

Gastrointestinal endoscopy- An emerging soft power in health care

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Abstract

“Soft power” is a relatively new concept that describes an entity’s ability to influence and alter the behavior of other entities through attraction and co-option, in contrast to hard power which uses incentives and coercion. Assessment of the role of GI Endoscopy in present day’s health care shows it to have the required attractive and influential properties of a soft power. In this article we examine the diagnostic and therapeutic roles that GI endoscopy, as a soft power, has taken over, and the further evolution of this field into a smart power.

Key words

Gastrointestinal endoscopy, natural orifice transluminal endoscopic surgery, radiology, soft power

The Concept of Soft Power

Power in philosophical context is a measurement of an entity’s ability to control its environment, including influence the behavior of other entities. Soft power is the ability to obtain what one wants through co-option and attraction in contrast to ‘Hard Power’, that is the use of coercion and payment. *Soft Power* is the term used in international politics to describe a country’s ability to influence and alter the behavior of others through co option and attraction. The term was coined by *Joseph Nye* of Harvard University in 1990 in his book, *Bound to Lead: The Changing Nature of American Power*. He further developed the concept in his 2004 book, *Soft Power: The Means to Success in World Politics*. The term is now widely used in international affairs by analysts and statesmen.^[1] Soft power represents behavioral way of getting the outcomes you want. Soft power is contrasted with hard power, which has historically been the predominant realist measure of national power, through quantitative metrics such as population size, concrete military assets, or a nation’s gross domestic product.

Soft Power is attractive power and the resources are the assets that produce such attraction.^[2] The primary currencies of soft power are an actor’s values, culture, policies and institutions—and the extent to which these “primary currencies”, as Nye calls them, are able to attract or repel other actors to “want what you want.”

The Soft Power of Medicine

Medical assistance undertakings have a long history of engendering positive international relations and fostering domestic stability. Global health diplomacy is part of the “new diplomacy” agenda by which foreign policy, since the end of the Cold War, has expanded to embrace new issues, new actors and new processes.^[3] Medical diplomacy is the collaboration between countries to improve relations and simultaneously produce health benefits. Medical diplomacy advocates the use of health care for furthering foreign policy goals. It is a form of soft power that has major benefits and garners symbolic capital (prestige, good will, and influence) for both countries involved and should be seen as a model for international relations.

Brazil has been particularly adept among so-called BRIC (Brazil, Russia, India and China) nations at using a gently persuasive form of ‘soft power’ diplomacy—and the country is using public health issues in particular to leverage long-term economic and political gain.^[4] Brazil’s HIV/AIDS policy is probably the best example of what some experts have dubbed the country’s ‘health industrial complex’. The export

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and training of doctors by Cuba, NATO's Medical Stability Operations in Afghanistan and Iraq,^[5] the deployment of hospital ships by China, to supplement a longstanding practice of sending medical teams to Africa and Asia, and South Korea's commitment to double its aid to Africa by 2012, are more recent examples. An understanding of how emerging economies are engaging in global health diplomacy tells us much about the changing nature of global leadership.

When the Obama administration took over in 2009, they recognized that soft power, to change minds, build legitimacy, and advance interests, was the key element missing from the recent U.S. approach to the world.^[6] There was a change from the use unilateral military action against countries like Iran and Afghanistan, to the use of soft power, through deployment of medical aid in these war ravaged countries. The US\$63 billion, 6-year Global Health Initiative under the Obama Administration fits within this approach.

India has always been a country with tremendous 'soft power' because of its culture and civilization links—its large diaspora, popular films, music, art and historical and cultural links with several countries around the world all contribute to its soft power. The health industry's contribution to India's soft power and the role of the Indian Diaspora in the global health industry is well known. Medical tourism, a growing sector in India, is expected to experience an annual growth rate of 30%, making it a \$200 billion industry by 2015.^[7] As medical treatment costs in the developed world balloon more and more Westerners are finding the prospect of international travel for medical care increasingly appealing. The Indian Health Industry is expected to *attract* an estimated 150,000 patients to India for low-priced healthcare procedures every year.

GI Endoscopy as an Emerging Soft Power

Gastrointestinal Endoscopy as an accurate diagnostic and efficient therapeutic tool has emerged as an indispensable part of modern health care. The increasing influence of GI endoscopy by means of "attraction and cooption" on allied medical specialties is leading to softly achieve "want what you want", overall improving the quality of health care [Figure 1].

