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Clinical evaluation of administration a single dose of antibiotic in surgical treatment of laparoscopic appendectomy

Dr. Pranay Kumar[1], Dr. NP Narayan[2*]
[1] Senior Resident, Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar, India
[2] Professor & HOD, Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar, India
[*] Corresponding Author: Dr. NP Narayan

Abstract
A single, effective and nontoxic drug is used to prevent infection by a specific microorganism or to eradicate an early infection. Single or multiple dosage regimes of antibiotics will be depending upon the patient resources, the surgical condition of the patient and the vulnerability of the patient for infection. Hence based on the literature findings the present study was planned to assess the efficacy and outcome of the single dose of antibiotics in patients undergoing the laparoscopic appendectomy.
The study was planned on the 25 patients undergoing the uncomplicated laparoscopic appendectomy. The patients admitted to the Department of Surgery in Patna Medical College and Hospital, Patna from Dec 2017 to Dec 2018 Were enrolled in the present study. All the patients received one dose of preoperative intravenous antibiotics (cefazoline 1 gram and metronidazole 500 milligram) one hour before surgery. In the second group, the patients received 3 doses of antibiotics (cefazoline 500 milligram and metronidazole 500 milligram every 8 hours).
Based on the data generated from the present study it can be concluded that single dose prophylactic preoperative antibiotics would be sufficient in cases of laparoscopic appendicectomy for simple uncomplicated non-perforated acute appendicitis.

Keywords: Laparoscopic appendectomy, antibiotic, single dose, etc

Introduction
An appendectomy (known outside the United States as appendisectomy or appendicectomy) is a surgical operation in which the vermiform appendix (a portion of the intestine) is removed. Appendectomy is normally performed as an urgent or emergency procedure to treat acute appendicitis.
Appendectomy may be performed laparoscopically (as minimally invasive surgery) or as an open operation. Laparoscopy is often used if the diagnosis is in doubt, or in order to leave a less visible surgical scar. Recovery may be slightly faster after laparoscopic surgery, although the laparoscopic procedure itself is more expensive and resource-intensive than open surgery and generally takes longer. Advanced pelvic sepsis occasionally requires a lower midline laparotomy. In US adults, the 30-day mortality after appendectomy was 1.8% [1].
Over the past decade, the outcomes of laparoscopic appendectomies have compared favorably to those for open appendectomies because of decreased pain, fewer postoperative complications, shorter hospitalization, earlier mobilization, earlier return to work, and better cosmesis. However, despite these advantages, efforts are still being made to decrease abdominal incision and visible scars after laparoscopy. Recent research has led to the development of natural orifice transluminal endoscopic surgery (NOTES) [2]. However, numerous difficulties need to be overcome before a wider clinical application of NOTES is adopted, including complications such as the opening of hollow viscera, failed sutures, a lack of fully developed instrumentation, and the necessity of reliable cost-benefit analyses [2].
Many surgeons have attempted to reduce incisional morbidity and improve cosmetic outcomes in laparoscopic appendicectomy by using fewer and smaller ports. Kollmar *et al*. described moving laparoscopic incisions to hide them in the natural camouflages like the suprapubic hairline to improve cosmesis. Additionally, reports in the literature indicate that minilaparoscopic appendectomy using 2– or 3-mm or even smaller instruments along with one 12-mm port minimizes pain and improves cosmesis. More recently, studies described variants of an intracorporeal sling-based single-port laparoscopic appendectomy with good clinical results [2].
Also, a trend is increasing towards single-incision laparoscopic surgery (SILS), using a special multiport umbilical trocar. With SILS, a more conventional view of the field of surgery is seen compared to NOTES. The equipment used for SILS is familiar to surgeons already doing laparoscopic surgery. Most importantly, it is easy to convert SILS to conventional laparoscopy by adding a few trocars; this conversion to conventional laparoscopy is called 'port rescue'. SILS has been shown to be feasible, reasonably safe, and cosmetically advantageous, compared to standard laparoscopy [2]. However, this newer technique involves specialized instruments and is more difficult to learn because of a loss of triangulation, clashing of instruments, crossing of instruments (cross triangulation), and a lack of maneuverability. Also, the additional problem of decreased exposure and the added financial burden of procuring special articulating or curved coaxial instruments exist. SILS is still evolving, being used successfully in many centres, but with some way to go before it becomes mainstream. This limits its widespread use, especially in

rural or peripheral centres with limited resources [2].

The words "laparoscopic" and "open" appendectomy describes the techniques a surgeon uses to gain access to the internal surgery site. Most laparoscopic appendectomies start the same way. Using a cannula (a narrow tube-like instrument), the surgeon enters the abdomen. A laparoscope (a tiny telescope connected to a video camera) is inserted through a cannula, giving the surgeon a magnified view of the patient's internal organs on a television monitor. Several other cannulas are inserted to allow the surgeon to work inside and remove the appendix. The entire procedure may be completed through the cannulas or by lengthening one of the small cannula incisions. A drain may be placed during the procedure. This will be removed later by surgeon [3].

