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Impact of the surgical approach, considering Goh classification, on long-term results in patients with vesicovaginal fistula repair

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Abstract

Background: This study aims to present long-term results, preoperative classification, and surgical approach in the therapy of vesicovaginal fistulas (VVF) and neovesicovaginal fistulas (NVVF). Unlike developing countries, where fistulas are mainly the result of delivery trauma, in the modern world, the main causes are urogynecological surgery and irradiation therapy.

Methods: Data of 36 woman who underwent surgical treatment of VVF and NVVF were collected retrospectively. After clinical assessment, fistulas were categorized by the Goh classification system, which led to the choice of surgical approach: transvaginal or transabdominal. Follow-up period was 60 to 108 months.

Results: Out of 36 patients evaluated, 23 were operated transabdominal, and 13 were operated transvaginal. Patients selected for the transabdominal approach were mainly categorized as Goh 1 and 2, including patients after radiotherapy and patients with large fistulas. Patients selected for the transvaginal approach were mainly Goh 3 and 4. There were no statistical differences between groups regarding the success of the operation (83.3%) and complication rate. Complications included fistula recurrence (16.6%), stress urinary incontinence (22.2%), urinary tract infections (11.1%), overactive bladder (13.9%), and urosepsis (2.8%). There was a statistical difference in the duration of the hospital stay in favor of the transvaginal approach (12.00 ± 5.8 vs 16.27 ± 4.65).

Conclusions: Success in the surgical treatment of VVF and NVVF can be achieved by careful preoperative classification, selection of surgical approach, assessment of local tissue status, taking into consideration the characteristics of the fistulas, and adhering to the basic surgical principles. Regardless of the surgical approach, conducting such a preoperative stratification can achieve similar long-term outcomes. Most fistula recurrence (83.3%) appeared within 6 months after the surgery.

Keywords: Vesicovaginal fistula repair, Goh classification, Surgical approach

1 Background

Vesicovaginal fistula (VVF) is an abnormal opening between vaginal and bladder cavities which results in uncontrolled urinary leakage and is the leading cause of acquired urogenital fistula [1, 2]. Neovesicovaginal fistula (NVVF) is extra-anatomic communication, resulting in extra urethral urinary leakage, between vaginal and neovesical cavity—cavity inside the ileal pouch which is used as a substitution for the urinary bladder. In the industrialized world, VVF is most commonly iatrogenic, in over 75% is a result of urinary bladder injury during gynecological, urological, or other pelvic surgery [3–5]. In developing countries, VVF is most often the result of prolonged obstructed birth [6]. The incidence of obstetric fistula is estimated

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at 0.3–0.4% of all childbirth [7]. Due to differences in etiology, patient age, and other associated treatments (irradiation, chemotherapy, etc.) between these two groups, the approach and results of the treatment should be analyzed separately.

2 Material and methods

We conducted a retrospective analysis of 36 women, 33 to 68 years of age, treated from the beginning of 2011 until September 2015.

Data were extracted from hospital medical documentation, including documentation collected during the hospitalization and ambulatory documentation, and subsequently, patients were interviewed with The Questionnaire for urinary incontinence diagnosis [8] for obtaining data about continence and other existing urinary tract symptoms.

Preoperative evaluation included detailed anamnesis with determining causes and risk factors for the development of fistula and clinical examination which included vaginal examination per specula that was used for detection of fistula as well as for assessment of vaginal anatomy and the possible existence of signs of inflammation, masses, or previous operations. By performing cystoscopy and multi-slice computed tomography (MSCT) urography, we confirmed our clinical diagnosis, defined characteristics of fistula such as localization, number, and size [9]. We also evaluated the proximity of ureteral orifices and excluded the existence of ureterovaginal fistulas. Fistulas were categorized by the Goh classification which determined the choice of surgical approach. The classification consists of three components by which they are determined: distance between the distal edge of the fistula from external urethral meatus, size of the fistula, and complexity of the fistula (fibrosis, bladder capacity, ureteric involvement, previous repair, etc.) [10] Indications for transvaginal surgery were fistula classified as Goh 3 and 4, and the transabdominal route was the method of choice for Goh 1 and 2 fistulas (Table 1).

For the transvaginal surgery, a modified Martius labial fat pad flap technique was used [11–13]. For the transabdominal operation, the bladder was "bivalved" to the level of the fistula, followed by a dissection of the bladder 2–3 cm under the fistula [14]; in that area, the bladder is dissected from the vagina and the opening in the vagina is sutured. When we were planning to use an omentum mayor flap, we would mobilize it and put it over the fistula [15]. Afterward, the bladder is also sutured. The postoperative examination included anamnesis, a questionnaire for urinary incontinence, vaginal examination after methylene blue test of the bladder, and cystography in patients with suspected fistula recurrence.

