

Abdominal Wall Reconstruction with Polypropylene-mesh (PROLENE™) in Exstrophy of Bladder - An Interim Report.

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Abstract: Bladder exstrophy is a serious malformation of lower abdominal wall with pubic diastasis and lateralized rectus muscle that causes difficulty in abdominal wall closure. Our aim was to evolve an easier method for abdominal wall closure without osteotomy. From January 2010 to August 2012, we managed 4 cases of exstrophy bladder and one cloacal exstrophy in whom abdominal closure was done with a Prolene™ mesh without pubic approximation. Of the five cases treated, none had any complication in short term follow up. One case returned for second stage of surgery had no perioperative issues. We could achieve a tension-free closure of the anterior abdominal wall defect using our technique without any complication.

INTRODUCTION

Over the last 200 years, exstrophy of bladder has undergone a transition from a primarily non-surgically treated disease to a disease treated by urinary diversion or staged repair and now, primary total neonatal reconstruction. But still it is challenging that the abdominal defect closed primarily may dehiscence as the pubic symphysis is widely distracted and the rectus muscles are lateralized¹. In cases of 'anterior abdominal wall defect' like omphalocele and gastroschisis one-stage closure is frequently impossible and for which various plastic surgery technique and sialstic silo closure is described. We report our experience with synthetic mesh-closure of abdominal wall defect without any osteotomy in exstrophy bladder patients.

METHODS AND MATERIALS

The study group consists of classical exstrophy bladder (n=4) and cloacal exstrophy patients (n=1) who underwent surgery from January 2010 to August 2012. Patients submitted for primary turn-in stage of staged repair or total reconstruction surgery in whom the abdominal wall defect had been closed with a synthetic mesh were included in the study. Patients who already underwent bladder turn-in with or without osteotomy were excluded from the study. The pros and cons of using a mesh to repair the abdominal defect were discussed with the parents and consent was obtained for the same.

The surgical technique

The technique of primary bladder turn-in or total reconstruction was essentially the same as the standard technique². The ureteric stents were brought out lateral to the lateral border of rectus abdominis and skin margin. Suprapubic catheter was brought out cranially between the two recti (Fig. 1). Peritoneal defect, if any, was closed and the repaired bladder was thus rendered extra-peritoneal. The rectus abdominis muscle was approximated craniocaudally as much as possible with absorbable interrupted sutures. In the caudal end of the wound a triangular defect was leftover between the medial edges of rectus abdominis and diastased pubic bone. Then, the side of bladder wall was stitched [seromuscular] to the medial border of rectus abdominis on either side by interrupted absorbable sutures (Fig. 2). A custom made polypropylene mesh

matching the size of the defect was kept over the bladder and anchored with 3-0 Polypropylene stitches to the edge of the muscle and inferiorly to the pubic bone (Fig. 3). The skin and soft tissue were closed by subcuticular stitches with a suction drain in the subcutaneous plane. The drain was removed in 48-72 hours time if there were no collection or otherwise kept till the collection was less than 5ml a day. The dressing was removed on 2nd post operative day and after that local cleansing and antibiotic ointment application was done daily till the stents and catheters were removed. Epidural analgesia and oral paracetamol were used for postoperative analgesia. Patients were made ambulatory from 3rd post operative day and no traction or immobilization dressings were applied during the care. A cystogram was done on the 14th day and the ureteral stents were removed if there was no leak. The suprapubic catheter and urethral catheter if kept were removed after 2-3 days. Complications like seroma, infection, dehiscence, extrusion, incisional hernia and the need of mesh removal were noted. The duration of drain stay and collection volume were observed. Any difficulties observed during the redo surgery were noted. Second stage of reconstructive surgery was done via the previous scar and the mesh was divided in the midline and dissected from bladder wall for about a centimeter and then the bladder was opened in the midline (Fig. 4).

RESULTS

The total number of patients submitted for mesh repair was 5, of which 3 were classical bladder exstrophy submitted for primary turn-in and one each were total reconstruction of classical bladder exstrophy and cloacal exstrophy. Of the 5 cases studied 4 were male with median age of 3 years. Two patients were late presenting exstrophy referred from another country. No complication such as seroma, prolonged drainage, delayed healing, fistula formation or need for mesh removal were encountered. The wound healed well in all the 5 patients including the total reconstruction of a cloacal exstrophy in a preterm newborn baby. In this short follow up one case was submitted for second stage operation and there was no intraoperative difficulty in identifying the mesh and the bladder. The mesh could be dissected from the bladder surface and we could suture back after the procedure without difficulty. There was no undue bleeding during the procedure.

