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COMPARISON OF BOGOTÁ BAG TECHNIQUE AND ALTERNATIVE TEMPORARY ABDOMINAL CLOSURE METHODS IN POST-SURGICAL WOUND DEHISCENCE: AN OBSERVATIONAL STUDY

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ABSTRACT

Introduction: Temporary abdominal closure techniques are important in the management of deep wound gapes following surgery. The Bogotá bag technique is a widely used as temporary abdominal closure method due to its simple procedure, cost-effective and better wound management. The current study compares the outcomes of Bogotá bag closure with alternative methods. **Materials And Methods:** A cross-sectional observational study was conducted on 21 female patients with post-surgical wound dehiscence at a tertiary care hospital between 2023 and 2024. Eleven patients underwent Bogotá bag TAC, while ten received alternate abdomen closure methods. Data on patient demographics, clinical characteristics, surgical history, haemoglobin levels, and need for resuturing were analysed using SPSS v27. **Results:** The Bogotá bag group had a significantly lower mean age than alternate closure group (p=0.008). There was no significant difference in surgical history, anaemia prevalence (p=0.476), diabetes (p=0.311) and haemoglobin levels (p=0.969). All the patients in alternate closure group had resuturing after the intervention, whereas no patient with Bogotá bag technique had undergone resuturing (p<0.001). **Conclusion:** The Bogotá bag technique was found to be superior in wound healing and reducing the need for resuturing. Therefore, it is a more effective temporary abdomen closure technique.

KEYWORDS

abdominal surgery, Bogotá bag technique, TAC, wound gape, wound management.

INTRODUCTION

Abdominal wound closure is a fundamental aspect of surgical management, essential for restoration of the integrity of the abdominal wall and prevention of complications such as evisceration and infection (Rutherford et al., 2004). In cases of abdominal trauma, sepsis, or intra-abdominal hypertension, primary fascial closure may not be feasible. Therefore, the use of temporary abdominal closure (TAC) techniques to facilitate further intervention and optimize patient outcomes is necessary (Atema et al., 2015). Among the available TAC methods, the Bogotá bag technique has been widely utilized due to its simplicity, cost-effectiveness, and effectiveness in managing the open abdomen (Manterola et al., 2011).

The Bogotá bag closure involves the use of a sterile plastic sheet, which is often an intravenous fluid bag (Boele Van Hensbroek et al., 2009). It is sutured to the fascial edges of the open abdomen to create a temporary barrier (Boele Van Hensbroek et al., 2009). This technique allows adequate control of abdominal contents and at the same time maintains accessibility for subsequent interventions (Neeman et al., 2020). The method was originally described in Colombia and later gained widespread acceptance in emergency and trauma surgery settings, especially in resource-limited environments where commercial TAC systems may not be readily available (Diaz et al., 2010).

TAC is crucial in damage control laparotomy, and facilitates physiological stabilization before definitive surgical repair (Tremblay et al., 2001). Delayed primary fascial closure done by step-wise surgical approach is associated with decreased morbidity and higher survival rates (Chen et al., 2014). The Bogotá bag serves as an effective bridge to definitive closure, minimizing fluid loss and thus reduces the risk of abdominal compartment syndrome (Huang et al., 2016). It enables the planned re-exploration for surgeons in case of emergency (Huang et al., 2016). Compared to alternative TAC techniques, such as negative pressure wound therapy, the Bogotá bag remains a better alternative due to its ease of application and minimal resource requirements (Zahid et al., 2024).

Despite its advantages, the Bogotá bag technique has limitations, such as the potential for adhesion formation, loss of domain, and delayed fascial closure (Hu et al., 2018). However, studies have demonstrated that when used appropriately, this method contributes to favourable outcomes in critically ill patients requiring step-wise abdominal interventions (Tremblay et al., 2001).

The current study involved a total of 21 females with deep wound gaps. All the cases were resutured, however 11 were managed with Bogotá bag technique for TAC and remaining 10 were managed with TAC other than Bogotá bag technique. This study aims to evaluate the effectiveness of Bogotá bag closure in managing the open abdomen with deep wound gapes, focusing on clinical outcomes and the feasibility of delayed fascial closure. Furthermore, it also aimed to evaluate need of resuturing after TAC. By analysing the role of Bogotá bag technique, this research attempts to provide more knowledge regarding utility of the technique.

