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ARTICLE

Robot-assisted vesicovaginal fistula repair – initial experience

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ABSTRACT

Purpose: To report our initial experience of robot-assisted vesicovaginal fistula (VVF) repair.

Materials and methods: Data from all patients who underwent robot-assisted VVF repair from August 2015 to October 2018 were analyzed. Preoperative data included age, BMI, smoking status, alcohol consumption, etiology of fistula and location and size of fistula. Operative data was operation time and the use of tissue interposition. Postoperative data included time to follow up, complications and reoperations.

Results: A total of 13 patients underwent robot-assisted VVF repair and 15 operations were performed as 2 patients required a repeated procedure. The mean age was 45.0 ± 14.5 years (±SD) and operative time was 138.3 ± 58.9 min (±SD). The mean time to follow up was 18.3 ± 16.1 weeks (±SD). Postoperative complications were reported by one patient and was Clavien-Dindo I. Relapse of fistula was found in two patients who had a successful reoperation with repeated robotic-assisted surgery. An interposition flap was used in a single patient. The overall success rate was 84.6% after primary surgery (11 out of 13) and 100% after repeated procedure (2 out of 2).

Conclusions: In this initial small series, we found that robot-assisted VVF repair is a safe procedure with results comparable to transvaginal repair. This procedure has a high success rate and few complications without using interposed tissue.

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Introduction

Vesicovaginal fistula (VVF) is a communication between the bladder and the vagina. In developing countries, the most common cause is obstetric trauma while in industrialized countries it is most often a complication to pelvic surgery, e.g. hysterectomy. Other causes are trauma, radiation therapy, infection, foreign bodies or malignant disease [1]. In an American study of 207 patients, VVF was caused by hysterectomy in 91%, radiation in 4% and other causes accounted for 5% [2]. The incidence of VVF after hysterectomy is reported to range from 0.1% to 4% and higher incidence is reported after hysterectomy on malignant basis [3].

In rare cases, conservative or minimally invasive treatment may achieve acceptable results [4]. When conservative treatment is not sufficient, VVF repair is traditionally done with surgical techniques using vaginal or abdominal approach [2]. Minimally invasive techniques as laparoscopic and robot-assisted techniques are increasingly being used as an alternative to the abdominal approach [5,6].

In this study, we report our initial experience on robot-assisted VVF repair.

Materials and methods

This study included all patients undergoing robot-assisted laparoscopic repair of VVF at The Urological Department, Aarhus University Hospital, in the period August 2015 to October 2018. Preoperative data regarding symptoms, demographic data, physical examination and cystovaginoscopy were registered prior to operation. Demographic data were retrieved from hospital records and included age, BMI, smoking status, alcohol consumption and etiology of fistula. Relevant operative data was location and size of fistula, operation time and the use of tissue interposition during operation. Postoperative data included time to follow up, complications and reoperation.

Follow up was performed at least 3 months after the operation in an out-patient setting or a telephone consultation by a doctor. Success was defined as no symptoms of persistent VVF.

Surgical technique

The fistula was localized by cystovaginoscopy and robot-assisted VVF repair was found to be the most appropriate operative procedure. The procedure itself was initiated by cystoscopy to identify the fistula and both ureteric orifices. The fistula was tubulated with a Selec-Tip catheter going in through the urethra and out through the vagina. Depending on the distance from fistula to the ureters, ureteral catheters were used. A urethral catheter and a clamp in the vagina were placed in order to localize the bladder and the top of the vagina later in the procedure (Figure 1). Robotic port positions were as for radical prostatectomy and one AirSeal port was used for the assistant. The patient was placed in

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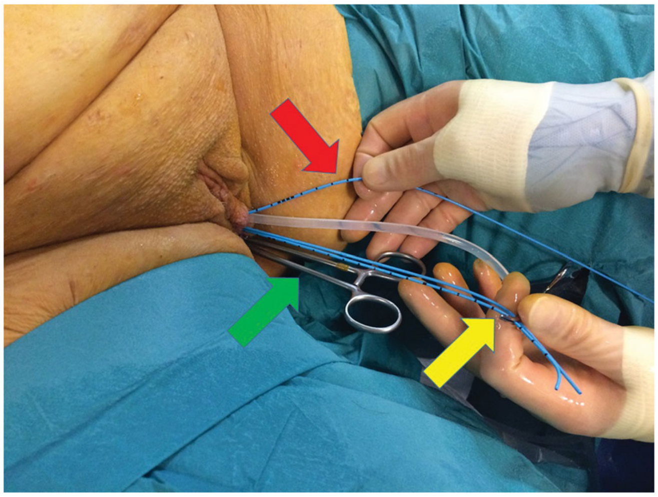

