



Open Appendicectomy and the Surgical Trainee in Ireland. The Experience of a University Teaching Hospital

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Abstract

Introduction: Both societal changes and technological advancements in recent decades have resulted in an evolutionary time for both surgical trainees and their mentors. A reduction in the amount of available working hours and the introduction of minimally invasive surgery has resulted in a need for an innovative approach to training our surgical trainees. This innovative approach should be in the form of simulated surgical training.

Methods: The Hospital Inpatient Enquiry (HIPE) database was used to identify laparoscopic and open appendicectomies performed during a 6 year period, from January 2009 to December 2014. The rates of laparoscopic and open appendicectomy performed during the first three years (2009-2011) were compared with those in the second three years (2012- 2014).

Results: Of 1072 appendicectomies performed over the six year period, 62% were Laparoscopic. The median patient age, length of hospital stay, and the male to female ratio did not differ between the two time periods studied. The open appendicectomy rate fell from 54% during the first half of the study to 22.5% during the second half ($p < 0.001$). A significant increase in laparoscopic appendicectomy rates were noted in both male and female patients, as well as in paediatric (8-16 years) and adult (≥ 16 years) patients. Only 25(14.1%) open appendicectomies were performed in 2014.

Conclusion: Simulated surgical training provides a risk free and safe learning environment for surgical trainees and should be utilised more in the National Surgical Training Programme in Ireland.

Keywords: Laparoscopic appendicectomy; Open appendicectomy Ireland; Training; Technology

Introduction

Recent decades have brought with them several advances in medicine and surgery. One of the main advances has been in technology. Selected early gastric cancer is now treated with endoscopic submucosal or full thickness dissection combined with a laparoscopic lymphadenectomy if there is a high risk of metastatic spread [1]. Research into biomaterials over the last twenty years have revolutionised bone tissue engineering in orthopaedic surgery with 3rd generation biomaterials being not only osteo-conductive but also osteo-inductive allowing in-situ tissues to regenerate and combine with engineered tissues [2]. As imaging technologies improve it is likely that ultrasound is destined to become the new stethoscope, giving all clinician easily accessible and better bedside information regarding their patient [3]. The Da Vinci robot is changing the face of minimal access surgery in urology and colorectal surgery. It not only offers a reduction in morbidity but also allows the surgeon to overcome the challenges of reduced tactile perception in laparoscopic surgery [4]. Furthermore the robot has been shown to give equivalent oncological outcomes to the open surgery alternative. With these newly developing and improving technologies available in the field of surgery, the modern surgeon has had to adapt and evolve technical skills in order to utilise these advancements.

The laparoscopic approach to an appendicectomy is currently the treatment of choice for acute appendicitis in Ireland. The laparoscopic appendicectomy is superior to the open procedure with studies showing a reduction in wound infection rates, post-operative pain and shorter length of hospital stay [5]. There has been some important societal changes in recent years. This has resulted in concerns regarding the ability of core surgical trainees, on completion of basic surgical training, to be able to perform a laparoscopic appendicectomy [6]. In 2009, the European Working Time Directive (EWTd) placed a restriction of 48 working hours per week on Doctors [7]. Running parallel to this is the newly introduced eight years National Surgical Training Programme in Ireland which has

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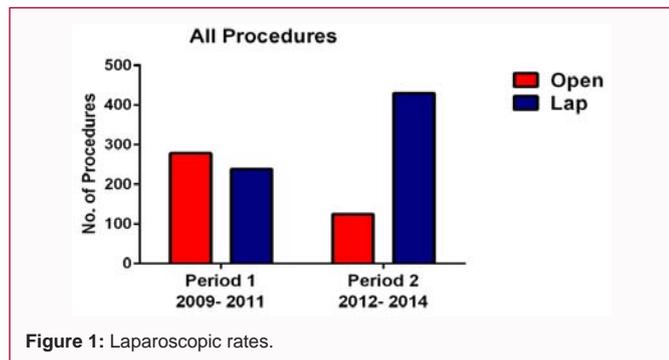


Figure 1: Laparoscopic rates.

