

Sun Tzu and The Art of Orthopaedics

BY DR ERNEST KWEK

Whilst essays in the past years have focused on forward thinking predictions of the future, I decided instead to cast my eyes in a retrograde examination of history and pull forth parallels to the orthopaedic practice of today.

Sun Tzu's *The Art of War* is an ancient, 2000-year old textbook on the principles of warfare. It is the most widely used book on strategy in the world today, and its classic teachings have even been applied to modern politics and businesses.

I am by no means a scholar of Confucius, a practitioner of Tao, nor even a recreational dabbler in philosophy, but I had a high index of suspicion that Sun Tzu's teachings would form an appropriate template for this essay.

How many times have we heard orthopaedic surgeons brag about the number of techniques or tricks they have in their "arsenal"? Doesn't the surgeon who boasts about how swiftly he chops, or how many complicated cases he's accomplished remind you of an army regular proudly displaying his marksman, airborne and Ranger tabs on his uniform? Surely we've all felt the trepidation, cold sweats and butterflies-in-stomach apprehension of starting a busy orthopaedic call, not unlike the sickening sensation soldiers get when they're about to enter the bloody arena of war.

Hence the aim of this essay is to perform a retrospective analysis of Sun Tzu's tactics (dutifully translated, of course, by Thomas Cleary), with the hypothesis that the practice of modern orthopaedics is very similar to the campaign of war, and its philosophical ramifications.



"Military action is measured in terms of 5 things: the way, the weather, the terrain, the leadership, and discipline" – Sun Tzu

In orthopaedics, the battlefield can be likened to the operating theatre, the surgeon is the general, and his assistants and scrub nurses are his soldiers. The enemy is the task at hand, whether it is a case of arthroplasty or osteosynthesis, and the battle is the monumental struggle to complete that task.

Sun Tzu believes that if the general is able to understand and control these 5 factors, then victory is virtually assured, even before combat has begun. Similarly, these 5 factors can be applied to orthopaedics.

The Way refers to the surgeon's grasp of operative procedures and mastery of technique. Just as a bumbling fool is not expected to lead an army into a successful campaign, similarly a poorly prepared orthopod is unlikely to excel at his job.

The Weather refers to the right timing for surgery. Just as a general would be suicidal to fight a battle during a thunderstorm or a drought, the orthopod must choose the right time to put knife to skin. Too early in cases of spinal trauma, and you're guaranteed a bloody field of vision. Too late in polytrauma cases and you run the risk of wound complications in the setting of SIRS.

The Terrain refers to an accurate assessment of the battleground. The orthopod must always accurately determine the status of the soft tissues, and the skeletal geometry before proceeding into battle. Choose the wrong path through bad terrain, and he's likely to wind up with wound breakdown, implant infections, and all manner of dreadful complications.



The Leadership refers to the ability of the general to marshal his forces. The orthopod too must realize that difficult tasks require the skilled direction of all available hands and minds, and the ability to take charge of the situation, no matter how dire.

The Discipline refers to the attitudes of the soldiers. When the leadership is able, there will be good discipline. Similarly a good surgeon should garner the unfailing cooperation and devoted attention of his

subordinates, lest he wishes to risk his assistant 'accidentally' dropping a freshly harvested hamstring graft on the theater floor.

If any of these 5 elements are not present, Sun Tzu highly recommends deferring any surgery until these conditions can be improved. These are wise words to be heeded.

“When you do battle, even if you are winning, if you continue for a long time it will dull your forces and blunt your edge; if you besiege a citadel, your strength will be exhausted. If you keep your armies out in the field for a long time, your supplies will be insufficient. The important thing in a military operation is victory, not persistence” – Sun Tzu

Sun Tzu believed that skilled military operations should not last long as there is rarely any benefit in a protracted campaign (my thoughts wander to the US campaign in Iraq and its relevance to this phrase). A swift but clumsy campaign is still a victory nonetheless. A high toll is made on soldier morale, physical and mental health, on expenses, and resources.



