

DETERMINANTS OF FAILURE IN SURGICAL REPAIR OF VESICOVAGINAL FISTULA AT A TERTIARY REFERRAL HOSPITAL IN INDONESIA: A RETROSPECTIVE STUDY

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Abstract

Background: Repair failure or recurrent fistula is the most common complication of vesicovaginal fistula repair procedures. The paper aims to explore determinants of failure in the surgical repair of vesicovaginal fistula at a tertiary referral hospital in Indonesia

Methods and Results: The retrospective study was conducted at a tertiary referral hospital. 71 medical records from vesicovaginal fistula patients were recorded to obtain data such as age, BMI (Body Mass Index), size and number of fistulas, obstetric and previous surgical procedures, and previous repair history. The data were analyzed descriptively and statistically. The results showed age ($p=0.569$, correlation coefficient = 0.104), Body Mass Index (BMI) ($p=0.104$, correlation coefficient = 0.298), fistula size ($p=0.230$ and correlation coefficient = 0.222), and repeat procedure ($p=0.903$ and correlation coefficient = 0.022) shows that there is no significant relationship between the success of vesicovaginal fistula repair and the fistula size factor ($p\text{-value} > 0.05$), while the etiology of the fistula ($p=0.029$ and correlation coefficient = 0.502) and the number of fistulas ($p=0.034$ and correlation coefficient = 0.356) shows that there is a significant relationship ($p\text{-value} < 0.05$).

Conclusion: Etiology and the number of fistulas were factors related to the success of vesicovaginal fistula repair. Health workers need to pay attention to these two factors when treating patients with vesicovaginal fistula to prevent repair failure.

Keywords: failure, surgical repair, vesicovaginal fistula, hospital

Introduction

Repair failure or recurrent fistula is the most common complication of vesicovaginal fistula repair procedures.(1) Vesicovaginal fistula itself is a condition where there is a connection between the bladder and vagina causing continuous urine discharge through the vagina.(2) This pathological relationship between the bladder and vagina is the most common type of genitourinary fistula, as many as 76.57% of genitourinary fistulas are vesicovaginal fistulas.(3) Based on the cause, vesicovaginal fistulas are divided into two, namely obstetric (prolonged labor) and non-obstetric (malignancy, hysterectomy, congenital abnormalities, and radiation therapy). The wound-healing process plays an important role in the pathogenesis of fistulas. The injury process that becomes the etiology of vesicovaginal fistula will be followed by tissue damage and necrosis.(4)

The existence of contact or communication between the bladder and vagina is not directly life-threatening but can have social effects on the patient's quality of life.(2) This condition also affects the psychosocial and economic state of the patient's family.(5) Management of vesicovaginal fistulas includes conservative treatment, such as continuous bladder drainage (CBD), catheterization with fulguration of the fistula channel, glue injection, platelet-rich plasma (PRP) injection, and anticholinergic administration.(6) Operative procedures can

also be performed with certain indications, and still be the primary method for fistula management regardless of the etiology.(7) Women who have undergone vesicovaginal fistula repair are proven to have improved health quality.(8)

The success of vesicovaginal fistula repair can be influenced by several factors, such as younger age and smaller fistula size are closely related to success.(6) Body Mass Index (BMI) also contributes to repair success, patients with a normal Body Mass Index (BMI) have a greater likelihood of successful repair.(9) Higher repair success is achieved in fistula repair due to non-obstetric or gynecological surgery compared to obstetric consequences.(10) The level of difficulty of the surgical procedure, the condition and quality of the tissue or scarring around the fistula, the anatomical condition of the fistula (the size and number of fistulas), and the success of previous repairs are also factors that affect the success of repair.(11) Patients with a history of previous repair have the potential to develop recurrence fistulas.(12) Although the success rate of vesicovaginal fistula repair is quite high compared to the failure rate, there are still vesicovaginal fistula patients who experience repair failure. The paper aims to explore determinants of failure in surgical repair of vesicovaginal fistula at a tertiary referral hospital in Indonesia

Methods

Types of Research

This type of research is a retrospective study using medical records from 2018 until 2023. This research was conducted at East Java, Indonesia, a tertiary referral hospital in Indonesia. This research has gone through ethical testing at Dr. Soetomo General Academic Hospital with ethical number 1408/LOE/301.4.2/VII/2023.

