

## Original Research Article

### Vesicovaginal Fistula Diagnosis and repair, Benghazi-Libya (Nine years of experience).

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#### Abstract

**Introduction:** Although most of vesicovaginal fistulas (VVF) are iatrogenic, they can also occur as a result of congenital anomalies, neoplastic changes, and complications of radiotherapy. In rural areas, the obstructed labor may lead to the development of VVF. However, the most common cause of VVF in developed areas is iatrogenic damage of the bladder tissue.

**Aim:** To confirm that the immediate repair of iatrogenic urinary bladder injuries during obstetric or gynecological surgeries prevents VVF formation, and to identify optimal time and outcome of surgical techniques of VVF repair.

**Patients & Methods:** Prospective study was carried over 9 years and included 95 patients. These patients were divided into two groups; one group underwent immediate intra-operative repair of urinary bladder injuries (n=76), while other group presented with VVF and underwent either reconstructive or urinary diversion surgeries on elective bases (n=19).

**Results:** The mean age of 19 cases having VVF was  $29.4 \pm 8.4$  years. One case was missed and other 18 cases underwent abdominal repair (n=8), vaginal repair (n=5) and permanent urinary diversion (n=5). The time of repair ranged from 2 day to 7 months after detection of VVF. The success rate of post-surgical VVF repair was 92.3%.

**Conclusion:** Immediate repair of urinary bladder injuries during obstetric or gynecological surgeries prevents development of VVF. Post-surgical VVF repair can be done in first post-operative days before inflammatory changes takes place. The result of VVF repair depends on the experience of the surgeon rather than the used surgical techniques.

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**Key-words:** Abdominal repair, vaginal repair, Vesicovaginal fistula.

**Abbreviations:** VVF=Vesico-vaginal fistula, A.H=Abdominal Hysterectomy, C.S = Cesarean Section.

### INTRODUCTION

VVF is an abnormal opening between the urinary bladder and vagina resulting in urine leakage through vagina. In 1037 AD, the relationship between VVF and obstructed labor was documented by Avicenna (renowned Arabo-Persian physician) [1]. 1836 is the year of the first successful VVF closure which performed by Peter Mettauer of Virginia in the United States [2], three years later (i.e. in 1839) same successful VVF repair was achieved by George Hayward of Massachusetts in United States [3]. Many modern advances developed soon and in the late 1800s, Fredrich Trendelenburg pioneered the transvesical approach of VVF repair [4]. In 1894 “layered” repair for VVF was first performed by Alwin Mackenrodt [5], however, the most significant advancement came from Dr. Heinrich Martius in the late 1920s by placement labial fat graft between bladder and vaginal wall for surgical repair of complex VVFs through transvaginal approach [6].

Obstetric trauma, surgery, infections, congenital anomalies, malignancy and malignancy treatment are possible causes of VVF [7]. In the past, obstructed labor, coupled with a lack of medical attention, were more common causes of VVF [8, 9]. In developed countries, with improvement of obstetric facilities, the VVF are mostly associated with

gynecologic and pelvic surgery, especially hysterectomy [10]. However, in many underdeveloped countries with a low standard obstetric care, prolonged labor still remains a major cause of VVF [11]. The World Health Organization (WHO) estimates that the new cases of obstetric fistula in each year are about 130,000 cases, calculated from an assumption that fistula is likely to occur in 2 percent of the 6.5 million cases of obstructed labor that occur in developing countries [12]. A prospective study of maternal morbidity in sub-Saharan Africa reported an annual 33,000 obstetric fistulas [13].

The timing of VVF repair remains controversial. There is no consensus regarding the definition of late (2-4 months) and early (1-3 months) repair of VVF [14, 15]. Several authors have reported comparable success with early and late surgical repair of VVF [16-18]. Waaldijk [19] concluded that the immediate repair of fresh obstetric fistulas was highly effective, thus protecting the patient from becoming a social outcast, with progressive downgrading medically, socially and psychologically.

The choice of approach and technique of surgical repair depends on the surgeon’s experience, the type and location of the fistula, and the patient’s specific preferences [20]. Many studies have claimed that the



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transvaginal approach is less invasive than the trans-abdominal procedure [21]. Others have reported a clearly higher success rate of the trans-abdominal approaches with interposition grafts, in both benign and malignant VVF [22].

