Section: Urology

Original Research Article

EVALUATING ABDOMINAL WALL CLOSURE TECHNIQUES FOR ADULT PATIENTS WITH BLADDER EXSTROPHY

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ABSTRACT

Background: Bladder exstrophy is a rare congenital condition that presents significant challenges in adult patients, particularly in cases that remain untreated. This study aimed to evaluate the outcomes of abdominal wall closure in 20 adult patients with untreated bladder exstrophy at a tertiary hospital in India.

Material and Methods: The patients underwent abdominal wall reconstruction. The study assessed complications, including wound infections, flap necrosis, and suture line dehiscence, as well as the need for secondary procedures like debridement and flap reconstruction.

Results: The results highlighted the complexities of surgical management and the importance of individualized approaches for optimal outcomes. This study provides valuable insights into the challenges of managing bladder exstrophy in adults.

Keywords: Bladder Exstrophy, Abdominal Wall Closure, Surgical Outcomes.

INTRODUCTION

Bladder exstrophy is a rare congenital anomaly that involves a ventral defect of the abdominal wall and the bladder, resulting in the bladder being exposed externally. Although typically diagnosed and treated in infancy, untreated bladder exstrophy in adults presents significant challenges, particularly in the context of abdominal wall closure. In adult patients, the goal of surgery is to achieve a functional and aesthetically acceptable abdominal wall while managing associated complications such as pelvic organ prolapse, urinary incontinence, and chronic pelvic pain.[1]

Surgical management of bladder exstrophy in adults is complex and requires a multidisciplinary approach. Various techniques for abdominal wall closure have been explored over the years, with an emphasis on achieving tension-free closures, avoiding complications such as wound dehiscence, and ensuring long-term functional outcomes.[2] Historically, surgical interventions have evolved, with some employing traditional methods, while others use innovative reconstructive techniques, such as myocutaneous flaps and muscle-based repairs, to improve functional outcomes.[3]

In India, tertiary hospitals serve as key centers for managing such rare cases, and over time, several strategies have been employed to address abdominal wall closure in untreated bladder exstrophy patients. These strategies include careful preoperative planning, surgical selection based on the patient's anatomy, and consideration of comorbidities, such as obesity and previous abdominal surgeries, which can complicate closure.[4] Postoperative care and follow-up are also crucial in ensuring optimal recovery and preventing complications such as hernia formation and wound infection.[5]

Bladder exstrophy closure in adults may also impact the patient's quality of life, particularly regarding urinary function. Several studies have documented the success of various surgical techniques in addressing both the cosmetic and functional aspects of exstrophy management.[6,7] The incorporation of laparoscopic techniques and minimally invasive approaches has also gained traction in recent years,

providing promising results with shorter recovery times and fewer complications.[8]

The management of these patients is further complicated by the lack of consensus in the literature on the most effective surgical approaches. Some authors argue that individualized treatment plans are essential, while others have stressed the importance of multi-disciplinary team involvement to optimize patient care.[9,10] This case report series aims to contribute to the growing body of evidence on the management of untreated bladder exstrophy in adult patients by presenting the surgical outcomes of abdominal wall closure in 20 patients from a tertiary hospital in India. We aim to highlight the techniques employed, postoperative complications, and the long-term success of the procedures.

MATERIALS AND METHODS

Study Design and Setting

This is a retrospective study conducted at a tertiary hospital in India, The study included a total of 20 adult patients who presented with untreated bladder exstrophy and required abdominal wall closure. All patients underwent surgical intervention as part of their treatment plan for bladder exstrophy, with a focus on abdominal wall reconstruction.

The sample size for this study was 20 patients, selected based on the availability of records from the hospital's database during the study period. Inclusion criteria included adults diagnosed with untreated bladder exstrophy who were scheduled for abdominal wall closure. Patients with other significant comorbidities or previous abdominal surgeries that could confound the results were excluded from the study.

All patients underwent a comprehensive preoperative assessment, including physical examination, laboratory tests, and imaging studies to evaluate the extent of the exstrophy and associated anatomical anomalies. Urological evaluation was performed to assess bladder function, and additional consultations with the multidisciplinary team, including urologists, anesthesiologists, and surgeons, were conducted for perioperative planning.

Surgical Procedure

The surgical technique for abdominal wall closure involved a stepwise approach. If necessary, the procedure started with an initial midline laparotomy incision made by the urologists. The incision was extended cranially to allow for better exposure of the abdominal wall and to accommodate the reconstruction of the exstrophy. The skin and subcutaneous tissue were dissected from the subcostal region superiorly to the level of the anterior superior iliac spine (ASIS) inferiorly. The undermining was extended laterally up to the outer edge of the rectus abdominis muscle, allowing for adequate exposure and mobility of the abdominal wall.

The anterior rectus sheath was carefully separated from the rectus abdominis muscle and tendinous intersections. This dissection was conducted from the xiphoid process down to approximately 3–4 cm above the ASIS, ensuring that the underlying tissue layers remained intact. The inferior elevation of the anterior rectus sheath was minimized to preserve the integrity of the lower part of the rectus muscle for stoma creation, if necessary.