DISCUSSION

Bladder exstrophy is an embryologic malformation that results in complex deficiency of the anterior midline, with urogenital and skeletal

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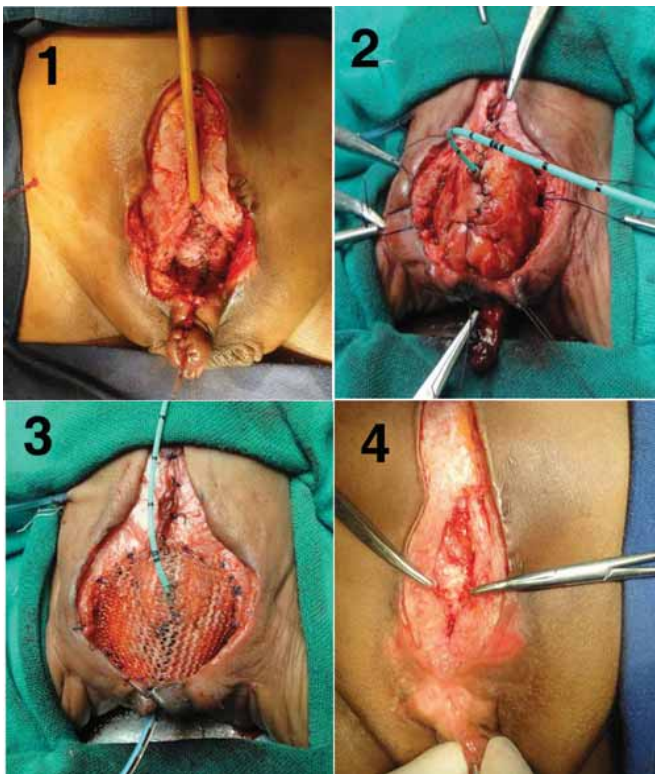


Figure 1-4: The technique of Mesh Repair of bladder exstrophy. (1) Bladder turn-in with stents in situ; (2) Urinary bladder stitched to the medial border of rectus abdominis on either side; (3) Polypropylene mesh matching the size of the defect anchored to the edge of the muscle and the pubic bone; (4) Second stage of surgery done via the previous scar showing the mesh being dissected from bladder wall

problems. The main purpose of early surgery is to secure abdominal wall for achieving bladder closure, which subsequently leads to urinary continence and preservation of renal function. Reconstruction methods have always looked for easier symphyseal approximation, abdominal wall closure, placement of the entire bladder deep into the pelvis and re-approximation of the pelvic floor towards the midline. Wide pubis prevents approximating the lateralized rectus muscle; primary closure even if possible occurs under considerable tension, which may eventually lead to dehiscence and fistula formation^{3,4}.

Various methods have been described for abdominal wall reconstruction using the bilateral rectus abdominis muscles¹, local rotation flaps, myocutaneous flap and skin grafting⁵. Synthetic Marlex™ mesh and silo closure is also described for abdominal wall defects⁶. The use of a rectus abdominis myocutaneous flap for closing exstrophy is more complex than the tensor fascia lata flap^{3,5}. Rectus fascial flaps have been used in abdominal repair because lack of support predisposes the bladder to reopening as well as fistula formation⁷. Marlex mesh [poly ethylene] and Teflon mesh are expensive and not always easily available. We have used poly propylene [Prolene™] mesh which is cheap and readily available in most of the centers. If a silastic “silo” staged repair is done to close the abdominal wall in neonates with exomphalos, excessive scarring occurs and later redo surgery becomes difficult and time-consuming⁸. Hence, this procedure is also not advisable for abdominal wall closure in exstrophy cases. Urinary diversion and utilization of the vesical plate muscular coat for supporting the anterior abdominal wall is a reliable method for abdominal reconstruction⁹ but it loses the native bladder and is no more a recommended surgery. Tissue

expanders have been used for closure of abdominal wall defect by gradual inflation of the tissue expander and then muscle flaps are rotated inferiorly with intact blood supply at the time of bladder closure. This flap improves the appearance of the abdominal wall and reduces scarring⁸. This is once again staged procedure and the inflatable balloon has its own complications like erosions apart from the cost factor.

The main role of osteotomy in the surgical management of exstrophy is to relax tension on the bladder and the repaired abdominal wall and to enhance wound-healing. Osteotomy has gained importance in the prevention of uterine prolapse and the overall functional outcome. Despite osteotomy the symphysis can reopen and influence the reconstructive surgery of pelvic soft tissue¹⁰. The size of pubic diastasis increases steadily with age from a mean value of 4 cm at birth to a mean of 8 cm at the age of 10, compared with a mean normal width of the pubic symphysis of 0.6 cm at all ages¹¹. Hence, repair of abdominal wall defect in late-presenting case is a formidable task and it should not be relegated to an occasional exstrophy surgeon. In the past, osteotomy was routinely done in neonates operated after 37 hours of birth and immobilization with a ‘frog-leg’ plaster-cast or ‘mermaid’ dressings were used¹². Untreated or failed exstrophy closure in adults is not rare in underdeveloped parts of world for various socio-economic reasons. In such late-presenting adulthood exstrophy patients the large defect in the abdominal wall with tough, fibrous and inelastic margins causes mechanical alterations and, not closing the pubic bone by osteotomy may predispose the patients to rectal prolapse, anal incontinence, and occasionally uterine prolapse¹³. Additionally, there is ongoing debate whether osteotomy may cause or prevent orthopedic long-term outcome problems. By our mesh repair technique, we were able to close the abdominal wall in late-presenting cases with ease without the need for osteotomy. Complete repair of bladder exstrophy in the newborn period requires experience, appropriate pelvic and patient immobilization, and excellent postoperative care. While earlier reports of this procedure seem encouraging, complications are real and difficult to manage, even in experienced hands¹⁴. In one of our cloacal exstrophy case after total reconstruction with mesh repair, the wound healed well with no need for osteotomy or immobilization. The abdominal-wall defect in exstrophy bladder is often large and accompanied by a wide detachment of the pubic bone. We recommend prolene mesh closure as an easy and feasible technique in such cases.

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