

## CASE SERIES

### Vesicovaginal fistula with surgical interventions at Dr. Ramelan Naval Hospital, Surabaya, Indonesia

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Article Info	ABSTRACT
Received Apr 1, 2025 Revised Aug 5, 2025 Accepted Aug 15, 2025 Published Dec 1, 2025	<b>Objective:</b> Evaluating the risk factors and outcomes of surgical interventions in patients with vesicovaginal fistula at Dr. Ramelan Naval Hospital Surabaya, from January 2019 to December 2023.
<b>*Corresponding author:</b> Dian Ardiana dian.ardiana @hangtuah.ac.id	<b>Case Series:</b> There were 6 cases of vesicovaginal fistula that underwent surgical interventions at Dr. Ramelan Naval Hospital Surabaya from 2019 to 2023 that met the inclusion criteria. The majority of vesicovaginal fistula cases occurred as a result of hysterectomy, accounting for 4 cases (67%), followed by caesarean section surgery (16%) and radiation therapy for cervical cancer (17%). Symptoms experienced by the patients included urine leakage from the vagina, foul odor, and pain during urination. The vesicovaginal fistulas that underwent surgical interventions were typically 0.5 to 3 cm in size. Most of the cases involved simple-type fistulas. A total of 5 cases (83%) were successfully repaired. These patients were able to urinate normally, without pain or vaginal leakage. However, 1 case (17%) experienced recurrent fistula with an increase in the number of fistulas and continued to experience pain during urination and leakage from the vagina, particularly during strenuous activities.
<b>Keywords:</b> Caesarean section Cervical cancer Fistula repair Hysterectomy Surgical interventions Vesicovaginal fistula	<b>Conclusion:</b> The vesicovaginal fistula cases at Dr. Ramelan Naval Hospital Surabaya from 2019 to 2023 showed a high therapeutic success rate. Among 6 patients that we studied, the majority of cases were caused by hysterectomy, characterized as simple-type fistulas, with 83% of the cases successfully repaired.

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#### Highlights:

1. Vesicovaginal fistula (VVF) cases were primarily caused by hysterectomy, post-caesarean section surgery, and radiation therapy for cervical cancer. Symptoms experienced by patients included urine leakage from the vagina, foul odor, and pain during urination.
2. The success rate of fistula repair using cystography and fistula repair procedures was very high. Patients were able to urinate normally without pain or vaginal leakage.



## INTRODUCTION

Vesicovaginal fistula (VVF) is an abnormal tract between the bladder and the vagina, resulting in continuous urinary leakage into the vagina and consequently causing urinary incontinence.<sup>1</sup> Gynecological fistulas typically arise from gynecological surgeries, such as hysterectomy, radiotherapy, malignancy, or congenital abnormalities. Obstetric fistulas are attributed to tissue damage due to birth trauma, particularly prolonged labor.<sup>2,3</sup>

According to the Urological Clinic of North America Journal (2018), the incidence of vesicovaginal fistulas in developed nations ranges from 0.3% to 2%. The majority of these cases result from trauma to the urinary tract due to pelvic surgeries (e.g., hysterectomy, endometrioma, or prolapse). Less frequently, they are caused by radiation-induced damage and advanced-stage pelvic malignancies.<sup>1,4</sup> It is estimated that 3 million women in developing countries suffer from vesicovaginal fistulas, with annual new cases ranging from 30,000 to 130,000.<sup>5,6</sup>

The success rate of fistula repair reported in the literature varies from 70% to 100% in non-radiation cases. Fistulas in patients who have undergone radiation therapy exhibit lower repair success rates. Factors such as multiple fistulas (two or more), size (>10 mm), type of fistula (complex VVF involving the bladder cervix or urethra), urinary tract infections, and obstetric etiology are associated with a higher risk of recurrence.<sup>7-9</sup>

This case report examines 6 cases of vesicovaginal fistula managed surgically. The sample used consists of medical record data of vesicovaginal fistula patients from 2019 to 2023 who met the inclusion criteria, including patients diagnosed with vesicovaginal fistula, cases of vesicovaginal fistula recorded in the medical records of Dr. Ramelan Naval Hospital Surabaya from 2019 to 2023, and medical records containing data on age and surgical procedures. The VVF cases reported in this study are considered unique as they present a retrospective analysis of six cases managed in a single military hospital over a five-year period, with a high therapeutic success rate of 83%. The majority of VVF cases were caused by hysterectomy procedures (67%), followed by cesarean section (16%) and radiation therapy for cervical cancer (17%). Another distinctive feature of this study is the variation in surgical approaches used, including laser techniques, double-layer closure, and the use of a Foley catheter inserted from the vagina into the bladder, demonstrating individualized treatment based on the size and complexity of each fistula. The aim of this report is to evaluate the risk factors and the effectiveness of surgical intervention for vesicovaginal fistula at Dr. Ramelan Naval Hospital Surabaya from January 2019 to December 2023.

## CASE SERIES

There were 6 cases of vesicovaginal fistula that underwent surgical interventions at Dr. Ramelan Naval Hospital Surabaya from 2019 to 2023, meeting the inclusion criteria as detailed in Table 1.

Table 1. List of vesicovaginal fistula patients undergoing surgical interventions.