Table 1: Male to female ratio and mean inpatient stay between the two groups.

	2009-2011	2012-2014
Total Patients (1072)	517	555
Median Age (Range)	20.1 (2.7-87.8)	20.9 (3.0-90.0)
Male : Female	273 : 244	320 : 235
Male % : female %	52.8% : 47.2%	57.7% : 42.3%
Mean Inpatient Stay (days)	3.7	3.5

further limited the time available for surgeons to become competent on surgical training completion. Trainees are now faced with the need for more technical skills than previously required. Furthermore, the old apprenticeship model of “See one, do one, teach one” is no longer viewed as an ethically acceptable learning environment in today’s society due to increased patient risk. An innovative approach must therefore be undertaken to ensure the proficiency and quality of surgical training in Ireland.

This innovative approach must be in the form of simulated surgical skills training. The American Board of Surgery expressed concerns regarding many residents extending their training and not directly entering practice on completion of training [8]. Simulated surgical training removes the high pressured environment of the operating theatre which is a suboptimal learning environment [8]. This training can be low or advanced technology depending on the skills to be learned at the surgical trainees’ relevant stage in career progression. The risk free learning opportunity provided by simulation training can be undertaken without infringing on the EWTD while allowing trainees to enhance and improve technical skills.

Methods

A retrospective study was undertaken in the University Hospital Waterford, a main teaching hospital associated with the Royal College of Surgeons in Ireland training body. Patients were identified using the Hospital Inpatient Enquiry (HIPE) coding system. The aim was to analyse the number of open versus laparoscopic appendicectomies performed over a six year period (January 2009 to December 2014). Data was collected regarding patient age, gender and hospital length of stay post-operatively. The number of these procedures that were performed by surgical trainees in the final year of the study (2014) was also collected. A comparison was made based on two three year timelines, January 2009 to December 2011 and January 2012 to December 2014, period 1 and period 2, respectively. Post-operative complications were not recorded for the purposes of this study and the HIPE coding system did not allow for analysis of those procedures that converted from laparoscopic to open. A standard three port technique was used for the laparoscopic approach to the appendicectomy [9]. Information was obtained regarding the

expectations set out by the Royal College of Surgeons in Ireland training body of a surgical trainee on completion of the higher surgical training programme.

Results

A total of 1072 patients were included in the study. In period 1 (January 2009 to December 2011) there were 512 patients and 555 patients in period 2 (January 2012 to December 2014). The median age was 20.1 and 20.9 in period 1 and 2 respectively (non-significant). The male to female ratio and mean inpatient stay between the two groups was also non-significant (Table 1). Open procedures decreased from 54% to 23% between the two time periods and laparoscopic rates increased from 46% to 77% (Figure 1). There was an increase in laparoscopic procedures undertaken in period 2 from 61% to 83% and 33% to 74% in females and males, respectively (Figure 2). This trend was evident in children between the ages of eight to sixteen who had an increase in laparoscopic procedures from 31% in period 1 to 71% in period 2 (Figure 3 and 4). The same trend was not seen however in children under eight, with the majority of this age group still undergoing an open procedure (Figure 4).

Even with the trend for preference to laparoscopic procedures clearly evident, of the 555 patients in period 2 who underwent an appendicectomy 125 were performed by the open method (23%).

In 2014, the last year of our study, 177 appendicectomies were performed, 14%(25) of these were open procedures. There were a total of 14 trainees in UHW (7 Registrars and 7 Senior House Officers). Therefore on average a trainee performed/assisted in <2 open appendicectomies.

According to RCSI, a general surgical trainee should have 80 appendicectomies performed, which can be either open or laparoscopic. A paediatric surgical trainee is required to have performed at least 20 appendicectomies, and of these at least 20 (100% of required procedures) must be performed laparoscopically.