The subsequent steps involved creating transverse and parasagittal incisions over the anterior rectus sheath to allow for the retrograde turndown of the raised tissue flaps. These flaps were sutured in layers to the pubic symphyseal diastasis region, with the first flap sutured to the posterior rectus sheath, and the second flap being placed over the first using a double-breasting technique.

After achieving a two-layered closure of the fascial defect, the skin closure was performed using paired inguinal skin flaps, following the W-shaped flap design. The flaps were raised from the subcutaneous tissue, and the donor site was closed using a V-to-Y flap technique. The flaps were sutured medially and anchored superiorly to the base of the penis, ensuring adequate coverage and aesthetic alignment.

Postoperative Care

After surgery, patients were closely monitored for complications, including wound infection, hematoma, and urinary retention. Pain management was optimized, and patients were encouraged to mobilize as early as possible to prevent complications related to immobility. Follow-up visits were scheduled to assess wound healing, detect potential complications, and evaluate the functional outcomes of the surgery, especially regarding urinary and abdominal function.

Data Collection and Analysis

Data was collected from the hospital's medical records and included demographic details, surgical details, and postoperative outcomes. The outcomes measured were:

1. Surgical complications (e.g., wound infection, dehiscence, hernia formation)
2. Duration of surgery and hospital stay
3. Postoperative functional outcomes (urinary continence, abdominal wall stability)
4. Cosmetic results and patient satisfaction.

Descriptive statistical analysis was performed to summarize patient demographics, surgical outcomes, and complications. Data were presented as frequencies, percentages, and mean values with standard deviations. The results were analyzed to identify trends and potential correlations between surgical techniques and postoperative outcomes.

RESULTS

Table 1 shows the profile of 20 patients who underwent abdominal wall closure for untreated bladder exstrophy in a tertiary hospital in India. The data includes the age at presentation, postoperative

follow-up period, complications, and any secondary procedures required. The age at presentation varied from 18 to 44 years, with a majority of patients in their twenties and thirties. The postoperative follow-up period ranged from 3 to 14 months. In terms of complications, there were cases of wound infection (3 patients), necrosis of skin flaps (2 patients), minimal suture line dehiscence (2 patients), and marginal necrosis of the T-junction (1 patient). Secondary procedures included debridement (3 patients), rectus muscle flap creation (2 patients), and secondary suturing (2 patients). Most patients did not experience complications and did not require any additional procedures.

Table 1: Profile of patients included in this study

Age at presentation (years)	Postoperative follow up period (months)	Complications	Secondary procedures, if needed
19	5	Minimal suture line dehiscence	None
35	6	Wound infection	Debridement
22	12	None	None
40	8	None	None
30	7	Necrosis of skin flap	Debridement and rectus muscle flap
25	3	None	None
33	9	Minimal suture line dehiscence	None
18	4	None	None
28	6	None	None
34	10	Wound infection	Debridement
44	5	None	Secondary suturing
27	8	Wound infection	Debridement
23	14	None	None
32	7	None	None
20	11	None	None
24	3	None	None
41	6	Marginal necrosis of T junction	Secondary suturing
26	10	Necrosis of skin flap	Debridement and rectus muscle flap
29	9	None	None
37	5	None	None

DISCUSSION

Bladder exstrophy, a complex congenital anomaly, presents unique challenges when left untreated into adulthood. This study aimed to assess the outcomes of abdominal wall closure in 20 adult patients with untreated bladder exstrophy, highlighting complications, secondary procedures, and postoperative care. The findings demonstrate that despite the complexity of the condition, surgical closure remains an effective approach when carefully managed.

The study revealed that complications such as wound infection and skin flap necrosis were observed in several patients. These findings are consistent with other studies, which also report high incidences of complications like infections and flap necrosis, particularly in adult exstrophy cases.[11] This emphasizes the importance of meticulous planning and technique during surgery, particularly in ensuring adequate blood supply and minimizing tension on the abdominal wall.

A significant observation was the need for secondary procedures in a subset of patients. Wound debridement and rectus muscle flap creation were necessary for some patients who experienced complications like necrosis or infection.[12] These procedures are vital in managing large tissue defects, and similar interventions have been suggested in other studies as a standard approach when primary closure fails or complications arise.[13]

Postoperative care is crucial in these patients, as complications may develop even after an initially successful procedure. In this study, patients were followed up for a period ranging from 3 to 14 months, and long-term follow-up was critical in detecting complications like marginal necrosis and the need for secondary suturing.[14] This aligns with other literature, which underscores the importance of extended postoperative monitoring for detecting issues that may not be immediately apparent after surgery.[15]

While the incidence of complications was notable, the majority of patients did not require any secondary procedures, supporting the idea that with proper surgical technique and patient selection, favorable outcomes can be achieved. This is consistent with previous research that has shown that while bladder exstrophy closure in adults is technically challenging, positive outcomes can be achieved with careful surgical management.[16]

CONCLUSION

In conclusion, this study reinforces the complexity of managing untreated bladder exstrophy in adults but also highlights the success of abdominal wall closure when appropriate techniques are employed. The

outcomes from this study stress the importance of individualizing the surgical approach and ensuring long-term follow-up to monitor for potential complications.

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