Patients' identity	Primary complaint	Risk factors	Procedure	Evaluation
Mrs. D (46 years old)	Urine leakage from the vagina	Post-hysterectomy due to uterine leiomyoma + ovarian cyst; Multiparous with previous caesarean section	Cystoscopy	Persistent urine leakage from the vagina
			Vesicovaginal fistula repair 1	Unable to urinate, persistent abdominal pain.
			Vesicovaginal fistula repair 2	Able to urinate; Still experiences leakage during heavy activity and pain during urination.
Mrs. U (30 years old)	Urine leakage from the vagina	Post-caesarean section due to delayed labor	Cystoscopy + Vesicovaginal fistula repair	No complaints of urine leakage from the vagina
Mrs. W (45 years old)	Urine leakage from the vagina and pain at the end of urination	Post-hysterectomy due to cervical cancer	Cystoscopy	Unable to urinate, pain during urination
			Vesicovaginal fistula repair	Able to urinate; No further complaints
Mrs. J (53 years old)	Inability to urinate and foul-smelling discharge	Stage III B cervical cancer + Chemoradiotherapy	Cystoscopy + Vesicovaginal fistula repair	Able to urinate; No complaints.
Mrs. N (46 years old)	Urine leakage from the vagina	Post-hysterectomy due to uterine leiomyoma + ovarian cyst; History of three abortions + two ectopic pregnancies	Cystoscopy + Vesicovaginal fistula repair	No complaints of urine leakage from the vagina.
Mrs. M (50 years old)	Incontinence and frequent wetting	Post-hysterectomy due to uterine leiomyoma + ovarian cyst	Cystoscopy + Vesicovaginal fistula repair	Complaints reduced; Able to urinate normally.

### Case 1

A 46-year-old female came to the Obstetrics and Gynecology Clinic at Dr. Ramelan Naval Hospital Surabaya in October 2019 with complaints of vaginal discharge resembling urine that had occurred since four days post-hysterectomy, particularly during activity and mobilization. The patient had a history of uterine fibroids and endometrioma, accompanied by a right ovarian cyst. Histopathological examination revealed adenomyosis. The patient also had a history of three previous caesarean deliveries. Upon speculum examination, urine accumulation was observed in the posterior fornix, suggesting leakage from the posterior bladder wall. A methylene blue test was positive, indicating a fistula at the anterior vaginal apex measuring 1-1.5 cm.

Laboratory pathology results were within normal limits. Cystoscopy revealed a 1 cm irregularly shaped vesicovaginal fistula in the bladder trigone. Laser treatment was performed at the fistula until the tract perfectly closes. However, the patient continued to report urinary leakage from the vagina at the first month follow-up post-cystoscopy.

During surgical repair of the fistula, a 3 cm-long vesicovaginal fistula was identified and closed using a two-layer suture technique. One month post-repair, the patient experienced difficulty urinating and lower abdominal pain. Urinary catheterization revealed minimal urine output with seepage into the vagina. A

second repairment was performed, identifying two vesicovaginal fistulas approximately 2.5 cm and 1 cm in size, which were repaired using transvaginal visualization techniques. After the second repairment, the patient was able to urinate but with intermittent flow and clear yellow urine. She occasionally experienced leakage during heavy activity and reported continued pain during urination at the first month follow-up after the second repairment.

### Case 2

A 30-year-old female came to the Obstetrics and Gynecology Clinic at Dr. Ramelan Naval Hospital Surabaya in November 2020 with complaints of urinary leakage from the vagina since undergoing a caesarean section for her first child 8 months ago. The patient had her first caesarean section due to prolonged labor after receiving oxytocin drip at a community health center and being referred to a hospital after 3 days with no progress.

Upon speculum examination, a defect with a flat margin approximately 1 cm was observed, and urine leakage was found in the anterior vaginal mucosa. The cervix was smooth, and the uterus appeared normal. Cystography revealed a vesicovaginal fistula with a fistula tract length approximately 1.1 cm, located approximately 6.3 cm from the fistula tract to the labia minora. Laboratory pathology results were within normal limits.

