



Centralized, capacity-building training of Lichtenstein hernioplasty in Brazil



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ARTICLE INFO

Article history:

Received 5 April 2016

Received in revised form

15 October 2016

Accepted 21 October 2016

Keywords:

Brazil

Surgical education

Inguinal hernia

Lichtenstein hernioplasty

ABSTRACT

Background: In Brazil, access to healthcare varies widely by community. Options for repair of surgically correctable conditions, such as inguinal hernias, are limited. A training program was instituted to expand access to Lichtenstein hernioplasty.

Methods: Between September, 2014 and September, 2015, 3 orders of training series took place in São Paulo, Brazil. Participating surgeons received training and assessments from expert trainers using the Operative Performance Rating Scale (OPRS). Those who completed training successfully were invited to become trainers. OPRS scores were compared between training series. Outcomes were documented up to 6 months post-training.

Results: The 3 orders of training series resulted in 45 surgeons trained and 213 hernias repaired. Eleven trainees subsequently became trainers. Mean post-training OPRS scores were 4.4 (scale of 5) and did not vary significantly between training series. The overall complication rate was 4.7%, with no hernia recurrences or reoperations at 6 months.

Conclusions: Competency-based training generates a regional network of surgeons proficient in Lichtenstein hernioplasty. Each training session progressively expands patient access to high quality operations in underserved communities in Brazil.

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1. Introduction

The global burden of surgically-treatable disease ranges from 11 to 28%, with an estimated 5 billion people without access to essential surgical care in 2015.^{1–3} While low- and middle-income countries (LMICs) are home to a substantial proportion of patients with surgically treatable disease, regional variation and disparities of access within higher-income countries (HICs) account for a significant population of patients with a similar burden of untreated surgical disease. Brazil is the fifth most populous country in the world, occupying 47% of South America, and is home to the world's fifth largest economy.^{4,5} In the southern region of the

country, access to surgical care and rates of healthcare utilization are equivalent to those of other HICs; however, access to care in the rural northern and northeastern regions is substantially limited.^{4,5} From a system-wide perspective, variable access to healthcare infrastructure presents the first hurdle for patients within economically disadvantaged regions. While the healthcare system in general has improved substantially since the implementation of the Unified Health System (Sistema Único de Saúde) in 1988, these improvements were largely confined to the wealthy regions of the country.⁵

Inguinal hernia is a prevalent yet treatable surgical disease for which there is wide variation in patient access to surgical care and in quality of operations performed worldwide.⁶ In underserved regions, patients with inguinal hernia suffer from reduced productivity. While quantifying the ramifications of the disease is challenging, the potential impact of inguinal hernia repair in Ghana, a resource-limited environment similar to some regions of

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Brazil, is estimated to avoid 5 million disease-adjusted life years (DALYs).^{7,8} For those patients in underserved regions who do have access to surgical care, tissue-based repairs are performed approximately 80% of the time, despite the broad availability of mesh for hernioplasty throughout the country.⁸ This is in stark contrast to patients in HICs, where Lichtenstein tension-free hernioplasty is the standard open operative approach due to low rates of postoperative hernia recurrence and of serious morbidity.^{9–11} Additionally, rates of recurrence and other complications of Lichtenstein hernioplasty are similar among inexperienced and experienced surgeons, making it an effective target for surgical education.^{9,10} The adoption of the Lichtenstein hernioplasty has been limited in LMICs and in regions of HICs like Brazil with limited access to surgical care due to lack of resources and surgical education.¹²

In this study, we present a competency-based regional training program for Lichtenstein tension-free hernioplasty. The program was devised by the faculty of the School of Medical Sciences of Santa Casa de São Paulo in conjunction with Hernia Repair for the Underserved (HRFU, 501(c)3) to address disparities in patient access to high quality surgical care and to foster surgical education in Brazil.

