Original Article

Rectus Muscle Flap-augmented Closures in Wide-gap Exstrophy Bladder

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Abstract

Background: Wound dehiscence is one of the main complications in complete primary repair of exstrophy (CPRE). In our pediatric urology unit, we have switched to the use of inferior epigastric artery based rectus abdominis flap cover for abdominal wall closure in addition to measures like osteotomy and postoperative hip spica. **Aim:** to assess the efficacy of Recus abdominis flap in prevenion of wound dehisence. **Methods:** This study was conducted from June 2014 to June 2021 comparing two groups of the patients; group I consisted of thirty patients of CPRE with rectus flap repair of abdominal wall (CPRE-RF) and group II consisted of thirty patients with CPRE without rectus flap. Clinical and surgical details, including the outcome with regards to wound dehiscence and continence, were recorded. **Results:** The mean age of the patients in CPRE-RF was 5 months and that with only CPRE was 4.6 months. Mean pubic diastasis in Group l was 4.8± 1.07 cm and that of Group II was 4.6±1.3 cm. None of the patients in CPRE-RF had wound dehiscence or bladder prolapse while as 6 patients in CPRE alone had wound dehiscence and 1 had bladder prolapse. This difference was statistically significant. Primary bladder continence was achieved in 4 patients in CPRE-RF and 3 patients in CPRE group. Hypospadias had almost similar occurrence in the two groups. One patient in each group had bladder neck fistula. **Conclusion:** Use of rectus muscle flap in complete Primary Repair ofExtrophy bladder helps in prevention of wound dehiscence and contributes in achievement of final goal of continence in wide gap pubic diatasis.

Keywords: Exstrphy, rectus falp, wound dehiscence

Introduction

Complete primary repair of exstrophy (CPRE) was first described by Grady and Mitchell in 1989.[1] It is thought to reduce the cost and morbidity associated with multiple operations besides stimulating early bladder cycling.[2] However, it may be associated with complications such as bladder neck fistulas, hypospadiatic urethra, glanular and corporal loss and wound dehiscence.[3,4] Wound dehiscence is a significant complication that leads to multiple surgeries, ugly abdominal scars, increased chances of incontinence and parental anxiety.[5] To reduce the incidence of abdominal wound dehiscence, osteotomy and post-operative hip spica are usually used for appropriate approximation of the abdominal wall.[3] However, despite these measures wound dehiscence is still one of the major complications of BE repairs jeopardising the ultimate goal of attaining continence, especially in cases where pubic diastasis is >4 cm.[5] In our paediatric urology unit, we have switched on to the use of inferior epigastric artery-based rectus abdominis flap cover for abdominal wall closure in addition to measures such as osteotomy and post-operative hip spica.

Aim

The aim of this study was to assess the outcome of rectus abdominis flap on the outcome of CPRE, especially with regard to wound dehiscence.

Methods

This is a prospective study which was conducted from June 2014 to June 2021. Two groups of patients were studied;

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Group I consisted of 30 patients with classical bladder exstrophy (CBE) who were managed by CPRE with rectus flap repair of the abdominal wall (CPRE-RF) and Group II consisted of 30 patients with CPRE and osteotomy without rectus flap (only CPRE). Patients in both groups were more than 3 days old. Only patients with pubis diastasis >4 cm were included [Figure 1]. Patients with pubic diastasis <4 cm and redo-repairs were excluded from the study. Proper consent of the guardians was taken and ethical clearance from the institutional ethical committee was sought and received. All the patients were followed up to June 2021. Clinical and surgical details including the outcome with regard to continence were recorded.

