

PRIMARY RECONSTRUCTION OF EXSTROPHIED BLADDER AFTER SUPERIOR PUBIC RAMUS OSTEOTOMY

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Aim of the study: *This study was undertaken to assess the value of superior pubic ramus osteotomy (SPRO) for easy closure of the pelvic ring during repair of different types of BE.*

Methods: *Fourteen consecutive cases of (BE) were subjected to primary reconstruction after anterior pubic osteotomy that was performed by the pediatric surgeon and did not require the assistance of an orthopedic team. Varieties of the studied cases, the associated anomalies and postoperative complications were reviewed. After osteotomy, closure of the abdominal wall and skin was easy and tensionless.*

Results: *Out of the 14 operated cases, 2 cases developed bladder dehiscence that were reclosed 4 months latter. In both cases pubic rediastasis had not occurred. 3 children developed postoperative inguinal hernias, one of them was bilateral.*

Conclusion: *We can conclude that SPRO is safe and efficacious technique to obtain tension free approximation of the pelvic ring in BE-repair with a similar results to those obtained with more complicated osteotomies.*

Key words: *Bladder exstrophy - Superior pubic ramus osteotomy*

INTRODUCTION

Bladder exstrophy (BE) represents a challenging reconstructive problem. Its incidence has been estimated to be 1 in 50,000 live births with male to female ratio 4:1.⁽¹⁾

Exstrophy complex includes pubic diastasis, male epispadias, classic bladder exstrophy, supravescical fissure, duplex exstrophy, bladder exstrophy with imperforate anus and cloacal exstrophy.⁽²⁾

Classic BE constitutes more than half of the cases. It may be conceptualized by the visual image of what would occur if one blade of a scissor was passed through the urethra into the bladder of a normal person, the other blade was used to cut through the skin, abdominal wall, anterior wall of the bladder and urethra and the symphysis pubis.⁽³⁾

The typical appearance of BE shows an everted posterior bladder wall, separation of symphysis pubis, small umbilical hernia or an omphalocele and anteriorly displaced anus. The penis is foreshortened due to wide separation of symphysis pubis.⁽⁴⁾

On the other hand, cloacal exstrophy is the rarest and most extreme form of the exstrophy-epispadias complex. It occurs once in 400,000 births, classically it consists of an exstrophic central bowel field flanked by two hemibladders.⁽⁵⁾ Symphysis pubis is widened due to outward rotation of the innominate bones leading to shortening and external rotation of the anterior segment.⁽⁶⁾

There is a significant difference between pelvic floor anatomy in cases having BE and controls. The degree of divergence of the levator ani in classic exstrophy is significantly more outwardly rotated with the transverse diameter of the levator hiatus is two-fold that in the control group. These abnormalities have a pivotal role in pelvic organ prolapse, fecal and urinary incontinence in cases with BE.⁽⁷⁾

There are two general approaches to the management of (BE), the first is functional reconstruction and the second is urinary diversion which is undertaken when reconstructive options are not available or when repeated efforts at reconstruction fail.⁽⁸⁾

The single most important step to achieve urinary continence is successful bladder and posterior urethral closure. Pelvic osteotomies ensure a tension-free closure and enhance bladder outlet resistance by restoring the sling of the pelvic muscles.⁽⁹⁾ On the other hand, failure of initial closure has a severe impact on long-term outcome and quality of life.⁽¹⁰⁾

Successful exstrophy bladder closure depends on the proper use of osteotomy and effective postoperative immobilization of the pelvis.⁽¹¹⁾

Different types of osteotomies are performed in most patients undergoing primary closure of the exstrophic bladder to facilitate abdominal wall closure, prevent postoperative wound dehiscence and to achieve better urinary control.⁽¹²⁾

Traditionally, bilateral posterior iliac osteotomy has been the most commonly used technique.⁽¹³⁾ Other techniques like anterior innominate osteotomy⁽⁹⁾ and superior pubic ramus osteotomy (SPRO).⁽¹⁴⁾

Basic Ilizarov principle of callus distraction is used in management of diastasis. It provides true bone growth that prevent rediastasis⁽¹⁵⁾

The aim of present study it to evaluate SPRO for repair of BE.

PATIENTS AND METHODS

The present study included 14 consecutive previously untreated cases of BE (12 males and 2 females) seen from October 2002 to May 2004 admitted at Pediatric Surgical Unit, Mansoura University Children Hospital. Their ages ranged from one to 7 days at the time of the procedure.

Preoperative plain x-ray and abdominal ultrasound were performed to diagnose associated anomalies.

Technique of repair:

Fig. 1 shows a female neonate with BE.

Six French infant feeding tubes were used as ureteric stents. Dissection was started by mobilizing the edge of the bladder and urethra from the skin and muscle (Fig. 2). In the 2 cases with cloacal exstrophy, the intestinal plate was mobilized and folded into a tube, which restores the ileocecal junction, then the distal segment of the hind gut was exteriorized as an end colostomy, The bladder was closed with OOOO polypropylene and the ureteric stents were brought out perurethram.

