

Ethology - the Methodology That Works for TMD

Introduction

If one looks at G.V. Black as the prototype dentist at the beginning of the era of modern dentistry one sees a dentist who both cared for patients and did research as part of his activity using observational skills for both.

With the development of dental subspecialties many dentists began to supplement clinical skills with postgraduate training in such fields as biochemistry, physiology, microbiology and statistics to learn the methodology of scientific research.

In TMD study a diastema appears to be developing between clinicians who are involved in patient treatment and researchers involved in dental research. The dentist is either the artful clinical practitioner or the scientific experimental researcher. Certainly a person can do both but the subtle intellectual division is a belief that one does not do both simultaneously. Arguments such as whether malocclusion can cause a TMD typifies the schism present in the contemporary environment.

Ethology

In 1973, the Nobel Prize for Medicine was awarded to Tinbergen, Lorenz and Von Frisch for their studies utilizing ethological methodology. Ethology has been described as the study of animal behavior patterns, and Tinbergen in his acceptance speech referred to it as "the old method of watching and wondering" about how understanding of behavior can contribute to the relief of human suffering caused by stress.

A computer search of the Index Medicus since 1973 lists over 175 papers published in juried journals involving the ethological method. These papers are in such diverse medical or medical related fields as neurology, psychiatry, psychology, pharmacology, nursing, physiology, gerontology, and sociology.

Typically ethology involves observational studies designed to ascertain the significance of a behavior. Keen observation and accurate recording of data are usually necessary for a large heterogeneous population of the same species. Ethology as it relates to medicine is a search for the commonality of healthy behavior in terms of relating it to variants for purposes of understanding and effecting a cure. Recent studies involve such modern technology as videorecorders, microcomputers and software to facilitate the observation and quantification of data. The ethological method can be used to compare healthy subjects to unhealthy subjects in terms of secondary characteristics and can provide valuable adjuncts to conventional subjective clinical assertive schemes. Ethology is suited for examining such phenomena as pain, or other behaviors

unsuited to self-report methods. Similarly, chewing and swallowing are behaviors suitable to ethological study. Electromyography is used as a measuring tool for monitoring how sensory input effects motor behavior. EMG and electrokinematic analysis can be utilized in ethological study to understand the coordinated motor pattern of jaw function. Output of the basic circuit can be modified by TNS to produce motor patterns of improved behavior. In the correct neuromuscular protocol, various aspects of the patient's circuitry and motor function throughout treatment are compared to those established by that person at the initial examination, and proven biological principles are used to evaluate the results.

For an ethological study to be meaningful, it must pass the test of revealing facts about behavior which are universal to all healthy individuals in a group, community, species, etc. Secondary facts regarding aberrant behavior in terms of etiological variants may suggest ways of correction.

Sample size for the study is not always important. It is the reliability of the information. Tinbergen in his 1973 Nobel acceptance speech discussed two examples of how ethology contributed to the relief of human suffering caused by stress. He discussed his own work in the behavior of autistic children and the work of F.M. Alexander.

How Tinbergen came to give his speech on the work of Alexander is very interesting. The work of Alexander has particular relevance to TMD and will be the subject of another paper. Alexander, born in 1869 in Australia, was a Shakespearean actor who found himself losing his voice early in his career. Receiving no help from the doctors of that era, he resolved to study the problem himself. After nine years of careful observation of himself, Alexander came to realize that head balance had a tremendous effect on patterns of posture. He devised a method of restoring proper use of musculature.

The Alexander Technique is a method for using one's body at maximum efficiency and minimum stress. It has no similarity to chiropractic adjusting. It is taught by an instructor who uses gentle touch as a method of assisting sensory awareness of one's own posturing. It cannot be self-taught from a book. The Alexander Technique is a very sophisticated form of psychophysical re-education which is affected by teaching conscious inhibition of automatic habitual responses. Through sensory appreciation of what is "correct," improved use results. The technique does not involve relaxation, but rather a balanced state of rest in which the body is well-aligned. Alexander also found that correcting long term misuse of the body's muscles resulted in alleviation of many diverse somatopsychic problems such as migraine, asthma, arthritis, ulcers, high blood pressure and depressive states.

Alexander's work has held up to scientific scrutiny for almost 100 years. His was a valid ethological study of human behavior based on **SELF-OBSERVATION** which produced scientific principles applicable to all human beings, principles

which are still being taught and practiced all over the world. In medical science a single well studied case may seem statistically meaningless but can sometimes establish or refute a major clinical concept.

