1110-5704
African Journal of Urology

Vol. 11, No. 4, 2005
261-267

ORIGINAL ARTICLES

RESULTS AND PREDICTORS OF SUCCESS OF VESICO-VAGINAL FISTULA REPAIR AT A NATIONAL REFERENCE LEVEL IN RWANDA

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Objective Vesico-vaginal fistulas (VVF's) cause enormous harm to women in developing countries. This prospective study intends to highlight epidemiological, etiological and pathological data, and to define predictors of surgical results in a national referral hospital setting.

Material and Methods All consecutive patients with VVF presenting at the Kigali Hospital Centre of Rwanda between 1997 and 2001 were included. Data on epidemiology, pathology, therapy and outcome were prospectively obtained. The risk factors for therapeutic failure were identified by multivariate analysis.

Results Ninety eight percent of all cases were of obstetrical origin. Twenty five percent of VVF were categorized as simple, 64% as complex and 11% as complicated. Complete closure and continence were obtained in 87 (77.7%) cases and closure with moderate incontinence in 7 cases (6.3%). In 18 cases (16%) closure failed even after 3 surgical attempts. The independent risk factors for therapeutic failure were vaginal fibrosis ($p<0.001$) and total destruction of the bladder neck ($p=0.002$).

Conclusion We conclude that failure is basically linked to the level of destruction of the bladder neck as well as the magnitude of pelvic scarring. Surgery of complex and complicated VVF remains a challenge and requires multi-skilled surgeons. The lasting solution is the development of maternity services and the training of health personnel in reproductive health.

Key Words vesico-vaginal fistula, surgery, outcome, predictors, Rwanda

INTRODUCTION

Vesico-vaginal fistula (VVF) remains a public health issue in many developing countries as well as a surgical challenge for complex anatomic types. In developing countries, it mainly results from obstructed labor in the context of poor medical services especially in rural areas, while in developed countries VVF is mostly a complication of surgery or radiotherapy. The role of surgery is to stop urine leakage from the fistula, ensure urinary continence by the bladder neck and the urethra and finally to allow as much as possible an acceptable sexual and reproductive function. While simple VVF's are normally repaired by a transvaginal repair after tissue dissection and tension-free closure with bladder drainage, there is still some controversy as to the timing of surgery, the surgical approach and the techniques of repair for complex cases, depending on the etiology, the anatomical presentation and the extent of fibrosis in the pelvic tissues.

The Kigali Hospital Centre (CHK) is the larger one of the two national referral hospitals located in the capital city of Rwanda, Kigali. It receives city patients and referred cases from the three surrounding rural provinces, Kigali Ngali, Gitarama and Byumba. From these provinces, patients would also come directly to CHK from home or health centers without any

Table 1: Surgical Methods Applied in 112 Patients and their Results

Surgical Method	No. of Patients	%	Results of Surgery		
			Good	Fair	Bad
Simple repair	62	55.3%	62	-	-
Modified Martius	12	10.7%	8	4	-
Anterior vesical flap	10	9.0%	6	-	4
Combined methods*	22	19.6%	8	1	13
Urethroplasty with simple pedicled labial flap of tunneled neo-urethra	6	5.4%	3	2	1
Total	112	100%	87	7	18

*Combined methods consisted of: ureteroplasty, Martius, buttock flap, omentoplasty, reimplantation of ureter, suspension of bladder neck

Table 2: *Predictors of Surgical Success in Bivariate Analysis*

Risk factors	OR	Conf. Int.	P
Etiology	0.86	0.3 – 2.1	0.45
Lesion of bladder neck and/or urethra	2.9	0.9 – 9.2	0.048
Complete bladder neck destruction	9.7	2.6 – 36.2	0.001
Vaginal fibrosis	15.2	5.2 – 44.5	0.000
Diameter	6.6	2.5 – 17.5	0.000

transition through a district hospital. At the time of the study, Rwanda was still rebuilding the health system that had been totally destroyed in the 1994 war and genocide. Only one urological consultant and one surgical post-graduate resident performed VVF surgery at that time.

The objectives of this prospective study are to highlight the epidemiological and etiopathogenic data as well as the success rates for different types of fistula and to define predictors of surgical results in a national referral hospital setting.

PATIENTS AND METHODS

In this prospective and analytical study, all consecutive patients (n=112) operated on between January 1st 1997 and December 31st 2001 at the Kigali Hospital Centre were included. The median age was 25 years with extremes of 16 and 52 years.