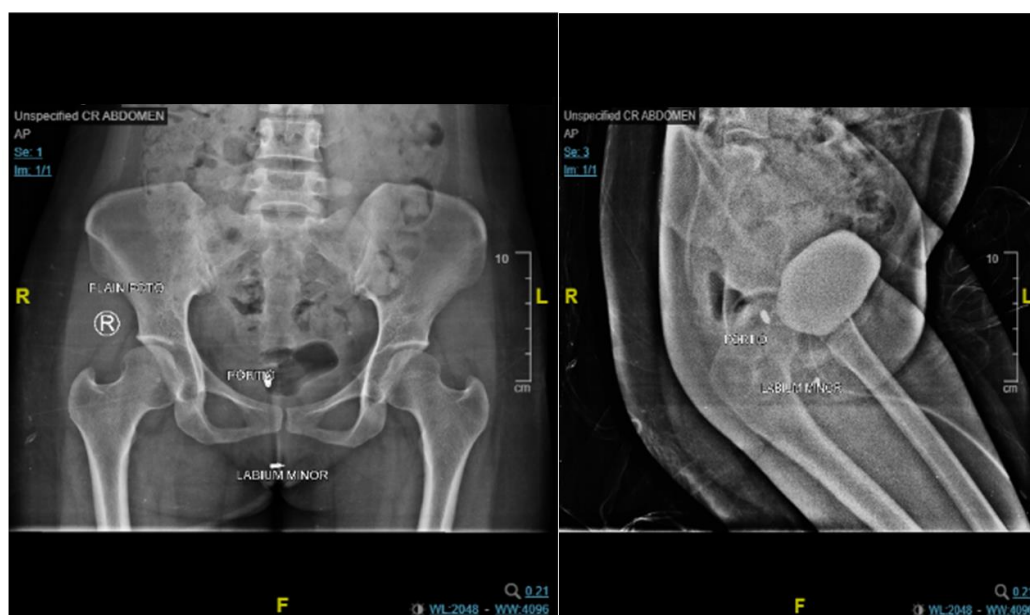


Figure 1. Cystographic examination results of Case 2.

Based on the findings, repair of the fistula was performed with a single-layer closure using a guiding catheter inserted from the cervix into the fistula's tract. Suturing was completely conducted, followed by bladder testing by filling the bladder with 60 mL of fluid three times. No leakage was detected. The first week post-repair, the patient was able to urinate normally with no vaginal leakage.

### Case 3

A 45-year-old female came to the Obstetrics and Gynecology Clinic at Dr. Ramelan Naval Hospital Surabaya in November 2022 with chief complaint of urine leakage from her vagina for 2 weeks prior to hospital admission. The symptoms began after the patient underwent a hysterectomy 3 weeks before her re-admission. The patient also complained of pain at the end of urination. She had a history of cervical cancer and giving birth by cesarean section once before that.

Speculum examination and vaginal toucher revealed smooth vaginal mucosa, fluid in the posterior fornix, and an unpleasant odor. A methylene blue test from the vagina was positive in the bladder. Cystography showed contrast filling the bladder and causing distension, with a fistula tract visible from the posteromedial bladder wall extending towards the cervix. Contrast appears to fill the vaginal introitus and come out from the vaginal ostium, thus findings supporting the diagnosis of a vesicovaginal fistula. Laboratory pathology results were within normal limits.

Based on these findings, a cystoscopy was performed and revealed a 0.5 cm vesicovaginal fistula located in the posterior bladder. The right and left urethral orifice were difficult to evaluate. Laser treatment was conducted on the fistula area until it closes completely. The first week post-cystoscopy, the patient still had a catheter and experienced painful urination. At the second weeks post-cystoscopy, the patient was scheduled to remove the catheter but complained of not being able to urinate and pain. By the third weeks post-cystoscopy, the patient reported an urinary leakage from the vagina again and was scheduled a repair for the second times 2-3 months later. After the second repair, the patient was able to urinate normally with no further vaginal leakage.

### Case 4

A 53-year-old female came to the Emergency Department at Dr. Ramelan Naval Hospital Surabaya in February 2023 with an inability to urinate for 1 day prior to hospital admission. The patient had previously experienced painful urination with minimal urine output and complained of excessive vaginal discharge with an unpleasant odor for 1 week prior to hospitalization, occasionally accompanied by bleeding and abdominal pain. The patient has a history of recurrent urinary tract infections (UTIs) and stage IIIB cervical cancer (Invasive Non-Keratinizing Squamous Cell Carcinoma). She had undergone 6 cycles of chemotherapy and 35 sessions of radiotherapy and was on routine medication with urinter and prednisone.



Figure 2. Results of cystography examination for case 3

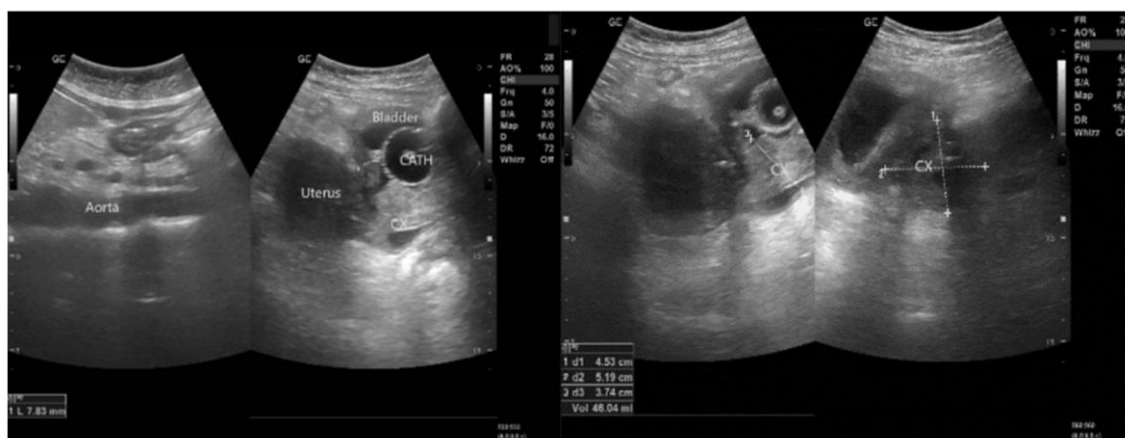


Figure 3. Results of abdominal ultrasound examination in case 4

Vaginal examination revealed positive fluor (fluor discharge), negative fluxus (flow), and fibrous tissue is palpable at the cervix. The uterine and douglas cavity were within normal limits. Ultrasound examination of the upper and lower abdomen suggested a fatty liver, bilateral III grade of hydronephrosis, a 4.53 x 5.19 x 3.74 cm cervical mass with a volume of 46.04 mL, and infiltration of the mass into the bladder. No metastasis was found in the abdominal cavity. Laboratory pathology results were within normal limits.