Research Population

The population of this study is patients diagnosed with vesicovaginal fistula undergoing repair surgery at Dr. Soetomo General Academic Hospital during the research period. The study sample is patients diagnosed with vesicovaginal fistula, undergoing repair surgery, and hospitalized and meets the inclusion and exclusion criteria. The inclusion criteria in this study were complete medical records. Among 71 data recorded, as many as 38 patients have undergone repair. Patients with successful repair amounted to 22 patients, while 10 patients experienced unsuccessful repair. A total of 3 patients did not meet the inclusion criteria due to incomplete medical record data.

Data Collection

Successful repair is defined as total closure of the fistula or no urinary incontinence or no complaints of urine leaking into the patient after undergoing a vesicovaginal fistula repair procedure with a follow-up 1-month post-repair. Data such as age, BMI (Body Mass Index), size and number of fistulas, obstetric and previous surgical procedures, as well as previous repair history were recorded. Successful repair is defined as total closure of the fistula or no urinary incontinence or no complaints of urine leaking into the patient after undergoing a vesicovaginal fistula repair procedure with a follow-up 1-month post-repair.

Statistical Test

Univariate and bivariate analyses are used to determine the relationship between factors, such as age (<60 years or ≥60 years), body mass index (underweight, normal, overweight), fistula etiology (hysterectomy, other iatrogenic procedure, congenital, malignancy), fistula size (<1.5, 1.5-3, >3 cm), fistula

number (single, multiple), history of previous repair (with previous repair, no previous repair) with successful vesicovaginal fistula repair. Pearson and contingency coefficient bivariate analysis was used to analyze the relation. Statistical analyses were considered significant at a P-value less than 0.05.

Results

General data about the fistula

Based on 71 vesicovaginal fistula patients from January 2019 to December 2023 at Dr. Soetomo Regional General Academic Hospital, as many as 38 patients have undergone repair. A total of 3 data were excluded as their data was incomplete, and data of the remaining 32 were analyzed; With details 22 patients underwent successful repair procedures, and the remaining 10 experienced repair failures.

The patient's age ranged from 20 to 66 years with a mean of 45 years, thirty patients were less than 60 years old (93.85). Based on Body Mass Index (BMI), thirteen patients (40.6%) vesicovaginal fistula patients undergoing repair with overweight BMI (>25.1 kg/m²), twelve patients (37.5%) with normal Body Mass Index (BMI) (18.5 – 25.0 kg/m²), seven patients (21.9%) with underweight BMI (< 18.5 kg/m²). A total of nineteen patients (59.4%) had fistula etiology due to hysterectomy (TAH), two patients (6.3%) due to obstetrics (prolonged labor), eight patients (25%) due to iatrogenic (gynecological surgical procedures other than TAH), one patient (3.1%) due to congenital, two patients (6.3%) due to malignancy. Based on fistula size, patients with the largest fistula diameter <1.5 cm were twenty-four patients (75%), patients with the largest fistula diameter 1.5-3 cm were six patients (18.8%), and fistulas with the largest diameter >3cm were two patients (6.3%). Based on the number of fistulas, patients with the number of single fistulas were 30 patients (93.8%), and patients with multiple fistulas were 2 patients (6.3%). Based on repeated repair procedure data, patients who had no previous repair history with twenty-six patients (81.3%), and patients who had undergone previous repair procedures were six patients (18.8%). Data is presented in Table 1.

Table 1. Patient Characteristics

Variable	Category	Frequency (n)	Percentage (%)	Mean	SD
Age	<60 years	30	93,8	45,19	10,805
	≥60 years	2	6,3		
Body Mass Index (BMI)	Underweight (< 18,5 kg/m ²)	7	21,9	23,75	4,787
	Normal (18,5 – 25,0 kg/m ²)	12	37,5		
	Overweight (>25,1 kg/m ²)	13	40,6		
Etiology	Hysterectomy (TAH)	19	59,4		
	Obstetric (prolonged labor)	2	6,3		
	Iatrogenic (gynecological surgery except TAH)	8	25		
	Congenital	1	3,1		
	Malignancy	2	6,3		
Size of the fistula	The biggest fistula diameter is <1,5 cm	24	75	1,1853	1,17643
	The biggest fistula diameter is 1,5 – 3 cm	6	18,8		
	The biggest fistula diameter is >3 cm	2	6,3		
Number of Fistula	Single	30	93,8		
	Multiple	2	6,3		
	No	26	81,3		

Repeated repair procedure	Yes	6	18,8		
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Table 2. Determinants of failure on surgical repair of vesicovaginal fistula