Figure 1. Placement of catheters before docking of the robot. A Selec-Tip catheter is going into the urethra from the bladder side through the fistula to the vagina and thereafter fixed with a pean (yellow arrow). Another selec-Tip catheter is tubulating the ureteral orifice close to the fistula for safety (red arrow). A clamp with a sponge is placed in the top of the vagina (green arrow). A normal silicone catheter is placed in the bladder through the urethra.

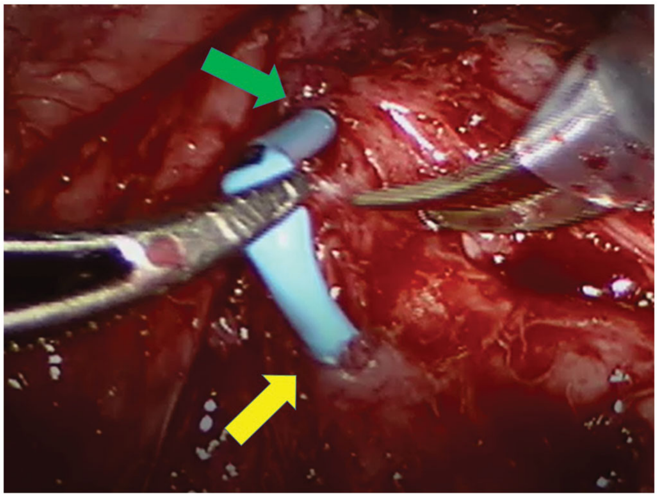

Figure 2. The 'fistula' Selec-Tip catheter seen in the robot after transection of the fistula. The fistula openings in the bladder (green arrow) and the vagina (yellow arrow) is thereby visualized.

30 degrees Trendelenburg. Hereafter, dissection was made aiming directly toward the fistula, guided by intermitting tension on the Selec-Tip catheter placed in the fistula, the urethral catheter and the clamp in the vagina. The fistula was transected and the surrounding tissue dissected to make as much distance from the opening of the bladder and the opening in the vagina as possible (Figure 2). Thereafter, both openings were closed using running sutures Biosyn 4-0. In most patients, TachoSil was placed between bladder and vagina to separate the former openings of the fistula. The urethral catheter was kept open in place for a minimum of 10 days.

Results

During the study period, 13 patients were included and 15 robot-assisted VVF repairs performed (Table 1). Hysterectomy was the cause of the VVF in ten patients (77%) (seven hysterectomies on benign basis and three on malignant basis). One patient had a VVF after a complicated sectio, one after nephroureterectomy because of urothelial cancer and one because of a foreign body in the vagina for several years. One patient had a VVF and two ureterovaginal fistulas. The rest of the patients had a single fistula. The majority of the patients had a fistula localized to the back wall, above the trigone. Two patients had a fistula in trigone and two had a fistula in relation to the ureteric orifice. All operations were performed by one of two experienced urological surgeons. Open urethral catheter was kept in place after surgery for 10–14 days.

Table 1. Characteristics of patients who underwent robot-assisted VVF repair.