The superior pubic ramus was identified at the lateral border of the rectus abdominis sheath and approached through the space between the adductor and pectineal muscles, then divided with bone-cutting forceps or with scissors (Fig. 4). Protection of the obturator nerve and vessels was accomplished by the introduction of a retractor into the obturator foramen.

Corpora cavernosa were dissected free from the interpubic bar tissue and from the pubic bones, this allows the bladder and urethra to be recessed into the pelvis. Symphyses were brought together with OO figure of eight polypropylenes, avoiding interposition of the posterior neourethra between the approximated symphyses. Recti and fascia were closed with OOO polypropylene (Fig. 5). Then skin was closed easily (Fig. 6). Post operative immobilization was not performed.

Fig. 7 and Fig. 8 are plain x-rays of preoperative pubic diastasis and postoperative approximated symphyses.

RESULTS

Of 14 cases with BE, 11 presented in the classical form (78.6%), 2 were cloacal (14.3%) and one had supravescical fissure (7.1%) as shown in Table 1.

Four cases showed associated anomalies (Table 2) which include renal agenesis in one case (7.1%), unilateral undescended testis in another case (7.1%) and 2 cases had talipes equinovarus (14.3%).

Primary reconstruction of the exstrophied bladders was performed in all 14 cases. Two cases developed bladder dehiscence (14.3%) on the 6th and 9th postoperative day secondary to wound infection and maceration of the perineum, frequent dressing was performed for the dehiscent bladders till infection subsided and then the bladders were reclosed 4 months later. In both cases with dehiscent bladders, symphyses pubis rediastasis had not occurred. Three children developed postoperative inguinal hernias (21.4%) as shown in Table 3.

Bilateral SPRO was easy and safe except in one case in whom troublesome bleeding had occurred due to obturator vessels injury which was controlled with selective ligation of the bleeder. Osteotomy was performed by the paediatric surgeon and did not require the assistance of an orthopaedic team. Operation time for both osteotomies was about 40 to 50 minutes in the first 5 cases and then decreased to less than 25 minutes in the rest of the cases.

Table 1. Types of bladder exstrophy

Types	No. of patients
Classical BE	11 (78.6%)
Cloacal exstrophy	2 (14.3%)
Superior vesical fissure	1 (7.1%)

Table 2. Associated anomalies.

Anomalies	No. of patients
Renal agenesis	1 (7.1%)
Unilateral undescended testis	1 (7.1%)
Talipes equinovarus	2 (14.3%)

Table 3. Postoperative Complications

Complications	No. of patients
Bladder dehiscence	2 (14.3%)
Inguinal hernia	3 (21.4%)

