Sterling Bunnell – The founder of hand surgery

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Sterling Bunnell was a surgical giant, a seeker of deeper understanding of all things, an evolver of newer concepts and the founder of reconstructive surgery of the hand. He applied the concepts derived from his searches to the practice of surgery. At first, it was general surgery, but later he became passionately interested in the surgery of the hand. He left a cavalcade of methods and techniques that have been adopted and followed by many surgeons in many countries. Bunnell was a great teacher and a lucid writer; his book Surgery of the Hand (1) will remain a monumental reference text for a long time. While Bunnell’s passing on August 20, 1957 was a great personal loss – a loss of a guide, teacher and a friend – it served as an incentive for my dedication to surgery of the hand.

Sterling Bunnell was born on June 17, 1882. His undergraduate training was done at the University of California; he entered medical school at the same university and graduated in 1908. Bunnell’s initial interest was in general surgery and he studied in a number of clinics in the eastern United States. Eventually, he joined the staff of the University of California Medical School in San Francisco.

During the First World War, he served as Captain in the United States Army Medical Corps, both in the fighting front in France and at the base hospitals. He resumed his practice of general surgery upon his return to San Francisco in 1918, but soon began to develop an interest in reconstructive surgery of the hand, which culminated in publication of the encyclopedic work on surgery of the hand a quarter of a century later (1).

KEEPER OF JOURNALS

Bunnell was organized and methodical in his approach to any endeavour. He kept a journal on the marine specimens he collected along the Pacific shores of San Francisco before he started university. The findings were illustrated with sketches giving the most outstanding features of the find. The valuable collection which he kept at home became too large and he donated it to the Marine Museum of San Francisco.

By the time he started private surgical practice in San Francisco, he kept five different notebooks. In addition to the first book on marine life, he had a book on hunting and fishing in which he entered the interesting wild animals or fish he encountered during his outings. After a few years he stopped hunting; the gun was replaced with a movie camera. The other three books were on general surgery, orthopedic surgery and plastic surgery.

Bunnell was an imaginative and inventive surgeon; many of his ideas developed gradually, through faltering steps with the sketches that he entered in the appropriate books. Clinical trials took place only after preliminary sketching and an exhaustive process of conceptualization. He followed the example of the great Leonardo Da Vinci who considered that the work of the hand defined the compass of human thought (2).
THINKER AND PRAGMATIST
Bunnell was a great surgical thinker as well as a surgical practitioner. His constant search for better understanding of the function of the upper extremity was always tempered by the desire for practical application of the findings to a more efficient reconstruction of maimed hands. His careful observations and sound thinking formed the basis for the meticulous details of the specific operative procedures that he devised. The accumulated experience enabled him, when confronted with a specific difficult problem of reconstruction, to outline the various possibilities that might be employed in handling the particular case. Unhurriedly, he would give the pros and cons for each possible procedure and, when all possibilities were exhausted, he would choose what would appear to be the more logical course of action. It was as if he were thinking aloud.

Bunnell was kinetically and mechanically minded. Although he started out as a general surgeon, it was inevitable that he should gravitate to orthopedic and reconstructive surgery. Surgery of the hand, because of its complexities of structure and function, must have presented a great challenge to him. Indeed, he introduced new concepts as long as 75 years ago; he used ‘atraumatic’ handling of tissue and ‘aseptic surgery’ long before these terms became fashionable (3).

In discussing a paper by Bunnell in 1952, Leo Mayer of New York, an old friend of Bunnell, reminisced about the early days.

It was in January, 1918, 34 years ago, that Dr Bunnell published his first paper on surgery of the hand (3). A few weeks later we met and spent one entire day dissecting, discussing and operating. That day I will never forget. The friendship begun there has ripened with the years; the originality and skill which then betokened a surgeon of the most unusual potentialities have as they matured made Bunnell the accepted master surgeon of the hand ... his book is regarded as the bible of hand surgeons.