Based on the findings, a cystoscopy was performed, revealing a 0.5 cm vesicovaginal fistula in the posterior bladder, with signs of cervical mass infiltration. The right and left urethral orifice were difficult to evaluate. Laser treatment was applied to the fistula area until it closes completely. The first week post-cystoscopy, the patient was able to urinate normally with no vaginal leakage.

### Case 5

A 36-year-old female came to the Obstetrics and Gynecology Clinic at Dr. Ramelan Naval Hospital Surabaya in September 2023 with chief complaint of urinary-like fluid discharge from the vagina for 6 months following a Total Abdominal Hysterectomy Salpingo-Oophorectomy Dextra (TAH SOD), particularly during activity and mobilization. The patient had a history of multiple uterine leiomyomas and a right ovarian cyst, for which she underwent TAH SOD in March 2023. Histopathological examination showed no sign of malignancy. The patient also had a history of three abortions and two disrupted ectopic pregnancies.

Speculum examination and vaginal toucher revealed smooth vaginal mucosa, fluor in the posterior fornix, and an unpleasant odor. Laboratory pathology results

were within normal limits. Ultrasound result of the upper and lower abdomen suggested a filled bladder with no masses found in the uterus or adnexa. A Contrast-Enhanced Computed Tomography (CT) scan of the abdomen showed normal liver, spleen, gall-bladder, pancreas, and kidneys, with no residual masses in the abdominal or pelvic cavity. However, an abnormal tract approximately 1.08 cm in diameter was detected at the superoposterior bladder wall, resulting a fluid accumulation in the posterior bladder (vagina) approximately 3.51 cm x 3.15 cm x 4.8 cm in size. These findings supports the diagnosis of a vesicovaginal fistula.

During cystography with diluted water-soluble contrast (1:1 ratio) approximately 400 cc was administered using a catheter into the External Urethral Orifice (OUE), the contrast smoothly filled the bladder until it was completely full. The outline of the bladder appeared normal with no filling defect. A tubular formation was observed on the posterior bladder wall with a non-visualized track. These further findings support the diagnosis of a vesicovaginal fistula with a non-visualized fistula tract.

Based on the findings, surgical intervention was performed by inserting a 16 Fr foley catheter from the vagina through the fistula into the bladder, and inflating the balloon. Undermining method was performed between the endopelvic fascia and vaginal mucosa. Interrupted suturing of the fascia was performed with Vicryl 2-0, followed by interrupted suturing of the vaginal mucosa with Vicryl 2-0. Bladder testing indicated no leakage. Cystoscopy from the vagina revealed a vesicovaginal fistula's size is 3 x 2 cm. The first week post-cystoscopy, the patient was able to urinate normally with no vaginal leakage.





Figure 4. Results of abdominal CT scan examination in case 5



Figure 5. Results of cystography examination for case 5

## Case 6

A 50-year-old female came to the Obstetrics and Gynecology Clinic at Dr. Ramelan Naval Hospital Surabaya in August 2019 with chief complaints of urinary incontinence and frequently found wetting her underwear that began 1 week after undergoing a hysterectomy. The patient had a history of uterine fibroids with an ovarian cyst. Histopathological examination revealed an adenomyosis.

A methylene blue test indicated positive blue staining in the vaginal fluid. Laboratory pathology results were within normal limits. Chest X-ray showed no metastases in the bones or lungs, and no abnormalities were observed in the heart or lungs. An Intravenous Pyelogram (IVP) was suggested at the presence of a fistula extending from the posterior part of the bladder to the vagina.

Based on these findings, an intravenous solution as much as 500 cc of 0.9% NaCl—14 drops per minute—was administered, along with urinary catheterization. Once the patient was stabilized, cystoscopy was performed and revealed a 0.5 cm vesicovaginal fistula on the left lateral vaginal wall. The fistula edges were freshened and repaired with Vicryl 4-0, using a two-layer water-tight suture technique. Post-surgical management included the placement of a vaginal tampon and a 16 Fr foley catheter. The third weeks post-cystoscopy, the patient was able to control urination and no longer experienced an urinal leakage.

## SCOPING REVIEW

This scoping review was conducted using online electronic search engines from the following 4 databases: 1) Google Scholar; 2) Google Cendikia; 3) Springeropen; and 4) Directory of Open Access Journal

(DOAJ). This scoping review follows the Preferred Reporting Items for Systematic Reviews and Meta-

Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines.

