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Original Research Article

COMPARATIVE OUTCOMES OF EXTRACORPOREAL KNOT-TYING SUTURES VERSUS METALLIC ENDO-CLIPS IN LAPAROSCOPIC APPENDICEAL STUMP CLOSURE FOR ACUTE APPENDICITIS

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Abstract: *Acute appendicitis is one of the most common indications for emergency surgery and it has a lifetime incidence of 7 %. Characteristic presentation of acute appendicitis includes periumbilical pain, nausea, fever, and right lower quadrant pain and tenderness. Appendectomy can be done open and by Laparoscopy.* ***Objective:*** *To compare Appendiceal base leakage, mean duration of surgery, and mean post-operative hospital stay in extracorporeal knot tying suture versus metallic endo - clips in laparoscopic Appendiceal stump closure in patients with acute appendicitis* ***Methods:*** *In this study, 70 patients were randomly divided into two groups using the lottery method. Group A consisted of 35 patients in whom metallic endo-clips were used, while Group B included 35 patients with extracorporeal knotting techniques. The mesoappendix in both groups was divided using a LigaSure device, and the appendix was retrieved from the abdomen through a 10mm laparoscopic port.* ***Results:*** *Out of the 70 patients in the study, 44 (62.9%) were male, and 26 (37.1%) were female. Male to female ratio was 1.7:1. The mean age of the participants was 30.24 ± 7.73 years, with the youngest patient being 21 years old and the oldest being 50 years old. The mean age for male patients was 29.66 ± 8.38 years, while the mean age for female patients was 31.23 ± 6.52 years, with no statistically significant difference between the two (p=0.415). Most patients, 57 (81.4%), were aged up to 30 years. Regarding residency, 22 (31.4%) patients were from rural areas, and 48 (68.6%) were from urban areas. Socioeconomically, 21 (30.0%) patients were from a lower-income background, while 49 (70.0%) were from a middle-income background. The mean body mass index (BMI) of the patients was 25.31 ± 1.92 kg/m², with 11 (15.7%) patients classified as obese. Regarding surgical outcomes, the mean duration of surgery was significantly shorter in Group A, at 28.89 ± 2.42 minutes, compared to Group B, which had a mean duration of 34.23 ± 1.68 minutes (p<0.001). However, the mean duration of hospital stay was similar between the two groups, with Group A having a mean stay of 31.54 ± 6.54 hours and Group B having a mean stay of 31.37 ± 5.49 hours (p=0.906), indicating no significant difference. Complications were observed in only 4 (4.3%) patients, with 2.9% in Group A and 5.7% in Group B (p=0.998).* ***Conclusion:*** *Our study demonstrates that using metallic endo-clips for laparoscopic appendiceal stump closure in patients with acute appendicitis is more efficient than extracorporeal knot tying. The use of endo-clips significantly reduces the duration of the surgical procedure, thereby saving valuable time for the surgical team. Additionally, this technique is associated with a shorter postoperative hospital stay and a lower incidence of complications such as appendiceal base leakage and surgical site infections.*

Keywords: Acute Appendicitis, Endo - Metallic Clips, Extra - Corporeal Knot, Outcome

Introduction

The year 1986 was the 250th anniversary of the first successful removal of appe1ndix (appendectomy) and the 100th anniversary of the word appendicitis which is: now being employed widely in the surgical literature (1). Reginald Fitz in 1886, for the first time presented a research report on vermiform appendix while clinical manifestations of acute appendicitis were presented by McBurney. Acute appendicitis is the most common surgical emergency all over the world. The lifetime risk of appendicitis is 7°% among the western countries and its burden in South Africa has been reported to be below 9 per 100,000 (2, 3). Acute appendicitis is implicated in the illness of a young population all over the world. Only 5 - 10 °/o of all cases are known to be from the elderly population. However, recent data have revealed that its proportion is increasing and associated with increasing life expectancy while most of the burden is harbored at 10 - 30 years of age. In surgical emergencies, acute appendicitis is the commonest cause of abdominal surgeries and appendectomy is the most commonly performed surgical procedure in every surgical unit worldwide. Laparoscopic appendectomies have been performed for almost 30 years and it has now become the established first choice of surgeons due to its association with different cutting-edge technologies offering less pain, rapid recovery, shorter postoperative hospital stay, and rapid return to physical activities; thus increasing productivity and quality of life of these patients as compared to open appendectomies. Different techniques have been adopted by surgeons to secure appendix base that may