Whilst prolonged surgeries may be the norm in certain subspecialties, the orthopedist should bear in mind that as the day draws longer, assistants and his own pair of hands may grow wearier, affecting concentration and team efficiency. Ultimately, exhaustion sets in, mistakes are made and the chances for success start to become more remote. Many of us have experienced this and have learnt to reorganize the complex cases to the top of the list.

We are fortunate that the majority of orthopaedic cases can be dispatched expediently in the operating theater; that we don't have to sit through DVT-inducing aneurysm clippings, Whipples' operations or transplants. However Sun Tzu reminds us that speed is a strong tool for achieving success and that as leaders the welfare of our team lies in our hands.

“Look upon your soldiers as you do infants, and they willingly go into deep valleys with you; look upon your soldiers as beloved children, and they willingly die with you” – Sun Tzu

“There are five traits that are dangerous in generals: Those who are ready to die can be killed; those who are intent on living can be captured; those who are quick to anger can be shamed; those who are puritanical can be disgraced; those who love people can be troubled” – Sun Tzu

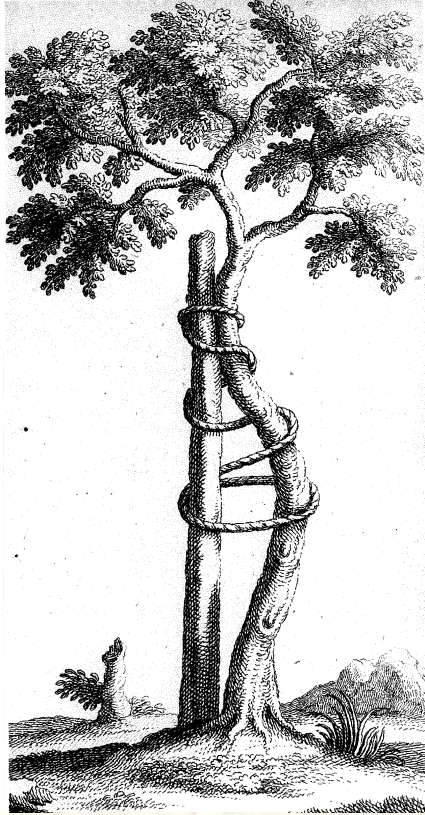
Sun Tzu advises his generals to avoid these qualities, and allusions can also be made with the orthopaedic surgeon's day to day practice. Gungho, overenthusiastic surgeons can be careless and brash. Conversely, the overly meticulous surgeon trying hard to avoid the pitfalls of a procedure may be caught out where he least expects it. The strict disciplinarian in all his arrogance may one day be publicly embarrassed, whilst the compassionate, sympathetic surgeon can often be troubled by his own emotions.

Although seemingly impossible to avoid any of these characteristics, Sun Tzu emphasizes the importance of being adaptable to what the situation calls for. A strategic-minded surgeon knows when he needs to exercise caution, when to be fervent, when to be strict, and when to show empathy.

“A military force has no constant formation, water has no constant shape: the ability to gain victory by changing and adapting according to the opponent is called genius” – Sun Tzu

So a surgeon's best tactic in his practice is to maintain flexibility and adaptability in his every endeavour. Whether it be the consideration of differential diagnoses, the choice of management regimes, the application of various implants, or the treatment of unexpected complications, the orthopod must learn to be like water, steering away from rigid mindsets and predictable patterns. Of course, this is to be supplemented by a large dose of skill and knowledge.





“So it is said that if you know others and know yourself, you will not be imperiled in a hundred battles; if you do not know others but know yourself, you win one and lose one; if you do not know others and do not know yourself, you will be imperiled in every single battle” – Sun Tzu

Two issues are raised here: the value of ‘knowing yourself’ and ‘knowing others’. The former refers to identifying and acknowledging one’s limits, not foolhardily attempting surgery that’s beyond one’s capabilities, especially when still in the infancy of apprenticeship. ‘Knowing others’ therefore becomes important when the orthopedist finds himself threading on unfamiliar territory. Orthopaedics cannot be practiced in isolation; the surgeon should not allow his pride to get in the way of enlisting specialists from other disciplines to co-manage their patients. Working with other medical and paramedical personnel is also implicit in a multidisciplinary approach to complex problems. Finally, the orthopedist should never be too ashamed to request the assistance of his fellow colleagues, who may be better equipped to handle various challenges. Only then can a hundred battles be won.

