Robotic Assisted Laparoscopic Colorectal Surgery: Analysis of the Learning Curve Time and Experience of One Surgeon

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Introduction

With robotic assisted laparoscopic surgery (RALS) on the rise especially in the realm of colorectal surgery, many are still questioning not only the cost but also the learning curve in training. Recent studies have analyzed the surgeon’s “learning curve” as a function of not only the surgeon’s technical abilities and time of operation, but also of the robotic operating room team. The purpose of the study was to evaluate the learning curve of RALS colorectal surgery performed by one surgeon.

Methods

A series of 36 RALS colorectal procedures were performed on the Da Vinci S operating system by one surgeon in two hospital systems between May 2011 to June 2013. With IRB approval, retrospective analysis was performed and total operative time was studied. Analysis of Variance ANOVA single factor analysis with p<0.05 is considered statistically significant.

Results

Comparing the first ten cases with the second ten cases the times were 285min and 280min (P=0.877). When comparing the first fifteen cases with the next fifteen cases the time decreased from 285 min to 236 min (P=0.071). The first half (n=18) compared the last (n=18) decreased from 290min to 214min (P=0.001) figure 2. The first 20 cases compared to the last 16 cases decreased from 283min to 213min (P=0.003).

Conclusion

In conclusion, the operative time significantly reduced after 18 cases P=0.001. The learning curve began at 18 RALS colorectal procedures and plateau of time continues on after this number of cases.

Discussion

With the incorporation of robotic assisted laparoscopic surgery into everyday surgical practices, attention now is focusing on studying learning curves of current surgeons as well as current residents and fellows. Various studies are emerging on the concept of the “learning curve”. The term “learning curve” has various meanings depending on surgeon interpretation. According to Kaul et al (4) the term is used to denote the process of gaining knowledge and improving skills in performing a surgical procedure. A study performed by Schreuder et al. (5) titled Training and learning robotic surgery, time for a more structured approach: a systematic review, describes the learning curve as the number of surgical procedures performed before a surgeon reaches an acceptable plateau in outcome parameters (operating time, blood loss, complication rate, quality of surgery). Although we only looked a time as an endpoint, we want to mention that there were no conversions to open procedure and complication rates were similar compared to laparoscopic assisted colorectal procedures.

The learning curve for robotics is much less steep than that for laparoscopic colorectal surgery/ reasons being the three-dimensional view and the ability of the robot to transfer the surgeon’s hand movements to the instrumnts(2). M. Bokhari et al. determined that learning curve for based on surgical times for colorectal surgery was between 15-25 cases (3). Our learning curve of 18 cases is consistent with their findings.

Based on our literature review many studies are focusing not only on the barriers surgeons starting out in robotics face but also on proposed curriculums to train new surgeons, residents, and fellows. As of 2011, there were 24 dVSS FDA approved training facilities all around the world but focus remains on how to bring these to every hospital system (5). Team training is critical including not only the surgeon but the whole operating room team of nurses and assistants. All should be trained in the basics of robotic technology prior to initiating simulation or real patient operations. In conclusion, the learning curve is a much more complex concept than originally thought.

REFERENCES