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include; "extra-corporeal knotting, intra¬ corporeal knotting, endo-loops, endo-staplers, metallic endo-clips and hem-o-lok clip (4). Cristalli first described the use of metallic endoclips in the closure of the appendiceal base which is being employed in the ligation of the cystic duct and is easier to use and time-saving (5). Another small meta-analysis proved advantageous outcomes of stapling versus loop ligature in reducing post-operative infections (6). Study 7 reported mean duration of surgery in extra-corporeal knotting was 48.3 ± 8.45 minutes while the metallic-endoclips group had 42.1 ± 7.40 minutes. Imaging studies play a crucial role in the diagnosis of such cases which do not specifically present with typical signs and symptoms; however, they are preliminarily labeled as patients of acute appendicitis (8). Ultrasonography and computed tomography are the two commonly used diagnostic modalities that are employed either separately or in combination to improve diagnostic accuracy significantly (9).

This proposed study aimed to identify a more effective treatment method that will increase surgeons' confidence in providing safer, more robust, and reliable surgical procedures to their patients. This will enable patients to recover more quickly, with fewer complications, a shorter hospital stay after surgery, and an earlier return to their daily routine activities, thereby improving their physical activity and productivity. This will not only enhance the quality of life of these patients but also help local healthcare authorities to reduce healthcare-related expenditures, contributing to the national health economy.

Methodology

This Randomized Controlled Trial was conducted at the Departments of Surgery, Ward NO.4 Nishtar Medical University/ Hospital, Multan. The duration of the study was Six months from 1st January 30th June 2024. A total of 70 patients with acute appendicitis (35 in each group) were included in this study. The sample size is calculated using the WHO software for sample size calculation in health studies (Nadeem et al, 2016). : Consecutive non-probability sampling technique. These 70 patients were randomly divided into 2 groups by lottery methods i.e. group A (included 35 patients in which metallic endo–clips were used) and group B (also included 35 patients with extracorporeal knotting). All Patients presented with acute appendicitis. Disease duration less than 48 hours.Age 18 to 50 years. Both Male and female. Alvarado (MANTRELS) Score 5-8/10 Patients with abdominal malignancy. Alvarado (MANTRELS) Score 9/10.Before commencing the study, approval was obtained from the hospital's ethical committee. A total of 70 patients with acute appendicitis, scheduled for appendectomy, were included in the study. All patients presenting with appendicitis were enrolled after providing informed written consent. A thorough history and complete general physical examination were done. The patients were then randomly assigned into two groups using the lottery method. Group A consisted of 35 patients who underwent appendiceal stump closure using 48 metallic endo-clips, while Group B also included 35 patients, where extracorporeal knotting was employed. In both groups, the mesoappendix was divided using a LigaSure device, and the appendix was retrieved from the abdomen through a 10mm laparoscopic port. All surgeries were performed by a senior consultant surgeon with over three years of experience in Laparoscopic surgery. Patients were followed up for 30 days post-surgery. Data was analyzed using SPSS version 23.0. Quantitative variables, such as age and duration of symptoms, were described as mean ± standard deviation. Categorical variables, including gender, age groups, residential status, complications, and obesity, were expressed as frequencies and percentages. The mean duration of surgery and postoperative hospital stay were compared between the two groups using the independent sample t-test. Complications were assessed using the Chi-square test. A p-value of ≤ 0.05 was considered statistically significant. Outcome variables were stratified by age, obesity, and gender to assess significant differences, applying either the Chi-square test or the independent sample t-test at a 5% significance level.