SEARCHER AND WRITER
Bunnell’s eager mind urged him to seek how things work, and this urge took shape in various explorations of the marine life of the California coast, the study of ornithology, comparative anatomy and other subjects. Eventually it led to the exploration of the functions of the hand and the complexities of intrinsic muscles, and helped to lay the foundation of a rational approach to reconstruction. The same grasping quality of his mind made him look for appropriate words when relating his observations. This gift for choosing the fitting word made his observations all the more poignant and his instructions more impressive. He revelled in teaching the interested and the attentive, and spared no pain or effort in dwelling upon the many facets of a particular point. Like his speech, his writing was vigorous and manly, and the many articles he published on the numerous phases of reconstructive surgery were compact and unpadded. This economy in his style of writing and compactness in expression made his writings all the more valuable, although they require more concentration than is customarily devoted to a casual perusal—a concentration which is indeed rewarding to the reader, as it helps him glean some of the approaches to a new method or a new technique.

Bunnell’s book on surgery of the hand is a classic in its own right (1). It was not really intended for a novice or a beginner. Like all his writings, the paragraphs are packed with facts and interjected with surgical aphorisms, some of which have become household words wherever hand surgery is performed. This textbook serves as an endless source of reference, and numerous quoted cases are all the more valuable because the analysis and treatment have been backed by years of experience and sober judgement.

During the Second World War, the Surgeon General of the United States Army, Norman T Kirk, was not happy with the handling of injuries of the hand in military hospitals. Knowing Bunnell’s interest in surgery of the hand, he persuaded him to become the Civilian Consultant to the Surgeon General. Kirk established nine hand centres in strategic areas throughout the United States; these were staffed by eager young surgeons, who, under the general supervision of Bunnell, began to apply the proper principles of treatment.

Bunnell threw himself into this assignment with great eagerness. He visited the various centres in turn, presenting clinics, discussing special subjects and operating on difficult cases. A special manual was created, which was issued to all units, stressing the principles of hand surgery. Bunnell continued his rounds for three years; it was his singleness of purpose, physical stamina, capacity for organization and inherent desire to share his experience that made this program an overwhelming success. He received the United States medal of merit for his efforts (4). This particular phase of Bunnell’s life as consultant was comprehensively documented in the volume on hand surgery in the Second World War (5).

General Kirk knew that Bunnell had been working on the textbook Surgery of the Hand for some years before the Second World War. After the war started, Kirk insisted that Bunnell finish this book as soon as possible. Bunnell had to complete it under pressure and some portions were not as polished as they ought to have been, for lack of time. However, when Surgery of the Hand appeared in 1944, it was acclaimed as a monumental work, and it is still regarded as the most authoritative book on hand surgery written by one man. By the end of the war, there were a couple of dozen trained hand surgeons in nine hand centres. It was inevitable that they would want to continue their association; persuaded by Bunnell, the Hand Society was born shortly after the war.

Bunnell suggested the formation of the American Society for Surgery of the Hand for the purpose of advancing the new specialty, to exchange these advances among the members and to propagate the correct principles of hand surgery. He was elected as the first president. Bunnell’s attitude to permit nonmembers to attend the annual meetings of the Society was a wise one. It encouraged the spread of correct principle to interested surgeons. The audience of nonmembers at the annual meetings often exceed the members many times.
EXPLORER AND NATURALIST

There are a number of outstanding features of personality and character that great surgeons have in common: resourcefulness, energy, imagination, deduction and willingness to share their knowledge. Often they are physically vigorous and tend to be as intense about their play as they are about their work.

Bunnell’s outdoor pursuits had started early in life and his interest in nature must have gone back to his childhood. As a young man, he spent a great deal of time studying the marine life around the California coast. He was an ardent ornithologist and so keen was his acquaintance with the birds of California that he could take census of the bird population ‘by ear’ while riding horseback through the forests of the Sierras (6).

