Mesh Hood Fascial Closure in Renal Allograft Compartment Syndrome in Pediatric Transplantation

Sajni I. Khemchandani

Institute of Kidney Diseases and Research Center, Dr HL Trivedi ITS, Civil Hospital Campus, Ahmedabad, Gujarat, India.

Correspondence Author:
Sajni I, Khemchandani, MD
401, Sudarshan Flats, 13, Shantinagar Society, Usmanpura, Ahmedabad- 380 013, Gujarat, India.

Tel: +91 9426 520 112
Fax: +91 79 2764 0095
E-mail: dr_sajni@rediffmail.com

Received December 2011
Accepted April 2012

Keywords: child; kidney transplantation; surgical mesh; herniorrhaphy; fascia.

INTRODUCTION

Donor recipient organ size disparity remains a major obstacle in pediatric renal transplantation. Successful closure of the anterior abdominal wall in children following renal transplantation of adult organs may present as a challenging dilemma to transplant surgeons.[1] Renal Allograft Compartment Syndrome (RACS) is an under-appreciated and poorly described surgical complication of renal transplantation.[2] It occurs when a tight fascial closure compresses the graft in its limited retroperitoneal space leading to graft ischemia and resultant early renal allograft dysfunction.[2,3] Early renal allograft dysfunction may be caused by a number of technical factors including thrombosis, kinking of vessels, and a Page kidney situation in which allograft is compressed within a shallow false pelvis and limited retroperitoneal space.[4] The successful treatment requires a high index of suspicion, prompt recognition and early surgical decompression. To facilitate closure of the abdominal wall in these cases, a tension free technique using a polypropylene mesh is described. Mesh hood fascial closure (MHFC) was performed in two children, primarily to prevent graft loss due to RACS, and secondarily to treat this complication and avert incisional hernia.

CASE 1

A 13 years old male child weighing 23 kg received living related renal donor graft from father weighing 64 kg at our institute. Vascular anastomosis was done using right common iliac vessels. Brisk diuresis was established on release of clamps. Stented ureteric reimplantation was done by Lich's method.The wound closure was done by approximating all muscles with interrupted absorbable sutures. But because of large kidney; fascial closure was under excessive

Figure . Wound closure using polypropylene mesh.

tension leading to compression of the graft and anuria. The wound was reopened; kidney was soft and hypo-perfused with diminished renal artery pulsations. We tried to reposition it in optimal position within iliac fossa to avoid kinking of renal artery, but again on fascial closure child developed anuria.

Hence wound closure was carried out using a large ellipsoid of polypropylene mesh which was draped loosely and without tension over the graft. The mesh was attached to edges of external oblique aponeurosis using continuous 1-0 polypropylene sutures, closed suction drain was placed in the retroperitoneal space lateral to the kidney. Skin closure was then completed. Although child had acute tubular necrosis in immediate postoperative period, graft function was established and he was discharged with serum creatinine of 0.8 mg/dL. At six months follow up, serum creatinine was stable.

CASE 2

This 9 years old female child, weighing 26 kg with end stage renal disease (ESRD) underwent live related donor transplantation from mother, weighing 62 kg. Vascular anastomosis was done using proximal external iliac vessels. Brisk diuresis occurred on release of clamps, stented ureteric reimplantation was done by Lich's method. Since wound closure was under excessive tension, releasing incision over rectus sheath was kept and wound was closed. On third post operative day, child developed graft dysfunction function and severe edema of right lower limb. Doppler ultrasound showed increased resistive index (RI) and decreased flow in renal, external iliac and femoral veins. Hence the child was re-explored and renal graft was found to be dusky, soft with decreased turgidity. The repositioning and release of pressure over the graft lead to return of color and turgidity. Hence, the wound was closed by approximation of subcutaneous tissue and skin only, the external oblique sheath and muscles were left open. Post-operative color-Doppler study showed normalization of the flow and RI with restoration of renal function. On 12th post-operative day, J-J stent was removed and fascial closure was done by loosely suturing polypropylene mesh to the external oblique aponeurosis edges with continuous 1-0 polypropylene suture to avoid RACS and incisional hernia (Figure).The skin closure was done without using subcutaneous drain. The child was discharged with serum creatinine of 0.58 mg/dL without any wound infection. Serum creatinine was 0.8 mg/dL at six months of follow up.