The aim of this study is to prove the benefits of immediate detection and repair of iatrogenic urinary bladder injuries during obstetric or gynecological surgeries for prevention of VVF formation, as well as to determine the optimal time of VVF repair and the outcome of available surgical techniques.

### PATIENTS & METHODS

A descriptive longitudinal study over a period from June 2007 to June 2016 was carried out in Obstetric and Gynecological department at Al Jamhouria hospital and Benghazi Medical Center (BMC), the urological departments at Al Hawari urological center and at BMC. The total number of patients included in the study was 95 consecutive patients. The patients divided into 2 groups; one group sustained intra-operative urinary bladder injuries detected and repaired immediately (n=76) and other group presented with VVF required surgical repair (n=19).

A computer database was created to record information from 19 cases presented with VVF such as etiology, site, size, presentation, and the outcome of surgical approaches, as well as postoperative complications of VVF repairs. All patients were examined thoroughly and completely

investigated. In our study different techniques of VVF repair such as endoscopic fulguration, abdominal and vaginal approaches were chosen according to the site and size of the fistula as well as to the preference of surgeons. A written consent was taken from patients presented with VVF considering the type of surgical technique and possible complications as well. The Descriptive statistical analysis was carried out by using IBM SPSS version 22.

### RESULTS

Out of 55539 obstetric and gynecological surgeries [49059 Cesarean Section (C.S) and 6480 Abdominal Hysterectomy (A.H)] done over 9 years, there were 76 (0.1%) patients with sustained bladder injuries. The number of bladder injuries during C.S was 25 cases which represented 0.05%, while the number of bladder injuries during A.H was 51 cases which represented 0.78%. Out of 76 cases sustained intra-operative urinary bladder injuries, 25 (32.8%) patients detected during C.S and 51 (67.1%) patients detected during A.H. Immediate intra-operative abdominal repair of urinary bladder injuries was performed in order to prevent subsequent VVF formation without significant postoperative morbidity to the patient and medical litigation to the surgeons.

The number of cases presented with VVF was 19 cases which represented (25%) of all recorded cases. The mean age of these patients was  $29.4 \pm 8.4$  years (median 36.7 years) (Table 1).



**Table 1: Age distribution of patients with vesicovaginal fistula.**

Age of patients (years)	Number	Percentage
Less than 20	2	10.5%
21-30	5	26.3%
31-40	6	31.5 %
41-50	3	15.7%
51-60	1	5.2%
More than 61	2	10.5%
<b>Total</b>	<b>19</b>	<b>100%</b>

The etiologies of fistula in 19 cases were; post-surgical (n=11), obstructed labor (n=2), bladder tumor (n=2), post radiotherapy complications (n=3) and calculus ulceration (n=1) which represents 57.8%, 10.5%, 10.5%

and 15.7% and 5.2% of patients with fistula respectively. Out 11 cases of post-surgical VVF cases there were 7 case post abdominal hysterectomies (63.6%) and 4 post caesarean sections (36.3%) (Table 2).

**Table 2: Etiology of vesicovaginal fistula.**

Etiology	No	%	
Post abdominal hysterectomy	7	36.8%	57.8%
Post cesarean Section	4	21.05%	
Post obstructed labor	2	10.5%	
Bladder tumor	2	10.5%	
Calculus ulceration	1	5.2%	
Radiotherapy and recurrent Bladder Tumor	1	5.2%	15.6%
Post radiotherapy for Carcinoma Cervix	1	5.2%	
Radiotherapy after recurrence of Uterine	1	5.2%	
<b>Total</b>	<b>19</b>	<b>100%</b>	

Table 3 shows the presentations of VVF in 19 cases.

Two cases of VVF presented with history of passage of fecal material with urine and gases through vagina due to injury of rectum and bladder after obstructed labor in one case,

and due to infiltration of recurrent uterine tumor as well as complications of radiotherapy in the other case. One patient with calculus VVF presented with foul smell purulent pus vaginal discharging through stenotic vaginal opening with normal interval urine voiding.



**Table 3: Presentation of vesicovaginal fistula.**

Symptoms	No	%
Total incontinence	15	87.9%
External genital skin rash	11	57.8%
Vaginal dribbling of urine with normal interval urine voiding	3	15.7%
Intermittent hematuria and vaginal bleeding	2	10.5%
Passage of fecal material with urine and gases through vagina	2	10.5%
Discharging vaginal foul smell purulent pus	1	5.2%
Uremia	1	5.2%

The vaginal examination by using speculum is useful for locate the site of fistulas and assess their sizes. Table 4 shows, the site and size in 19 cases of VVF. The site and size of

fistula couldn't be assessed in one case of VVF with vaginal stone because of vaginal opening stenosis and the patient missed before complete evaluation.

