

Preliminary results of complete delayed primary bladder exstrophy reconstruction in male patients

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ABSTRACT

Introduction. The success of primary bladder closure in bladder exstrophy (BE) is the determining factor for future capacity and continence. In recent years, owing to the unsatisfactory results of staged repair, complete delayed primary reconstruction has gained prominence.

Objective. To analyze short-term results in male patients with BE undergoing delayed primary closure and compare them with early bladder closure as part of staged repair in our healthcare facility.

Materials and methods. The success of bladder closure, postoperative management, complications, and hydronephrosis was assessed over a 12-month follow-up period in both groups: early primary closure (group A) and delayed primary closure (group B).

Results. In group A (n=13), mean age at closure was 25 hours and mean pubic diastasis was 32 mm. Patients had respiratory support and muscle relaxation for an average of 4 days postoperatively. Closure success was 85%, and 1 patient presented maintained hydronephrosis beyond the first 6 months. In group B (n=6), mean at closure was 58 days, and mean pubic diastasis was 34 mm. Patients had epidural analgesia and no respiratory support postoperatively. Closure success was 100%. 33% had transient hydronephrosis, and 1 patient (17%) presented maintained bilateral hydronephrosis. The same immobilization technique was used in both groups for 3 weeks.

Conclusions. Delayed primary reconstruction is safe as it allows for closure success without increasing complications as compared to staged repair. A long-term follow-up is required to assess urinary continence, esthetic results, and genital functionality.

KEY WORDS: Bladder exstrophy; Delayed primary closure; Complications.

RESULTADOS PRELIMINARES DE LA RECONSTRUCCIÓN COMPLETA PRIMARIA DIFERIDA DE LA EXTROFIA VESICAL EN EL VARÓN

RESUMEN

Introducción. El éxito del cierre primario vesical en la extrofia (EV) es el factor determinante de la capacidad y continencia futuras. En los últimos años, debido a los resultados poco satisfactorios de la reparación por estadios, la reconstrucción primaria completa diferida ha adquirido mayor protagonismo.

Objetivo. Analizar los resultados a corto plazo en varones con EV sometidos a cierre primario diferido y compararlos con el cierre vesical precoz en la reparación por estadios en nuestro centro.

Material y métodos. Evaluamos el éxito del cierre vesical, el manejo postoperatorio, las complicaciones y la presencia de hidronefrosis durante un tiempo de seguimiento de 12 meses en los grupos: cierre primario precoz (grupo A) y diferido (grupo B).

Resultados. En el grupo A (n= 13) la edad media al cierre fue de 25 horas y la diástasis púbica media de 32 mm. Permaneció con asistencia respiratoria y relajación muscular una media de 4 días en el postoperatorio. El éxito del cierre fue del 85% y un paciente mantuvo hidronefrosis más allá de los 6 primeros meses. En el grupo B (n= 6), la edad media al cierre fue de 58 días, la diástasis púbica de 34 mm y se mantuvieron en el postoperatorio con analgesia epidural, sin asistencia respiratoria. El éxito del cierre fue del 100%, el 33% presentó hidronefrosis transitoria y un paciente (17%) hidronefrosis bilateral mantenida. En ambos grupos se empleó igual inmovilización durante 3 semanas.

Conclusiones. La reconstrucción primaria diferida es segura, permitiendo el éxito del cierre sin aumentar las complicaciones, comparado con la reparación por estadios. Es necesario un seguimiento a largo plazo para evaluar la continencia urinaria, el resultado estético y la funcionalidad genital.

PALABRAS CLAVE: Extrofia vesical; Cierre primario diferido; Complicaciones.

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INTRODUCTION

Bladder exstrophy (BE) is a rare congenital malformation with important repercussions in the patient's life. It requires cross-disciplinary postnatal management to

successfully close the bladder, since this has an impact on future capacity and continence. Therefore, treatment goals are adequate urinary continence and sexual function, without causing renal damage.

