



Short communication

Laparoscopic surgery for gynecologic cancer in low- and middle-income countries (LMICs): An area of need

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ABSTRACT

Over 90% of people living in low- and middle-income countries (LMICs) do not have access to surgical care. In the absence of appropriate surgical care, there is high morbidity and mortality from surgically curable diseases, such as cervical cancer. Laparoscopic surgery for gynecologic cancer in LMICs is extremely limited. The benefits of laparoscopy over open surgery are even more pronounced in LMICs than in resource-rich countries. Barriers to implementation of laparoscopic surgery in LMICs should be identified and addressed in order to improve global cancer care and the lives of women worldwide.

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4.8 billion people do not have ready access to surgical services. In low- and middle-income countries (LMICs), this disparity is most profound with over 90% of people unable to access basic surgical care. One third of the world's population lives in a LMIC, but only 6% of surgical procedures occur in these areas (Alkire et al., 2015). In the absence of appropriate surgical care, there is high morbidity and mortality from treatable diseases, such as cervical cancer. The World Health Organization as well as the *Lancet* Commission on Global Surgery have been explicit in calling attention to the need for improved surgical care in the world's poorest countries (Rose et al., 2015). There is growing consensus that surgical capacity building must become a priority of global health interventions (Meara et al., 2016). Investing in basic surgical services and essential surgical care will be the next large focus of improving healthcare systems in LMICs (Verguet et al., 2015). As this is accomplished, infrastructure will be enhanced and so will the desire to perform minimally invasive surgery, as the benefits of such operations are clear.

Surgery is the cornerstone of management for many gynecologic malignancies. The global incidence of cancer and cancer-related deaths is rising, with a disproportionate burden in LMICs. For example, 84% of worldwide deaths from cervical cancer occur in a LMIC (Jemal et al., 2011). Cervical cancer is one of the leading causes of cancer deaths among women in LMICs, despite it being a surgically curable disease if identified early. Access to surgery is essential to the proper functioning of a healthcare system and critical to meeting global goals for the treatment of cancer.

As an effort is put forth to increase surgical capacity globally, there must be a congruent aim towards safety and quality. The benefits of laparoscopy as compared with laparotomy have been well described. Laparoscopic surgery has been shown to decrease surgical blood loss, reduce rates of wound complications, decrease post-operative pain, and quicken recovery time (Chao et al., 2016). In the United States, laparoscopic surgery has been driven by patient demand, physician competition, and hospital administration. Over the last three decades, there has been an increase in uptake of laparoscopy among gynecologists and gynecologic oncologists in developed countries. Currently, laparoscopy is not widely available in LMICs. Access and adoption of laparoscopic surgery is variable in both developed countries and LMICs and within a given country. Laparoscopy may be feasible, cost-effective, and have enhanced benefits in resource-limited settings. Perioperative mortality in LMICs ranges from 5 to 10% compared with <1% in resource-rich settings (Gawande et al., 2009). The majority of perioperative deaths in LMICs are due to anesthesia complications, infections, and hemorrhage (Gawande et al., 2009). In LMICs where sanitary living conditions and access to clean water are suboptimal and blood banks are scarce, laparoscopic surgery may help reduce morbidity and mortality from surgery. However, the cost of implementation of minimally invasive surgery in such settings is often prohibitive. In order to improve global cancer care, high-quality treatment must be prioritized.

The exact capacity of gynecologists to perform laparoscopy in LMICs is largely unknown and highly variable between countries. Thorough record keeping and reliable databases do not exist in most LMICs. However, limited published data from large referral hospitals in LMICs report rates of laparoscopic surgery for gynecologic indications to be <10% (Mboudou et al., 2014). The majority of these surgeries are for benign indications, including diagnostic laparoscopy for infertility, adnexal

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surgery, and sterilization. Based on available literature, we can extrapolate that the rates of advanced or specialized laparoscopic surgery, such as for gynecologic malignancy, to be extremely low. However, LMICs that are performing laparoscopic surgery for gynecologic cancer appear to have better economics and have outside support.

Specific to the treatment of cervical cancer in LMICs, where there is frequently a lack of radiation therapy, radical hysterectomy has been considered for patients with larger locally advanced stage cervical cancer who would normally receive primary chemoradiation. Furthermore, ASCO resource-stratified clinical practice guidelines recommend that for women with advanced stages of cervical cancer in which there is no access to radiation therapy, neoadjuvant chemotherapy followed by extrafascial hysterectomy can be offered (Chuang et al., 2016). Thus, the treatment of cervical cancer in LMICs is often more heavily reliant upon surgical interventions than in settings in which radiation therapy is readily available. Additionally, in many LMICs, diagnostic imaging is not available. Laparoscopy might be useful as a diagnostic tool and could help reduce unnecessary laparotomies and guide management of patients with gynecologic malignancy. Evidence has been published showing that diagnostic laparoscopy can reduce the number of futile laparotomies for patients undergoing primary cytoreductive surgery for advanced ovarian cancer in resource-rich countries (Rutten et al., 2016). In LMICs, where laparotomy has increased morbidity and mortality, diagnostic laparoscopy could help avoid unnecessary open surgery and its associated complications.