**Table 4: Site and Size of vesicovaginal fistula.**

The site of VVF	NO	%	The size of VVF	NO	%
Post hysterectomy vault fistula	7	36.8%	Less than 0.5 cm	3	21.05%
Juxta-cervical	3	21.05%	From 0.5 to 1.0 cm	9	47.3%
Mid-vaginal	5	10.5%	From 1 to 2 cm	5	26..3%
Vesico-vaginal and recto-vaginal fistulas	2	10.5%	Extended Fistula	1	5.2%
VVF with complete destruction of urethra	1	5.2%	The size of fistula was not assessed	1	5.2%
The site of Fistula is not assessed	1	5.2%			

Out of remaining 18 cases of VVF, only 13 cases were candidates of VVF repair and underwent reconstructive surgeries as follow; abdominal repair was done in 8 cases (44.4%) with success rate 100%, and vaginal repair performed in 5 cases (27.7%) with success rate 80%. However, for the other 5 cases (27.7%) of VVF due to malignancies and secondary to radiation, permanent urinary diversion was done by insertion of

nephrostomy tubes, because these patients were unfit for any surgical interventions.

The timing of surgical repair of the 13 cases of surgical and obstetric VVFs range from the second day post C.S to 7 months after detection of fistula, while in the 5 cases of VVFs due to malignancies or radiation, permanent urinary diversion was done on elective basis [Table5].



**Table 5: Time of vesicovaginal fistula detection and surgical intervention**

Etiology of Fistula	Number	T.O.D	T.O.S
Abdominal Hysterectomy	2	1 Week	3 Months
	5	Immediately	4 Months
Cesarean Section	1	Immediately	2nd day
	1	Immediately	4 Months
	2	Immediately	5 Months
Obstructed labor	1	Immediately	4 & 6 Months
	1	Immediately	7 Months
Calculus ulceration	1	Years	Missed
Radiotherapy and recurrent Bladder Tumor	1	6 Months	Urinary Diversion
Bladder tumors	1	8 Months	Urinary Diversion
Bladder tumors	1	10 Months	Urinary Diversion
Post radiotherapy for Carcinoma Cervix	1	7 Years	Urinary Diversion
Radiotherapy and recurrent Uterine tumor	1	4 Months	Urinary Diversion

In 1 case with extended bladder and vaginal injuries, the vaginal repair failed twice and complicated by bladder contraction and the urethra become like a dense fibrous band, warranted urinary diversion which done by implantation of both ureters in ileal conduit. The success rate and the number of attempts required for each procedure as well as success rate in each surgical attempt. The total numbers of attempts of procedures for 13

cases of primary VVF were 17 attempts (VVF due to tumor infiltration or secondary to radiotherapy were not included) (Table 6).

The post-successful VVF repair complications were stress incontinence (n=1), increased frequency (n=2), Para umbilical hernia (n=1), and dyspareunia (n=1). However, no obvious complications recorded in other six cases, all of these complications were treated accordingly.

**Table 6: Number of attempts for each surgical interventions**

Surgical attempts	NOA	S.1st.	F.1st.	S.2nd.	F.2nd.
E.F	3	0/3	3/3	--	--
A.R following E.F	3	3/3	0/3	--	--
Primary A.R	4	4/4	0/4	--	--
A.R following S.D	1	1/1	0/1	--	--
V.R	6	2/5	2/5	1/2	1/2
Total NOA	17				

NOA= Number of Attempts, E.F = endoscopic fulguration , AR = Abdominal Repair, S.D= Stool diversion, V.R= Vaginal repair, S.1st. =Successful at 1st attempt, F.1st. =Failure at 1st attempt, S.2nd =Successful at 2nd attempt, F.2nd =Failure at 2nd attempt



