

ORIGINAL ARTICLE

Use of autologous platelet rich fibrin in urethracutaneous fistula repair: preliminary report

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Urethrocutaneous fistula; Hypospadias; Platelet rich fibrin; Wound healing

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E-mail: soyer.tutku@gmail.comSoyer T, Çakmak M, Aslan MK, Şenyücel MF, Kısa Ü. Use of autologous platelet rich fibrin in urethracutaneous fistula repair: preliminary report. *Int Wound J* 2013; 10:345–347**Abstract**

Urethrocutaneous fistula (UCF) is one of the most common complications occurring after hypospadias repair. Despite the surgical advancement in hypospadias, multiple failed fistula closures are commonly referred to paediatric urologists. Although several techniques have been described to interpose a waterproof layer between urethral and skin closures, occurrence of urethrocutaneous fistula cannot be eliminated completely. In addition to several local tissue grafts, autologous and homologous fibrin sealants are used to prevent UCF. Platelet rich fibrin (PRF) is known as an autologous source of growth factors obtained from the sera of the patient. PRF supports collagen synthesis and tissue repair and accelerates wound healing. We aimed to present our initial experience about the use of autologous PRF in a 3-year-old boy with a UCF after hypospadias repair.

Introduction

Urethrocutaneous fistula (UCF) is one of the most common complications after hypospadias repair with a varying incidence of 4–20% (1). Recurrence of UCF can be attributed to several factors including urethral obstruction, diverticulum, postoperative infection and poor vascularised tissue (2). The success of UCF repair depends on basic principles such as correction of distal urethral obstruction, tension-free anastomosis, closure with absorbable suture material, covering the urethral repair with a well-vascularised tissue and interposing a waterproofing layer between urethral and skin closures (3). Despite the advance in surgical repair of hypospadias, recurrent UCF still remains challenge.

Several techniques have been described using local penile subcutaneous tissue, tunica vaginalis, dartos, fascia lata or extragenital tissues including bladder mucosa and free skin grafts to prevent recurrent UCFs (4–7). Different from these tissue flaps fibrin sealants were proposed as new biomaterials to prevent fistula formation by promoting both wound healing and suture line supporting. Gopal et al. found that fibrin glue can be used to minimise the incidence of fistula formation. However, they suggest that it does not eliminate the risk of UCF formation (8). Thereafter, Kajbafzadeh et al. was proposed the use of single-donor fibrin sealant for UCF repair (9).

Key Messages

- despite the advance in surgical repair of hypospadias, recurrent UCF still remains a challenge
- different from tissue flaps, fibrin sealants were proposed as new biomaterials to prevent fistula formation by promoting both wound healing and suture line supporting
- platelet rich fibrin (PRF) is a new generation of platelet concentrate
- PRF supports collagen synthesis and tissue repair and accelerates wound healing
- it can be used for all types of healing in superficial cutaneous and mucous tissues
- although, PRF has been used commonly in oral and reconstructive surgery; it has not been used in hypospadias surgery
- our aim was to present our initial experience with the use of PRF in UCF repair
- a 3-year-old boy who underwent Snodgrass repair for coronal hypospadias was admitted to our department with a history of recurrent urethro cutaneous fistula
- fibrin sealants can be prepared either form a large pool of plasma or from single-donor plasma

- the use of autologous blood as a source of fibrin reduces the risk of infections, allergic reactions and bleeding
- through this case report, we can claim that it is technically possible to use PRF in UCF repair
- further experimental studies and large series of clinical trials are required to confirm our suggestions
- we suggest that PRF can be used as a novel alternative in UCF repair and can be used adjunct to other fistula preventing manoeuvres

Platelet rich fibrin (PRF) is a new generation of platelet concentrate. It is an autologous source of growth factors obtained from the sera of the patient (10). PRF supports collagen synthesis and tissue repair and accelerates wound healing (11). It was firstly described by Choukroun *et al.*, with a simplified process without biochemical blood handling (10). PRF permits rapid angiogenesis and easier remodelling of fibrin in more resistant tissues. Therefore, it can be used for all types of healing in superficial cutaneous and mucous tissues (10). Although, PRF has been used commonly in oral and reconstructive surgery; it has not been used in hypospadias surgery. We aimed to present our initial experience with the use of PRF in UCF repair.

Case report

A 3-year-old boy who underwent Snodgrass repair for coronal hypospadias was admitted to our department with a history of recurrent urethrocutaneous fistula. The patient was reserved for autologous PRF application during fistula repair. The fistula was 3×3 mm in diameter with coronal localisation. After obtaining informed consent from the parents, two layer fistula repair was performed under general anaesthesia.

Protocol for PRF

A PRF preparation requires a bench top centrifuge and 24 G butterfly needle with a 9-ml sterile blood collecting tube. In the operating room, after the anaesthetic induction, blood sample was obtained from the patient. The whole blood is collected into a sterile dry tube without an anticoagulant. Then, it is immediately centrifuged (Hettich Rotanta 46R, Germany) for 10 minutes with approximately 400 g in the operating room. Although, original description of preparation consists 9 ml of blood, we obtained adequate PRF from 5 ml blood, which can be easily obtained from small children.

After centrifugation, three layers were obtained from the serum. These layers were; red layer consists of red blood cells, upper most layers consist of plasma without cells and middle layer consists of PRF (Figure 1). The centrifuged sera were handled in sterile fashion on operating table and the middle layer, PRF, was collected. A 1×1 cm PRF was picked and placed on two layered urethral repair (Figure 2). Thereafter, wound was closed with 5/0 polyglactin interrupted sutures. Urethral catheter was not used.

The patient has no voiding problems after fistula repair and discharged from the hospital after an uneventful 2 days period.

