent and palpable. No, we are also substantiating the premise that exercise in and of itself enhances our immunological system in a very positive way and additionally, as stated centuries ago in the 23rd Psalm, “restoreth our soul” (8).

I may have taken a circuitous path, but I have attempted to illustrate just one of the many ways that a biological substratum underpins the aphorism, “as a man thinketh in his heart, so he shall be.” We literally are what we think, as mediated through definable anatomical and neurochemical pathways. Our character and our health are—to a large extent—the sum of all of our thoughts. It’s as simple as this: good thoughts and actions are unlikely to produce bad results. Bad thoughts and actions can never produce good results.

Yes, you say, but what are good thoughts? What is the good life? What guidelines do we have for right thinking and right living? What should our relationship be toward our families and friends, our patients, our society at large? Obviously, such questions extend beyond the scope of this address and must be answered by each of us individually. But, clearly, each of
us must adopt for himself an acceptable way of life and a livable, personal religion and spirituality—the third arm of our square.

One of the earliest spiritual guidelines designed to maintain equanimity in humans and peace among people is found in the Old Testament and then is reemphasized in the New Testament by St. Matthew and St. Mark (14, 15). “Thou shall love thy neighbor as thyself.” With certain variations, this commandment can be found in the most diverse religions and philosophies. The so-called Golden Rule—“do unto others as you would have them do unto you”—is but a modifi-
cation of the idea of loving our neighbors.

Perhaps that is why this commandment appears so often and in so many places. Zarathustra taught it to the fire worship-
ers in Persia 3000 years ago. Confucius, Lao-Tse, and Buddha incorporated loving one's neighbor into their doctrines. It
appears, of course, in Judaism and Christianity. Above all, despite the variations in religions, the existence and impor-
tance of a Higher Authority is accepted by the adherents of every religious group.

Hans Selye contemplated spirituality, particularly as it ap-
plies to physicians (10). In discussing the aim of life, he con-
cluded that it is our responsibility to incite love, goodwill, gratitude, respect, and all other positive feelings that render
us useful and, indeed, indispensable to our patients and neighbors. By so doing, we express an “egotistical altruism”
that is rewarded many times over by similar feelings by others toward ourselves. There is much wisdom in this philosophy.

Physicality and spirituality are irrevocably intertwined and
lead to equanimity—to balance.

The final arm of the square is the family. The family is so
important that it is said that no other success can compensate
for failure at home. Concomitantly, there is no greater stress
or distress than that which arises from rancor or problems at
home. The pain of a sick, injured, or retarded child or one
on drugs or the breakup of a marriage are among the most severe
forces destabilizing anyone's equilibrium. Family problems
unfortunately must come to all of us sooner or later. They
again summon the great need for spirituality, for a belief in
a higher authority, to bring ease, to bring understanding, to
bring coping, and even to bring survival.

Just as the family may be the source of tears and sorrow, it
may also be the fount of our joys and laughter. Certainly, we
are delighted with our children's academic and athletic
achievements, but perhaps the greatest joy comes from expe-
rriencing those intangibles of love and trust shared between
parent and child, the purity of a child's uncluttered mind, and
the unconditional love that is expressed in the everyday
sharing of activities.

I lay no claims to being a paragon of excellence or an
outstanding figure as a physician-father. I do know, however,
that children are amazingly resilient and that, even though
wilted by lack of attention, time, and love, they quickly
rebound to our caring with a blossoming that matches the
freshness of flowers. We must carefully look at their de-
veloping squares and help them by our example to obtain balance
in all four components. Our children are not vessels to be
filled with money, cars, clothes, and material goods, but rather
are fires to be lit with love, caring, and support and to be kept
burning by our presence physically and emotionally.

In this short address, I have attempted to illustrate what
I believe to be the necessity for seeking a balance or personal
equanimity in all aspects of our lives. We must guard against
soaring too high with success, as did Icarus, or sinking so low
with failures as to wet our wings with the heaviness of depres-
sion. which, in our profession, may at times seem ubiquitous.
We must travel from Icarus to Aquanimitas to the present.

Fig. 6. The relationship of spirituality to the physical, profes-
sional, and family/social aspects.

Having discussed each arm of our square, we have seen the
importance of some form of spirituality in all aspects of our
lives. Differing slightly with William Danforth, I submit that
a triangle might best depict the physicians' approach towards
equilibrium—with spirituality permeating all aspects of our
professional, familial, and physical lives (Fig. 6).

Equilibrium—we all require it—is needed for ourselves,
our families, and our patients. We have discussed the bidirec-
tional pathways between our brains and our immune systems
and the profound mental and physical consequences, which
many of us have experienced, of not maintaining such a state.
Equilibrium—equal measure should be given to all four sides
of our squares or all three sides of our triangles. In the
quietness of our own hearts, we must work to maintain our
balance. To those less fortunate—like myself—who find our-
selves out of balance, I suggest, or perhaps urge, that we follow
the admonition of St. Luke, who, as quoted by Dr. Bruce
Sorensen in his classic and sensitive presidential address, said,
“Physician, heal thyself” (12).

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