MATERIALS AND METHODS

This cross-sectional observational study involved a total of 21 female patients referred for post-operative complication of wound gape after various surgeries in a tertiary care hospital of a metropolitan city. The study duration was two years (2023-2024). The study included female patients of age group 18-55 years, operated for various surgeries, such as total abdominal hysterectomy (TAH), Lower Segment Caesarean Section (LSCS) surgery and having deep wound gape in the form of full-length wound gape or rectus breech. Patients age group less than 18 years, with superior wound gape, not giving consent for the recruitment in the study and not undergoing resuturing were excluded. Cases were selected by complete enumeration method. After taking written informed consent and all necessary ethical approvals, patients were enrolled in the study. All socio-demographic details, clinical history, surgery and related details of the patients were noted. The cause for resuturing was confirmed in all the cases. Resuturing was done in all the cases. A total of 11 patients were intervened with Bogotá bag technique for TAC. All these were operated in the year 2024 as Bogotá bag technique for TAC was started in the hospital from the same year. Remaining 10 patients were operated and resutured in the year 2023 when Bogotá bag technique for TAC was not available in the hospital and alternate techniques were used. The day of the resuturing was noted. Patients' blood parameters including haemoglobin and transfusion history was recorded. The wound status periodically reviewed and follow ups were made till complete wound healing. Any event of resuturing after TAC (either with Bogotá bag technique or other non- Bogotá bag technique) were noted and compared.

Statistical Analysis: All the collected data was entered and cleaned in Microsoft Excel 2021 (©Microsoft Inc.). SPSS version 27 (©IBM Inc.) was used for data analysis. Mean and standard deviation (SD) were taken as measure of central tendency for continuous data. For categorical data, median and inter quartile range (IQR) were calculated. For nominal data, proportion of each variable was calculated. Descriptive analysis was done and analysed data was represented graphically. Normality of the data was checked with the help of Shapiro-Wilk Test ($p < 0.05$ as non-normal distribution). Association between two variables was calculated by Pearson's Chi Square Test. Additionally, Chi Square Test was used to find out difference between proportions. Independent-t Test and Mann-Whitney U Test were used for intergroup comparison based on the normality of the data. P value <0.05 was considered as significant.

OBSERVATION AND RESULTS

The study involved 21 female patients with 11 patients receiving Bogotá bag technique for TAC and 10 patients receiving non- Bogotá bag technique for TAC.

Patient Characteristics: Overall mean age of the patients was found to be 32±10.83 years. The patients who were managed with Bogotá bag technique for TAC had mean age of 26.82±5.00 years. The patients who were managed with alternative techniques had mean age of 37.70±12.81 years. The difference was **statistically significant**; hence it can be stated that the mean age of patients who underwent Bogotá bag technique for TAC had **significantly lower age** (Mann-Whitney U Test, p=0.008) (Table 1).

Surgical History: Out of the 21 cases, 11(52.4%) were undergone LSCS, 8(38.1%) were operated for TAH and 2(9.5%) underwent other surgeries. In patients with Bogotá bag technique for TAC, 6(60.0%) had history of LSCS and 4(40.0%) had history of TAH. In alternative abdominal closure group, 5(45.5%) had history of LSCS, 4(36.4%) had history of TAH and 2(18.2%) had history of other surgeries. The proportion of past surgery type was similar in the patients with Bogotá bag technique and alternate technique (Chi-Square Test, p=0.565).

Clinical Characteristics: Out of 21 patients, 19(90.5%) had anaemia and 4(19.0%) had diabetes. In the group of Bogotá bag technique closure (n=11), 9(81.8%) had anaemia and 1(9.1%) had diabetes. In the group of alternate technique closure (n=10), all had anaemia and 3(30.0%) had diabetes. There was no difference in the proportion of anaemia (Chi-Square Test, p=0.476) as well as diabetes (Chi-Square Test, p=0.311) between the two groups. Overall, mean haemoglobin was found to be 8.36±0.76 gm/dl with mean haemoglobin of 8.36±0.95 gm/dl in Bogotá bag technique closure group and 8.35±0.53 gm/dl in alternate technique closure group. There was no significant difference between the haemoglobin values of both the groups (Independent-t Test, p=0.969) (Table 1).

Resuturing After TAC: Out of 21 cases, 10 cases were resutured even after the TAC. All these cases were managed with alternate technique for closure. No resuturing was required in any patient managed with Bogotá bag technique for TAC. All 11 cases with Bogotá bag technique showed satisfactory wound healing and overall good prognosis. Therefore, Bogotá bag technique was found to be better than the alternate technique for TAC in the current study (Chi-Square Test, p<0.001) (Table 2).

DISCUSSION

The present study attempts to compare the Bogotá bag technique with alternative temporary abdominal closure (TAC) methods in 21 female patients. The findings showed significant differences in the clinical outcomes between the two groups.

The Bogotá bag technique was performed in younger patients as compared to those who underwent alternate closure technique. However, this difference wasn't meaningful as all the cases who were managed with alternate technique didn't have the choice of Bogotá bag technique due to the non-availability of the procedure in the study hospital.

