ELSEVIER

THE JOURNAL OF
MINIMALLY INVASIVE
GYNECOLOGY

Clinical Opinion

When Will Video-assisted and Robotic-assisted Endoscopy Replace Almost All Open Surgeries?

Camran R. Nezhat, MD, FACS, FACOG*

From the Center for Special Minimally Invasive and Robotic Surgery, Stanford University, Palo Alto, CA.

ABSTRACT This article traces the development of laparoscopy, and establishment resistance to its emergence as the technique to replace almost all laparotomies. Journal of Minimally Invasive Gynecology (2012) 19, 238–243 © 2012 AAGL. All rights reserved.

Keywords: Endoscopy; Keyhole surgery; Laparoscopy; Laparotomy; Laser surgery; Minimally invasive surgery; Robotic surgery; Robotic-assisted laparoscopy; Video-assisted endoscopy; Video-assisted laparoscopy

DISCUSS You can discuss this article with its authors and with other AAGL members at **http://www.AAGL.org/jmig-19-2-11-00587**

Use your Smartphone to scan this QR code and connect to the discussion forum for this article now*

* Download a free QR Code scanner by searching for "QR scanner" in your smartphone's app store or app marketplace.

Jacobaeus performed the first successful series of operative laparoscopies in 1910 [1]. The introduction of the scope into an area once thought inaccessible seemed to captivate the world, and soon the fledgling new field of laparoscopy was on the ascendancy [2–5]. So enthralled were many during this early 20th century heyday that soon the literature was teeming with soaring superlatives, with one early enthusiast describing laparoscopy as "the fulfillment of a dream" [6]. Interest in the new field was said to have been so piqued that by the 1930s, concerns about overenthusiasm arose [2]. Voicing such cautionary sentiments well was C. Abbot Beling [7], a successful laparoscopist-internist from New Jersey, who noted in 1941 that "Miracles were wrongly hoped for in situations where the use of the peritoneoscope was not indicated."

Such optimism was not unwarranted because most immediately realized the new technology had the potential to end at last the practice of exploratory laparotomy, the procedure it was designed to replace, bemoaned by endoscopists since at least 1898, and one that mid-20th century laparoscopist John Ruddock [8] declared "should be condemned."

Then all was quiet on the laparoscopic front [2]. Like clockwork, it seems, the repeating pattern of institutional inertia began anew, bringing innovation to a withering halt, an effect plainly evident when one considers that until the early 1980s, operative endoscopy had essentially progressed no further than the same procedures introduced earlier in the century: draining cysts, lysing adhesions, biopsying, and coagulation of neoplasms [2]. As for one of gynecology's most advanced laparoscopic procedures until the early 1980s, tubal sterilization, got its start decades earlier when Boesch, a Swiss surgeon, performed the first laparoscopic tubal sterilization in 1936 [9].

Indeed, with the exception of contributions from the 20th century's few virtuosos, including Bruhat, Cohen, Frangenheim, Gomel, Manhes, Palmer, Semm, and Steptoe, the entire discipline of gynecologic operative laparoscopy seemed stalled.

Such arrested development was not the exclusive domain of gynecology. By the end of the 1970s, laparoscopy in general surgery had essentially advanced no further than liver biopsy, the same procedure that Germany's Heinz Kalk and Carl Fervers had achieved in the 1930s [2,10,11].

The Price We Pay for Institutional Inertia

In terms of the toll on human lives, the cost of such delays in advancing minimally invasive surgery is not so readily apparent, especially since they occurred in a forgotten past that

The author has no commercial, proprietary, or financial interest in the products or companies described in this article.

Corresponding author: Camran R. Nezhat, MD, FACS, FACOG, 900 Welch Rd, Ste 403, Palo Alto, CA.
E-mail: cnezhat@stanford.edu

Submitted December 23, 2011. Accepted for publication December 23, 2011.
Available at www.sciencedirect.com and www.jmig.org

1553-4650/$ - see front matter © 2012 AAGL. All rights reserved.
doi:10.1016/j.jmig.2011.12.026

invariably fades from our memory like a fleeting aberration. Yet, when comparing surgical outcomes of today with those from just 30 years ago, we can see that the price paid was staggering, in particular for those with chronic disorders, which can require multiple surgical interventions to treat. For example, before endoscopy, female patients with chronic disorders such as endometriosis often had no choice but to undergo multiple laparotomies to treat sometimes only minimal disease. Research centers such as the World Endometriosis Research Foundation estimate that as many as 170 million women worldwide have endometriosis. By this example alone, we can see that the hidden cost of our collective inertia may have adversely affected millions of lives [12]. And so it was that worldwide, in all surgical disciplines, shock-inducing incisions were made in treating what sometimes were the mildest of maladies [10].