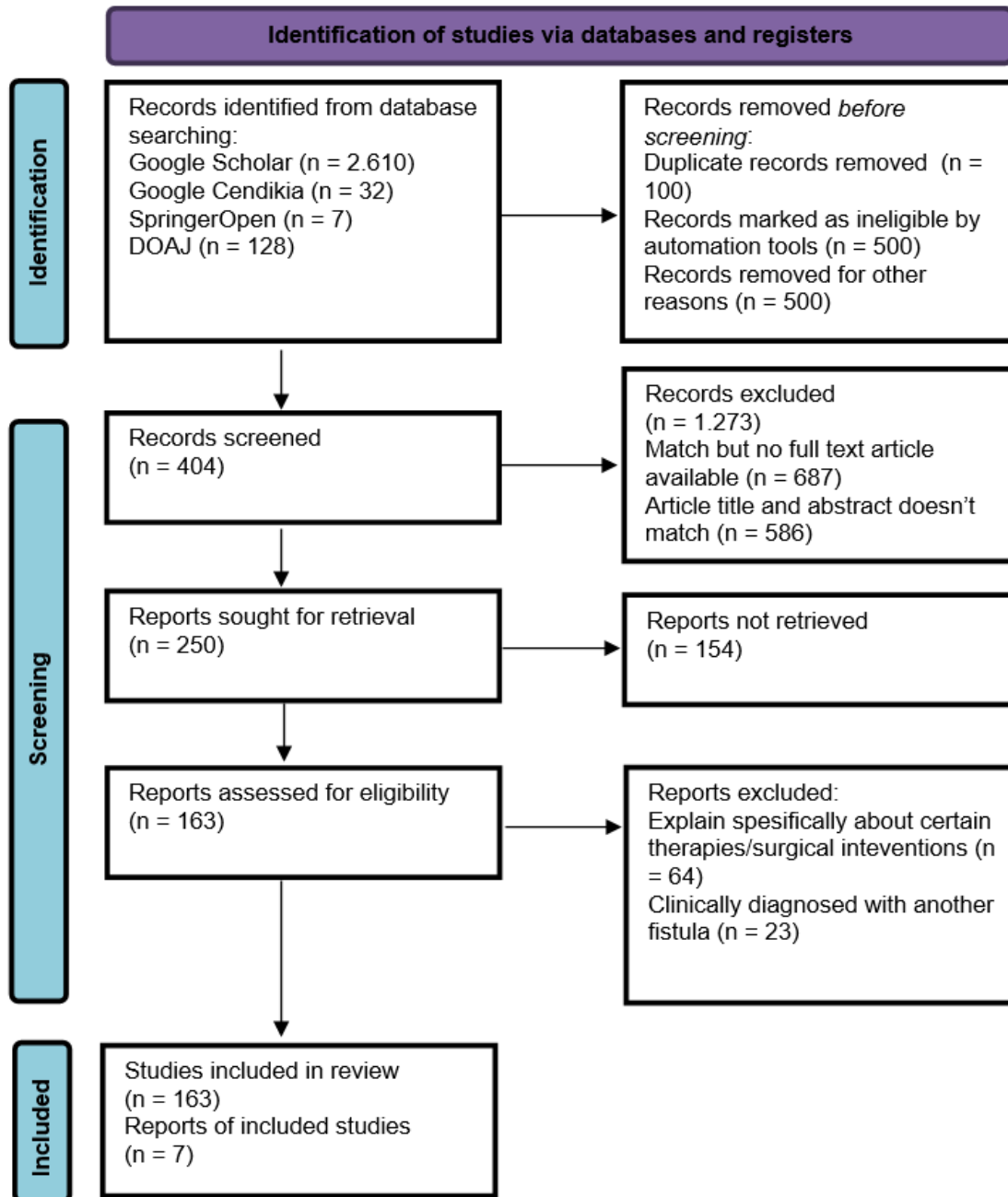


Figure 6. PRISMA-ScR flowchart.

Table 2. Search results for articles about risk factors and success of surgical interventions in patients with vesicovaginal fistula.