BE is a rare pathology (1/10,000-50,000 live births). It is more frequent in male patients and has a complex treatment. Long-term results are not fully satisfactory regardless of the technique used. There is no standardized consensus in the literature regarding BE management^(1,2), as it varies from one school or healthcare facility to another⁽³⁻⁵⁾.

Staged repair (Gearhart-Jeffs), complete primary closure (Mitchel), and total mobilization (Kelly) have been the most widely used techniques in the modern era of bladder exstrophy treatment. However, even though patient morbidity has decreased, urinary continence has not achieved the success rates initially expected. 70% of patients achieve urinary continence following various surgical procedures. Therefore, bladder exstrophy treatment remains a challenge for pediatric urologists⁽⁶⁻⁸⁾.

The objectives of this study were to analyze short-term results in male BE patients undergoing delayed primary closure and compare them with early bladder closure as part of staged repair in our healthcare facility.

MATERIALS AND METHODS

A retrospective study of our male patient cohort undergoing surgery for bladder exstrophy from 2001 to 2018 (n=19) was carried out. Patients with malformations such as cloacal exstrophy or exstrophy variants were excluded.

Patients were classified into early primary bladder closure (group A, undergoing surgery in the first 24-48 hours of life) and complete delayed closure, including epispatias (group B, undergoing surgery after the first month of life).

Patient characteristics included weight, pubic diastasis, and age at surgery (Table 1). Bladder closure success, postoperative management, complications, and presence of hydronephrosis were assessed for a minimum follow-up period of 12 months in both patient groups.

Descriptive statistical tests were used for comparative analysis purposes. <0.05 p values were considered statistically significant.

Table 2 features postoperative management protocols in both patient groups.

RESULTS

From 2001 to 2018, 19 male BE patients underwent surgery in our healthcare facility (Figure 1). 13 patients were included in group A (early bladder closure) and 6 patients were included in group B (delayed closure) (Table 2).

In group A (n=13), median age at closure was 24 hours, and mean pubic diastasis was 32 mm. Patients had respiratory support and muscle relaxation for an average of 4 days postoperatively. Closure success was 85%, with 2 patients requiring osteotomy at 6 and 14 months of life, respectively. 1 patient (8%) presented maintained hydronephrosis beyond the first 6 months, with a mean follow-up period of 9 years in this group.

In group B (n=6), median age at closure was 56.5 days, and mean pubic diastasis was 34 mm at surgery. These patients had epidural analgesia postoperatively (Figure 2). Closure success was 100% (Figure 3), 33% had transient hydronephrosis, and 1 patient (17%) presented maintained bilateral hydronephrosis requiring endoscopic VUR treatment, with a mean follow-up period of 1 year (Table 3).

Table 1.

	Early closure	Delayed closure
Total patients	13	6
Median age at surgery	24 hours	56.5 days
Mean weight	3.1 kg	5.2 kg
Mean pubic diastasis	32 mm	34 mm

Table 2.

	Early closure	Delayed closure
Postoperative anesthetic strategy	Intubation with muscle relaxation for 5 days	Extubation Control of analgesia with epidural catheter
Diet	Absolute for 5-6 days	Early enteral
Leg immobilization	3 weeks	3 weeks
Antibiotic therapy	IV ceftriaxone (50 mg/kg) + gentamicin (5 mg/kg) every 24 h for 10 days	IV ceftriaxone (50 mg/kg) + gentamicin (5 mg/kg) every 24 h for 10 days
Anticholinergic medication	0.2 mg/kg oxybutynin in 3 doses	0.2 mg/kg oxybutynin in 3 doses
Complementary tests	Ureteral stents removal: POD 5-7 Cystogram by suprapubic tube: POD 14 Renal ultrasound prior to discharge	Ureteral stent removal: POD 5-7 Cystogram by suprapubic tube: POD 14 Renal ultrasound prior to discharge



Figure 1. BE in a male newborn.

