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Radiofrequency: future applications for current knowledge

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Sir,

As surgeons, we must maintain the ability to be astounded in an era when it could become easy to accept the established as taken for granted. In science, old principles are the basis for groundbreaking advances. The electromagnetic field is an arbitrary classification of short and long waves created by charged electrons that, when accelerated, range from cosmic rays to electrical power [4].

D'arsonval, in the 19th century, used an electrical current generator to determine the principles and effects of electricity within the human body. Radiofrequency (RF), therefore, represents a modified electromagnetic tool that we revisit to allow new solutions to old problems. Thermal energy is an old and time-honored Hippocratic surgical technique; its application may result in damage but may also promote a healing process.

Traditionally, RF has been used to resect, coagulate, or ablate tissue. However, ablation of vital tissue is not the solution to all pathological conditions, and we have expanded our focus to include tissue repair. The application of RF in orthopedics goes back to 1928 when William Bovie and Harvey Cushing first described lifesaving thermal coagulation as a solution to uncontrolled bleeding. We are now entering the age of the understanding of growth factors; Mother Nature produces the call to awake healing, and cytokines promote repair at the site of an injury. The ways are still mysterious. We believe that RF may help to incite this mysterious phenomenon of a healing response and look forward to greater understanding of this tissue response to temperature.

Much RF investigation is at the basic science level. We apply RF to cartilage with uncertain results. Polemic or promissory, early results from some studies show a smoother chondral surface when thermal chondroplasty is compared to mechanical cutters such as shaver blades or basket devices. In addition, RF may seal minor fissures or

shrink degenerative cartilage of the patella, stabilizing the lesion. Additional investigation is required regarding the long-term results of thermal chondroplasty [3]. Meanwhile, current research is being pursued, and new young leaders emerge [2] to investigate safety as well as efficacy.

There is also evidence that the meniscus may be repaired if parameniscal synovial tissue is stimulated using RF, thus helping the meniscus to heal due to a "tide wave effect" of synovium "washing ashore" from the periphery. By rebooting torn tissue to initiate healing, RF may be combined with sutures or other fixation devices to creating a true hybrid system [1].

Tendinopathies may also respond to thermal treatment; RF can stimulate healing of degenerative tendons or apophyses [5]. Today, physicians and surgeons may provide a healing intervention that in the past required the operating room. Someday, as technology continues to improve, the RF generator may shrink to the size of a portable, low-wattage pen that may be used to treat tennis elbow or even shoulder tendonitis in a physicians office.

As humans are electrical beings, different wavelengths must be tested to determine the best wavelength of the electromagnetic field with which to stimulate damaged living tissue.

It is wonderful to be living in an orthopedic era where many wonders continue to arise. Surgeons, like children, should never resign their capacity to be astounded.

Sincerely,
Rafael Inigo Pavlovich

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