Laparoscopic appendectomy has become an increasingly prevalent intervention for acute appendicitis since its introduction in 1983 [4]. This surgical procedure consists of making three to four incisions in the abdomen, each 0.25 to 0.5 inches (6.4 to 12.7 mm) long. This type of appendectomy is made by inserting a special surgical tool called a laparoscope into one of the incisions. The laparoscope is connected to a monitor outside the person's body and it is designed to help the surgeon to inspect the infected area in the abdomen. The other two incisions are made for the specific removal of the appendix by using surgical instruments. Laparoscopic surgery requires general anesthesia, and it can last up to two hours. Laparoscopic appendectomy has several advantages over open appendectomy, including a shorter post-operative recovery, less post-operative pain, and lower superficial surgical site infection rate. However, the occurrence of intra-abdominal abscess is almost three times more prevalent in laparoscopic appendectomy than open appendectomy [5].

Surgical site infections (SSIs) are part and parcel of postoperative complication and contribute considerably to morbidity and mortality. Prevention of postoperative infection is an essential factor in improving the results of surgical procedures. A single, effective and nontoxic drug is used to prevent infection by a specific microorganism or to eradicate an early infection. Single or multiple dosage regimes of antibiotics will be depending upon the patient resources, the surgical condition of the patient and the vulnerability of the patient for infection. Hence based on the literature findings the present study was planned to assess the efficacy and outcome of the single dose of antibiotics in patients undergoing the laparoscopic appendectomy.

Methodology

The study was planned on the 25 patients undergoing the uncomplicated laparoscopic appendectomy. The patients admitted to the Department of Surgery in Patna Medical College and Hospital, Patna from Dec 2017 to Dec 2018. were enrolled in the present study.

All the patients received one dose of preoperative intravenous antibiotics (cefazoline 1 gram and metronidazole 500 milligram) one hour before surgery. In the second group, the patients received 3 doses of antibiotics (cefazoline 500 milligram and metronidazole500 milligram every 8 hours).Sterilization technique intraoperatively was done bycleaning the right iliac fossa by iodine and alcohol. Allthe patients had open appendectomy through a standardGrid-iron incision. Wound was closed with prolene 2-0sutures. No drains were used at all.Wound dressing change was done to all patients in thefirst postoperative day by iodine antiseptic solution, andall patients were discharged in the second postoperativeday.

Following was the inclusion and exclusion criteria for the present study.

Inclusion criteria: included adult patients (12 years old and, diagnosed clinically and/or radiologically by ultrasound in the emergency department as acute appendicitis, and operated as an emergency case within 4 hours of admission.

Exclusion criteria included patients proven to have had perforated appendix, appendicular mass, pregnant female patients, and all the patients who were started as conservative treatment and had received antibiotics within 24 hours of admission.

Results & Discussion

The data form the 25 patients were collected and presented as below.

Table 1: Clinical profile of the patients

Parameters	No. of Cases
Total No. of Cases	25
Sex	
Male	21
Females	4
Clinical Feature	
Fever	3
Nausea	4
Pain in Right iliac fossa	18

Table 2: Operative data

Feature	No. of Cases
Preoperative Stay	
Day 1	6
Day 2	19
Post-Operative Stay	
Day 1	20
Day 2	5

Table 3: Condition of Appendix

Condition of Appendix	No. of Cases	SSI
Normal	14	2
Tip Adherent	3	0
Tip inflamed	6	1
Mildly inflamed	2	1
Total	25	4

Table 4: Swab culture of wound

Swam Culture of Wound	No. of Cases
Negative	3
Positive	1
Total	4

Laparoscopic surgeries are more accepted then open conventional surgeries because of its following advantages: - decreased incision size and infection, less post operative pain, short hospital stay, faster recovery, less post operative complications and early return to activity.

Surgical site infection is most common complication after appendicectomy [6-7]. Standard criteria for surgical site infection were defined by Centres For Disease Control and Prevention (CDC) [8]. Antimicrobial prophylaxis is recommended in clean contaminated cases [9]. Prophylactic antibiotic is effective when administered at appropriate time and dosage before incision so that therapeutic tissue levels

are reached.