Standardized history and clinical examination included etiology of VVF, duration of labor, the time between the causal event and the first consultation at CHK, presenting symptoms, anatomic category, involvement of the bladder neck and/or urethra, vaginal fibrosis, VVF diameter and degree of destruction of the bladder neck. Indications for intravenous urography were limited to suspected uretero-vaginal or vesico-uterine fistula. The VVF's were grouped into three anatomic categories: simple (small to medium size with no or minimal urethral or bladder neck involvement, no or mild vaginal fibrosis), complex (significant bladder neck or urethral tissue loss with moderate fibrosis) and

Table 3: Predictors of Surgical Success in Multivariate Analysis

Variables	OR	IC	P
Vaginal fibrosis	17.2	5.3 – 60.1	< 0.001
Complete bladder neck destruction	13.3	2.5 – 69.4	0.002

complicated (huge loss of tissue and severe fibrosis).

Various surgical techniques were used depending on the type of VVF. Pre-operative colostomy was performed for large recto-vaginal fistulas only. After the repair, the urinary bladder was drained by a urethral Foley's catheter size 14 for 21 days. As there is no consensus on the duration of catheterization after VVF repair and in the context of the difficult surgical environment (post-conflict), a period of 21 days was preferred pending further evaluation. In cases of ureteral re-implantation, the ureter was drained for 10 days by a ureteric catheter. At the time of the study it was not possible to have a proper bacteriological analysis for all patients.

The patients were evaluated one and six months after surgery.

Sexual function was not evaluated, as the follow-up time required for a reliable evaluation of this parameter was insufficient. Surgical results were categorized as good (closure of the fistula and urine continence), fair (closure of the fistula and moderate incontinence) or failure (no closure or total urine incontinence).

Epi-info 6.04, SPSS and Stata were used for data entry, processing and analysis. After bivariate analysis of these factors using the Pearson chi square (significance level $p<0.05$), a logistic regression analysis identified independent predictors.

RESULTS

One hundred and twelve (112) patients were included in the study. Seventy three percent were under 30 years. The majority of the patients were primipara (62%) and 63% originated from the three main surrounding provinces of Kigali: Ngari, Gitarama and Byumba.

As for the etiology, 98% of all VVF's were of obstetrical origin (including 9% after cesarean section and 4% after hysterectomy for ruptured uterus), while 2% occurred following gynecological surgery. The median duration of labor was 28.5 hours (P_{25}: 19.5; P_{75}: 48 hours). Fetal death occurred in 85% of all cases. Patients consulted the CHK on average 18 months after delivery with extremes of 1 and 84 months.

All patients but one had urine leakage, 40% had associated amenorrhoea, 30% had vaginal fibrosis (ranging from moderate to vaginal atresia) and 10% had an associated recto-vaginal fistula. In one case the vesico-uterine fistula was revealed by monthly hematuria. Only for this case an IVU was performed, and it was non-contributory. The diameter of the fistula ranged from 2 to 60 mm (median 12; P_{25}: 5; P_{75}: 25). Three cases of bladder calculi and 30% of vulvo-perineal dermatitis were recorded.

Twenty five percent of VVF were categorized as simple, 64% as complex and 11% as complicated. Surgical procedures varied as the lesions were so diverse. A vaginal approach alone with episiotomies was preferred in 66% of all cases, while 16% and 18% were operated by a transvesical and combined approach (Table 1). In these last two categories, the patients had vesico-uterine or uretero-vaginal fistulas; some underwent ureteric reimplantation. In 62 cases (55.3%), a Chassar-Moir procedure was performed for simple to complex fistulas. For 12 (10.7%) patients the closure of the fistula was reinforced by a pedicled and well vascularized fat flap taken from the labia majora tunneled under the vaginal lateral wall and fixed between the bladder and the anterior vaginal wall suture lines. In 16 cases of subtotal urethral destruction, the urethra was reconstructed by tunneling an anterior bladder wall flap (10 cases; 9%) or a pedicled labial flap (6 cases; 5.4%). In 22 cases (19.6%) of complicated VVF, a combined approach and multiple

procedures were performed including 8 ureteral reimplantations, 6 omentoplasties using the greater omentum, 8 vaginoplasties using a pedicled buttock skin flap and two Burch's operations for bladder neck suspension. In 11 cases of associated recto-vaginal fistula, rectal repair was done after prior colostomy. No other interventions were done in the pre-operative period.