### DISCUSSION

VVF has bad emotional effect on patient because it results in a social stigma apart from the medical sequelae. VVFs in sub-Saharan African poor countries are much more common than in industrialized countries [12, 13]. Recently with improvement of obstetric services, the incidence of iatrogenic fistulas becomes rare; however the most common cause of all vesicovaginal fistulas is total A.H which represents 75–90% [23, 24]. Another study reported that gynecologic surgery causes 82% of all vesicovaginal fistulas [25]. Our study showed that A.H causes 63.6% of all post obstetric and gynecological surgical vesicovaginal fistulas. The incidence of bladder injury during C.S ranges from 0.08 to 0.94% [26-30]. In our case series, the incidence of bladder injuries during C.S was 0.05% of all iatrogenic bladder injuries. Nowadays, a significant number of vesicovaginal fistulas are the consequence of radiation therapy of pelvic malignancies which may appear even after 20 years after the initial radiation due to cumulative effect of radiotherapy [31]. We recorded that post radiotherapy VVF developed as early as 4 months after initiation radiotherapy and in one case the fistula delayed up to 7 years post radiation.

Arguments regarding the most appropriate approach for VVF repair still continue. In our urological department the timing and surgical approach of VVF repair depends on surgeon preference and status of vaginal and bladder tissue. In special situations, spontaneous closure in both surgical and obstetric fistulas

may occur within 6–8 weeks of continuous urinary bladder drainage [32-34]. Indeed, spontaneous closure of obstetric fistulas has been reported in up to 28% of cases only by catheterization [35], however fulguration of fistula may facilitate healing. We could not establish any success of fistula closure by performing endoscopic fulguration and continuous drainage of bladder in three cases with small VVF. The trans-vaginal approach is indicated in low positioned uncomplicated fistula and their advantages include the absence of cystotomy, minimal blood loss, less post-operative discomfort and a shorter hospital stay [36, 37]. According to Dupont et al., “prior trans-abdominal repair or a radiation-induced vesicovaginal fistula does not preclude a vaginal approach” [38]. In our urological department, transvaginal approach success in four cases and failed in one case, emphasizing that, the failure of transvaginal approach was in one case of post-obstructed labor VVF, because the injury was complicated and extended to involve whole urethra, bladder neck and bladder wall. The abdominal approach is reserved for complex cases and the repair is usually delayed 2 to 6 months after the diagnosis is confirmed, especially in obstetric fistulas which are usually larger than post-hysterectomy fistulas and located more distally [6, 23], or when ureteral orifices are involved in the fistula and ureteral re-implantation is required. Most authorities suggest waiting a minimum of three months in obstetric cases; although others advocate surgery as soon as the slough is separated [35]. The success rate of abdominal approach is 80–90% [23, 24, 31,



[39]. Some authors report a success rate of up to 100% when fistulas were repaired in as short a time as 6 weeks from diagnosis [40–42]. In our series, abdominal repair of VVF was performed from 3 to 7 months after the diagnosis is confirmed as follow, in 7 cases of VVF secondary to AH and 3 cases of VVF secondary to C.S, the repair was performed from 3 to 5 months after detection of fistula, in one case of post obstructed labor fistula, the repair delayed to 7 months after delivery because of concomitant rectovaginal fistula required time to heal after performing colostomy. However, we achieve a successful trans-abdominal repair which performed as early as the second day post cesarean section without any complications. The success rate of transabdominal repair reaches to 100%.

Whatever the surgical approach was chosen for repair of VVF, a highly vascular tissue should be placed between bladder and vaginal wall to prevent recurrence, as follow, Labial fat [Martius graft] [43], gracilis muscle [44], [35], or rectus abdominis muscle [45], can be placed between the bladder and vaginal walls after repair of their tears through vaginal route. Omental pedicle grafts [46-48], Peritoneal flap grafts provide an additional layer for trans-peritoneal repair. We are used to place labial fat between the vaginal and bladder wall when the VVF repair performed through vaginal approach and placement of omental pedicel graft between them when the approach of repair was abdominal.

Some patients may simply not be candidates for repair due to coexistent

medical morbidities, making them a prohibitive surgical risk. In these patients, permanent urinary diversion, either in the form of a urinary conduit or a continent reservoir can be considered. In a review of 55 cases from Denmark, Langkilde and colleagues report 90% success using either vaginal or transvesical approaches in post-surgical fistulas, but only 14% success in postradiation fistulas. As a consequence, they advocate ileal conduit urinary diversion as the method of choice for the latter cases. In our study, proximal permanent urinary diversion in form of percutaneous nephrostomy tube insertion was done for all patients presented with VVF due to tumor infiltration or secondary to radiation because they were unfit for any surgical intervention.