There are not many studies that studied the efficacy of single dose prophylactic antibiotics in patients undergoing laparoscopic appendicectomy only as most of the studies included open or both open and laparoscopic procedures together. So, this study has included only laparoscopic appendicectomy cases for better understanding of the efficacy of single dose prophylactic antibiotics in these cases. Laparoscopic appendicectomy is being widely preferred due to advantages like shorter postoperative hospital stay and less wound infection than open appendicectomy [10]. Prophylactic antibiotics are recommended in non-perforated appendicitis in many studies [11-12]. But the practice of administration of antibiotics postoperatively could result in antibiotic related complications following prolonged antibiotic use [13].

However, prophylactic antibiotic administration is no substitute for good surgical technique with established surgical principles.4 Moreover postoperative antibiotic administration was not found to reduce infectious complications but could increase antimicrobial resistance and hence may not be beneficial in nonperforated appendicitis [14]. Although many studies recommended prophylactic antibiotics, only few studies mentioned that single dose of preoperative antibiotic could reduce postoperative wound infection innonperforated appendicitis [15-16]. Medical expenses due to postoperative antibiotics usage, longer hospital stay and risk of antibiotic related complications may be unnecessary.

During laparoscopic surgeries the risk of infection starts when skin is incised and the first natural barrier is cut, but maximum risk of infection is at the time of handling the tissues which can also lead to post operative infection. As the incision in laparoscopic surgery is shorter than that in conventional open surgery, the former is considered to have a lower incidence of incisional SSI. 8 Most of the surgical site infections are superficial; even though they contribute greatly to the morbidity and mortality associated with surgery [17-18].

Single or multiple dosages of antibiotics are important to prevent surgical site infection. In addition to this preoperative preparation of the patient, per operative aseptic technique and precautions and meticulous surgery are also equally important to prevent post operative wound infection. A single, effective, nontoxic drug is used to prevent infection by a specific microorganism or to eradicate an early infection. A study of single-dose versus multiple dosage of antibiotics in which metronidazole was used showed that the incidence of incisional surgical site infection for the single-dose regimen was the same as that for the multiple-dose regimen [19].

Wound infections, if not controlled, can lead to major complications like burst abdomen, incisional hernia, necrotizing fasciitis and septicemia. Bucknall *et al*. found that wound infection was a major contributing factor in burst abdomen and incisional hernia in his series. Irvin *et al* found that dehiscence and herniation was observed more in infected wounds, and in view of the increased incidence of such complications, it is always desirable to avoid wound infection whenever possible [20-21]. Frequency of infective complications including wound infection in patients undergoing appendicectomy for uncomplicated appendicitis is generally very low [22].

However, it has been observed in daily practice that these patients usually receive costly parenteral postoperative antibiotics for prolonged period. The logic of this practice is the fear of the dreadful complications of wound infection. This prolonged administration of antibiotics on one hand is unnecessary, can increase antibiotic resistance, can have the antibiotics related side effects and on the other hand significantly increases the financial burden on the patient [23-24].

Surgical wound infection is affected by several risk factors, i.e. patient, local, environmental, procedural, surgeon/operator, and care factors. Patient factors consist of age, nutritional status (malnutrition, obesity), the presence of other diseases (malignancy, chronic diseases [diabetes mellitus, hepatic cirrhosis], associated infection), the treatment received (corticosteroids, immunosuppressant, radiation) and psychological state of the patient (anxiety, fright, and sleeping difficulty) [25]. In our study, a significant difference was found in wound infection due to patient geographical distribution. Rural areas and village patients had high infection rate, an observation we can attribute to the fact noticed in our patients that those group of people had low level of body hygiene.

Local factors that participate in surgical wound infection are necrotic tissue, avascular tissue, hematoma, poor hemostasis, foreign material in the wound, suture material and suturing technique, skin infection in the surgical area [26].

Conclusion

Based on the data generated from the present study it can be concluded that single dose prophylactic preoperative antibiotics would be sufficient in cases of laparoscopic appendicectomy for simple uncomplicated non-perforated acute appendicitis.

References

1. Margenthaler JA, Longo WE, Virgo KS, *et al*. Risk Factors for Adverse Outcomes After the Surgical Treatment of Appendicitis in Adults". Ann. Surg. 2003; 238(1):59-66. doi:10.1097/01.SLA.0000074961. 50020. f8. PMC 1422654.
2. Ashwin, Rammohan, Paramaguru, Jothishankar, Manimaran AB, Naidu RM. Two-port vs. three-port laparoscopic appendicectomy: A bridge to least invasive surgery. Journal of Minimal Access Surgery, 2012.
3. https://www.sages.org/publications/patient-information/patient-information-for-laparoscopic-appendectomy-from-sages/
4. Semm K. Endoscopic appendectomy. Endoscopy. 1983; 15(2):59-64. doi: 10. 1055/ s-2007-1021466. PMID 6221925.
5. Siewert B, Raptopoulos V, Liu SI, Hodin RA, Davis RB, Rosen MP. CT predictors of failed laparoscopic appendectomy". Radiology. 2003; 229(2):415-20. doi: 10.1148/radiol.2292020825. PMID 14595145.
6. Lamont P. Surgical Infection. In: Williams NS, Bulstrode CJK, O'Connell PR, eds. Bailey and Love's Short Practice of Surgery. 26th ed. Boca Raton, FL: CRC Press, 2013, 59-62.
7. Barie PS. Surgical Infections and Antibiotic Use. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL. Sabiston Textbook of Surgery. 20th ed. Philadelphia: Elsevier, 2017, 245-7.