Surgical history did not significantly differ between the groups (p=0.565). Sixty-percent of patients in the Bogotá bag group and 45.5% in the alternate closure group had history of LSCS. Similarly, TAH history was found in 40.0% and 36.4% of patients, respectively.

This finding is similar with outcomes of previous literature suggesting that prior abdominal surgeries influence TAC decisions but may not necessarily affect outcomes (Atema et al., 2015; Boele Van Hensbroek et al., 2009).

The prevalence of anaemia (90.5%) and diabetes (19.0%) was high in both groups. However, there was no significant difference in anaemia (p=0.476) or diabetes (p=0.311) between the groups. The mean haemoglobin levels were nearly identical (8.36±0.95 gm/dL vs. 8.35±0.53 gm/dL; p=0.969), suggesting that baseline clinical status did not influence the choice of TAC method.

These observations are similar to Chen et al. (20214) and Diax et al. (2010); who observed that though comorbidities can impact overall recovery, their role in TAC selection remains unclear (Chen et al., 2014; Diaz et al., 2010).

A significant difference was noted in wound healing and resuturing rates. None of the Bogotá bag patients required resuturing, on the other hand all 10 patients in the alternative closure group required additional surgical intervention (p<0.001). This strongly suggests that the Bogotá bag technique is superior and helps in satisfactory wound healing with decreased need for secondary closure. Previous studies have reported similar results with Bogotá bag closure where there were reduced fascial dehiscence and minimal surgical site complications (Hu et al., 2018; Manterola et al., 2011; Zahid et al., 2024).

Overall, the Bogotá bag technique showed better clinical outcomes compared to alternative TAC methods. These findings support the existing evidence of use of Bogotá bag technique, especially in cases requiring prolonged TAC, as it facilitates wound healing, reduces surgical complications, and avoids the need for resuturing (Huang et al., 2016; Rutherford et al., 2004).

CONCLUSIONS

The Bogotá bag technique for temporary abdominal closure had superior outcomes compared to alternative methods, with significantly lower resuturing rates and better wound healing.

The findings support the Bogotá bag as an effective TAC method, minimizing complications and the need for secondary interventions.

Limitation

The study was done in a small sample size for limited period which may affect the generalizability of the study for different populations and geographical areas. Further large-scale controlled trails may yield robust results with greater generalizability.

Conflict Of Interest

None.

Funding

None.

Table 1: Comparison of variables in patients with Bogotá bag technique and alternate technique for TAC

Variable	Bogotá Bag Technique	Alternate Technique	Test used	p alue	Inference
Age	26.82±5.00	37.70±12.81	Mann-Whitney U Test	0.008	Age was lower in Bogotá bag technique group
Haemoglobin	8.36±0.76	8.35±0.53	Independent-t Test	0.969	Haemoglobin levels were similar in both groups

Table 2: Association between variables of patients with Bogotá bag technique and alternate technique for TAC

TAC Technique	Anaemia Absent		Anaemia Present		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Bogotá Bag Technique	2	18.2	9	81.8	11	52.4
Alternate Technique	0	0	10	100.0	10	47.6
Total	**2**	**9.5**	**19**	**90.5**	**21**	**100.0**
Chi-Square Statistics: df=1, p=0.476. Cramer's V=0.309						
TAC Technique	**Diabetes Absent**		**Diabetes Present**		**Total**	
	Frequency	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Bogotá Bag Technique	10	90.9	1	9.1	11	52.4
Alternate Technique	7	70.0	3	30.0	10	47.6
Total	**17**	**81.0**	**4**	**19.0**	**21**	**100.0**
Chi-Square Statistics: df=1, p=0.311. Cramer's V=0.266						
TAC Technique	**Resuturing needed**		**Resuturing not needed**		**Total**	
	Frequency	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Bogotá Bag Technique	0	0	11	100.0	11	52.4
Alternate Technique	10	100.0	0	0	10	47.6
Total	**10**	**100.0**	**11**	**100.0**	**21**	**100.0**
Chi-Square Statistics: df=1, p<0.001. Cramer's V=1						

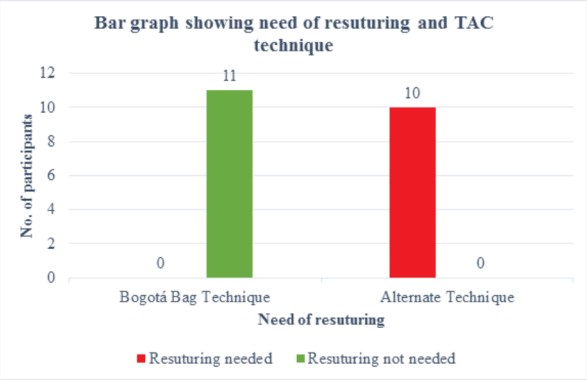

Figure 1: Bar graph showing need of resuturing and TAC technique

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