No.	Author, Year	Research title	Research location	Research purposes	Research design	Research results
1.	Hernández-Hernández <i>et al.</i> , 2021	Same problem, different approaches: transvesical and extravesical laparoscopic vesicovaginal fistula repair—case report	Canary Islands Hospital Complex, San Cristóbal de La Laguna, Spain	Comparing the repair results of different numbers of fistulas and different surgical techniques.	Case report	<ol style="list-style-type: none"> <li>1. There were 2 woman diagnosed with VVF aged 43 and 45 years.</li> <li>2. Both patients experienced VVF after hysterectomy.</li> <li>3. Both complained of urine leakage from the vagina and incontinence urine. The diagnosis was confirmed by cystoscopy and CT urogram.</li> <li>4. The diameter of the fistula is between 5 and 10 mm. There was 1 patient with a simple fistula, and 1 patient with a complex fistula</li> <li>5. Simple VVF can be treated extravesically while complex VVF may be best treated transvesically and there is no recurrence in the patient.</li> </ol>
2.	Cannoletta <i>et al.</i> , 2024	Single-Port Transvesical Vesico-Vaginal Fistula Repair: An Initial Experience	University of Illinois at Chicago	VVF repair results with Single-Port (SP) Transvesical (TV) access.	Case report	<ol style="list-style-type: none"> <li>1. There were 4 woman diagnosed with VVF, with an average age of 53 years.</li> <li>2. As many as 3 out of 4 patients experienced VVF after hysterectomy.</li> <li>3. The diagnosis was confirmed by cystoscopy, cystogram, and in two cases by CT Urogram.</li> <li>4. The diameter of the fistula is between 11 and 15 mm.</li> <li>5. Transvesical SP VVF repair can be considered as a safe and feasible invasive treatment for small or medium fistulas (10-15 mm) and there were no recurrences in the patients.</li> </ol>
3.	Tsakos <i>et al.</i> , 2023	Surgical and Quality of Life Outcomes Following Robotic-Assisted (da Vinci) Laparoscopic Repair of Vesicovaginal Fistula: A Case Report and Video Demonstration	St. Luke's Hospital in Thessaloniki, Greece.	Comparing surgical techniques with other alternative methods aimed at increasing the success of patient therapy.	Case report	<ol style="list-style-type: none"> <li>1. A 63-year-old woman complaining an incontinence urine since 2 weeks after hysterectomy.</li> <li>2. The diagnosis is confirmed by cystoscopy and MRI.</li> <li>3. Laparoscopic vesicovaginal fistula repair with robot assistance can be an effective and safe treatment, also there are no recurrences in patients.</li> </ol>
4.	Niu <i>et al.</i> , 2022	Minimally invasive complete urinary tract drainage in the treatment of vesicovaginal fistula: A case report	Zhangye People's Hospital, China	Explaining about VVF treated with bilateral ureteral single J Tube placement and drainage through a suprapubic bladder puncture with indwelling catheterization.	Case report	<ol style="list-style-type: none"> <li>1. A 56-year-old woman with chief complaints of urinary leakage from the vagina since 1 month after hysterectomy.</li> <li>2. The diagnosis was confirmed by cystoscopy and it showed a 1 cm fistula.</li> <li>3. Inserting a single J-tube in both ureters can be an effective method for treating vesicovaginal fistulas and there were no recurrences in the patient.</li> </ol>
5.	Dahman <i>et al.</i> , 2021	Utilizing Colpocleisis to Repair a Vesicovaginal Fistula in a Cervical Cancer Patient with History of Pelvic Radiation: A Case Report and Literature Review	West Virginia University School of Medicine, Morgantown	Describes transvaginal colpocleisis for surgical repair of vesicovaginal fistula in patients with previous history of pelvic radiation.	Case report	<ol style="list-style-type: none"> <li>1. A 53-year-old woman with stage IV of cervical cancer and been treated with chemotherapy dan radiation complaint urinary incontinence.</li> <li>2. The diagnosis is confirmed by cystoscopy</li> <li>3. Colpocleisis is a way to close and heal the wounds if the patient no longer wants to have intercourse. An approach like this is safe and less invasive.</li> </ol>
6.	Lo <i>et al.</i> , 2019	Clinical relevance and treatment outcomes of vesicovaginal fistula (VVF) after	Chang Gung Memorial Hospital, Linkou Medical Center, Taoyuan,	Present the clinical and lower urinary tract symptom outcomes of women with VVF after surgery.	Retrospective case series	From 15 patients who were evaluated—1 had spontaneous closure, 8 had vaginal repair, and 6 had abdominal repair. Patients who had their vagina repaired were found to



	obstetric and gynecologic surgery	Taiwan, Republic of China				have a mean age of 50.3 ±7.1 years. They had VVFs near their supra-trigone area, which was 1.7±0.5 cm away from their ureteric orifice. However, patients who had their abdomen fixed had a mean age of 38.0±8.2 years and had VVFs that were 0.4 ±0.4 cm from the ureteric orifice. After vaginal repairment, there were 2 recurrence cases of VVF and de novo urodynamic stress incontinence (USI) were recorded. Three cases of concurrent ureteric injury and overactive bladder were also recorded.
7.	Nabila Istighfarin <i>et al.</i> , 2022	Risk Factors of Vesicovaginalis Fistule in Obstetric and Gynecologic Division of Dr. Mohammad Hoesin General Hospital in 2018-2020	Dr. Mohammed. Hoesin General Hospital, University Sriwijaya, Palembang, Indonesia	To find out how risk factors affect the chance of vesicovaginal fistula.	Cross sectional	As many as 37 people had an abnormal hole in their vagina. There were 9 people who had obstetric vesicovaginal fistula (24.3%) and the other 28 people (75.7%) who had it was significantly impacted (p=0.010) with the method of delivery, birth weight, history of gynecological surgery, pelvic radiotherapy, and history of gynecological cancer based on the Chi-Square test. However, there was no significant connection between age, gender, and how long someone worked (p=0.347)

RESULT AND DISCUSSION

Based on 7 research articles that we found that has the same criteria and keywords from our studies, the result from the other studies that we analyzed reveal important insights into the varying surgical approaches and their outcomes. A significant focus in our study is placed on comparing the success rate of different techniques, such as transvesical and extravesical laparoscopic repairs, as well as robotic-assisted methods. These techniques are shown to be effective, with no reported recurrences in patients undergoing these treatments, regardless of the complexity of their VVF.

The main aspect that emerges from the research is the preference for minimally invasive procedures. For instance, single-port transvesical VVF repair has been highlighted as a safe and feasible option, especially for small to medium fistulas (10-15 mm in diameter). This method, along with other minimally invasive approaches like bilateral ureteral J-tube placement, emphasizes a trend towards less invasive interventions, which it's show promising better outcomes.

However, despite the overall effectiveness of these techniques, there are cases of recurrence and complications—particularly with vaginal repairs. An issues such as urodynamic stress incontinence (USI) and ureteric injury were observed, indicating that while surgical interventions are generally successful, patient-specific factors—such as the location and size of the fistula—can influence the long-term success.