“There are only two kinds of charge in battle, the unorthodox surprise attack and the orthodox direct attack, but variations of the unorthodox and the orthodox are endless” – Sun Tzu

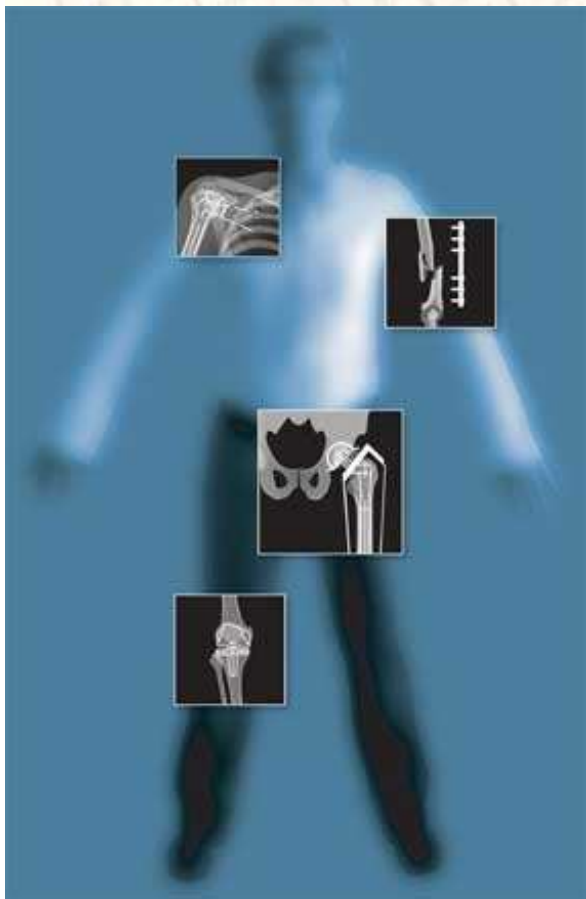
Sun Tzu encourages his generals to keep their minds open and explore various ways of attack, from the traditional methods to the unconventional. Likewise, orthopedists must realize that there are many ways to skin a cat. In terms of management options, surgical approaches, implants, fixation techniques and various modalities, the palette from which the surgeon makes his selection is virtually encyclopedic in today’s modern age.

More than that, Sun Tzu wishes to stimulate his generals to invent and generate fresh methodologies, and explore the ‘endless variations’. The cultural wave of research and innovation in orthopaedics is unlikely to recede. With it we have benefitted from the advent of stem cell therapies, biological fixation, advances in arthroplasty designs, alternate

bearing surfaces, minimally invasive techniques, and sophisticated pharmacological agents. Although this movement has been hampered somewhat by the bugbear known as 'evidenced based medicine', it is necessary for orthopaedic surgeons to continue to think outside the box, and push the frontiers of our specialty.



"The rules of the military are five: measurement, assessment, calculation, comparison, and victory. The ground gives rise to measurements, measurements give rise to assessments, assessments give rise to calculations, calculations give rise to comparisons, comparisons give rise to victories" – Sun Tzu



The terms used in this phrase uncannily describe the orthopaedic practice of reading, interpreting and utilizing radiographs.

The Ground gives rise to Measurements: every bony structure in the body is governed by set normal values, numbers that every orthopaedic surgeon strives to memorize.

The Assessments: with the knowledge of normal bony architecture, the orthoped radiographically assesses for abnormalities.

The Calculations: generals draw up strategic plans just as orthopaedic surgeons plan and template for cases pre-operatively.

The Comparisons: when in doubt, always compare or template with the normal side.