Table 1 Goh classification, 1–3 distance between distal edge of the fistula from external urethral meatus, a-c size of the fistula, i-iii complexity of the fistula

	Goh			
	Frequency	**Percent**	**Valid percent**	**Cumulative percent**
Valid				
1 ai	11	30.6	30.6	30.6
1 aiii	2	5.6	5.6	36.1
1 bi	3	8.3	8.3	44.4
1 ciii	2	5.6	5.6	50.0
2 ai	2	5.6	5.6	55.6
2 aiii	2	5.6	5.6	61.1
2 biii	2	5.6	5.6	66.7
3 ai	7	19.4	19.4	86.1
3 aiii	2	5.6	5.6	91.7
3 bi	1	2.8	2.8	94.4
3 biii	2	5.6	5.6	100.0
Total	36	100.0	100.0	

3 Statistical analysis

Demographic data were presented with descriptive statistic analysis: middle value, standard deviation, and percentage. Parametric Student's t test for continuous variables and Chi-square, that is Fisher extract test for categorical variables, were used for comparison of variables between groups. For all comparisons between groups, p-value < 0.05 was appointed as statistically significant. All statistical methods were conducted using commercial statistical software SPSS.

4 Results

Hysterectomy, with or without adnexectomy, was a cause of 30 fistulas (in 83.3% of patients), in 1 case it was hysterectomy followed by radiotherapy, in 1 case the cause was radiotherapy alone, and in 4 patients (11.1%) anterior pelvic exenteration proceded fistulas. Gynecological cancers were the most common cause of fistulas, in 19 cases (52.7%), followed by myoma in 9 cases (25%) and bladder cancer in 4 patients (11.1%) who underwent anterior pelvic exenteration. Additionally, the diagnosis that caused fistula formation was endometriosis in 1 patient, bleeding during cesarean section in 1 patient, polyp in 1 patient, and neuroectodermal tumor in 1 patient.

We stratified our patients into the transvaginal and transabdominal groups, according to the surgical approach, and we compared the results between the two groups. The transabdominal route was the method of choice in 23 patients and transvaginal in the remaining 13. Mean age in the abdominal group

was 49.43 ± 6.54 years, and in the vaginal group, it was 50.56 ± 8.80 years, without a statistically significant difference. A statistically significant difference was observed in mean hospital stay in days, where the mean value in the transabdominal group was 16.27 ± 4.65 days, in comparison with the transvaginal group where the mean value was 12.00 ± 5.80 days, P 0.034.

Regarding the Goh classification, 18 patients were assigned to Goh1 class, to be precise, 11 (30.6%) in 1ai, 2 (5.6%) in 1aiii, 3(8.3%) in 1bi, and 2(5.6%) in 1ciii. Six patients were estimated as Goh 2, more precisely 2 (5.6%) as 2ai, 2 (5.6%) as 2aiii, and 2 (5.6%) as 2biii. In total, 12 patients were assessed as Goh 3 class, 7 of them (19.4%) as 3ai, 2 (6.7%) as 3aiii, 1 (2.8%) as 3bi, and 2 (6.7%) as 3biii (Table 1).

Nine patients had recurrent fistulas, 4 were in the transvaginal and 5 in the transabdominal group, and there was no statistically significant difference. Of those patients with recurrent fistulas, 5 had 1 previous repair, 2 had 2 previous repairs, and 2 had 3 previous repairs. The primary outcome variable in our study was the resolution of fistulas, and there was no statistically significant difference in fistula resolution between the transabdominal and the transvaginal group. In the transabdominal group, 20 patients had a resolution of the fistula, compared to 10 of them in the transvaginal group. Follow-up period varied from 60 to 108 months (84 months on average). Five complications were registered during the follow-up period which was the following: fistula recurrence in 6 cases (16.6%), stress urinary incontinence (SUI) in 8 cases (22.2%), urinary tract infection (UTI) in 4 cases (11.1%), overactive bladder (OAB) in 5 cases (13.9%), and urosepsis in 1 case. Both the approaches resulted in 9 complications. In the transabdominal group, SUI, UTI, and OAB occurred 3 times each, while in the transvaginal group 5 patients had SUI, one had UTI, 2 had OAB, and 1 had postoperative sepsis. There was no statistical difference between groups for the 4 main complications. Fistula recurrence was the complication that occurred the most within the first 6 months and incidence of SUI, OAB, and UTI increased during the follow-up period (Table 2).