Another important discussion point revolves around the risk factors for VVF development. Based on the other studies also indicate that prior hysterectomies, pelvic radiation, and certain obstetric or gynecologic surgeries increase the possibility of fistula formation. The identification of these risk factors can help in both preventing VVF and guiding the selection of appropriate surgical interventions.

In summary, while surgical advancements in the treatment of VVF show positive results, the choice of technique must be individualized based on the patient's condition. Minimally invasive approaches are particularly promising, but careful monitoring for potential complications remains crucial for ensuring long-term success.

Vesicovaginal Fistula (VVF) represents an abnormal tract between the bladder and the vagina, leading to the passage of urine through the vaginal canal.<sup>5,10</sup> In developed countries, the predominant etiologies for VVF include surgical interventions such as hysterectomy, caesarean section, and vaginal delivery. Additional causes involve pelvic malignancies (e.g., cervical or colorectal cancer) and pelvic radiotherapy. The presence of a VVF can result in continuous urinary leakage (incontinence), persistent urinary odor, skin irritation in the vaginal, vulvar, or perineal regions, dyspareunia, recurrent urinary tract infections, pyelonephritis, and vaginitis.<sup>11-13</sup>

Based on our scoping review result a history of operative procedures, radiotherapy, and gynecological malignancies are significant risk factors for VVF. This



aligns with the findings of our study, which showed that most cases of VVF arose from hysterectomy procedures (4 cases, 67%), followed by caesarean section (16%) and radiation therapy for cervical cancer (17%).<sup>14</sup> A history of hysterectomy was also identified as the primary cause of VVF in studies by Hernández-Hernández et al.(2021), and 4 out of 7 women had a similar history in another study by Cannoletta et al. (2024). Recent studies have also shown that VVF can be diagnosed as early as 1-2 weeks after hysterectomy.<sup>15,16</sup> In addition to hysterectomy, other risk factors such as cervical cancer, along with chemotherapy and radiation treatments, were also noted in the research article by Dahman et al., (2021).<sup>16-20</sup>

Common symptoms of VVF include urinary leakage from the vagina, unpleasant odor, and dysuria. Vaginal discharge and incontinence are the most frequently reported symptoms, as observed in 4 out of 7 studies reviewed in the scoping analysis.<sup>15,17-19</sup> The majority of VVFs occur due to bladder dissection during flap mobilization, which can lead to devascularization or unnoticed tears in the posterior bladder wall. Alternatively, inadvertent suturing into the bladder during vaginal wall repair can result in ischemia, necrosis, and subsequent fistula formation.<sup>16,17,19,21</sup>

A comprehensive physical examination— including speculum assessment— is essential for evaluating inflammation, infection, edema, necrosis, or other abnormalities in the bladder or vaginal structures.<sup>21</sup> Diagnosis is confirmed with tampon dye tests using methylene blue; the appearance of blue dye on the apex of the gauze confirms VVF. If the dye is only noted on the distal portion of the tampon, it may indicate leakage during bladder filling or another form of urinary incontinence.<sup>22</sup>

Further diagnostic procedures, including cystoscopy and imaging studies like a Computed Tomography (CT) urogram, are crucial for identifying an additional injuries (e.g., ureteral damage or concurrent fistulas) and for surgical planning.<sup>4</sup> In six reported cases, physical examinations including vaginal toucher and speculum examination, were performed, but only three cases involved methylene blue examination. Imaging studies such as abdominal ultrasound, CT scan, fistulography or cystography, and cystoscopy were conducted. All VVF patients underwent cystoscopy according to the scoping review, while some studies (e.g., Hernández-Hernández et al., 2021, and Cannoletta et al., 2024) also utilized CT urography.<sup>16-22</sup> Other studies, such as Tsakos et al. (2023), included MRI in their diagnostic approach.<sup>18</sup>

Small VVFs (<1 cm) without complications are often initially managed with conservative treatments, including long-term catheter drainage (12 weeks) and anticholinergic medications.<sup>24</sup> If the condition does not resolve within two months, surgical intervention is recommended to prevent further complications. Key factors for effective surgical repair include optimal visualization of the VVF, thorough dissection of the fistula tract, precise delineation of surgical margins, watertight tension-free suturing, utilization of vascularized tissue interposition flaps, and adequate bladder drainage.<sup>25</sup> Anticholinergic medications are used to prevent bladder spasms, pre-removal retrograde cystography is advised to confirm fistula closure.<sup>16-18</sup>

For post-surgery management, patients are instructed to avoid tampons and sexual activity for two months.<sup>16-18</sup> Surgical management of VVF is associated with incidences of sepsis (4.3%), blood transfusion (7.1%), and re-admission (10%). Reported success rates for fistula repair range from 70-100% for non-radiation cases. Fistulas in patients undergoing radiation therapy exhibit lower repair success rates. Risk factors for recurrence include multiple fistulas (two or more), larger size (>10 mm), complex fistulas involving the cervical bladder or urethra, urinary tract infections, and obstetric causes.<sup>7,19,20</sup>