And with a comprehensive understanding, accurate interpretation, and intelligent

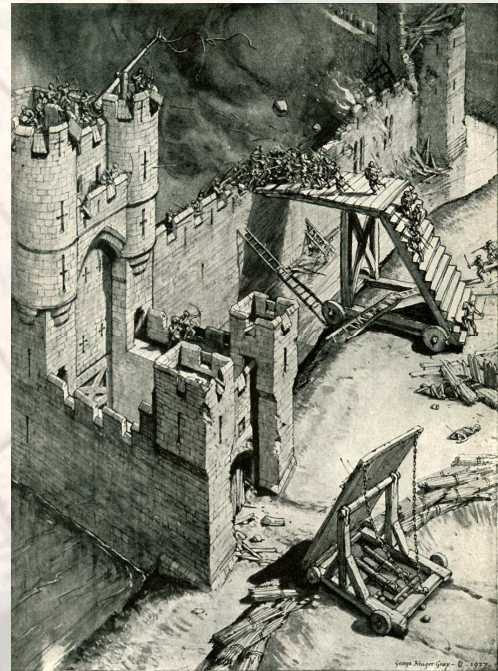
templating of radiographs, the doors to a victorious outcome in the operating theater will be open to the surgeon.

“The superior militarist strikes while schemes are being laid. The next best is to attack alliances. The next best is to attack the army. The lowest is to attack a city. Siege of a city is only done as a last resort” – Sun Tzu

This startling statement by Sun Tzu could have foretold the advent of biological fixation, if interpreted in the right way. Sun Tzu was a great proponent of winning wars without fighting. Wars should be staged whilst the problem is still small, failing which attacking the enemy’s alliances may help weaken the opponent. If your hand is forced, a direct battle has to be waged, and only as a last resort is the garrisoned city besieged. He recognized that attacking a city would result in many casualties, depleted resources, and not necessarily a victory.

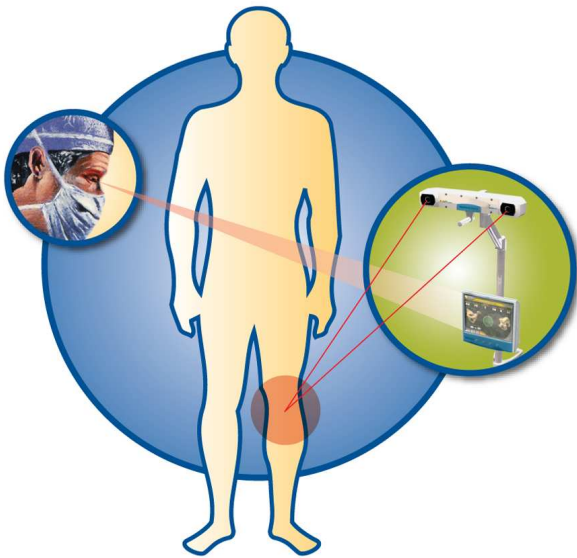
An analogy can be drawn from the viewpoint of the orthopaedic traumatologist: invading the stronghold that is the fracture site should only be the last resort. Current teaching now highlights the detrimental effects of overzealous soft tissue stripping, whereas thirty years ago the orthopod would have homed in straight for the ‘city’, perhaps ultimately resulting in fixation failure.

Having planned a comprehensive strategy of attack, the orthopod should instead first work on the ‘alliances’, aiming to achieve indirect reduction through manipulating the supporting soft tissues. Thereafter, the fracture can be bridged by attacking its surrounding ‘army’, or bony support. If the ‘city’ can be secured by controlling these elements, the victory is won without having to lay siege on the ‘city’.



“Those who win every battle are not really skillful – those who render others’ armies helpless without fighting are the best of all” – Sun Tzu

In the same vein, Sun Tzu teaches that to be truly skillful, one should win battles without direct confrontation. Just as modern warfare has evolved with stealth weapons,



smart bombs and long range missiles, this form of 'indirect warfare' is also now prevalent in orthopaedics.