5 Discussion

The leading cause of VVF is hysterectomy with or without adnexectomy, most often as a complication of treatment of gynecological cancer, or less frequently myoma. NVVF appears after anterior pelvic exenteration. Globally, the cause of VVF is abdominal hysterectomy in 83%, vaginal hysterectomy in 8%, radiation in 4%, and other in 5% of the cases [16]. Further causes include urological and gynecological instrumentation [17], retroperitoneal, vascular and pelvic surgery, inflammatory and infective diseases [18], and foreign bodies, for example, a forgotten pessary ring [19], congenital VVF [20], sexual trauma [21], and vaginal laser treatments [22]. Approximately 3–5% of VVF occur as a result of a malignant tumor, most often cervical, vaginal, and endometrial carcinoma. The risk of urinary bladder lesion during abdominal hysterectomy is 0.5–1% [23], and the incidence of fistula occurrence after hysterectomy is 0.1–0.2% [24]. In this study, in most cases, fistulas emerged after hysterectomy with or without adnexectomy, most often as a

Table 2 Results and complications

	VVF *n* = 36	Vaginal *n* = 13	Abdominal *n* = 23	*p* value
Mean age (year)	50.56 ± 7.47 (33–68)	52.54 ± 8.80	49.43 ± 6.54	0.280
Mean hospital time (days)	14.69 ± 5.44 (7–27)	12.00 ± 5.80	16.27 ± 4.65	0.034*
Cause				
H	12 (33.3%)	3 (23.1%)	9 (39.1%)	0.468
H + A	18 (50%)	6 (46.2%)	12 (52.2%)	1.000
H + RT	1 (2.8%)	0	1 (4.3%)	1.000
RT	1 (2.8%)	0	1 (4.3%)	1.000
NVVF	4 (11.1)	4 (30.8%)	0	0.012*
Recurrent VVF (*n* %)	9 (25%)	4 (30.8%)	5 (21.7%)	0.693
VVF resolution (*n* %)	30 (83.3%)	10 (76.9%)	20 (87.0%)	0.645
Complications				
SUI	8 (22.2%)	5 (38.5%)	3 (13%)	0.107
UTI	4 (11.1%)	1 (7.7%)	3 (13%)	1.000
OAB	5 (13.9%)	2 (15.4%)	3 (13%)	1.000
Urosepsis	1 (2.8%)	1 (7.7%)	0	0.361

VVF vesicovaginal fistula, *H* hysterectomy, *H + A* hysterectomy + adnexectomy, *H + RT* hysterectomy + radiotherapy, *RT* radiotherapy, *NVVF* neovesicovaginal fistula, *SUI* "stress" urinary incontinence, *UTI* urinary tract infection, *OAB* overactive bladder

*p value < 0.05

treatment of gynecological malignant or benign tumors, rarely in patients who were treated with radiotherapy for gynecological cancer. We should also mention patients that developed NVVF after anterior pelvic exenteration and orthotopic urinary diversion. After hysterectomy, symptoms and signs of VVF appear right after the surgery or within 1–3 weeks following the removal of a urinary catheter. After radiotherapy, fistulas can form tens of years after the treatment.

Conservative treatment with permanent catheter drainage and antimuscarinic pharmacotherapy through 2–3 weeks can be conducted in carefully selected patients with newly diagnosed VVF with a success rate of 11–15% [25]. Smaller epithelialized fistulas can be treated in a minimally invasive fashion by electrocoagulation of the fistula channel, by using silver nitrate and laser therapy [26].

Surgical treatment of fistulas can be conducted through a transabdominal or a transvaginal approach with or without the use of interposition grafts. The advantages of the vaginal approach are shorter operating times, shorter hospitalization, and less blood loss [27].

The transvaginal approach is indicated in small, uncomplicated lower VVF. Indications for the transabdominal approach are large and deep VVF, narrow vaginal cavity, radiation fistulas, fistulas that were previously treated transvaginally, the need for concomitant urinary bladder augmentation or reimplantation of the ureter, the inability of putting the patient in a lithotomy position, although unsuccessful transvaginal operation on fistula is not necessarily a contraindication for repeated transvaginal approach [16].