"Sometimes Good Things Fall Apart So That Better Things Can Fall Together" *[Jessica Howell]*

Like disruptive technologies are apt to do, the introduction of endoscopy called into question nearly 2 centuries of cherished traditions, ushering in the inescapable new reality that 170 years of surgical norms were no longer optimal care and that large incisions were not only unnecessary in most cases, but they often risked causing even more chronic pain and morbidity than the original illness.

After witnessing outcomes that seemed nothing short of miracles, even for notoriously difficult surgeries such as bowel, bladder, or ureter resection or reanastomosis; radical hysterectomy; advanced ovarian cancer; pelvic and paraaortic lymph node dissection; sacral colpopexy; management of ovarian remnant syndrome; and laparoscopy in advanced pregnancy, in 1990, our team could not help but proclaim that "In 20 years, major abdominal surgery will be nearly extinct." Carrying on with our unabashed declaratives, we went on to state that with endoscopy "You can see better; and if you see better, you can do better," noting too that "Wherever in the body a cavity exists or…can be created, laparoscopy is indicated and probably preferable. The limiting factors are skill and experience of the surgeon and the availability of proper instrumentation" [13–26].

What we failed to foresee, however, was just how many epic academic brawls would ensue as a result of this unwelcome threat to the entire order of things [27–32]. In the early 1980s, for example, one reviewer lambasted our first manuscript to bits, declaring in no uncertain terms that "The authors' [Nezhat et al] recommendation to operate on the monitor instead of looking through the laparoscope is dangerous and irresponsible. It could lead to severe complications and death of…patients. Only 1 out of 200 surgeons might be able to operate on the monitor and off the images the way Nezhat recommends" (personal communication). In the late 1980s, another reviewer found our first report on laparoscopic bowel resections so unconscionable that he could barely contain his ire, calling the entire enterprise "barbaric" (personal communication).

Even after collecting years of sound clinical data [2,4,34–52], video-assisted endoscopy continued to be the subject of nearly universal derision for most of the 20th century, dismissed as a glitzy gimmick of sorts, an implausible bubble just waiting to burst into oblivion [14,53–60].

The Moment of Reckoning Is Finally Here

It was only after overwhelming evidence in favor of the new surgical philosophy accreted to a point where it became impossible to ignore that open surgery was finally subjected to more rigorous critical analysis, a nearly 30-year process that ultimately has led to its worldwide downfall as the criterion standard of surgery [2,13]. More remarkable, even with elderly, pediatric, obese, emergency, and oncologic patients, in whom video-assisted endoscopy had remained staunchly contraindicated for most of the 20th century, a breathtaking reversal has occurred as physicians in these fields are now beseeching their colleagues to phase out overreliance on large incisions and embrace video-assisted endoscopy as their criterion standard of choice [2,13,61–65].

Even the most advanced laparoscopic procedures, those referred to as imprudent and infeasible for most of the 20th century [66], are now considered so superior to laparotomy that the *New England Journal of Medicine* dedicated an entire editorial on the subject, noting that "Technological advances, which are followed by long periods of catch-up while clinicians learn how to use the new techniques appropriately, often precede true medical progress. Early on, surgeons were hampered by having to steady the laparoscope with one hand and look through a small lens while performing surgery with the other hand. Advances in laparoscopic surgery were facilitated by a series of innovations that allow true video surgery, in which two surgeons work together with both hands to perform operations. Surgeons must progress beyond the traditional techniques of cutting and sewing…, to a future in which…minimal access to the abdominal cavity [is] only the beginning" [59]. How ironic that the procedure of laparoscopic colectomy referenced in this editorial, the same one first presented at the American Fertility Society in 1988, was the very procedure referred to as "barbaric" just a few years ago [29,31,33,67,68].

Critical Reappraisal

Perhaps of greatest significance, the introduction of minimally invasive surgery is catalyzing a long-overdue moment of reckoning, when all surgical traditions are finally being held to the light of scrutiny. For example, with the new minimally invasive philosophy leading the way, emphasis on sparing reproductive organs is becoming the norm in gynecology, rather than the exception. Another profound effect has been the way video-assisted endoscopy has revolutionized our understanding of anatomy. Just through these new