Review Article

Plastic Surgical Techniques in the Repair of Vesicovaginal Fistulas: A Review

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Abstract: A variety of plastic surgical techniques may be used in the repair of vesicovaginal fistulas. The indication for their use include: (a) diameter greater than 4 cm; (b) involvement of the bladder neck/proximal urethra; (c) radiation-induced fistulas; and (d) previous failed repair(s). In the developing world the vast majority of complex fistulas are caused by obstetric trauma; elsewhere they occur mainly following radiotherapy or radical surgery for gynecologic malignancy. The majority of complex fistulas requiring tissue donation may be effectively treated using a vaginal approach and a modified Martius graft. There is probably little or no advantage in incorporating bulbocavernous muscle fibers in this graft. Although some concern exists regarding the long-term viability of these grafts in radiation-induced fistulas, in view of the relatively simple operative technique, together with the low associated morbidity, modified Martius grafts may be deemed suitable for first-time repairs. The gracilis muscle graft should be considered next in cases of exclusive transvaginal repair. The omental graft is undoubtedly the most versatile: it can be used in both abdominal and combined abdominovaginal procedures. The recently described posterosuperior sliding bladder flaps warrant further evaluation. For most fistulas involving the bladder neck/proximal urethra, there is no clear advantage in bladder flap reconstruction over vaginal flap reconstruction, the latter being augmented by an anti-stress incontinence procedure were appropriate. When continent urinary diversion is required, the Indiana pouch appears preferable to the Kock pouch; ureterosigmoidostomy is, however, technically and culturally more acceptable in these circumstances in the developing world.

Keywords: Surgical flaps; Surgical grafts; Vesicovaginal fistulas; Urinary incontinence

Introduction

A variety of plastic surgical techniques may be used in the treatment of vesicovaginal fistulas. The indications for their use include: (a) diameter greater than 4 cm; (b) involvement of the bladder neck/proximal urethra; (c) radiation-induced fistulas; and (d) previous failed repair(s). In the developing world the vast majority of complex vesicovaginal fistulas are caused by obstetric trauma; elsewhere they occur mainly following radiotherapy or radical surgery for gynecologic malignancy. These fistulas present a considerable challenge to both gynecologists and urologists alike. Simple repair by tissue approximation is often impossible, due to the extent of tissue destruction and cicatrization; even if possible, such repairs are doomed to failure because of devascularization. The following review attempts to summarize the various plastic surgical techniques that may be employed in the repair of such fistulas.

Labial Grafts

In 1834, Jobert de Lamballe succeeded in closing a small number of vesicovaginal fistulas using pedicled labial skin flaps; he termed this innovative technique ‘autoplastie vaginale par la méthode indienne’ [1]. Later he developed a second technique, ‘autoplastie par glisse-
ment ou locomotion', which involved dissecting the bladder from the cervix and vagina with the additional use of curved relaxing incisions in the vagina to facilitate mobilization and low-tension closure of tissue planes [1]. Although Noble in 1901 reported the use of labial grafting in neourethral construction, it was not until after 1928 that tissue grafting became accepted as an integral part of the surgical repertoire of fistula repair [2].

In 1928, Martius described the use of a unilateral ischiocavernosus/bulbocavernosus muscle graft in the repair of a large vesicovaginal fistula [3]. The muscles were exposed through a vestibular incision, detached from their origins, placed beneath the bladder neck and reattached to the opposite pubic ramus. The vaginal incision was then closed. Martius postulated that this muscle graft would improve continence by providing both mechanical support and adjunctive sphincteric activity to the bladder-neck region. Additional benefits of this operation included the separation of bladder/urethra and vaginal suture lines, reduction of dead space, and neovascularization [4]. Martius later modified the technique [5,6]; using a vertical incision over the labium majus, the bulbocavernosus muscle (and in certain descriptions just the overlying fibroadipose layer) was mobilized on a superior pedicle, tunnelled subcutaneously and fixed to the site of fistula repair. With large fistulas, when low-tension closure of the vagina was not possible, Martius used the graft as a tissue substitute [5,6]. Although Birkhoff et al. recommended that this type of graft should be used in the repair of all fistulas, Martius insisted that its use should be restricted to the more complicated cases [5–7].

Elkins et al. achieved an 86.5% success rate using a modified version of the Martius graft in the repair of 37 complex fistulas in 35 patients [8] (Fig. 1). Anatomical dissection of this graft is a cadaver revealed it to be composed of fibroadipose tissue from the labium majus without any bulbocavernosus muscle fibers. Vascular branches entering the graft area were traced to their origins and identified. The arterial vascular supply is from the external pudendal artery anteriorly and the internal pudendal artery posteriorly, these vessels forming a rich plexus within the graft. Symmonds had earlier postulated that this well vascularized fibroadipose layer is in fact the essential part of the transplant, and not the bulbocavernosus muscle [9]. Excluding the latter structure from the graft obviates the risk of injury to the vestibular bulb, and this most likely explains the low incidence of hemorrhage in this procedure [8]. Elkins et al. stress that the labial fibroadipose graft is an adjunctive repair technique; it does not preclude the general principles of fistula closure, i.e. layered dissection, mobilization of tissues, atraumatic technique, absolute hemostasis and low-tension closure. In addition, the graft does not provide adequate mechanical support or sphincteric activity for the bladder neck and is therefore an inadequate prophylaxis per se against postoperative stress incontinence, additional measures being indicated when necessary. Although successful closure has been achieved using this technique even in fistulas presenting many years radiotherapy, the long-term viability of these grafts is not fully known [10]. Recurrence of a radiation-induced rectovesicovaginal fistula 17 years after successful Martius grafting has been reported by Aarsten and Sindram [11].

In 1982 Leuchter et al. reported the use of a bulbocavernosus myocutaneous graft for the closure of a perineal hernia which developed after pelvic exenteration [12]. In 1984 Symmonds described two types of