All patients were evaluated at one month after surgery, but out of 87 patients who were discharged cured, only 56 (64.4%) returned after 6 months. Results of surgery were good in 87 (77.7%) cases including 6 and 3 cases after respectively 2 and 3 operations. All the 62 simple repaired cases, 8 out of the 12 Martius procedures, 9 out of 16 urethral reconstruction and 8 out of 22 combined procedures were successful. In 7 cases (6.3%), the VVF closed with moderate incontinence and in 18 cases (16%), the closure failed even after 3 surgical attempts. Thirteen repairs (11.6%) recurred in the immediate postoperative period. Apart from asymptomatic Foley's catheter infection (which could not be confirmed by lack of bacteriology) no major post-operative complications such as acute pyelonephritis, gross hemorrhage, anuria, etc. were noted.

So far, no single Coffey operation (rectal diversion) has been performed, thus avoiding the known complications of ureterosigmoidostomy.

The bivariate statistical analysis identified bladder neck and/or urethral involvement (p=0.048), vaginal fibrosis (p=0.000), total destruction of the bladder neck (0.001) and fistula diameter (p=0.000) as predictors of failure. (Table 2). A binary logistic multivariate analysis retained only vaginal fibrosis (OR 17,2; CI 5.3-60.1; p<0.001) and total destruction of the bladder neck (OR 13.3; CI 2.5-69.4; p=0.002). (Table 3)

DISCUSSION

In our series VVF occurred in young women, like in most series from developing countries[1-4]. In some reports from West Africa, the patients are even younger than in our study with mean age ranging from 15 to 23 years[5,6]. This is usually related to the young age of marriage. In Rwanda marriage at a very young age is quite uncommon. In developing countries, the epidemiological pattern of VVF's is different; they rather occur in older women. Seventy-two percent of our patients were primipara. This has been consistently found in almost all series from Africa[7-9].

The major etiology was obstetrical trauma in 98% of our patients. Arrowsmith in Nigeria[3], Ouattara in Mali[9], Gueye in Senegal[1] and Gressessew and Hilton in Ethiopia[10,11] found obstetrical trauma to be the main cause in 95%, 100%, 97%, 95%, and 80% of patients, respectively. It is well known that obstetrical VVF's are quite rare (in the range of 5% to 7%) in developed countries[12,13] where they mostly occur following gynecological surgery or – to a lesser extent – due to complications of radiotherapy and malignancy.

Vesico-vaginal fistulas in poor countries have been attributed to poor geographical access to maternity services, the lack of pre-natal care and quite often poverty and subsequently very limited access to health care[7,9,11,14]. This was the health-care situation in Rwanda in the post-genocide period when the health system was non-operational and health personnel very scanty. The length of labor (median 29 h) and the high fetal mortality (85%) illustrate this in our study. Poor accessibility to medical care is equally evidenced by the long waiting period before surgery: 51% of our patients were operated 12 months or more after the incident. Apart from the availability of only two surgeons capable of operating VVF's, three major obstacles are responsible for this delay: the inadequate reference system, financial barriers and the lack of information resulting in the belief that fistulas cannot be treated[3,7,9,15].

Simple VVF's were fewer in our series (25%) compared to 64% of the complex type in which the bladder neck and the urethra were involved. This is different from the preponderance of simple anatomic cases in other similar reports from Africa[1,9,16]. In our study there was also a higher incidence of significant to severe vaginal fibrosis (30%). This is explained by the intensity and duration of ischemia of the vagina and bladder tissues, which are squeezed between the fetal head and the symphysis. This level of pelvic fibrosis is usually not found in post-surgical VVF. It is a factor that will make surgical repair extremely challenging and sometime unpredictable[1,9,12,17-20].

With regard to repair, one of the debated issues is the surgical approach. In our study, a vaginal approach with episiotomies was used

in 66% of cases against 18% transvesical and 20% combined. This contrasts with similar series in sub-Saharan Africa in which a vaginal approach is the gold standard[1,8,21,22]. While it is a well-known fact that urological surgeons feel more comfortable with the transvesical approach, it is also worth linking the relatively low use of vaginal approach to the abnormally higher percentage of complex fistulas in our series.