Variable	Category	Repair Outcomes				P-value	Correlation Coefficient
		Success		Failure			
		n	%	n	%		
Age	<60 years	21	95,5	9	90	0,569	0,104
	≥60 years	1	4,5	1	10		
Body Mass Index (BMI)	Underweight (< 18,5 kg/m2)	5	22,7	7	20	0,104	0,298
	Normal (18,5 – 25,0 kg/m2)	11	50	12	10		
	Overweight (>25,1 kg/m2)	6	27,3	13	70		
Etiology	Hysterectomy (TAH)	14	63,6	5	50	0,029*	0,502
	Obstetric (prolonged labor)	0	0	2	20		
	Iatrogenic (gynecological surgery except TAH)	7	31,8	1	10		
	Congenital	1	4,5	0	0		
	Malignancy	0	0	2	20		
Size of the fistula	The biggest fistula diameter is <1,5 cm	18	81,8	6	60	0,230	0,222
	The biggest fistula diameter is 1,5 – 3 cm	2	13,6	3	30		
	The biggest fistula diameter is >3 cm	3	4,5	1	10		
Number of Fistula	Single	22	100	8	80	0,034*	0,356
	Multiple	0	0	2	20		
Repeated repair procedure	No	18	81,8	8	80	0,903	0,022
	Yes	4	18,2	2	20		



Age and successful vesicovaginal fistula repair

Age variables in the <60 years old or non-elderly category were more in the group with successful repair procedures (95.5%) compared to the ≥60 years or elderly (4.5%) group. Unsuccessful repair procedures were also more numerous in the group <60 years or non-elderly (90%) compared to the ≥60 years or elderly (10%) group. The results of Spearman's bivariate analysis of the success of vesicovaginal fistula repair with age factors showed a p-value of 0.569 and a correlation coefficient of 0.104. These results showed that there was no significant relationship between the success of vesicovaginal fistula repair and age factor (p-value >0.05).

Body mass index and successful vesicovaginal fistula repair

In the variable body mass index (BMI), the normal weight group underwent more successful repair procedures (50%) followed by the overweight group (27.3%), and underweight (22.7%). While unsuccessful repair procedures were more in the overweight group (70%), followed by the underweight group (10%), and normal (10%). The results of Spearman's bivariate analysis p of the success of vesicovaginal fistula repair with the Body Mass Index (BMI) factor showed a p-value of 0.104 and a correlation coefficient of 0.298. These results showed that there was no significant relationship between the success of vesicovaginal fistula repair and the Body Mass Index (BMI) factor (p-value >0.05).

Etiology and successful vesicovaginal fistula repair

Based on the etiology of fistula, of the 32 study subjects, the most successful repair procedures were obtained in fistulas with hysterectomy etiology (TAH) (63.6%), followed by iatrogenic causes due to gynecological surgical procedures other than hysterectomy (TAH). None of the patients with obstetric etiology (prolonged labor) or malignancy had a successful repair procedure (0%), unsuccessful repair procedures were also most common in the fistula group with hysterectomy etiology (TAH) (50%), this might be due to the 32 study subjects with the most group was fistulas with hysterectomy etiology (59.45%). The results of bivariate analysis of the contingency coefficient between the relationship between the success of vesicovaginal fistula repair with age factors showed a p-value of 0.029 and a correlation coefficient of 0.502. These results show that there is a significant relationship between the success of vesicovaginal fistula repair and fistula etiology (p-value <0.05).

Size of the fistula and successful vesicovaginal fistula repair

More successful repair procedures were in the largest fistula diameter group <1.5 cm (81.8%), followed by the largest fistula diameter of 1.5-3 cm (13.6%), and the largest fistula diameter >3 cm (4.5%). However, unsuccessful repair procedures were also more numerous in the largest fistula diameter group <1.5 cm (60%), followed by the largest diameter fistula 1.5-3 cm (30%), and the largest fistula diameter >3 cm (10%). The results of Spearman's bivariate analysis of the relationship between the success of vesicovaginal fistula repair with age factors showed a p-value of 0.230 and a correlation coefficient of 0.222. These results showed that there was no significant relationship between the success of vesicovaginal fistula repair and the fistula size factor (p-value >0.05).

Number of Fistula and successful vesicovaginal fistula repair

Based on the number of fistulas, out of 32 study subjects, there were no patients with multiple fistulas with successful repair procedures (0%), so all patients with single or single fistulas underwent successful repair procedures (100%). While unsuccessful repair procedures were also more in the single fistula group (80%) than in the multiple fistula group (20%). The results of bivariate analysis of the contingency coefficient between the relationship between the success of vesicovaginal fistula repair with the number of fistula factors showed a p-value of 0.034 and a correlation coefficient of 0.356. These results show that there is a significant relationship between the success of vesicovaginal fistula repair and the number of fistula factors (p-value <0.05).