In ethological study each observation gives rise to the questions: "What is the causal structure, external stimuli and hormonal influence underlying the behavior? What is their effect on the nervous system and subsequently on the muscle system?"

Ethology -- the study of mastication and deglutition, the sensory physiology, neurophysiology, endocrinology and muscle physiology as innate behaviors and how healthy behavior relates to unhealthy, provides a logical paradigm for the study of temporomandibular disorders.

Clinical Ethology

In scientific research the purpose of an experiment is almost always to gain new knowledge. In clinical treatment the usual purpose is to reproduce the best results of successful therapeutic experiments of the past. In scientific research the investigator makes a hypothesis and then tests its validity under different conditions. In clinical treatment the experiment begins when the patient seeks aid for a medical problem, thereby volunteering to serve as a subject of therapy and choosing the time, place and clinician to serve as investigator.

By coming to a dentist the patient asks to participate in the reproduced experiment that is dental care. If asymptomatic, the patient hopes the experiment will prevent or suppress further development of disease; if symptomatic, he or she wants to get rid of symptoms or obtain the relief that will allow a normal life. Every principal of scientific design and appraisal of experiments can be applied as exact analogy in clinical therapy. The procedures used to accomplish each is drastically different however.

Every act of treatment is an experimental attempt to reproduce a successful result of the past. Thus treatment of human beings demands a methodology capable of defining and reproducing the conditions of past success. During the therapeutic activities of a single week a busy practitioner conducts more experiments than most research colleagues do in a year

For diagnosis, relevant clinical data are used to suggest a group of possible causative or associative disorders that account for the signs and symptoms. For prognosis and therapeutic strategy, clinical data are used to suggest groups of patients with the same disease. As stated by Weldon Bell, prognosis and therapy begin after diagnosis is established. For this process the clinician must contemplate previous patients he or she has seen with the same disease and whose other characteristics most closely resemble the patient being considered. The term for this process is called clinical judgement. The background for the

experience is called clinical experience and the clinician designs, observes and appraises his chairside experiment in treatments of TMDs.

Clinical experiences filed, tabulated and stored in the memory to be applied later in the reasoning process of clinical judgement are organized differently by each individual. This organized background of clinical experience is what distinguishes one from all other colleagues.

Like the results of laboratory experiments, the data of clinical therapy are inscribed in a "notebook." It is called the patient record, and it contains an account of the design maneuver and responses observed on the individual therapeutic experiments performed in that patient's clinical care.

From studying and analyzing a collection of such notebooks an investigator should be able to assemble the manifold data that shows the similarities, disparities, and variations of patients who constitute the spectrum of a disease and the results of the different therapeutic experiences to which the patients have been subjected.

Such an investigator can then evaluate the conditions associated with success or failure and decide how to improve future performance. Such method of investigation is called retrospective study. This is the clinical use of ethological methodology.

Retrospective studies of patient records with appropriate data can provide solutions to problems previously thought to be irremediable because of lack of understanding of the relevance of the data. As such, a good clinician can benefit from any inanimate measuring device which improves his sensory activity. Information obtained from electromyography, electrosonography and electrokinetic tracings analyzed properly in retrospective studies aid in providing a clinical classification that assesses what a specific disorder does to the patient and the effect treatment has on that disorder.⁷

Clinicians are capable of correlating the knowledge gained from such retrospective studies with proper instrumentation to better care for sick people. As conductors of such routine chairside experiments clinicians have hardly begun to exploit the opportunities for scientific investigation.

To consider an illness improved, clinicians must establish criteria by which to interpret changes in symptoms and signs besides the patient's subjectivity that "it still hurts" or "it doesn't hurt anymore." Interpretations and guesses can be replaced by appropriate measurements.

Clinicians and researchers who fail to make use of such diagnostic data obtainable by retrospective studies impede not only the humanistic heritage of dentistry but the scientific performance of treatment.

Conclusion

Ethological Methodology is applicable to the study of TMD. In matters of reasoning, the clinical judgement need not be a mystique, an intuition, or a subconscious unstructured process that is rationally amorphous and which cannot be expressed by accurate measurement of the behavior he observes and statistically analyzed like any scientific data.

In matters of observation, the clinician's qualitative and quantitative descriptions of kinematic behavior, joint sounds and muscle activity can be measured with scientific precision if they avail themselves of the technology to do so.

In matters of classification, the clinician can improve accuracy by establishing certain diagnoses not based only on nosology but on precise measurement of biologic variables.

Scientific measurement of the changes effected in the treatment of patients is clinical ethology. Retrospective studies to correlate these measurements with successful results and application of the information and principles established to future patient care increases clinical competence and improves clinical judgement.