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EDITORIAL

Tissue interposition in hypospadias repair: A mechanical barrier or healing promoter?

Introduction

Urethrocutaneous fistula (UCF) is an inherent, most common and a challenging complication of hypospadias repair. Although hypospadias repair techniques are numerous and varied, from simple to complex and demanding, none is immune from fistula formation [1]. The first step to avoid UCF formation after hypospadias repair is to understand how fistula occurs. Several factors have been suggested in published articles, but the most important causes can be summarised and categorised into the following groups.

Mechanical impairment of healing

Healing of the suture line of the neourethra can be hampered by: (i) Epithelial eversion between the edges of the neourethra; (ii) increased intraurethral pressure, due to meatal stenosis or obstructed catheter, causing disruption of suture line, urine leakage and fistula.

Humoral impairment of healing

- (i) Preoperative testosterone therapy for penile enlargement of micropenis has a detrimental effect on the healing potential of the neourethra; it delays healing and increases inflammation. Consequently, the incidence of UCF and wound dehiscence increases. Thus, hypospadias repair should be postponed for 3–6 months after stopping androgen treatment [2].
- (ii) Ischaemia and subsequent delayed healing and fistula is a common problem in hypospadias surgery. Ischaemic changes can occur due to several factors; primary deficiency of adequate blood supply in hypospadiac penile

skin, excessive dissection, aggressive tissue manipulation, prolonged tourniquet around penile base, massive oedema, pressure effect of haematoma and tight dressing. Usually in recurrent hypospadias the blood supply is relatively deficient [1].

Is tubularisation of a flat flap or plate an ischaemic manoeuvre?

Dissection and suturing of the borders of the urethral plate or other types of pedicled flaps relatively decreases blood supply to the edges of the flaps. Tubularisation of the flap can also cause relative ischaemia at the edges due to stretching and curving of microvessels in the subepithelial layer, thus slowing blood flow [3]. In 1842, when Dieffenbach [4] denuded the borders of the urethral gutter (plate) without dissection and tubularised it around a cannula, the tubularised plate broke down. In 1874, Duplay [5] dissected the edges of the urethral groove and first tubularised the urethral plate; however, this operation failed four times and surprisingly his first success was achieved after a fifth re-operation. Obviously this was not due to a better blood supply to the edges, but to improvement of his surgical skills and tissue manipulation. Thus, successful healing of the tubularised plate or flap is the end result of the perfection of all technical steps. The same rule is applicable to the tubularised incised plate (TIP) repair of hypospadias. After TIP repair fistula was reported in up to 17% of cases [6]. Surgeons have long been aware of supporting the neourethra by a dartos fascial covering. However, there are heterogeneous and conflicting data about the superiority of double over single dartos coverings; some reports concluded that a double-dartos covering is more prophylactic against UCF, whilst others did not [7–9]. However, all the published articles on this subject lack Level of Evidence 1 and 2 and none of them is a prospective controlled study; moreover, some of them have defects in study design [7]. There is only one prospective randomised trial but

Abbreviations: UCF, urethrocutaneous fistula; TIP, tubularised incised-plate.

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without a control group (without dartos interposition); this study indicated that there was no difference in prophylactic effect of single and double dartos covering against UCF formation [10]. In this respect several factors should be considered when appropriate inclusion and exclusion criteria are devised for a prospective randomised and controlled study; the type of hypospadias, preoperative androgen therapy, circumcision and previous trials of repair, method of intraoperative haemostasis and, most importantly, how the dartos flap is dissected and obtained.

Dartos thickness or dartos vascularity?

Dissection of the dartos flap under temporary ischaemia using adrenaline infiltration or a tourniquet applied around the skin of the penile base might lead to inadvertent destruction of the dartos vasculature. Thus, a part of the dartos fascia of maximum vascularity should be obtained before applying temporary ischaemic manoeuvres. Recently, Canning and his group at the Children's Hospital of Philadelphia advocated antegrade dissection of the dartos pedicle to better preserve the vasculature of the dartos fascia for covering the TIP repair, as well as for better vascular supply of the attached preputial flap for onlay hypospadias repair. The predominant arteries can be identified by transillumination and followed distally to preserve their fine branches therefore the maximum fascial vascularity is preserved [11]. Unification of all these factors in a well-designed prospective randomised and controlled study on sufficiently many patients followed for an optimal period could give a solid and evidence-based answer as to whether multilayered dartos interposition is superior to a single layer or not.

Why does the interposition of tunica vaginalis give excellent fistula prevention and fistula repair when other tissues fail?

Tunica vaginalis has a generous blood supply. It provides excellent results in the treatment of recurrent and/or multiple fistulae after hypospadias repair, confirming the powerful healing potential of tunica vaginalis [12]. Moreover, some authors prefer to cover the neourethra with a tunica vaginalis flap when the TIP technique is used as the primary repair for proximal hypospadias, where the fistula rate is higher, benefiting from its power to augment and promote the healing process [13]. However, this might be considered as 'overkill'; why disturb the testis and spermatic cord to harvest the tunica vaginalis flap? Tunica vaginalis should be preserved for complicated cases in which there is a paucity of well-vascularised dartos flaps. Nevertheless, it should be clear that the technical skills and 'tricks' of hypospadias repair are the cornerstone of a successful repair

and prophylactic against complications. Although interposition of vascularised tissue to cover the repair promotes healing, it does not give protection or compensates for technical defects in hypospadias repair.

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Adel Elbakry
Department of Urology,
Suez Canal University, Ismailia, Egypt
E-mail address: aelbakry1@yahoo.com

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