The use of fluoroscopy and arthroscopy has revolutionized the face of orthopaedic surgery. Surgeons now direct their attention to TV monitors and video screens rather than dealing face to face with the pathology. Minimally invasive tools and techniques have been developed to stabilize fractures without visualizing them with the naked eye. And now computer aided navigation has introduced yet another formidable tool for which to fight our battles from afar. From

arthroplasties to cruciate reconstructions to trauma surgery, Sun Tzu's words portend an age where modern technology has enhanced the capabilities of the orthopaedic surgeon to a level never imagined possible fifty years ago.

"Unless you know the mountains and forests, the defiles and impasses, and the lay of the marshes and swamps, you cannot maneuver with an armed force. Unless you use local guides, you cannot get the advantages of the land" – Sun Tzu

No orthopaedic surgeon can claim to know all there is to know; such is the nature of our discipline. No two fractures are the same; no two hips can be carried out in the exact same way. Sun Tzu teaches that many a times in war, the general often finds himself and his army in foreign territories. To make the best of the situation, a local guide is an essential asset.

Similarly, the orthopod is frequently faced with procedures he is not familiar with, and equipment he has not handled before. Implant company reps play a crucial role as guides to ensure surgery gets completed without too many setbacks. With today's rapidly progressing technology, it is vital that our rapport with our 'local guides' is a strong one.

Their roles have continued to grow, from assisting surgeons in private hospitals, to



coaching scrub nurses on equipment, to delivering meals to famished surgeons in the operating theaters. Some have even ably acted as tour guides and hosts on overseas courses! Therefore implant company reps should be given the recognition they deserve as a fundamental component of the orthopaedic machinery.

“Only a brilliant ruler or a wise general who can use the highly intelligent for espionage is sure of great success. This is essential for military operations, and the armies depend on this in their actions” – Sun Tzu

One of Sun Tzu’s critical strategies is the utilization of spies in warfare. Spies are able to infiltrate the enemy’s ranks and gather vital information for a successful campaign. While corporate espionage is not a feature of the orthopaedic practice, there is value in sending employees on journeys to increase the department’s knowledge base. Registrars rotating through various hospitals are sponges for best practices that they can bring back to their parent hospital. Trainees should be regularly sponsored or subsidized for overseas courses or conferences to widen their outlook on the international scene of orthopaedics. Finally, the wise department head sends his young consultants to the best centres around the world on fellowships in the hopes that the nurturing of expertise in various subspecialties will yield a hundred times more returns for the department.



“Generals are assistants of the nation. When their assistance is complete, the country is strong. When their assistance is defective, the country is weak.” – Sun Tzu

Departments must realize they are only as strong as their weakest link. As teaching hospitals, the onus is on the senior surgeons to impart their knowledge gained through years of experience to the younger surgeons. Cultivating the junior staff ensures a cycle of replenishment required for producing a strong local orthopaedic community. This can only be achieved through a comprehensive training programme run by dedicated clinicians, who have the interests and welfare of the trainees at heart. It is imperative for senior surgeons to accept this responsibility, for one day these trainees will grow into the generals and ambassadors of the orthopaedic society.

Military action is important to the nation – it is the ground of death and life, the path of survival and destruction, so it is imperative to examine it” – Sun Tzu

We have always been told that medicine is an art, but rarely has this concept been expounded upon. I believe that more so than in any other discipline, orthopaedics epitomizes the practice of medicine as an art form. From the intellectual approach of directed history taking (as opposed to the carpet bombing interrogation of our internal medicine colleagues), to the visual performance of an orthopaedic physical examination; from the pencil-etched intricacies of radiological measurements and templating, to the development of a myriad of surgical approaches for any one anatomical region; from the rhythmic symphony of a total knee replacement, to the architectural complexity of an external fixator construct: orthopaedic surgery represents Art in almost all its diverse forms.



Just as Sun Tzu saw fit to label the atrocity of war as an artistic concept more than 2000 years ago, elevating the phrase from its tainted connotations to a much studied philosophy, so too do I hope that through these insights into our very own practice, we will continue to cultivate orthopaedic surgery into the premier model of ‘Medicine as an expression of Art’.

~fin~