DISCUSSION

RACS is an under-reported and poorly described surgical complication of renal transplantation.[2] Early renal allograft dysfunction may be caused by a number of technical factors including thrombosis, kinking of vessels, and a Page kidney situation in which allograft is compressed within a shallow false pelvis and limited retroperitoneal space. It occurs when a tight fascial closure compresses the graft in its limited retroperitoneal space leading to possible compartment syndrome and graft ischemia and resultant early renal allograft dysfunction.[2,3,4] The renal allograft experiences further potential insult after wound closure: ureteral kinking and obstruction, vascular kinking and obstruction. It should be suspected when patient displays rapid deterioration of graft function after good initial function.[5] The causes of RACS are otherwise poorly described, although the implantation of a relatively large renal allograft into a limited retroperitoneal space, especially in a pediatric recipient may represent a classical scenario and may be contributing factor to the higher rates of vascular thrombosis in pediatric transplantation.[4] Patients at risk for RACS may include recipients with significant weight discrepancy in relation to their donors. In Beasley and colleagues series mean recipient weight was 17% less

than donor's weight, in our patients recipient's weight was 60% less than donor's weight.

RACS may be prevented by positioning the allograft deeper into the abdominal cavity by choosing vessels proximal to the external iliac vessels for anastomosis. In our first child although common iliac vessels were used for anastomosis, we were not able to close the wound, hence polypropylene mesh was used for wound closure. Treatment options for post-transplantation RACS include:

1. Intraperitoneal reallocation of graft and wound closure.
2. Subcutaneous placement of graft with delayed secondary repair of hernia.
3. Creation of a relaxing incision of the external and internal oblique fascia.
4. Mesh closure:

a: The porcine dermal collagen graft,

b: The mesh hood fascial closure using polypropylene mesh as described by Beasley and colleagues and Nguan and colleagues.[2,4]

5. Wound closure using Vicryl mesh.

In our second patient, although relaxing incision of external and internal oblique fascia was kept, child still developed RACS in post-operative period. Probably the compression over the graft was exacerbated in postoperative period by edema leading to precipitation of RACS. Hence urgent fasciotomy was done and graft was placed subcutaneously as suggested by Ball and colleagues.[3] Once allograft function established, secondary MHFC was done to prevent incisional hernia.[5]

The surgical view states that the implantation of permanent synthetic material such as polypropylene mesh in the setting of genitourinary system may predispose to the development of wound infection.[3] In our experience, the use of polypropylene mesh in wound closure allowed proper placement of the allograft in the retroperitoneal space, avoiding excessive compression of kidney as in RACS. We also think that this tension-free surgical technique should be primary application if fascial closure is under considerable tension to avoid RACS and incisional hernia.

We conclude that mesh hood fascial closure can be safely performed after size mismatched kidney transplantation to prevent or treat RACS. It is easy to perform, is associated with minimal morbidity and does not preclude Doppler/ Ultrasound evaluation of the graft.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Richards SK, Lear PA Huskissan L, Saleen MA, Morgan JD. Porcine dermal collagen graft in pediatric renal transplantation. Pediatr Transplant. 2005;9:627-9
2. Beasley K A, McAlister VC, Luke PPW. Mesh hood fascial closure in renal allograft compartment syndrome. Transplant Proc. 2003;35:2418-9.
3. Ball CG, Kirkpatrick AW, Yilmaz S, Monroy M, Nicolaou S, Salazar A. Renal Allograft Compartment Syndrome an underappreciated post-operative complication. Am J Surg. 2006;191:619-24.
4. Nguan CYC, Beasley KA. McAlister VC, Luke PPW. Treatment of renal transplant complications with a mesh hood fascial closure technique. Am J Surg. 2007;193:119-21.
5. Maione C, Gambino G, Di Bona A, et al. PTFE mesh in renal allograft compartment syndrome. Transplant Proc. 2006;38:1049-50.