

ORIGINAL RESEARCH

Intracorporeal suturing in single-port surgery

¹Dr. O.P.Singh, ²Dr. Nayanshi Singh, ³Dr. Himanshu Singh

¹HOD & Senior Consultant, Department of Surgery, Divisional District Hospital, Gorakhpur, UP, India

²JR 1, Department of Gyne & Obs, SRMS IMS, Bareilly, UP, India

³MBBS, SMC Unnao, UP, India

Corresponding Author

Dr. O.P.Singh

HOD & Senior Consultant, Department of Surgery, Divisional District Hospital, Gorakhpur, UP, India

Received: 10 June, 2023

Accepted: 15 July, 2023

ABSTRACT

Background: In minimally invasive surgery (MIS), intracorporeal suturing and knot tying (ICKT) is a crucial technique for complex procedures like the Roux-en-Y gastric bypass or Nissen fundoplication. The present study was conducted to assess intracorporeal suturing in single-port surgery.

Materials & Methods: 58 surgeons of both genders who agreed to participate in the study were assessed for efficacy of intracorporeal suturing in single-port surgery

Results: Out of 58 subjects, males were 30 and females were 28. Completion rate was 84%, 90%, 92%, 94% and 20%, execution time (minutes) was 60.2, 47.2, 43.2, 48.0 and 210.5. Stress was 4, 3, 4, 4 and 6 and precision was 5, 3, 5, 5 and 3 at manipulation angle of 90 degrees, 60 degrees, 45 degrees, 30 degrees and 0 degree respectively. The difference was significant ($P < 0.05$).

Conclusion: Intracorporeal suturing in single-port surgery seems to be more difficult than conventional laparoscopic surgery.

Key words: Intracorporeal suturing, Single-port surgery, Precision, Completion rate

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution- Non Commercial- Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non- commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Based on operating time and surgeon impression, a number of clinical investigations have documented the SPS's increased difficulty when compared to traditional laparoscopic surgery.¹ Because to the decreased post-operative discomfort, improved recovery, shorter hospital stay, and improved cosmesis, laparoscopic surgery has become the preferred method for numerous treatments.² One of the many newer variations of laparoscopic surgery is single incision surgery, in which either regular ports or a single multi-channel port is introduced through a single skin incision. The cosmetic benefit of this is clear, but there is scant support for the claims of lower morbidity and better post-operative recovery.³ In minimally invasive surgery (MIS), intracorporeal suturing and knot tying (ICKT) is a crucial technique for complex procedures like the Roux-en-Y gastric bypass or Nissen fundoplication. When compared to open surgery, MIS requires quite distinct psychomotor abilities. Even seasoned surgeons have difficulty the first time they perform laparoscopic suturing.⁴ The effectiveness of each knot, the length of the process, and the precision of the suture insertion all factor into surgical suturing.⁵ Given the practically infinite

variety of modern laparoscopic procedures, it is becoming more crucial to discuss the comparability of the two approaches. Numerous studies have been conducted on the effects of knot failure. There are various ways to gauge the effectiveness and quality of knots.⁶ The present study was conducted to assess intracorporeal suturing in single-port surgery.

MATERIALS & METHODS

The present study comprised of 58 surgeons of both genders who agreed to participate in the study with their written consent. Data such as name, age, gender etc. was recorded. All surgeons used standard needle drivers to complete tasks in a dedicated dry box. An EZ Access was inserted through a single 3.0-cm opening in the specially designed cover of the specialised box, which was placed between the typical port placements. Through the EZ Access trocar port, two ordinary needle drivers were employed. With the aid of a 10 mm, standard length, 30° laparoscope equipped with a 90° light cord adaptor, visualisation was made possible through an Excel port. The manipulation angles of 0°, 30°, 45°, 60°, and 90° were evaluated with the elevation angle fixed at 60°. The angle between the two instruments (active and aiding)

was known as the manipulation angle. The angle between the instrument and the horizontal plane was known as the elevation angle. Results of the study were assessed statistically with level of significance

was set below 0.05. Table I shows that out of 58 subjects, males were 30 and females were 28.