Procedure

The procedure is essentially conventional CPRE preceded by bilateral Salter's osteotomy. The incision is made around the bladder and is extended over the lateral borders of the urethral plates and ventrally along the phallus. The bladder is mobilised extra-peritonealy followed by complete penile disassembly and division of inter-symphyseal band from a caudal to the cranial direction to avoid any injury to the corpora. The remaining deeper bands are divided after the separation of corpora cavernosa. Care is taken to preserve the neuromuscular bundles innervating the corpora. The bladder is closed along with the mobilised urethral plate after placing ureteral catheters, a suprapubic catheter (SPC) and a Foleys's catheter *in situ*. The prostatic urethra, bladder and bladder neck are placed deep in the pelvis. The corpora cavernosa are rotated medially and sutured. The urethra is brought underneath the corpora. Following this, the anterior rectus sheath is opened at the medial border and the rectus muscle flap is mobilised preserving the inferior epigastric arterial blood supply [Figure 2]. The muscle is divided at the upper end and then rotated medially to cover the remaining defect in the anterior abdominal wall [Figure 3]. The muscle is also hitched to the bladder on either side of the suture line by three interrupted sutures to prevent bladder dehiscence and bladder prolapse. The free end of the muscle is sutured to the rectus sheath of the other side. Skin is closed [Figure 4] and a hip spica is applied. Ureteral catheters were removed after 1 week,



Figure 1: Wide-gap pubic diastasis 5.84 cm

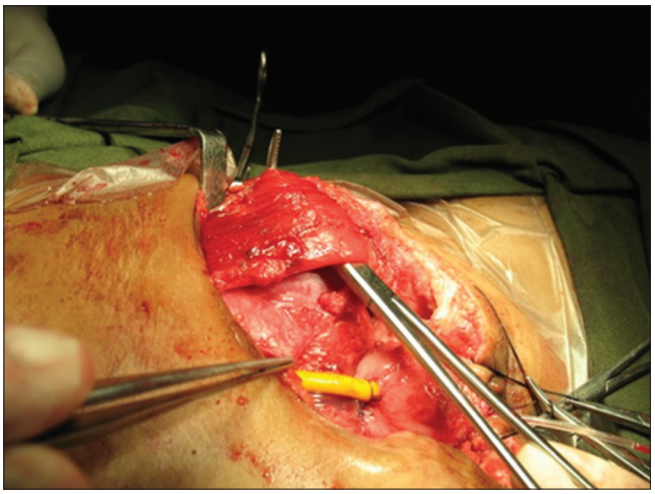


Figure 2: Inferior epigastric artery-based rectus flap being harvested

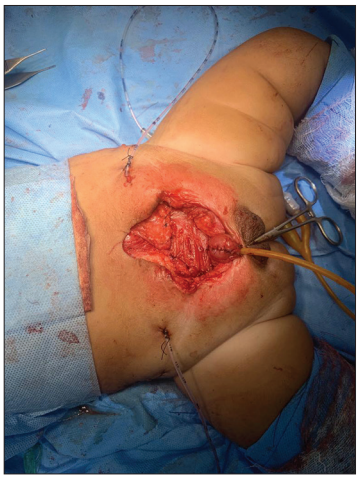


Figure 3: Rectus flap sutured in place to cover the defect. Underneath, the bladder is also hitched to the flap



Figure 4: Skin closure in a patient of complete primary repair of exstrophy with rectus flap

Table 1: Comparison of various parameters in two groups

Parameter	CPRE with RF (*n*=30), *n* (%)	CPRE without RF (*n*=30), *n* (%)	*P*
Age (months)	5.1±1.68	4.6±1.39	0.214
Pubic diastais	4.8±1.07	4.9±0.87	0.693
Immobilisation	25 (83.3)	29 (96.7)	0.197
Wound dehiscence	0	6 (20)	0.024*
Bladder prolapse	0	1 (3.3)	1.000
Bladder continence (primary)	4 (13.3)	3 (10)	0.687
Hypospadias	9 (30)	8 (26.7)	0.775
Fistula	1 (3.3)	1 (3.3)	0.721

*P<0.05 is significant. CPRE: Complete primary repair of exstrophy, RF: Rectus flap



Figure 5: Mutilating effect of repeated wound dehiscences and redo-repairs

SPC after 2 weeks. Finally, hip spica and urethral catheters were removed after 3 weeks. Patients were discharged and followed after 3-month intervals.