In the first case, which experienced recurrence, several relevant risk factors were identified. The patient had a history of three cesarean sections, increasing the likelihood of bladder injury. The fistula was large in size (up to 3 cm), and multiple fistula tracts were discovered during the second surgical intervention.<sup>20,28-30</sup> The location of the fistula in the bladder trigone posed additional technical challenges for successful repair. Postoperatively, the patient continued to experience urinary leakage during strenuous activities and dysuria. These factors align with existing literature stating that large fistula size, complex anatomical location, and the presence of multiple tracts are significant predictors of recurrence.<sup>28-31</sup>

In our cohort studies of six patients with VVFs undergoing surgical repair, fistula sizes ranged from 0.5 to 3 cm. Based on a scoping review, Hernández-Hernández et al., (2021) reported fistula diameters of 5–10 mm, with one simple and one complex fistula case.<sup>16</sup> Cannoletta et al. (2024) reported fistula diameters of 11–15 mm.<sup>17</sup>

Preoperative catheter placement was performed in all cases to alleviate symptoms and prevent further complications. Post-stabilization, cystography and fistula repair were conducted. From the 6 cases that we found, the majority were classified as simple fistulas. Five

cases (83%) achieved successful repair, with patients reporting normal urination and no vaginal leakage or pain. However, one case (17%) experienced recurrence with additional fistulas and symptoms such as dysuria and vaginal leakage, particularly during strenuous activities 31–33.

According to our scoping review, surgical approaches like laparoscopic transvesical and extravesical repair (Hernández-Hernández et al., 2021) and robotic-assisted surgery (Tsakos et al., 2023) have shown effectiveness in treating VVFs. Success depends on fistula complexity, with simple cases responding well to less invasive techniques and complex cases requiring advanced methods.<sup>16,18,20–22</sup> Minimally invasive techniques—including single-port transvesical repair as in the study by Cannoletta et al., (2024) and J-tube placement for drainage in the study by Niu et al., (2022) — have also been shown to be safe and feasible for small to moderate VVFs, with no recurrences reported in several case studies.<sup>17,19</sup> However, the other studies like Lo et al. (2019) reported complications such as urodynamic stress incontinence and ureteric injury, particularly after vaginal repairs.<sup>21</sup>

### Strength and limitation

The strength of this research lies in its nature as a serial case study, which allows researchers to document in detail various cases of VVF within a certain time period, namely 2019-2023. The use of clinical data from one health service center, namely Dr. Ramelan Naval Hospital Surabaya, provides consistency in terms of surgical approach and standards of care. In addition, this study focuses on a fairly long period, so it can provide a comprehensive picture of surgical intervention patterns and long-term outcomes in VVF patients.

The diagnosis of vesicovaginal fistula (VVF) often faced many challenges, particularly due to the non-specific nature of its symptoms—which may resemble common urinary tract infections or non-fistula-related urinary incontinence. In this study, the diagnostic challenges varied from the size, location, and number of fistulas, as well as the patients' medical histories—such as previous hysterectomy procedure, radiation therapy, or cesarean section. In some cases, the fistula was not immediately detected postoperatively because urinary leakage through the vagina not present until days to weeks after the surgery, leading to delayed diagnosis.

Diagnostic methods used at Dr. Ramelan Naval Hospital included speculum examination, methylene blue dye tests, cystography, abdominal CT scans, and cystoscopy. However, not all patients underwent the

methylene blue test, which is a simple yet effective tool. Additional diagnostic difficulties arose in patients with a history of cervical cancer and radiation therapy, where fibrosis and tumor infiltration obscured normal anatomical landmarks and complicated fistula visualization during endoscopic evaluation. In one of our cases, the fistula was only detected during a second surgical intervention after the initial cystoscopy failed to reveal all existing tracts, highlighting the importance of a multimodal diagnostic approach. These findings emphasize the need for individualized assessment strategies to improve diagnostic accuracy and optimize treatment planning.

However, limitations of this study include its retrospective nature, which depends on the quality of existing medical record data, so there may be a risk of bias in data collection. Additionally, because this study was conducted in a single hospital, the results may not be generalizable to a wider population, especially outside the geographic and demographic context of Dr. Ramelan Naval Hospital. The relatively limited number of cases may also limit statistical power in drawing conclusions.

### CONCLUSION

In our cohort studies consist of six patients that diagnosed with vesicovaginal fistula (VVF) and managed at Dr. Ramelan Naval Hospital Surabaya, the age range was between 30 and 53 years old. Vesicovaginal fistula is characterized by the abnormal leakage of urine through the vagina. The etiology in this cohort was predominantly linked to hysterectomy (67%), followed by caesarean sections (16%), and radiation therapy for cervical cancer (17%). The presenting symptoms included vaginal urine leakage, malodorous discharge, and dysuria. The cases of VVF treated at Dr. Ramelan Naval Hospital Surabaya from 2019 to 2023 demonstrated favorable therapeutic outcomes. Among the six patients with VVF, the majority had simple fistulas, with an 83% success rate in repair procedures.

### DISCLOSURES

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## Conflict of interest

The authors declare no conflicts of interest concerning this work.

## Patient consent for publication

The patient consented to all aspects of the publication, including the inclusion of personal information. All relevant family members have been informed and have consented to the publication of this information.

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## Author contribution

All authors contributed to the entire research process, including the preparation, data collection, and analysis, as well as the drafting and approval of the manuscript for publication.

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