GI endoscopy and radiology

Radiology has been the first to experience the influence the power of endoscopy. The superiority of endoscopy has resulted in a slow decline of conventional barium studies during the past 25 years. With the endoscopic capability of direct visualization of luminal mucosal lesions, the conventional barium studies become increasingly obsolete in mucosal pathology. However, barium studies augment endoscopy in evaluating submucosal and extrinsic mass lesions and for assessing GI function and motility from the pharynx to the anorectal junction. Endoscopic tools, upper GI endoscopy

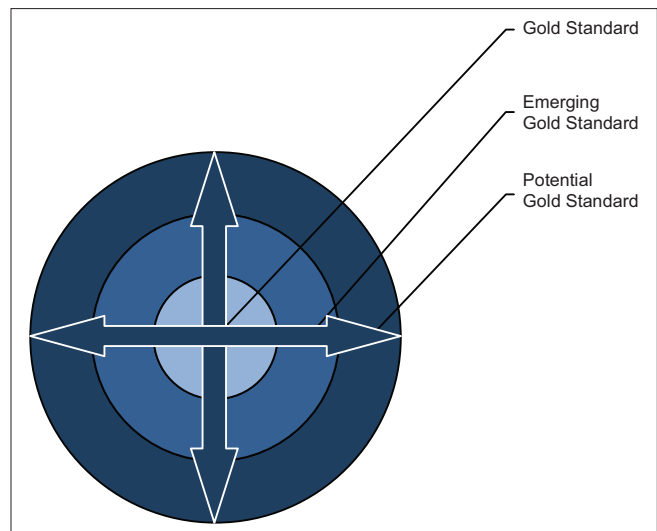


Figure 1: GI Endoscopy as an emerging soft power

and colonoscopy, have largely taken over from barium studies, as the investigation of first choice, for the evaluation of the proximal and distal gastrointestinal tract.^[8] In the traditional small bowel grey zone, enteroscopic evaluations are becoming the gold standard but contrast studies still serve as road maps augmenting the results and decreasing the morbidity associated with these procedures.^[9]

Soft power can be exemplified in the concept that endoscopy has not totally taken over radiology but has resulted in "attraction and co-option". Virtual endoscopy and colonoscopy have been designed and are in use by radiologists, based on the concept and images obtained by the intraluminal examination using an endoscope.^[10] Also, the help of fluoroscopy, a radiologist's domain, is frequently required in and it often forms an essential part of endoscopic examinations like ERCP and enteroscopy. Endoscopy and radiology work complementing each other for the investigation of areas with difficult access, as in the evaluation of a patient with obscure GI bleed. Collaboration between the two fields is often required for treatment of complex ailments, best illustrated by the *rendezvous* procedure performed for bile duct pathologies^[11] and recently EUS guided pancreatic drainage procedures.

GI endoscopy and pathology

Modern pathology relies on its core instrumentation, the microscope, with high-powered, high-resolution lenses, which allow optical inspection of cellular structure. Until recently, this has been the exclusive domain of ex vivo microscopy. Over the past three to four years, endoscopic flexible optical instruments have reached a level of magnification, resolution, and in conjunction with specific staining methods, contrast to directly visualize cellular and sub-cellular structures similar to that of ex vivo microscopy. Optical magnification up to 400-fold was integrated into moderate endoscopes in Japan in the 1990s, and together with the use of topical and vital stains, increased the ability to see detailed mucosal structures

such as colonic pit patterns as well as variable contrast uptake between normal and neoplastic cells.^[12] Most recent advances in endoscopic optical imaging reach the threshold of 1,000-fold magnification and less than one micron resolution, on par with most traditional ex vivo microscopes. The standard endoscopes now available use high-definition optics with optical filtering or color enhancement methods (e.g., Narrow Band Imaging (NBI), Fujinon Intelligent Color Enhancement and iScan), which substantially improve the contrast between normal and disease tissues.^[13] Recent advances extend the ability to directly visualize cells and subcellular structures.