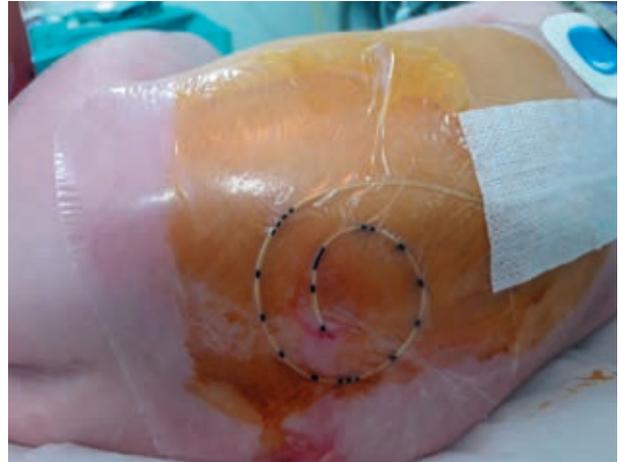


Figure 2. Epidural catheter for postoperative maintenance.



Figure 3. Immediate result of delayed BE closure.



Figure 4. “Mermaid bandage” postoperative immobilization for 3 weeks.

The same “mermaid bandage” postoperative immobilization was used in both groups for 3 weeks (Figure 4).

None of the patients in group B had lesions in the corpora cavernosa.

Table 3.

	<i>Early closure (n=13)</i>	<i>Delayed closure (n=6)</i>
Primary closure failure	2 (15%)	0 (0%)
Transient hydronephrosis (< 6 m)	3 (23%)	2 (33%)
Maintained hydronephrosis (> 6 m)	1 (8%)	1 (17%)
Repetition UTIs	5 (38%)	3 (50%)

DISCUSSION

Quality and safety in pediatric patient care are two objectives under constant evolution and increasingly important for pediatric healthcare professionals. Therefore, a critical attitude towards surgical practice is required to ensure the patient receives the best treatment possible, and the best results are achieved.

All modern techniques for bladder exstrophy repair are aimed at achieving adequate continence without impacting renal function, and also at providing the external genitalia with an appearance as normal as possible.

In our healthcare facility, three-stage repair (neonatal bladder closure, epispadias, and neck surgery) has been the technique of choice for bladder exstrophy repair for more than 30 years, with similar results as those described in the literature. Today, delayed primary closure, regardless of the technique, is clearly the most widely used method as it has demonstrated that osteotomy, postoperative respiratory support, and postoperative muscle relaxation are not required to ensure closure success.

This means bladder closure is delayed for 6-12 weeks post-birth, instead of being performed at 48-72 hours of life (early closure).

Delayed closure can prove advantageous as it avoids general anesthesia at a time when the newborn is still physiologically immature, and also makes immediate post-birth mother-child separation unnecessary. In addition, it allows for scheduled surgery and even complete defect repair with lower risks for the corpora cavernosa.

Early primary bladder closure used to be recommended to avoid bladder mucosa inflammation and fibrosis, as well as to facilitate pubic approximation with the help of relaxin (a placenta-generated hormone during pregnancy and delivery), thus avoiding osteotomy. However, recent publications demonstrate that pubic approximation can also be successfully achieved in the first weeks of life. No histological and immunohistochemical differences between the mucosa exposed for 6-8 weeks and the mucosa of early closed bladders have been found either.

The first results of delayed primary bladder exstrophy closure without osteotomy are similar to those of staged closure regarding closure dehiscence. Dehiscence rate in our series (15% for early closure, 0% for delayed closure) was comparable to that reported in other series^(4,9-11).

Regarding complete delayed primary closure, it is critical to know whether neck surgery carried out in the same procedure is beneficial or harmful for the upper urinary tract and the bladder. One of our complete delayed closure patients presented maintained bilateral hydronephrosis requiring surgical treatment.

Results in terms of penile appearance and development should also be compared.

The main limitation of this study is the fact it requires a small number of patients and a long-term follow-up period, especially in delayed closure patients.

In conclusion, a critical attitude is required when results are not satisfactory. Delayed primary reconstruction is a safe technique which allows for closure success without increasing complications as compared to staged repair.

A long-term follow-up is required to assess esthetics and genital functionality.

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