### CONCLUSIONS

In principle, the success rate of intra-operatively detected and repaired urinary bladder injuries almost equivalent to the success rate of post-surgical VVF repair, but the advantages of intra-operative urinary bladder injuries repair over delayed repair of post-surgical VVF are the absence of physical and emotional effect of continuous urine leak as well as the tissues of genital and urinary tract still fresh and can be handled easily. However, because we achieve successful trans-abdominal repair which performed in the second day post C.S without any complications may encourage us to perform VVF repair in first post-operative days as soon as the diagnosis confirmed before any inflammatory changes due to urine leakage takes place.





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In cases of post obstructed labor and post radiotherapy VVF, early repair is not recommended because the urinary bladder and vagina tissues in these situations usually badly inflamed and congested requiring time to dissolve before an attempt of any surgical repair.

Regardless of the surgical approaches or techniques used for VVF repair, the results of repairs depend on the experience of the surgeon.

### LIMITATIONS OF STUDY:

Despite the large number of patient sustained iatrogenic urinary bladder injuries, the number of cases with VVFs is small; this indicates the benefit of early detection and intra-operative repair of these injuries.

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Authors declare that there are no competing interests with others.

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## ملخص باللغة العربية

### تشخيص وإصلاح الناسور المثاني المهبلي، بنغازي -ليبيا (تسع سنوات من الخبرة)

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#### مقدمة:

على الرغم من أن معظم الناسور المثاني المهبلي هو جراحي المنشأ إلا أنه يمكن أن يحدث أيضا نتيجة للتشوهات الخلقية، وتغيرات الأورام، ومضاعفات العلاج الإشعاعي. الولادات المتعسرة في المناطق الريفية قد تؤدي إلى حدوث الناسور المثاني المهبلي. ومع ذلك، فإن السبب الأكثر شيوعا لحدوث الناسور المثاني المهبلي في المناطق المتقدمة هو التضيق الجراحي لأنسجة المثانة.

#### الهدف من الدراسة:

للتأكيد ان الاصلاح الفوري للمثانة البولية المتضررة أثناء العمليات الجراحية للتوليد وأمراض النساء يمنع تشكيل الناسور المثاني المهبلي، وكذلك تحديد الوقت الأمثل ونتائج التقنيات الجراحية المتوفرة لإصلاح الناسور المثاني المهبلي.

#### طريقة الدراسة:

أجريت دراسة مستقبلية لأكثر من 9 سنوات، وشملت 95 مريضا. تم تقسيم هؤلاء المرضى إلى مجموعتين؛ المجموعة الأولى تشمل 76 حالة خضعت لإصلاح فوري لإصابات المثانة البولية أثناء العمليات الجراحية بنسبة نجاح 100%، وضمت المجموعة الأخرى 19 مريض يعانون من الناسور المثاني المهبلي وخضعوا اما لعمليات ترميم جراحية أو لتحويلات بولية على أسس اختيارية.

#### النتائج:

كان متوسط العمر ل 19 حالة ناسور المثاني المهبلي هو  $29.4 \pm 8.4$  سنوات. قد غابت حالة واحدة وخضعت باقي الحالات وعددها 18 لإصلاح الناسور المثاني المهبلي ام عن طريق البطن (عدد 8)، او عن طريق المهبل (عدد 5) وقد تم اجراء عمليات تحويل البول الدائم (عدد 5). تراوح وقت اصلاح ناسور المثاني المهبلي من يومين إلى 7 أشهر بعد اكتشاف الناسور المثاني المهبلي. وكان معدل نجاح إصلاح الناسور المثاني المهبلي بعد الجراحة 92.3%.

#### الخلاصة:

الإصلاح الفوري لإصابات المثانة البولية أثناء العمليات الجراحية للتوليد وأمراض النساء يمنع حدوث الناسور المثاني المهبلي. إصلاح الناسور المثاني المهبلي جراحي المنشأ يمكن ان يجري خلال الايام الاولى بعد الجراحة قبل ان تحدث اي تغيرات في جدار المهبل والمثانة. نجاح عمليات إصلاح الناسور المثاني المهبلي يعتمد عي خبرة الجراح عوضًا عن التقنيات الجراحية المستخدمة.

#### الكلمات المفتاحية:

إصلاح البطن، إصلاح المهبل، الناسور المثاني المهبلي.