Surgical techniques have been diverse. Like in most similar series, simple vaginal repair with fistula excision and tension-free closure of the urinary bladder and vagina in layers was performed in 56% of our cases. This has been consistently successful.

In the case of vesico-vaginal fibrosis and involvement of the sphincter region, simple repair is usually ineffective, and urinary incontinence despite successful fistula closure will require repeat surgery. It is in those 12 cases that we reverted to the Martius flap interposition between the vagina and the bladder. Even here we had 4 cases of moderate incontinence. It is probably important to take good care of the fixation of the flap to the pubic symphysis so as to suspend the bladder neck sufficiently.

One of the surgically most challenging situations is the circumferential VVF in which there is almost no urethra and bladder neck. In those cases, we used the anterior bladder wall flap[23] or a pedicled labial flap for the reconstruction of a neo-urethra of at least 3 cm in 16 cases[24,25].

Seven repairs failed with severe urinary incontinence and recurrence. In that situation one may need to be very cautious with the length of the reconstructed urethra and the interposition of additional well-vascularized tissue in order to achieve some bladder neck suspension[9,26,27].

There are other conditions that are beyond any anatomic description because of the magnitude of tissue loss, vaginal scarring and associated lesions. There were 22 such cases in which a combination of two or more techniques was used including urethroplasty, Martius flap, vaginoplasty by a pedicled buttocks skin flap, omentoplasty, ureteral reimplantation and rectovaginal repair[28,29].

It is not rare to be in a situation of no alternative than palliative diversion of urine. The surgeon in the developing world will usually think twice before resorting to the latter solution that imposes a more rigorous clinical and biological renal function follow-up.

Bivariate analysis of the risk factors found no correlation between the surgical results and the etiology or the duration of the disease. The correlation with the involvement of the bladder neck and the urethra and with the diameter of the fistula was eliminated by multivariate analysis that highlighted the negative role of vaginal scarring and the total destruction of the bladder neck. This suggests that apart from those cases in which there is extensive vaginal fibrosis and/or total bladder neck destruction, classical surgery would allow a good outcome[3,18,21,22,30]. We could not compare our results for prediction of success rate, as we did not find any former analysis of this type in the literature.

We conclude that we had a high rate of complex forms, probably due to the poor health system following the 1994 war and genocide. Failure is basically linked to the level of destruction of the bladder neck as well as the magnitude of pelvic scarring. Surgery of complicated VVF remains a challenge and requires multi-skilled surgeons and a lot of patience. The lasting solution is the development of maternity services and the training of health personnel in reproductive health as well as in surgical skills.

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RESUME

Résultats et facteurs prédicateurs du résultat chirurgical des fistules vésico-vaginales à l'échelle d'un hôpital de reference national

Objectifs: Les fistules vésico vaginales entraînent un handicap sévère chez les femmes dans les pays en voie de développement. Cette étude prospective vise à mettre en évidence les données épidémiologiques, étiologiques, pathologiques et les résultats thérapeutiques et de définir les facteurs prédicateurs du résultat chirurgical à l'échelle d'un hôpital de référence national. **Matériels et méthodes** : Toutes les patientes reçues pour fistule vésico-vaginale au Centre Hospitalier de Kigali au

Rwanda entre 1997 et 2001 ont étés inclues. Les données épidémiologiques, pathologiques et les résultats thérapeutiques ont été recueillis. Les facteurs de risque d'échec thérapeutique ont été identifiés par analyse multi variée. **Résultats** : Quatre vingt huit pour cent des cas étaient d'origine obstétricale. Vingt cinq pour cent des fistules vésico-vaginales étaient considérées comme simples, 64% comme complexes et 11% comme compliquées. Une fermeture complète et une bonne continence ont été obtenues dans 87 cas (77.7%), une fermeture avec incontinence modérée dans 7 cas (6.3%). Dans 18 cas (16%) la fermeture n'a pu être obtenue malgré 3 opérations. Le facteur indépendant de risque d'échec thérapeutique était constitué par la fibrose vaginale ($p<0,001$) et la destruction du col vésical ($p=0,002$). **Conclusion** : Nous constatons que l'échec thérapeutique est lié au degré de destruction du col vésical et à l'état de délabrement périnéal. La chirurgie des fistules vésico vaginales constitue un challenge et nécessite des chirurgiens expérimentés. La solution passe par le développement de maternités et la formation de personnels de santé en matière de santé de la reproduction.

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