2. Methods

2.1. Setting and participants

This study was conducted between September, 2014 and September, 2015. There were 3 orders of training series conducted during the study period. The first-order series was conducted September 18–20, 2014 at Hospital Geral de Guarulhos in the city of São Paulo. The second-order series was conducted September 22–23, 2014 at Hospital Municipal São Luis Gonzaga in the city of São Paulo. The third-order series was undertaken at 5 hospitals in 4 cities further inland in the state of São Paulo from September 10–12, 2015 (Table 1). Local surgeons were identified by faculty surgeons at the School of Medical Sciences of Santa Casa de São Paulo and invited to participate in a training program in Lichtenstein hernioplasty. Patients with inguinal hernia were identified by HRFU-designated program coordinators and were offered inguinal hernioplasty with local anesthesia free of charge during the training series. General anesthesia was offered to some patients at the discretion of hospital anesthesiology staff members, who were present for all operations.

2.2. Training program

Each surgeon trainee participated in one series of 3–5 Lichtenstein hernioplasties, with each series completed over the course of a single day. Training series were taught by expert HRFU-affiliated volunteer surgeons. The trainer performed the first case of each series with the trainee assisting. The trainee performed all subsequent cases in the series with assistance and guidance from the trainer.

Trainees were evaluated by trainers using the competency-based Operative Performance Rating Scale (OPRS) for open inguinal hernia repair with mesh.¹³ Operation-specific categories (evaluated on a scale of 1–5) were incision, dissection of tissue and hernia sac, preparation for mesh placement, mesh cutting, mesh fixation, and closure. General performance categories (evaluated on a scale of 1–5) included instrument handling, respect for tissue, time and motion, operation flow, and overall performance. Each category includes a unique set of descriptive anchors detailing technical criteria for each objective scale score. At the conclusion of each operation, trainers were instructed to provide a verbal assessment of the trainees' performance in each of the OPRS categories. While included in the OPRS assessment of dissection of tissue, identification of each of the ilioinguinal, iliohypogastric, and genitofemoral nerves was independently documented in the third-order training series to quantify compliance with this key standard component of the training program. This additional assessment component was implemented after review of the first two training series for quality assurance, to confirm the new trainers were compliant with the standard instructional course.

The mean maximum overall performance rating for each trainee was tabulated and compared among first-, second-, and third-order training series using a single-factor ANOVA. Trainee technical proficiency was defined as an overall performance score of 3 or greater. Those demonstrating technical proficiency by the end of the training series received a certificate of completion from HRFU and the School of Medical Sciences of Santa Casa de São Paulo. Among certified trainees, a subset was selected by HRFU to serve as trainers for future-order training series. Criteria for selection of future trainers included certification of technical proficiency via the HRFU program and interview with an HRFU Board member.

2.3. Patient characteristics and outcomes

For each training operation, patient age, gender, and hernia site were recorded. Hernias were classified according to the Nyhus classification system.¹⁴ The primary outcome of the operations was successful hernia repair, defined as absence of recurrence and absence of need for reoperation during the study period. Secondary outcome measures included rates of hernia recurrence, chronic pain, reoperation, hematoma, and seroma. Complications were identified and recorded in the early postoperative period (<24 h), at 1 week, at 1 month, and at 6 months by HRFU-affiliated physicians in Brazil. As first- and second-order training series were conducted within a short timeframe, follow-up and complications from these training series were assessed as a single cohort.

3. Results

3.1. Setting and participants

Training series were conducted successfully at all 7 selected hospitals in the state of São Paulo (Table 1). During the first-order training series, 6 expert surgeons taught 8 surgeon trainees in 36

Table 1
Training sites in Brazil.

First order	Hospital Geral de Guarulhos (São Paulo)
Second order	Hospital Municipal São Luis Gonzaga (São Paulo)
Third order	Hospital Beneficência Portuguesa (Ribeirão Preto)
	Santa Casa de Misericórdia de Ribeirão Preto (Ribeirão Preto)
	Ambulatório Médico de Especialidades, Santa Casa de Franca (Franca)
	Santa Casa de Misericórdia de São Carlos (São Carlos)
	Santa Casa de Araraquara (Araraquara)

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