8. Centers for Disease Control and Prevention, National Healthcare Safety Network. Surgical Site Infection (SSI) Event, 2015, 2016 (Modified) (cited June). Available at http:// www. cdc.gov/nhsn/ pdfs/ pscmanual/9pscssicur rent.pdf.
9. ASHP Therapeutic Guidelines on Antimicrobial Prophylaxis in Surgery. American Society of Health-System Pharmacists. Am J Health Syst Pharm. 1999; 56(18):1839-88
10. Wei HB, Huang JL, Zheng ZH, Wei B, Zheng F, Qiu WS, *et al*. Laparoscopic versus open appendectomy: a prospective randomized comparsion. Surg Endosc. 2010; 24(2):266-9.
11. Bauer T, Vennits B, Holm B, Hahn-Pedersen J, Lysen D, Galatius H, *et al*. Antibiotic prophylaxis in acute non perforated appendicitis. The danish multicentre study Group III. Ann Surg. 1989; 209(3):307-11.
12. Busuttil RW, Davidson RK, Fine M, Tompkins RK. Effect of prophylactic antibiotics in acute non perforated appendicitis a prospective, randomized, double-blind clinical study. Ann Surg. 1981; 194:502-9.
13. Mui LM, Ng CS, Wong SK, Lam YH, Fung TM, Fok KL, *et al*. Optimum duration of prophylactic antibiotics in acute non perforated appendicitis. ANZ J Surg. 2005; 75:425-8.
14. Hughes MJ, Harrison E, Paterson-Brown S. Postoperative antibiotics after appendectomy and postoperative abscess development: a retrospective analysis. Surg Infect (Larchmt). 2013; 14(1):56-61.
15. Choi SM, Lee SH, Jang JY, Kim HW, Jung MJ, Lee JG. Is single administration of prophylactic antibiotics enough after laparoscopic appendectomy for uncomplicated appendicitis? J Acute Care Surg. 2015; 5:59-63.
16. Le D, Rusin W, Hill B, Langell J. Post-operative antibiotic use in non-perforated appendicitis. Am J Surg. 2009; 198(6):748-52.
17. Leaper DJ, van Goor H, Reilly J, Petrosillo N, Geiss HK, Torres AJ, *et al*. Surgical site infection - a European perspective of incidence and economical burden. Int Wound Journal. 2004; 1(4):247-27.
18. DiPiro JT, Martindale RG, Bakst A, Vacani PF, Watson P, Miller MT. Infection in surgical patients: effects on mortality, hospitalization, and post discharge care. Am J Health Syst Pharm. 1998; 55(8):777-81.
19. Kow L, Toouli J, Brookman J, McDonald PJ. Comparison of cefotaxime plus Metronidazole versus cefoxitin for prevention of wound infection after abdominal surgery. World J Surg. 1995; 19(5):680-686.
20. Bucknall TE, Cox PJ, Ellis H. Burst abdomen and incisional hernia: a prospective study of 1129 major laparotomies. Br Med J. 1982; 284:931-3.
21. Irvin TT, Stoddard CJ, Greaney MG, Duthie HL. Abdominal wound healing: a prospective clinical study. Br Med J. 1977; 2:351-2.
22. Gupta R, Sample C, Bamehriz F, Birch DW. Infectious complications following laparoscopic appendectomy. Can J Surg. 2006; 49:397-400.
23. Derek WM, Lillian SK. Controversies in appendicitis. Surgical Infections. 2008; 9:553-8.
24. Busttil RW, Davidson RK, Fine M, Tompkins RK. Effect of prophylactic antibiotics in acute non perforated appendicitis. Ann Surg. 1981; 194:502-8.
25. Nichols RL. Preventing surgical site infections: surgeon's perspective. Emerg. Infect Dis. 2001; 7:220-4.
26. Nichols RL. Preventing surgical site infections: surgeon's perspective. Emerg. Infect Dis. 2001; 7:220-4.
27. Bayoumi AA, Fattah H, Abd-alRasoul S, Abd-AlRrasoul M, Jawad E. Comparative In-vitro pharmaceutical evaluation of some selected brand of Metronidazole tablets marketed in Iraq. International Journal of Pharmaceutical Science and Research. 2019;4(2):13-5.