

Medical Journals Should Be a Forum for Disruptive Research



Abstract: Disruptive innovation completely changes the traditional way that we operate and may only be realized in retrospect. For example, shoulder superior capsule reconstruction (SCR) is a complete change from the traditional methods of treating massive, irreparable rotator cuff tears and pseudoparalysis. Classic examples of disruptions in orthopaedic surgery include distraction osteogenesis, total hip joint replacement arthroplasty, and modern orthopaedic trauma care. Orthopaedic technologies that promise future disruption include artificial intelligence, surgical simulation, and orthopaedic biologics, including mesenchymal stromal cell (MSC) and gene therapy. Most of all, arthroscopic surgery completely changed the way we operate by using new methods and technology. Many never saw it coming. The challenge going forward is to motivate and foster new ideas and research that result in innovation and progress. Skepticism has a place, but not at the expense of transformative ideas, particularly as medical journals offer the alternative of prospective hypothesis testing using the scientific method, followed by unbiased peer review, and publication. Medical journals should be a forum for disruptive research.

Disruption (business): "The action of completely changing the traditional way that an industry or market operates by using new methods or technology"

–The Cambridge Dictionary¹

The term “disruptive innovation” was first popularized by Bower and Christensen, who identified a failure of leading companies to remain at the top as technologies or markets change.² A contemporary example of disruptive technology could be Web-based video applications, such as Netflix, which have changed the way people experience television and movies. On the other hand, while ride-sharing companies like Uber may eventually displace traditional taxi companies, ride-sharing companies have not completely changed the way the industry operates; rather, the companies have upgraded the technology, but we still summon a car. That said, disruptive innovation occurs stealthily and may only be realized in retrospect.

As with the examples above, we acknowledge that some may disagree with what we define as disruptive or not disruptive. Bearing in mind this caveat, from our point of view, surgical techniques are frequently modified, but most modifications do not “completely” change how we operate. For example, “new” ACL techniques, such as double-bundle,³ anatomic,⁴ all-

inside,⁵ or new graft options,⁵ or preparation methods,⁶ seem like refinement rather than disruption. “New” soft tissue-to-bone fixation implants, such as those used in shoulder surgery, may allow us to operate with greater facility, but have not “completely” changed what we accomplish.⁷ In contrast, among recent surgical innovations, we find shoulder superior capsule reconstruction (SCR) to be a “disruptive technology”; this new surgical technique is a complete change from the traditional methods of treating massive, irreparable rotator cuff tears and pseudoparalysis like tendon transfer or reverse total shoulder replacement.⁸ Classic examples of disruptions in orthopaedic surgery⁹ may include the technique described by Ilizarov for distraction osteogenesis,¹⁰ innovations leading to successful total hip joint replacement arthroplasty credited primarily to Charnley,¹¹ and the introduction of modern orthopaedic trauma care and education by the AO Group founded by Müller, Allgöwer, and Willenegger.¹² Examples of orthopaedic technologies that hold promise for future disruption include artificial intelligence,¹³ surgical simulation,¹⁴ and orthopaedic biologics, including mesenchymal stromal cell (MSC)¹⁵ and gene therapy.¹⁶ Again, here, time will tell.

And “time will tell” is telling. Innovators responsible for critically disruptive medical breakthroughs were initially ridiculed by their peers. Gruntzig, the German cardiologist responsible for developing the concept of balloon angioplasty produced the initial device in his kitchen.^{17,18} When he first presented his idea to his peers, he was told “it will never work” and “never

happen in my hospital.”¹⁷ When Warren and Marshall announced that, in addition to stress, *Helicobacter pylori* infection could lead to peptic ulcer disease, Marshall was pushed to infect himself and undergo gastric biopsy to finally prove his point; ultimately, he was awarded the Nobel Prize.¹⁹

This brings us to *Arthroscopy*, our journal; arthroscopy, our field; and AANA, the Arthroscopy Association of North America. The complete history of AANA; arthroscopy; and *Arthroscopy* (not to mention *Arthroscopy Techniques*, and *Arthroscopy, Sports Medicine, and Rehabilitation*) is for another day and will fill volumes. The names and accomplishments of arthroscopic disruptors are too numerous to mention, and attempting to do so risks failing to be comprehensive. Thus, in brief: In Japan, Watanabe initiated a revolution when he adapted and introduced the “Number 22 Arthroscope,” the first ultrathin, fiberoptic endoscope, into the knee joint.²⁰ Jackson, of Toronto, visited Watanabe, and both figuratively and literally brought arthroscopy to North America.²⁰ Jackson and his colleagues eventually formed AANA, promulgated arthroscopy as a result of their founding teaching mission, and established the *Arthroscopy* journal. Their efforts were met with criticism and scorn every step of the way.²⁰ Rockwood is credited with asking: “*Why look through the keyhole when you can open the door?*” and denouncing arthroscopy as an “*instrument of the devil.*” Later, in more measured tones, Dr. Rockwood did not hesitate to publish that “*the use of the arthroscope for operative procedures is still in the developing stages; its use should be considered as a research tool and remains controversial.*”²¹ This was in the *Journal of Bone & Joint Surgery* in 1988; talk about failing to recognize disruption!

The rest is history—our history. Arthroscopic surgery is a classic example of disruptive innovation. Without a doubt, arthroscopy “completely” changed the traditional way we operate by using new methods and technology. Andrews identifies the arthroscope as “the major milestone” that “revolutionized sports medicine.”²² And, to be fair to Dr. Rockwood, many never saw it coming. Thank goodness for AANA and our visionary, unapologetic, unrelenting, founding, disruptive leaders.²³

Recently our Swiss colleagues have created the Meyer Award to support “disruption in orthopedics” and to award those who forswear “me too” research in favor of research that truly “change(s) the destiny of musculoskeletal patients.”⁹ The challenge is to motivate and foster new ideas and research that result in innovation, progress, and new and better methods and technology. We fully support this intention that honors and continues the *Arthroscopy*, arthroscopy, and AANA tradition.²⁴

Let us learn from the errors of the past. Healthy skepticism has a place, but not at the expense of potentially transformative ideas. There is no place for ridicule, particularly as medical journals offer as an alternative, prospective hypothesis testing using the scientific method, followed by unbiased peer review and publication.²⁵ While many fail to recognize disruption and are “late to the party,” we are eager to provide a forum for future paradigm shifts.²⁶ Medical journals should be a forum for disruptive research.²⁷

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