Results

Over 6 years, 60 patients were enrolled in the study. The mean age of the patients in CPRE-RF was 5 months and that with only CPRE was 4.6 months [Table 1]. The maximum age was 9.4 months while the minimum age was 3 months. There were 16 males and 14 females in the CPRE-RF group and 20 males and 10 females in the CPRE group. The mean pubic diastasis in Group I was 4.8 ± 1.07 cm and that of Group II was 4.6 ± 1.3 cm (maximum 5.9 cm and minimum 4 cm). None of the patients in CPRE-RF had wound dehiscence or bladder prolapse while six patients in CPRE alone had wound dehiscence and one had bladder prolapse. This difference was statistically significant. Primary bladder continence was achieved in four patients in CPRE-RF and three patients in the CPRE group. Hypospadias had an almost similar occurrence in the two groups. One patient in each group had a bladder neck fistula.

Discussion

Management of CBE is complex. Conventionally, it was being managed by staged procedures. In 1989, Grady and Mitchell introduced a single-stage procedure called CPRE.[1] This procedure involves single-stage closure of the bladder, epispadias repair and bladder neck remodelling which are carried out simultaneously to allow early bladder cycling and also to reduce the cost and social burden of recurrent operations.[6] In a society like ours, where a majority of the population resides in distant villages, patients usually do not turn up on appropriate dates for staged repairs. Owing to this, our department has shifted from staged procedure to CPRE. According to the literature, CPRE has the same success rates with regard to preservation of upper tracts, achievement of continence and attaining the normal or near-normal appearance of external genitalia, as the staged procedures.[7]

The success rates for continence are varied amongst different centres. Continence is defined as a dry period of 2 h without the aid of Clean Intermitent Catheterisation (CIC).[8] Some groups have achieved continence rates of around 74% after secondary procedures like bladder neck reconstruction. In contrast, Arab *et al*. have achieved primary continence in only 23% of patients which increased to 36% after bladder neck procedures.[9] Shoukry *et al*. had to rely on augmentation cystoplasty in all patients of CPRE to achieve continence.[10] Our study has produced similar results. We have achieved primary continence in 7 (11.6%) patients without any significant difference between the two groups (CPRE-RF n = 4, CPRE n = 3, P = 0.68). However, we achieved continence in four more patients with bladder neck procedures (CPRE-RF n = 2 and CPRE n = 2, $P > 0.05$), thus raising the number of total continent patients to 18.3%. Another 14 patients, with bladder capacity lesser than 80 ml and age in the range of 8–15 years, received augmentation cystoplasty and Mitrofanoff. They are also continents but with the aid of CIC through the Mitrofanoff channel. Thirty-five patients are on follow up with 24 of them < 4 years of age. As discussed above most of the patients with CPRE become continent only after bladder neck repairs and some after augmentation cystoplasty with continent urinary diversion.[11] Many factors play a significant role in achieving this goal, especially the successful initial wound closure and number of surgeries thereon. Wound dehiscence has a bearing on the length of hospital stay, the number of subsequent procedures and functionally on the continence of the patient.[12,13] Besides, the impact of wound dehiscence can be very serious on the appearance and function of external genitalia, as shown in Figure 5. Conventionally, osteotomy has been used as a procedure to prevent wound dehiscence.[3] However, in wide pubic diastasis osteotomies may not be enough to approximate the abdominal wall. Besides it has been observed that even after bilateral osteotomies the pubic diastasis tends to return to its original position thus putting the traction on the wound and risking wound dehiscence.[14] In a study by Baka-Ostrowska *et al*., wound dehiscence occurred in 18.75% of patients even after osteotomy.[5] Similarly, Shoukry

et al. reported failed closure in 15.6% of patients with CPRE. He also reported fistula in 11.7% of patients.[10] We experienced wound dehiscence in 6 (20%) patients of CPRE without RF. None of the patients in CPRE + RF had dehiscence. This difference was statistically significant and we believe that the use of RF has helped us to prevent wound dehiscence in the post-operative period. In addition to preventing wound dehiscence, it holds the bladder in position and prevents bladder prolapse too. Recently, James Sam *et al*. have produced similar results with the use of rectus flaps though their cohort of patients underwent redo repair procedures for abdominal wound closure.[15] They used a rectus flap to bridge the gap of pubic diastasis and were able to successfully close all the previously dehisced repairs.

Conclusion

Use of the rectus muscle flap in complete primary repair of the exstrophy bladder helps in the prevention of wound dehiscence and contributes to the achievement of the final goal of continence in wide-gap pubic diastasis.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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