The ability to precisely locate and classify neoplastic tissue *in vivo* has the potential to dramatically improve the efficiency and methods with which we can treat conditions of the colon, the esophagus, the colon and, more recently, the bile duct. Although, ex vivo microscopy still remains the reference standard, *in vivo* microscopy helps in identifying the representative tissue that needs to be targeted for biopsy. Also, a more confident ex-vivo microscopy may result in a diagnosis-and-discard strategy thereby resulting economy in the utilization of pathology services.

The next generation endoscopes with capacity for *in vivo* histological evaluation have not only helped in identifying targets for a better biopsy, but has also helped in decision making during surgery. On table surgical decisions have lead to one-stage diagnosis and therapy. Real time identification of malignant tissue, both in laparoscopic and in open surgeries, has helped in diagnosing disseminated disease,^[14] in revision of resection margins,^[15] and in the performance radical surgeries.

GI endoscopy and surgery

The role of surgery has been increasingly taken over by the interventional endoscopy in the treatment of a variety of disorders. The less invasive nature coupled with equivalent results is leading to emergence of new endoscopic gold standards.^[16] While for many disorders, endoscopy has completely replaced surgery as the therapeutic mode of choice, in other disorders, it is in active collaboration with surgery as a curative/palliative alternative [Table 1].

The Table 1 presents, though not an exhaustive list, is a fair representation of increasing role of therapeutic endoscopy in the treatment of a variety of disorders. The easy access to the lumen of the digestive tract and the development of various accessories has allowed the endoscopy to become the first intervention to arrest the bleeding from any part of the intestine. Development in stent technology has provided a preferred minimally invasive option, when compared to surgery, for palliation of malignant obstruction in the gastrointestinal and the biliary tracts. Endoscopy is also the first modality of choice for removal of intraluminal pathology, be it a foreign body in the esophagus, a stone in the bile duct or an early cancer/polyp of the proximal or distal intestinal tract. Also, the endoscopic rescue procedures for postoperative complications, as in post

cholecystectomy biliary leaks/strictures, post bariatric surgery leaks, oversized stomas, strictures, post liver transplant biliary leaks seems to have enormous endoscopic soft influence on surgical practice.

Last decade has seen flexible endoscopy exploring the possibility of breaking through the barrier of the intestinal wall.^[44] The combined efforts of GI Endoscopists and Laparoscopic surgeons have seen the emergence of NOSCART as a separate specialty.^[45] Natural Orifice Transluminal Endoscopic Surgery (NOTES) involves a group of new path breaking approach

Table 1: Comparative role of surgery and endoscopy in the therapy of various gastrointestinal disorders.

Organ	Disease condition	Role of endoscopy(E) vs surgery(S)
Esophagus	Barrett's Esophagus ^[17]	E>S
	Esophageal Varices ^[18]	E>S
	Gastrointestinal Foreign Bodies ^[19]	E>S
	Benign Esophageal Strictures ^[20]	E>S
	Palliation of Malignant Esophageal Strictures ^[21]	E>S
	Zenker's Diverticulum ^[22]	E>/=S
	Postoperative Upper Gastrointestinal Leaks ^[23]	E>S
	GERD ^[24]	E<S
	Achalasia Cardia ^[25]	E>/=S
Stomach	Peptic Ulcer Bleeding ^[26]	E>S
	Gastric Varices ^[27]	E>S
	Portal Hypertensive Gastropathy ^[28]	E>S
	Pyloric Stenosis- Benign ^[29]	E<S
	Palliation of Pyloric Stenosis- Malignant ^[30]	E>S
	Early Gastric Cancer and Gastric Tumors ^[31]	E>S
	Obesity ^[32]	E</=S
Small Intestine	Small Bowel bleeding ^[33]	E>S
	Small Bowel Polyps ^[33]	E<S
Biliary	Common Bile Duct Stone ^[34]	E >/=S
	Benign Biliary Strictures ^[35]	E</=S
	Palliation of Malignant Biliary Strictures ^[36]	E>S
	Biliary Complications after Liver Transplantation ^[37]	E>S
Pancreas	Chronic Pancreatitis ^[38]	E</=S
	Pseudocyst ^[39]	E=S
	Pancreatic Necrosis ^[40]	E</=S
Large intestine	Colorectal Polyps ^[41]	E>S
	Early Colorectal Tumors ^[41]	E</=S
	Angiodysplastic/Diverticular Bleeding ^[42]	E>S
	Palliation of Malignant Obstruction ^[43]	E</=S