The most cited barrier to implementation of laparoscopic surgery in LMICs is a lack of resources (Choy et al., 2013). The upfront costs of laparoscopic machines can be cost prohibitive. In certain LMICs that have larger economies of scale, greater purchasing power has allowed some hospitals to invest in laparoscopic equipment. This is the case in countries such as Brazil, Russia, India, China, and South Africa. Furthermore, LMICs that have a larger pool of patients seeking laparoscopic surgery make any initial investments more profitable (Gomes et al., 2013). Upfront costs of laparoscopy are just one component to funding. Ongoing financial backing for maintenance of equipment and continual education and training of surgeons, technicians, and other ancillary staff is also needed.

In order to recoup some of these costs, fee-for-service models often displace this additional cost to the patient, making laparoscopic surgery as compared to open surgery more expensive. Many patients therefore elect for the cheaper alternative. Organizational structures for funding of laparoscopy must be critically evaluated. Furthermore, inpatient hospital costs in LMICs are low, making the allure of laparoscopy for reducing hospital stay potentially not as advantageous as in high-resource settings (Choy et al., 2013).

Another barrier to implementation of laparoscopy in LMICs is a lack of expertise or training on laparoscopic surgical techniques. In many LMICs, there is no formal training in laparoscopy. International training initiatives are important to the adoption of laparoscopy in LMICs for the treatment of gynecologic cancer. Currently, there are approximately ten gynecologic oncology training and observership opportunities in the United States available to international physicians. These programs provide advanced surgical training with the intent of training international physicians in new skills that they can then bring back to their home country. Collaboration between The University of Texas MD Anderson Cancer Center (Houston, TX) and the Instituto de Cancerología Clínica las Américas (Medellín, Colombia) resulted in non-inferior surgical and oncologic outcomes in laparoscopic radical hysterectomy between the two cancer centers (Pareja et al., 2012). A high-intensity surgical teaching module for the treatment of cervical cancer was created in Canada and piloted in Kenya. This curriculum had immediate impact in the successful training of a small number of gynecologists in procedures such as radical hysterectomy (Elit et al., 2010). The use of standardized online surgical curricula might also be a means in which to increase training of gynecologic surgeons in advanced surgical procedures in a cost-effective manner (Goldstein et al., 2014). Outside

support, training, and continued mentorship will help to improve cancer outcomes in LMICs.

A better understanding of local surgical cultures when conceptualizing targeted programs will help improve acceptability of laparoscopy. Resistance to change from current surgical practice may limit dissemination of information. The most senior surgeons are usually the ones with the opportunity to learn new surgical techniques, such as laparoscopy. However, these surgeons might also be the least likely to incorporate new techniques into their practice (Choy et al., 2013). Given the hierarchical practice of medicine in some LMICs, investing in training junior surgeons and input from local surgeons as to how best to implement programs cannot be understated.

Education programs to increase expertise in laparoscopy for gynecologic cancer must also take into account a lack of subspecialization in many LMICs. Given the limited number of surgeons in many LMICs, most performing gynecologic cancer surgery are general gynecologists without formal fellowship training (Choy et al., 2013). Many are less willing to perform technically more complicated and time-consuming procedures. The learning curve for obtaining proficiency in a new surgical skill is weighed against the greater number of cases that a surgeon can perform open and with fewer complications. The establishment of Gynecologic Oncology fellowship programs in LMICs to train specialists is one avenue to address this education gap. International observerships and training opportunities for physicians from LMICs is another option. Most local gynecologists who are performing laparoscopy for gynecologic cancer received training from physicians in high-resource settings (Pareja et al., 2012). Laparoscopy in and of itself is a good teaching tool for anatomy and can enhance open surgical proficiency in LMICs as well. Additionally, there is a need for increased awareness among trained gynecologic oncologists and those in postgraduate fellowship training programs of opportunities to contribute to global cancer surgery for women in LMICs. More partnerships in LMICs for mutually beneficial training experiences for trainees from both countries are needed.

As we aim to increase global access to quality surgical services, there must be further development of laparoscopy in LMICs, especially for cancer cases. Estimates suggest low rates of adoption of laparoscopy for benign gynecologic indications in LMICs, with even more limited rates for gynecologic malignancies. The benefits of such surgery for gynecologic cancer in the United States have been studied and are clear. The potential benefits of such surgery in LMICs are more pronounced and could have an even greater impact on the quality of life of women living in these countries. Identification of barriers to implementation of laparoscopy in LMICs must be appropriately identified and addressed if we are to improve global cancer care and make headway in this area of great need.

Conflict of interest statement

The authors do not have any conflicts of interest.

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