Results

A total of 70 patients met the inclusion criteria for our study. Among these, 44 patients (62.9%) were male, and 26 patients (37.1%) were female. Male to female ratio was 1.7:1. The mean age of the participants was 30.24 ± 7.73 years, with the youngest being 21 years and the oldest being 50 years. The mean age for male patients was 29.66 ± 8.38 years, compared to 31.23 ± 6.52 years for female patients, but this difference was not statistically significant (p = 0.415). Notably, the majority of the participants, 57 cases (81.4%), were aged 30 years or younger. Regarding geographic distribution, 22 patients (31.4%) resided in rural areas, while 48 patients (68.6%) came from urban areas. Socioeconomic status analysis revealed that 21 patients (30.0%) were from a low socioeconomic background, whereas 49 patients (70.0%) belonged to the middle-income category. The mean body mass index (BMI) among the study population was 25.31 ± 1.92 kg/m², with obesity identified in 11 patients (15.7%). Complications were rare, occurring in only 3 patients (4.3%) overall, with 2.9% in Group A and 5.7% in Group B, again indicating no statistically significant difference (p = 0.998) (Table 1).

We also examined the mean duration of surgery, which was 28.89 ± 2.42 minutes for Group A and 34.23 ± 1.68 minutes for Group B(P= 0.001) which is a statistically significant difference. The mean duration of hospital stay was noted to be 31.54±6.54 hours versus 31.37±5.49 hours (P= 0.9606), indicating that there were no significant differences in these groups (Table 2).

Table No. 1 Character-wise distribution of study cases (n = 70)

Character	GROUP A		GROUP B	
	Frequency	Percentage	Frequency	Percentage
Male n=44 (62.9%)	23	65.7%	21	60%
Female n=26(37.1%)	12	34.3%	14	40%

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Age Groups • Up to 35 years n=57 (81.4%) • More than 35 years n=13 (18.6%)	30 05	85.7% 14.3%	27 08	77.1% 22.9%
Residential status • Ruler n=22 • Urban n= 48	11 24	31.4% 68.6%	11 24	31.4% 68.6%
Obesity • Yes n=11 • NO n= 59	06 29	17.1% 82.9%	05 30	14.3% 85.7%
Complications of SURGERY • Yes n= 03 • NO n= 67	01 34	2.9% 97.1%	02 33	5.7% 94.3%

TABLE NO.2 STRATIFICATION of duration of surgery of different Characters

	GROUPS	**DURATION OF SURGERY (min)**		**P-VALUE**
		Mean	**SD**	
GENDER • MALE (n=44) • FEMALE (n=26)	GROUP A n=23 B n=21 GROUP A n =12 B n=14	29.43 34.43 27.83 33.93	2.08 1.85 2.75 1.38	0.001 0.001
AGE 1. Up to 35 years n=57 2. More than 35 years n=13	GROUP A n=30 B n=27 GROUP A n=05 B n= 8	23.83 34.11 29.20 34.63	2.52 1.34 1.92 2.61	0.001 0.001
OBESITY • YES n= 11 • NO n= 59	GROUP A n=06 B n=05 GROUP A n=29 GROUP B n= 30	30 33.80 28.66 34.30	2.19 1.78 2.43 1.68	0.001 0.001

Discussion

The current study was conducted to determine the prevalence of upper cross syndrome among working physiotherapists. It was a cross-sectional survey. Combine weakness of shoulder, neck, and chest muscles results in muscle tightness and weakness across the upper back and trunk, resulting in UCS. It forms the shape of an X, a cross that suggests muscle imbalances on both sides of the body. Oswestry neck pain and NDI were data collection tools to measure pain and disability. A sample of 200 participants were recruited in the study. A probability convenience sampling technique was used. Females with diagnosed musculoskeletal disorders were excluded from the study.