Discussion

Recent decades have brought with them advances in

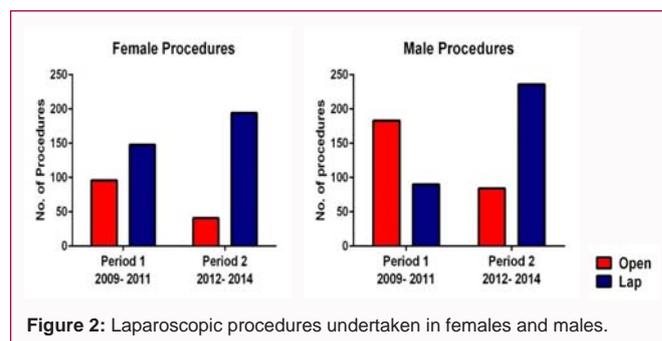


Figure 2: Laparoscopic procedures undertaken in females and males.

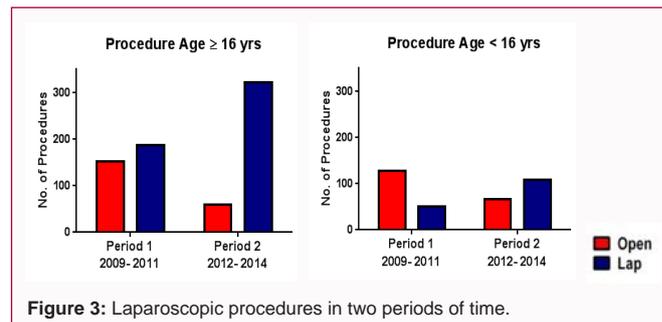


Figure 3: Laparoscopic procedures in two periods of time.

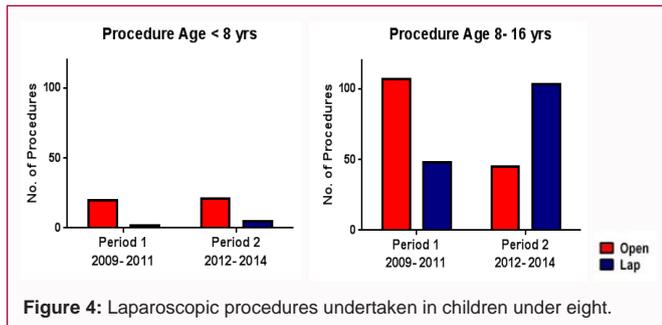


Figure 4: Laparoscopic procedures undertaken in children under eight.

surgical technology. Our study shows an uptake in laparoscopic appendicectomy versus the open method in the later years of our study. This was with the exception of children under the age of eight. This is consistent with studies undertaken worldwide [10,11]. Furthermore, McCoy et al. [12] in 2013 reported that trainees in the United States were performing 50% less open appendicectomies, while those undertaken laparoscopically had increased by 542%. In Ireland, a recent study by Emmanuel et al. [13] reported that laparoscopic appendicectomies are a safe procedure for trainees to perform. However there has been a reported 50% reduction in the number of appendicectomies performed by basic surgical trainees in Ireland since the uptake in laparoscopy [14]. This highlights the need for increased surgical simulation training [15,16].

Conclusion

Simulation training removes the high pressure environment of the operating theatre. It allows trainees to improve surgical skills and practice dealing with emergency surgical scenarios prior to the real life situation. There are many similarities between pilots and surgeons – a high pressure work environment with detrimental outcomes to people if incorrect decisions are made. The aviation industry has been utilising simulation training for decades. Studies have shown that flight simulators have been a very effective method in improving psychomotor skills and in retaining these learned skills. With the introduction of the EWT in Ireland, simulated surgical training is a realistic and useful resource in training core surgical trainees as an adjunct to the operating theatre.

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