RESULTS

Table: I Distribution of subjects

Total- 58		
Gender	Males	Females
Number	30	28

Table: II Effect of manipulation angles of the task

Parameters (degree)	90	60	45	30	0	P value
Completion rate	84%	90%	92%	91%	25%	0.05
Execution time	60.2	47.2	43.2	48.0	210.5	0.04
Stress	4	3	4	4	6	0.21
Precision	5	3	5	5	3	<0.05

Table: II shows that completion rate was 84%, 90%, 92%, 94% and 20%, execution time (minutes) was 60.2, 47.2, 43.2, 48.0 and 210.5. Stress was 4, 3, 4, 4 and 6 and precision was 5, 3, 5, 5 and 3 at manipulation angle of 90 degrees, 60 degrees, 45 degrees, 30 degrees and 0 degree respectively. The difference was significant ($P < 0.05$).

DISCUSSION

Intracorporeal suturing refers to the process of stitching or suturing tissues within the body during surgical procedures.⁷ Single-port surgery, also known as single-incision laparoscopic surgery (SILS) or single-site surgery, is a minimally invasive surgical technique where multiple instruments and the camera are inserted through a single small incision, usually in the umbilicus (belly button).⁸ Performing intracorporeal suturing in single-port surgery can be more challenging than in traditional laparoscopic surgery due to the limited number of instrument ports and restricted movement of instruments within the confined space. However, advancements in surgical instruments and techniques have made it feasible to perform complex intracorporeal suturing through a single port.⁹ The present study was selected to assess intracorporeal suturing in single-port surgery. One recent advancement is laparoscopic surgery with a single incision. This can be done using a specialised equipment with numerous channels or by inserting numerous ports through a minor incision.^{10,11} All the ports are placed through a single incision, which, when located in the umbilicus, can result in no visible scar in the abdominal wall, which is the key distinction from conventional multi-port laparoscopic surgery. The majority of the present research focuses on case studies and short series that describe single port techniques.¹² Appendicectomy, cholecystectomy to my, nephrectomy, hysterectomy, oophorectomy, adrenalectomy, gastric bypass, Nissen fundoplication, hernia repair, splenectomy, colon resection, and liver resection are just a few of the treatments that have been done using this approach.^{13,14} The present study was conducted to assess intracorporeal suturing in single-port surgery. We found that out of 46 subjects, males were 28 and females were 18. Open and

laparoscopic knot-tying techniques were compared by Romeo et al.¹⁵ The 32 participants were split up into 4 groups, each with a different level of expertise. There were six senior physicians in group 1. Ten interns in their first through fourth years made up Group 2. 16 medical students who have never before done open sutures or laparoscopic surgery made up groups 3 and 4. While group 4 individuals had no prior training, group 3 participants received a one-hour practical suturing course. The factors for evaluation in this study were total time, knot quality, suture placement accuracy, and performance. All participants, regardless of educational level, performed worse on the ICKT than open suturing. We observed that completion rate was 84%, 90%, 92%, 94% and 20%, execution time (minutes) was 60.2, 47.2, 43.2, 48.0 and 210.5. Stress was 4, 3, 4, 4 and 6 and precision was 5, 3, 5, 5 and 3 at manipulation angle of 90 degrees, 60 degrees, 45 degrees, 30 degrees and 0 degree respectively. Ishiyama et al.¹⁶ in their study found that the in comparison to manipulation angles of 30, 45, 60, and 90 degrees, the completion rate was substantially lower at 0°. The angles of 30, 45, 60, and 90° did not significantly differ in the completion rates. 19% of the subjects successfully completed the suturing assignment in the allocated 5 minutes at a manipulation angle of 0°. The longest execution time was for the 0° manipulation angle, but there were no notable differences in execution times among the other angles ($P > 0.05$). At manipulation angles of 30° and 45°, the precision score was substantially greater than at 0°. Only group 1 revealed no discernible difference in knot accuracy and quality between laparoscopic and open suture performance.