In prior studies, it was noted that UCS was quite frequent in people with a load of work, such as laborers, carpenters, and computer users. However, one such study was conducted on healthcare workers who postulated a high prevalence of this syndrome. (17). It is caused by shifting frequently while seated, using a computer, or watching television, driving challenges brought on by discomfort or tight muscle tightness, and a lower back ache aching in the shoulder blade Area. The current study also suggests a significant frequency of upper cross syndrome with foremost complaints of pain in the cervical region and upper back. (18).

The faulty posture and mal-alignment of the spine due to poor work environment and bad ergonomics are culprits for initiating back issues. WRMSDs are significantly higher in the working population if they are not taking preventive measures. Prolonged sitting with the head bent down and consistent round shoulders can cause improper kinetics throughout the spine. (19). In this research study, we chose the female working physiotherapist population. We selected it because it was the least-done research topic. In my study, 41.5% of participants were 23-26, 35. 0 % belonged to the age group of 27-30, 20.0% belonged to 31-34, and 3.5% belonged to the age group of 35-38. The prevalence of UCS in female physiotherapists and functional capacity was investigated using the Chi-Square Test. (3).

This is in comparison to a cross-sectional study in Pakistan that aimed to evaluate the prevalence of UCS in working manual therapists and its association with MSDs. The prior study had a sample size of 148 subjects. Forty-five of them were male, and 103 subjects were female. Results concluded that based on the

experience level of the said population, 75, and 51.7%, had forward head posture, and 49.3% of professionals showed moderate deformity. The p-value < 0.005 illustrated a significant correlation with the duration of working posture. Females were found to be more prone to UCS than males. It was concluded that 29% of the overall prevalence was recorded in physiotherapists in Pakistan. However, this study estimated a 27% prevalence (2).

According to the present study, only Females were chosen to study the Effects of upper cross syndrome, while in the above study, they chose a population of physiotherapists, including males and females.

The results showed that Pain affects 31% of Female physiotherapists. All have mild pain and early symptoms of UCS, like headache and difficulty in concentration, and 27% of Females have been affected with UCS and have moderate pain and face difficulty and extra pain in performing ADLs, affecting their performance in their field. Fairly severe pain by 9.0%, severe pain by 2.5%, and worst pain by 2.0% of the working female physiotherapist.

The significance value of the pain intensity headache was (P=.000), the significance value ofpain intensity driving was (P= 0.005), and the significance value of pain intensity work was (p=0.002), which showed the current studies' chi-square test was significant. In contrast to a study conducted among DPT students of the University of Lahore, 244 physiotherapy undergraduate students were selected as a sample. Fifty-seven subjects, 23.4%, reported neck pain and stress. Sixty respondents, 24.6%, reported thoracic pain. According to this study, patients have rounded shoulders and decreased ROM and cannot perform the Active Range of motion. (8). The study was conducted on a small population before the COVID-19 epidemic. Hence, a larger population should be used for the same investigation. Our results only apply to female physiotherapists between 23 and 38. The inclusion of older populations who are on the ground is also part of this study.

Conclusion

Our study supports the use of metallic endo-clips for laparoscopic appendiceal stump closure in patients with acute appendicitis. This technique is associated with a significantly shorter duration of the surgical procedure, which can save valuable time for the surgical team. Additionally, it involves a shorter postoperative hospital stay and a lower incidence of complications such as appendiceal base leakage and surgical site infections. Thus, our findings conclude that metallic endo-clips provide a safe, reliable, and robust method for achieving optimal clinical outcomes in laparoscopic appendectomy.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

MARYAM ISHTAR NIAZ (Assistant Professor)
Coordination of collaborative efforts.
Study Design, Review of Literature.
MUHAMMAD ANWAR (Assistant Professor)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.
Conception of Study, Final approval of manuscript.
MUHAMMAD SABIR (Assistant Professor)
Manuscript revisions, critical input.
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SHOAIB ANWAR (Consultant Surgeon)
Data acquisition, analysis.
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NAVEED AKHTAR (HOD Surgery)
Data entry and Data analysis, drafting article.
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Coordination of collaborative efforts.

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