The treatment of fistula can be performed immediately if it is an uncomplicated fistula with no signs of inflammation and the approach is transvaginal [28], but if there are signs of inflammation or other complicating factors, the recommendation is to postpone the operation for 3–6 months. According to accessible literature, the success rate of surgical treatment of fistulas is more than 90%, having in mind that the results are inferior if the fistula is caused by radiotherapy and in recurrent and long-lasting fistulas [29]. Factors that contribute to failure are diminished capacity of the urinary bladder, circumferential fistulas, severe vaginal fibrosis, and involvement of the urethra [30]. The most frequently used surgical approach in our patients was the transabdominal approach, in 23 patients. Thirteen patients were operated on transvaginal. All NVVF were treated transvaginal [31]. All of our patients operated transvaginal had interposing grafts, and patients with large fistulas and irradiated pelvises were treated transabdominal. In this study, success was achieved in 83.3% of patients, without a statistically significant difference in the rate of resolution of fistula regarding the operating approach. These results are comparable with literature data. Goh's classification has proven to be important, although not the exclusive, preoperative diagnostic procedure for selecting the appropriate surgical approach. In its components, it takes into account all the parameters essential for the successful treatment of VVF, thus standardizing the choice of surgical approach. This is especially important for less experienced surgeons, but also better understanding and control of postoperative results. Some authors did not find a correlation between the Goh classification and fistula resolution [32]. In 5 cases, fistulas appeared within 6 months after the operation and in 1 patient it appeared 15 months postsurgical. The success was compromised by previous surgical therapy of fistulas, size of fistula, and poor tissue quality after pelvic radiation. Nine patients had recurrent fistulas, 5 of them were previously operated on 1 time, two of them 2 times, and 2 of them 3 times. Of those operated 1 time, 3 had a transvaginal repair and 2 had transabdominal. Patients that underwent 2 previous fistula operations differed: One had 2 vaginal repairs and one had a transvaginal surgery followed by a transabdominal repair. When analyzing patients with fistula operated 3 times before, both had 2 transabdominal repairs following a transvaginal surgery.

Radiotherapy preceded fistula formation in 2 cases, and 2 patients had fistulas larger than 3 cm in diameter. There was a statistically significant difference in average hospital stay length in favor of the transvaginal approach. Complications included fistula recurrence and urinary tract symptoms. We observed 5 complications during the follow-up period: fistula recurrence in 6 cases (16.6%), SUI in 8 cases (22.2%), UTI in 4 cases (11.1%), OAB in 5 cases (13.9%), and urosepsis in 1 case [32]. Patients also reported vaginal narrowing and shortening, dyspareunia, and chronic pain. In 87% of patients, symptoms did not considerably affect the quality of life [33]. Although the study was done retrospectively and had a small sample, it should be noted that the patients enrolled were complex cases, some of them being previously unsuccessfully operated on due to vesicovaginal fistulas and some of them radiated.

All complications in our patients occurred immediately or after a longer follow-up period, except fistula recurrence, which was mainly presented within 6 months. Late complications did not interfere with the quality of life substantially, and those that were perceived as a nuisance were successfully treated with conservative measures [34].

6 Conclusions

Success in the surgical treatment of VVF and NVVF can be achieved with a careful preoperative assessment of fistula localization, size, previous surgical and radiotherapy treatment, and a selection of an appropriate surgical approach. With such processing, taking into consideration the characteristics of the fistula and adhering to the basic surgical principles, regardless of the surgical approach, similar long-term results can be obtained.

Abbreviations

VVF: Vesicovaginal fistula; H: Hysterectomy; H + A: Hysterectomy + adnexectomy; H + RT: Hysterectomy + radiotherapy; RT: Radiotherapy; NVVF: Neovesicovaginal fistula; SUI: "Stress" urinary incontinence; UTI: Urinary tract infection; OAB: Overactive bladder.

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Author contributions

All authors, BM, AH, and DH, contributed to the study. BM designed the study, BM and HA wrote the manuscript, HA collected the data, DH helped in statistical analysis, and BM and DH contributed to analysis of the data and conclusions. All authors read and approved the revised version of the manuscript.

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Availability of data and materials

All patients data are available on Department of Urology, Clinical Hospital,"Sveti Duh," Zagreb, Sveti Duh 64, Croatia.

Declarations

Ethics approval and consent to participate

This research study was conducted retrospectively from data obtained for clinical purposes. We consulted Ethical Committee in Clinical Hospital "Sveti Duh" who determined that our study did not need ethical approval. Informed consent was obtained from all individual participants included in the study.

Consent for publication

Patients signed informed consent regarding publishing their data.

Competing interests

The authors declare that they have no competing interests.

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