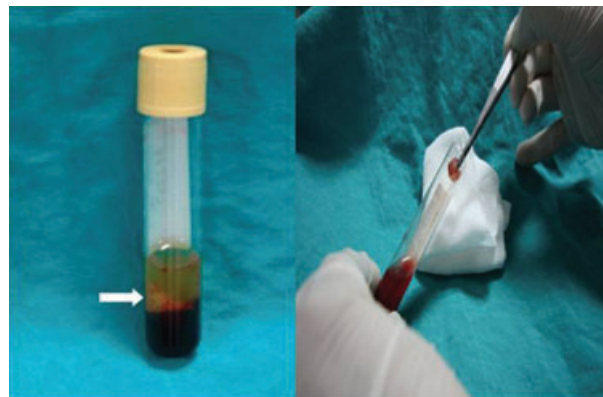


Figure 1 Preparation of platelet rich fibrin (PRF). After centrifugation, three layers were obtained; red layer consists of red blood cells, upper most layers consist of plasma without cells and middle layer consists of PRP (arrow).

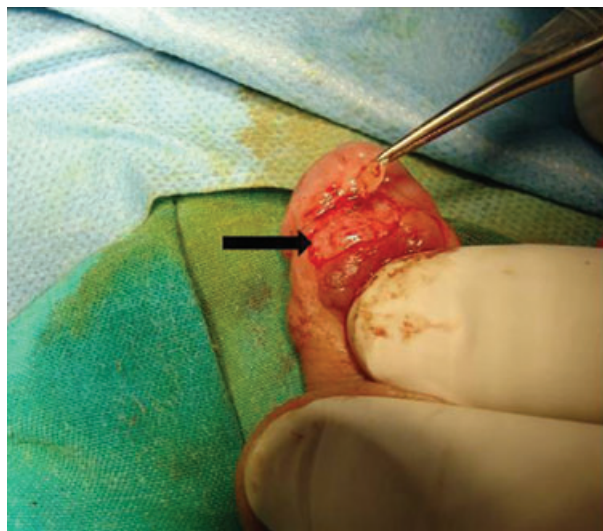


Figure 2 Platelet rich fibrin (PRF) was placed on two layered urethral repair (arrow).

During the control visits, (1st and 3rd postoperative months) no urethral fistula was detected.

Discussion

Despite different surgical manoeuvres, delicate tissue handling, fine suture material, formation of fistula after hypospadias repair remains the most common complication. Several local flaps and extragenital tissue grafts were used to interpose a waterproof layer between urethral and skin closures (4–7). Excessive scar formation and compromised blood supply of adjacent tissues limit the use of local flaps and necessitates the use of other supporting tissues with better wound healing features (9). Moreover, autologous or homologous fibrin materials are also used to provide a supporting layer over urethral repair.

Fibrin sealants have been used in many surgical procedures as a topical agent for haemostasis and adhesive

in tissue approximation (12). Fibrin glue is a manufactured biodegradable material which promotes angiogenesis, local tissue growth and repair (8). Kinahan and Johnson initially reported the use of fibrin sealant in hypospadias surgery (13). Then, Ambriz-Gonzales et al. suggest that UCF after hypospadias repair can be reduced by applying fibrin sealant over the suture line (14). However, the largest series of Gopal et al. showed that fibrin glue can be used to minimise the incidence of fistula formation but not eliminate the risk of recurrence (8).

Fibrin sealants can be prepared either from a large pool of plasma or from a single-donor plasma donations. Commercially available sealants are extracted from pool of plasma and associated with possible risk of transmission of blood borne diseases (9). Other concerns about these sealants include allergic reactions and bleeding. The use of autologous blood as a source of fibrin reduces the risk of infections, allergic reactions and bleeding. Kajbafzadeh et al. proposed the use of single-donor fibrin sealant for UCF repair (9). In their study, they obtained fibrin sealant from single donor with a series of procedures including; cryoprecipitation, centrifugation and incubation. None of their patients showed urethral stricture or fistula formation.

In this case, we use PRF as a supporting material for UCF repair. PRF is a new generation of platelet concentrate, promoting angiogenesis and wound healing. It contributes the immune response to injury and act as an autologous source of growth factors. PRF stimulates proliferation of normal human dermal fibroblasts and their collagen biosynthetic ability (15). Fibrin gel consists of growth factors such as fibroblast growth factor-basic (FGF-b), vascular endothelial growth factor (VEGF) and platelet-derived growth factor (PDGF) (10). Also, fibrin matrix guides the coverage of injured tissues and affecting the metabolism of epithelial cells and fibroblasts (10). PRF was initially reported by Choukroun et al. and has been used in several oral and reconstructive surgical procedures (10). PRF has several advantages over other fibrin sealants. It is simple to prepare and does not require biochemical blood handling (10). It is completely obtained from the patient's own sera and prepared during the operation with a simple centrifuge. Therefore, risk of infection, allergic reactions and harm of high fibrinogen concentration are eliminated. It has no cost. Five milliliters of blood sample is appropriate to obtain adequate amount of fibrin. We present the first case of use of PRF in UCF repair. We found that use of PRF is easy to obtain and simple to perform. We can suggest that PRF can be used as a supporting tissue in UCF surgery and may improve the success of repair by promoting wound healing, angiogenesis and tissue repair. By the help of this case report, we can only claim that it is technically possible to

use PRF in UCF repair. Further experimental studies and large series of clinical trials are required to confirm our suggestions.

In conclusion, PRF is an autologous source of growth factors which can simply be obtained from the sera of the patient. We suggest that PRF can be used as a novel alternative in UCF repair and can be used adjunct to other fistula preventing manoeuvres.

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