Factor	Value
Number of patients	13
Age (years), mean ± SD	45.0 ± 14.5
BMI, mean ± SD	28.0 ± 5.2
Smoking status	
Never (%)	7 (53.8)
Former smoker (%)	2 (15.4)
Current smoker (%)	3 (23.1)
Unknown (%)	1 (7.7)
Alcohol consumption	
<7 per week (%)	7 (53.8)
>7 per week (%)	4 (30.8)
Unknown (%)	2 (15.4)
Etiology of fistula, *n* (%)	
Benign hysterectomy	7 (53.8)
Malignant hysterectomy	3 (23.1)
Cesarean sectio	1 (7.7)
Nephroureterectomy	1 (7.7)
Foreign body	1 (7.7)
Radiation sequalae	1 (7.7)
Fistula size (mm), mean ± SD	13.2 ± 10.3
Operative time (min), mean ± SD	138.3 ± 58.9
Flap interposition, *n* (%)	1 (7.7)
TachoSil	10 (76.9)
Success at primary surgery, *n* (%)	11 (84.6)
Relapse of fistula, *n* (%)	2 (15.4)
Number of re-operations, *n* (%)	2 (15.4)
Postoperative complications, *n* (%)	1 (7.7)
Time to follow up (weeks), mean ± SD	18.3 ± 16.1

Postoperative complications were reported in one patient. This patient reported hematuria, flank pain and increased plasma-creatinine after surgery. A control was performed 3 days later with normalization of creatinine and no pain reported by the patient. This complication was considered Clavien-Dindo I [7].

Two patients experienced relapses of fistulas. Both had a successful repeated robot-assisted procedure with closure of the remaining fistula.

Discussion

Different surgical techniques can be used to repair benign VVFs. The transvaginal repair, considered a minimally invasive procedure, has been found preferable to transabdominal transvesical repair due to significant decrease in hospitalization period, reduced pain and blood loss and reduced complication rates [4,8]. Gedik et al. [8] found that the success rates for the two techniques were not significantly different. The transvaginal procedure can often be performed in an outpatient setting. However, in some cases, the transvaginal technique is not an option because of the location of the fistula or patient obesity, while the abdominal approach offers a wider work space.

Robot-assisted laparoscopic repair is considered to be associated with less surgical trauma, shorter time to recovery and lower morbidity compared to the open abdominal approach [6]. Bora et al. [5] found a 93% success rate in 30 patients undergoing robot-assisted VVF repair with tissue interposition and considered it a safe and effective technique especially regarding complex fistula repair. The mean operation time of 138.3 ± 58.9 min in our initial series presented here is comparable to the operation time reported by Bora et al. [5].

In more complex cases with larger (>2 cm) fistulas, irradiated tissue or previous failed repair tissue interposition grafts can be used as additional support [2,8]. In only one of our cases, a biological meche was used. This patient had radiation sequelae due to prior gynecological cancer. Matei et al. [9] performed a small study of five patients undergoing robot-assisted fistula closure without tissue interposition. Results indicated that the quality of robot-assisted fistula closure was sufficient to avoid tissue interposition without an increased risk of fistula repair failure [9]. This corresponds to our results; indicating that robot-assisted fistula closure is suitable for patients with no available tissue interposition without compromising the result. Matei et al. [9] also suggest that the robot-assisted technique is suitable for elderly patients.

In this study, the etiology of the majority of the fistulas was hysterectomies (77%). Duong et al. [10] found that some factors were associated with higher risk of VVF formation after iatrogenic hysterectomy injury; these included larger uteri, longer surgeries and severe bladder injuries.

In our case, the success rate was considered to be 84.6% after primary surgery and 100% after repeated procedures. This is comparable to success rates found in the literature; Miklos et al. [6] has reviewed papers on laparoscopic and robot-assisted VVF repair from 1994 to 2014 and found an overall success rate of 80–100%.

Due to the low number of patients, in this case, it is difficult to conclude if any patient characteristics are independent predictors for fistula closure. One study found that patient characteristics and comorbidities did not independently predict fistula closure or incontinence after successful operation [11]. Forsgren et al. [3] found several risk factors for VVF as a complication to hysterectomy; laparoscopic and total abdominal hysterectomy, smoking, diverticulitis, pelvic adhesions and increasing age.

According to Barone et al. [11], nearly 20% of patients with closed fistulas experienced residual incontinence. It is of importance to note that patients might experience incontinence postoperatively due to other etiologies despite sufficient fistula closure [11].

Conclusion

This study indicates that robot-assisted VVF repair is a safe and successful procedure with results comparable to transvaginal repair when this is not possible. It is a minimally invasive alternative to the open procedure associated with few postoperative complications and has a high success rate without using interposed tissue.

Disclosure statement

No potential conflict of interest was reported by the authors.

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