Repeated repair procedure and successful vesicovaginal fistula repair

Based on the variable of repeated repair procedures, successful repair procedures were more in the group that had never undergone a repair procedure before (81.8%) compared to the group that had undergone a repair procedure before (18.2%). While unsuccessful repair procedures were also more in the group that had never undergone a repair procedure before (80%), compared to the group that had undergone a repair procedure before (20%). The results of bivariate analysis of the contingency coefficient between the relationship between the success of vesicovaginal fistula repair with age factors showed a p-value of 0.903 and a correlation coefficient of 0.022. These results showed that there was no significant association between the success of vesicovaginal fistula repair and repeated repair procedures (p-value >0.05).

Discussion

There was no significant association between patient age and repair success.(1) (13) By the results of this study, there is no significant relationship between age and repair success. This may be related to the pathophysiology of wound healing which is very complex. Thus, the influence of these factors does not stand alone, there may be the influence of single or more factors in one or more individual phases, which contribute to the overall outcome of the wound healing process.(14) However, in other studies, it was mentioned that patients with younger age and smaller fistula size are closely related to the success of fistula repair.(6) It may be related to the elderly population or the age of >60 years is a major risk factor for impaired wound healing.(14) Where wound healing is the main pathophysiology

of vesicovaginal fistula.(4)

Vesicovaginal fistula repair patients who have a normal BMI (18.5 – 24.9 kg/m²) have a greater likelihood of obstetric fistula closure, this is related to a normal BMI needed for the wound healing process.(9) Another study mentions patients with higher BMI tend to have successful repair procedures with closed fistulas.(15) Different results were found in this study, there was no significant relationship between the success of vesicovaginal fistula repair and Body Mass Index (BMI) factors. Corresponding results were obtained in several other studies.(16) (17) The absence of significance between Body Mass Index (BMI) and the success of vesicovaginal fistula repair may be caused because Body Mass Index (BMI) cannot distinguish between muscle mass and adipose tissue, so it is not accurate in predicting abdominal obesity.(18)

Based on etiology, fistulas can be caused by obstetrics, such as obstructed labor that causes the compression of the baby's head to the pelvis (19) which leads to ischemic necrosis.(20) Other etiologies, such as non-obstetrics including iatrogenic (hysterectomy), other operations on the pelvic region(21), and radiation to the pelvic area,(22) where the success of repair is higher in fistulas due to non-obstetrics.(10) Following the results of this study, there is a significant relationship between etiology and repair success.

The size of the fistula is a factor that affects the success of repair.(11) (6) (1) The opposite result was obtained in this study, there was no significant relationship between fistula size and repair success. The size of the fistula is not a significant factor for the successful repair.(23) (24) (13) This might be due to fistulas with large sizes can also be closed with repair procedures.(13)

Anatomical conditions of fistulas such as fistula size are factors that influence the success of repair.(5) (1) (25) (26) (27) According to the results of this study, there is a significant relationship between fistula size and repair results. The success of repair is related to the level of difficulty of tissue mobilization and to achieving tension-free repair in multiple fistulas(1), where tension-free repair is the most important principle in vesicovaginal fistula repair.(28) (29) The highest probability of achieving repair success is on the first repair attempt.(30) (6) This mechanism is related to increased repair difficulties due to trauma caused by previous repair procedures can cause ischemia and tissue devitalization which leads to massive adhesions and fibrosis.(27) Different results were obtained in this study, where there was no significant relationship between repeated repair procedures and repair success. A similar result was also conducted in other studies, that there is no significant relationship between previous repair and successful vesicovaginal fistula repair.(19) (7) This may be related to several other surgical factors that affect the repair procedure, such as proper preoperative evaluation, extensive exposure of fistulas to surrounding tissue, tension-free closure, excision of all fibrous tissue, keeping suture marks dry and uninfected, and not putting excessive strain on the vaginal mucosa to dry space.(25)

Conclusion:

Etiology and the number of fistulas are factors related to the success of vesicovaginal fistula repair. Other factors such as age, Body Mass Index (BMI), fistula size, and repeated repair

procedures are not significantly related to the success of vesicovaginal fistula repair. Health workers need to pay attention to these two factors when treating patients with vesicovaginal fistula to prevent repair failure.

Acknowledgments: Thank to Universitas Airlangga for supporting this research

Sources of Funding: Self-funding

Disclosure and conflicts of interest: There is no conflict of interest

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