to the abdominal cavity, with potential advantages over conventional laparoscopic surgery. There has been growing interest in NOTES, which has translated exciting bench side animal research to bed side clinical work. Increasing number of publications of feasibility and safety of various complex surgeries including some preliminary randomized controlled trials likely to see the emergence of NOTES as soft alternative to surgery in line with evidence based medicine. The spinoff of this has been the evolution of various hybrid techniques, technology and instrumentation. Combined endoscopy and laparoscopy procedures seem to decrease the overall morbidity in certain procedures.^[46] The combined efforts have led to Natural orifice being used for extraction of large specimens following major laparoscopic procedures *viz* NOSE.^[47]

GI endoscopy on other specialties

The extension of endoscopy to bed side diagnosis and therapy in the intensive care units has earned endoscopy enormous soft power over the fields of cardiology, nephrology, neurology etc. Bed side diagnosis and therapy of bleeds, insertion of enteral feeding tubes (Naso gastric, naso jejunal and PEG, PEJ tubes) have decreased the overall mortality, morbidity and increased the QOL in these emergency health care.

GI endoscopy and basic sciences

Molecular imaging is a rapidly growing new discipline of gastrointestinal endoscopy that involves the development of novel imaging probes and instruments to visualize the molecular expression pattern of mucosa in the digestive tract. It possesses the potential to have a significant effect on the existing diagnostic and therapeutic paradigms. Molecular imaging encompasses different methods that enable the visualization of disease-specific morphologic or functional alterations of the mucosa based on the molecular signature of individual cells.^[48] This development has been made possible by advancements in basic science coupled with technological innovations in endoscopy, both facilitating the identification and characterization of mucosal lesions *in vivo* based on the lesions' molecular composition rather than their morphologic structure alone.

Several platforms for imaging agents, including antibody and peptide, are being developed to target over expressed biomolecules in cancer. In addition, technical advances in fluorescence microscopy techniques including laser scanning techniques, fluorescence-resonance energy transfer (FRET) microscopy, fluorescence lifetime imaging (FLIM), stimulated emission depletion (STED)-based super-resolution microscopy, scanning confocal endomicroscopes, thin-sheet laser imaging microscopy (TSLIM), and tomographic techniques such as early photon tomography (EPT) as well as on clinical laser-based endoscopic and microscopic techniques have helped in the development of better diagnostics in endoscopy. Novel studies based on fluorescent antibody imaging pave the road toward clinical translation and give hope for improved diagnosis and targeted therapies in gastrointestinal diseases.^[49] By topically applying fluorescent probes that

target specific cell-surface receptors to dysplastic epithelium during endoscopy, a variety of receptors can be visualized, and the response to treatment can be monitored in real time. This technique can mitigate the limitations of current surveillance protocols, allow for improved cancer detection, and be used for personalized treatment in the future.

GI Endoscopy – From Soft Power to Smart Power?

Cardiology has been the highest burden for the exchequer on the public sector but is the highest revenue generating specialty on the private sector. This is understandable given the high incidence of cardiovascular diseases worldwide. However, GI Endoscopy seems to be on the fast track mode. For example, in 2007, GI Endoscopy and Gastroenterologists contributed to 0.06% of Australia's total GDP, compared to 0.05% contributed by the Cardiologists. The wider availability of endoscopes, the increase in the number of trained endoscopists, the huge support from the technological industry and the insurance companies, and the minimally invasive nature of complex endoscopic procedures mean that GI Endoscopy is fast becoming an expanding revenue generator for the health industry.

Smart Power is a term in international relations defined by Joseph Nye as “the ability to combine hard and soft power into a winning strategy.” Smart power involves essentially the engagement of both military force and all forms of diplomacy.^[50] Preliminary evidence shows Gastrointestinal Endoscopy as an Emerging Soft Power in Health Care. The cooption ability of GI Endoscopy is seen as the factor responsible for the emergence of GI Endoscopy as a Soft Power in Health Care. Newer specialties like Bariatric Endoscopy, Metabolic Endoscopy, Robotic Endoscopy, Endoscopy and Basic Sciences are specialties which would have a significant impact on health care. Having amassed soft power, with the support of the technology industry, GI Endoscopy seems to be spearheading to becoming a Smart Power.

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