Fig 1. Female neonate with BE

Fig 2. Bladder dissected from surrounding

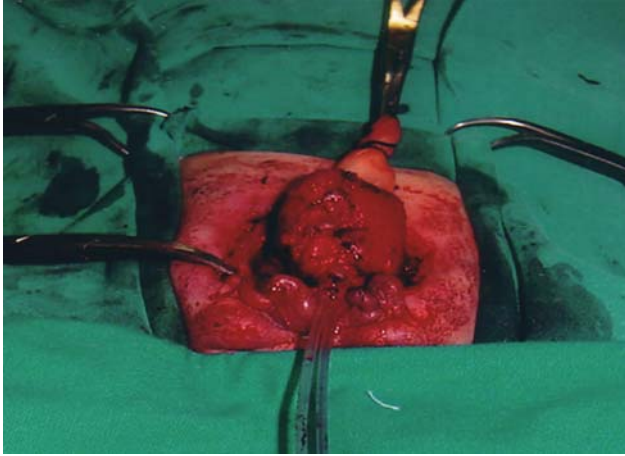


Fig 3. Bladder closed

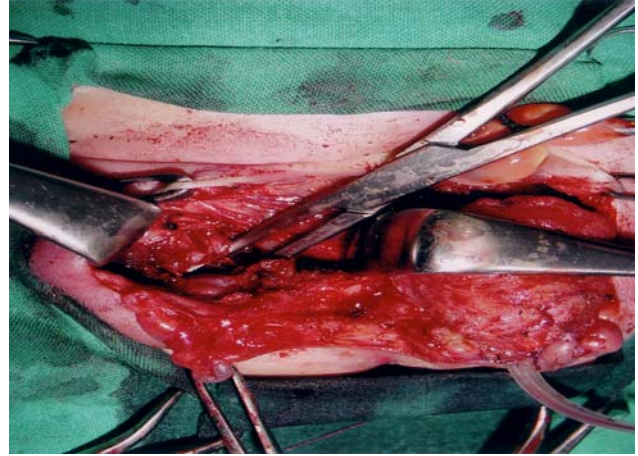


Fig 4. SPRO performed

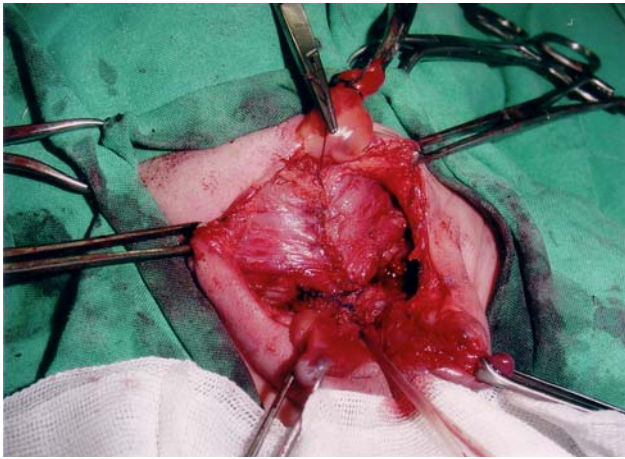


Fig 5. Symphyses and recti approximated easily



Fig 6. Skin closed

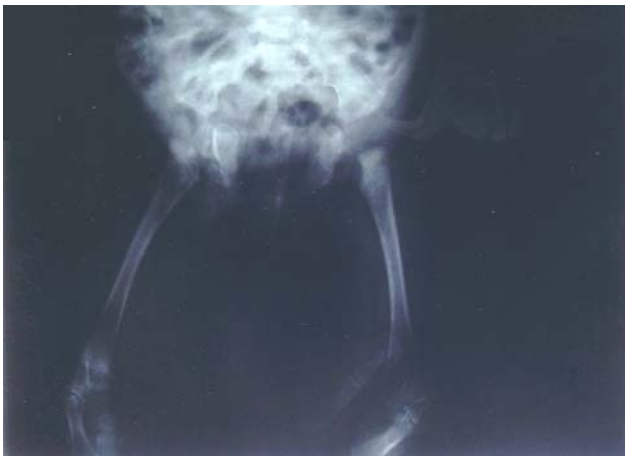


Fig 7. Pubic Diastasis



Fig 8. Closed Symphysis

DISCUSSION

Classic BE is a developmental defect presenting at birth with a wide pubic separation and an exposed bladder. Since earlier descriptions, the surgical management of BE and epispadias complex has experimented gradual changes in the research for good aesthetic and functional results. The initial urinary diversion and bladder plate removal has evolved to a staged functional closure and more recently the complete primary closure.

O'phelan⁽¹⁶⁾ reported his experience with posterior iliac osteotomy and considered it as the standard procedure to assist soft tissue approximation. His series was supported with that of Aadalen et al,⁽¹⁷⁾ who considered posterior iliac osteotomy ideal for penile lengthening and improved continence due to approximation of the levator ani around the urethra. On the other hand Sponseller et al⁽¹⁸⁾ and McKenna et al⁽¹⁹⁾ reported many drawbacks of posterior iliac osteotomy like the need for two additional incisions with increased risk for infection and blood loss, second is that the patient must be turned from the prone to the supine position which entails additional risk. Third, a great force is needed to approximate the entire hemipelvis. Lastly, they reported that posterior iliac osteotomy was attended with proximal migration of the hemipelvis with subsequent leg length inequality.

Sponseller et al⁽⁹⁾ reviewed the results of anterior innominate osteotomy that was performed in conjunction with genitourinary repair of B.E. and reported that wound dehiscence occurred in 4% of the patients while transient palsy of the femoral nerve had occurred in 8.5% of the patients.

Frey and Cohen⁽¹⁴⁾ described the superior pubic ramus osteotomy through a report of 4 cases. Then Frey⁽²⁰⁾ described successful experience in 12 additional patients. Perovic et al⁽²¹⁾ demonstrated that SPRO is equally effective to posterior iliac osteotomy in provision of tension-free closure of the abdominal wall and reported that the technique was successful regardless of previous surgical failure and case severity. In contrast to the series described by Chiari et al⁽¹²⁾ in which 2 children developed inguinal hernia (40%), in our series 3 children developed hernias (21.4%). On the other hand, the incidence of hernias in the series described by Frey⁽²⁰⁾ was only (8.3%). Frey in his series documented that more careful closure of the lateral aspect of the anterior abdominal wall could prevent this complication.

The incidence of bladder dehiscence in our series was 14.3% while Chiari et al⁽¹²⁾ reported uncomplicated healing in all five patients with only a minor superficial wound gaping that closed spontaneously in a few days. This difference in

the incidence of bladder dehiscence may be due to lack of postosteotomy external fixation in our series.

In conclusion, superior pubic ramus osteotomy is safe and efficacious technique to obtain tension free approximation of the pelvic ring in bladder exstrophy repair with a similar results to those obtained with more complicated osteotomies.

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