Fishing and hunting were his constant weekend pursuits right up to his death. Sir Harold Gillies, the imaginative developer of plastic surgery in Great Britain, reported an interesting coincidence: his old friend Bunnell happened to be visiting Rooksdoun House on June 17, which happened to be Sir Harold’s birthday. When he discovered that it was Bunnell’s birthday also, they celebrated the event by going fishing on the river Test; an obvious diversion for two ardent fishermen, who looked at their respective specialties with fresh mind and fresh eyes (7).

His interest in wild game, however, was not that of a hunter, but rather that of an explorer and photographer. Bunnell was one of the few genuine naturalists and his knowledge about the flora and fauna was phenomenal. On one occasion in the early ’30s, while Bunnell and Mayer were on an outing in the Sierras and had spent several hours walking together through five or six inches of snow, Bunnell suddenly said to Mayer. “What would you do if you were lost here?; how would you survive?” Mayer was not quite sure. “What would you do?” he asked Bunnell, and the latter replied, “Just watch!” They came to a stream where Bunnell broke the thin ice on the river, waded into the centre of the pool, bent down and put his hand onto the river bed. After a few minutes, he brought out a 2 lb trout, relaxed in his hand. In amazement, Mayer said: “How did you ever do that?” Bunnell replied that he knew that when ice is formed, the fish sink to the bottom and lie in the river bed; all he did was tickle the belly of the trout until it relaxed, and then he brought it out of the water.

Bunnell demonstrated the use of the ancient art of ‘trout tickling’ that was practised in Scotland and other countries by poachers. Bunnell explained his action thus:
After you make a noise in a stream follow one fish and see where he goes: usually he will hide in the shadow of a log or between the rocks with his nose upstream. The thing to do is to gently and quietly put your hand in front of his nose and gradually slip the hand down under his belly. Then he will be tame and will not struggle.

Of special interest are his studies of the Alaskan bear. He spent two summers with a guide in the Alaskan wilderness, photographing numerous bears. He brought back magnificent coloured movies depicting the life of the bear, its feeding habits, salmon fishing and play habits. In addition, some of the films contained interesting vignettes of flora and fauna of the northern regions. One fall, he scaled the Colorado crags to photograph the big-horned mountain sheep during its mating season. He alluded to this in a letter of April 21, 1953 as follows:

Two years ago, Junior and I took pictures in the far north of Eskimos, Pribilof Island seals, reindeer, caribou, and flew over the Brooks Range which is a little south of Point Barrow, but found those wide open spaces full of tundra and high mountains to be rather barren of game for photography. My photography of animals has lagged of late as last year I had to go to England and Scandinavia and this year to South America. I have joined all of my bear pictures into one fine film and also have a good one of the big-horned sheep of Colorado.

His account of the plane crash was all the more gripping because it was told in a matter-of-fact fashion. When the plane went into a spin in the narrow Box Canyon, Bunnell said to himself, "a spin doesn't always kill", and as the plane zoomed to the ground, he resolutely turned off the ignition. His newspaper companion was killed; Bunnell had his hip broken and was treated by a local surgeon in San Francisco. His hip did not heal properly. In 1927, during an orthopedic meeting in Yosemite Valley, he was examined by Fred Albbee of New York, who concluded that he had non-union of the hip, which was later confirmed by a lateral x-ray. Fred Albbee and Leo Mayer persuaded Bunnell to come to New York, where both operated on him and Albbee did a bone graft on Bunnell's hip.

Bunnell used to demonstrate the efficacy of the Albbee graft at meetings by jumping on one foot, the grafted one. He always had a slight limp, but this did not stop him from operating or hunting to the very last day of his life. He could outwork and outwalk any young man.