CONCLUSION

It was found that single-port surgery's intracorporeal suturing appears to be more challenging than traditional laparoscopic surgery.

REFERENCES

1. Yamaguchi S, Yoshida D, Kenmotsu H, Yasunaga T, Konishi K, Ieiri S, et al. Objective assessment of laparoscopic suturing skills using a motion-tracking system. *Surg Endosc*. 2011;25:771–775.
2. Santos BF, Enter D, Soper NJ, Hungness ES. Single-incision laparoscopic surgery (SILSTM) versus standard laparoscopic surgery: a comparison of performance using a surgical simulator. *Surg Endosc*. 2011;25:483–490.
3. Yang B, Xu B, Zeng Q, Altunrende F, Wang H, Xiao L, et al. A specialized course of basic skills training for single-port laparoscopic surgery. *Surgery*. 2011;149:766–775.
4. Santos BF, Reif TJ, Soper NJ, Hungness ES. Effective of training and instrument type on performance in single-incision laparoscopy: results of a randomized comparison using a surgical simulator. *Surg Endosc*. 2011;25:3798–3804.
5. Uchida K, Haruta N, Okajima M, Matsuda D, Yamamoto M. Multimedia article, the keys to the new laparoscopic world Thumbs up! Knot and Tornado Knot. *Surg Endosc*. 2005;19(6):859.
6. Champion JK, Hunter J, Trus T, Laycock W. Teaching basic video skills as an aid in laparoscopic suturing. *Surg Endosc*. 1996;10:23–25.
7. Aggarwal R, Hance J, Undre S, Ratnasothy J, Moorthy K, Chang A, et al. Training junior operative residents in laparoscopic suturing skills is feasible and efficacious. *Surgery*. 2006;139:729–734.
8. Nguyen NT, Mayer KL, Bold RJ, Larson M, Foster S, Ho HS, et al. Laparoscopic suturing evaluation among surgical residents. *J Surg Res*. 2000;93:133–136.
9. Ateş O, Hakgüder G, Olguner M, Akgür FM: Single-port laparoscopic appendectomy conducted intracorporeally with the aid of a transabdominal sling suture. *J Pediatr Surg* 2007, 42:1071–1074.
10. Roberts KE: True single-port appendectomy: first experience with the puppeteer technique. *Surg Endosc* 2009, 23:1825–1830.
11. Hong TH, Kim HL, Lee YS, Lee KH, You YK, Oh SJ, Park SM: Transumbilical single-port laparoscopic appendectomy (TUSPLA): scarless intracorporeal appendectomy. *J Laparoendosc Adv Surg Tech* 2009, 19:75–78.
12. Bucher P, Pugin F, Buchs N, Ostermann S, Charara F, Morel P: Single port access laparoscopic cholecystectomy (with video). *World J Surg* 2009, 33:1015–1019.
13. Ahsan R, Kynaston J, MacDonald ER, Ahmed I: Patient Preferences for surgical techniques: should we invest in new approaches? *Surg Endosc* 2010, 24:3016–3025.
14. Buxton MJ: Problems in the economic appraisal of new health technology: the evaluation of heart transplants in the UK. In *Economic Appraisal of Health Technology in the European Community*. Edited by Drummond MF. Oxford, UK: Oxford Medical Publications; 1987:103–118.
15. P. Romero, O. Brands, F. Nickel, B. Müller, P. Günther, S. Holland-Cunz. Intracorporeal suturing—

driving license necessary? *J Pediatr Surg* 2014; 1138–1141.

16. Yasuhiro Ishiyama, Noriyuki Inaki, Hiroyuki Bando, Tetsuji Yamada. Assessment of Intracorporeal Suturing in Single-Port Surgery Using an Experimental Suturing Model. *Indian J Surg*. 2017 Apr; 79(2): 137–142.