Bunnell was as methodical and orderly in his daily life as he was in his surgical thinking. Moreover, he disliked waste in movement, in speech and even in the most basic things of everyday life. For instance, he used to peel off his coat, waistcoat, shirt and vest by undoing all the buttons first, then remove them en masse, as one piece, so that they were ready to be put back on again in the same smooth operation. He could not abide the bunch of keys that were required for his car, house and office. He had several keys specially welded into one unit, forming the shape of St Andrew's cross. This latter trait urged him to devise numerous tools and instruments to speed operative procedures or to ease an intricate manoeuvre. It also influenced his personal life, so he managed to be enviably orderly. For example, he would have three separate tables devoted to his various hunting and fishing gear, in full readiness, to be grabbed at a moment's notice, and each meticulously restored to completion at the end of each trip. His writing was similarly arranged, so that no time was wasted in reassembling pertinent articles and books as he resumed his work.

It is difficult to assess a man's character, especially as it grows and changes with time. Bunnell's originality came from his personal little challenges; he could not endure to be defeated by anything. When he started tendon surgery he had very good immediate results, but with time the tendons stuck. This was a personal challenge to Bunnell. However, if he was not interested in some subject it did not matter whether he was able to do well in it or not. Many thought that Bunnell was a great surgeon technically as well as in his originality of thinking because of his intimate knowledge of anatomy. His neck dissections were done with a scalpel that he used for rapid cleaning away of all extraneous tissue and laying out of nerves and other structures in a beautifully deft dissection, never laying down the scalpel until he was done.

Bunnell was never interested in personal gain, but had a dedication of purpose, a drive which made him strive for success. He came along at the right time, the period between two wars. There was a demand for opening of new frontiers.
Bunnell’s publications after the First World War helped to establish the fundamental principles of hand surgery. One of his basic concepts was that it was mandatory to restore sensibility and grasp in a ‘remnant’ of a mutilated hand if it was to be useful to the patient (9). This concept was enlarged by later hand surgeons (10). He was so much ahead of his time that it took a generation for these principles to be accepted by everyone.

After the Second World War a number of orthopedic, plastic and general surgeons became interested in the new and challenging specialty of hand surgery and frequently dedicated their entire practice to the upper extremity. While I was spending my year of apprenticeship with him, several surgeons came to visit Bunnell and to observe his approach in analyzing complex reconstructive problems. Among these were Guy Pulvertaft (England), Erik Moberg (Sweden), Radicci (Milan), Leonard Goldner (Duke University), J. Böhler (Linz, Austria); all have subsequently established hand centres of their own (11).

Bunnell started out as a very strict, demanding perfectionist; the degree of perfection that he demanded from everybody he also demanded from himself. By the time I came to know Bunnell in 1949, he was mellowed by the alchemy of time but had not relented in his demands for excellence. The year that I spent working under his guidance was an exciting experience. It was like retracing the steps on the frontiers of knowledge. This gave me a poignant appreciation of the creative forces at work.

It was not difficult to draw him out into talking or reminiscing about some aspect of hand surgery. He never tired of discussing the structure and function of the hand and inevitably would clear up an obscure point or crystallize a problem. Bunnell delighted in new ideas – his own or those of his associates – with joy.

Bunnell had a tremendous capacity for abstracting and applying ideas. His conversation would be studded with practical factual statements based on his wide surgical experience and startling knowledge of comparative anatomy. These aphorisms were compact, incisive and compelling: “Scar breeds scar: better an empty house than a poor tenant”; “To operate without a tourniquet is like trying to repair a watch in an ink well” or “When you have nothing, a little bit is a lot”.

These maxims were often heard wherever Bunnell’s book was read and where competent hand surgery was being performed.

When I was parting at the end of a very profitable year, Bunnell said to me: “We have a great task ahead of us: continuous improvement of the surgery of the hand and the training of young men to do high quality work.”

I took that admonition very seriously. Bunnell encouraged me to develop the relatively new area of congenital anomalies of the upper limbs and the reconstruction of joints (12,13). These endeavours and the teaching of the principles of hand surgery to medical students, residents and postgraduate students became a sustained tribute to his memory – a way of life.

REFERENCES