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Assessment of the perfusion and morbidity of the buccal mucosal donor site for grafting of urethral strictures

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ABSTRACT

Buccal mucosal grafting has become the gold standard for reconstruction of urethral strictures. The aim of this study was to investigate donor site morbidity with a unique emphasis on objective measurements of perfusion and oxygenation.

Methods: In a prospective study 15 male patients with recurrent urethral strictures, underwent urethroplasty using an intraoral mucosal graft. Donor site was closed primarily (group 1) or left to granulation (group 2). Clinical examinations of recipient and donor sites, urograms and the modified SF-8™ health questionnaire were carried out 1, 3 and 24 weeks postoperatively. Oxygenation and perfusion parameters of the donor site were measured by the O2C (oxygen-to-see) monitoring device – a combined technique of laser Doppler flowmetry and tissue spectroscopy.

Results: No recurrence of strictures at recipient site or infections at either sites occurred. 24 weeks after operation, haemoglobin oxygenation (72.1 ± 5.9%) and deep flow (177.2 Arbitrary Units (AU)) of the donor site were slightly, but not significantly, lower compared to the contralateral unoperated buccal mucosa (haemoglobin oxygenation: 75.4 ± 5.2%, deep flow: 187.3 AU). Significant differences between the two groups of different wound healing could not be revealed.

Conclusions: Using free mucosal grafts for urethroplasty is a simple and safe method in the interdisciplinary treatment of urethral strictures. Donor site morbidity within the first 3 weeks after operation is noticeable, but tolerable measured by a validated Quality of Life-tool. Six months after the operation, perfusion and oxygenation of the former graft harvest site are equal to the contralateral unoperated mucosa.

1. Introduction

Urethral strictures are a common cause of male morbidity and open surgical urethroplasty is the method of choice. Short urethral defects can be reconstructed by excision of the damaged tissue and primary end-to-end anastamosis. Larger defects require tissue transplantation for urethral reconstruction.

In the last decade the buccal mucosal graft has emerged as the gold standard for urethral reconstruction. The donor site is easily accessible and most oral and maxillofacial surgeons possess the surgical expertise required for harvesting the graft. The technique was first described by Humby (1941). For more than five decades the technique seemed forgotten until Burger et al. (1992) and Dessanti et al. (1992) reintroduced it with their groundbreaking works. Since then numerous studies on the subject have been published. Although many studies have reported on results with buccal mucosal graft urethroplasty only a few have focused on donor site morbidity and none on donor site perfusion. Therefore the aim of this study was to investigate donor site morbidity by clinical assessment and an objective measurement of perfusion and oxygenation.

We used a cross mouth model comparing the harvest site and the unscathed contralateral site using the O2C system for assessment of perfusion. The patients were subdivided into two different groups in which the first group was treated with primary closure

Abbreviations: BM, buccal mucosa; LM, lip mucosa.

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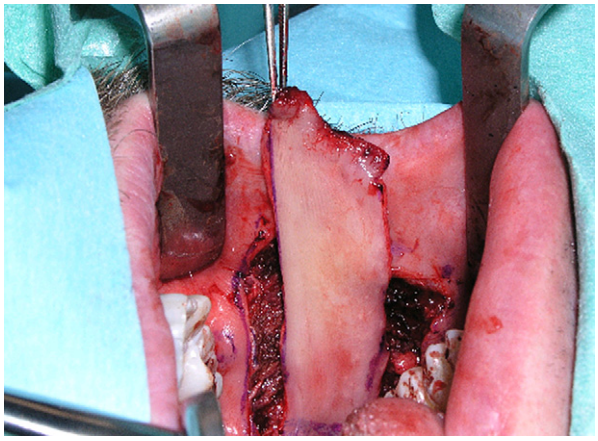

Fig. 1. Removal of the mucosal graft from the inner left cheek.

Fig. 2. O2C (oxygen-to-see) monitoring system during measurement of donor site perfusion in a patient.

after grafting and in the second group the wound was not closed because of large donor site defects. These groups were compared with the contralateral site using the O2C but also with the patients of the other group. The monitoring device has been established as a standard technique for the measurement of perfusion and oxygenation in different tissue types (Abdel-Galil and Mitchell, 2009, Beckert et al., 2004, Bürklein and Banzer, 2007).

2. Materials and methods

In a prospective study between May 2004 and August 2006, 15 patients, who suffered from recurrent urethral strictures, received a dorsal onlay buccal mucosal graft for urethral reconstruction. All operations were performed in a two-team approach. The urologist began the operation with preparing the urethral recipient region. As soon as he could estimate the defect size, the oral & maxillofacial surgeon started harvesting the buccal mucosal graft (Fig. 1). While the urologist reconstructed the urethra, the oral & maxillofacial surgeon carried on with the buccal wound closure according to the study protocol. The wound was closed completely primarily in eight cases with absorbable interrupted sutures (Vicryl 3.0) (group 1). In two cases of slightly larger defects only part of the wound was closed primarily, the remaining wound healing secondarily. These two cases were excluded from the wound healing analysis as a mixture of both protocols was present. In five cases the wound was not closed (group 2) and compared with the primarily wound closure (group 1). Follow-up examinations took place 1, 3 and 24 weeks postoperatively and were also carried out by an interdisciplinary team. Patients were asked to fill out two questionnaires. The modified SF-8™ questionnaire as a validated tool served to acquire data about the general health condition of the patients (Ware et al., 1999). The second questionnaire contained questions about oral pain, numbness and tightness of the harvest site, the ability to eat and drink and restriction of mouth opening. Additionally in the final examination perfusion and oxygenation parameters of the donor site were measured by the O2C system (Figs. 2 and 3). This monitoring device allows by means of a combination of two established techniques – laser

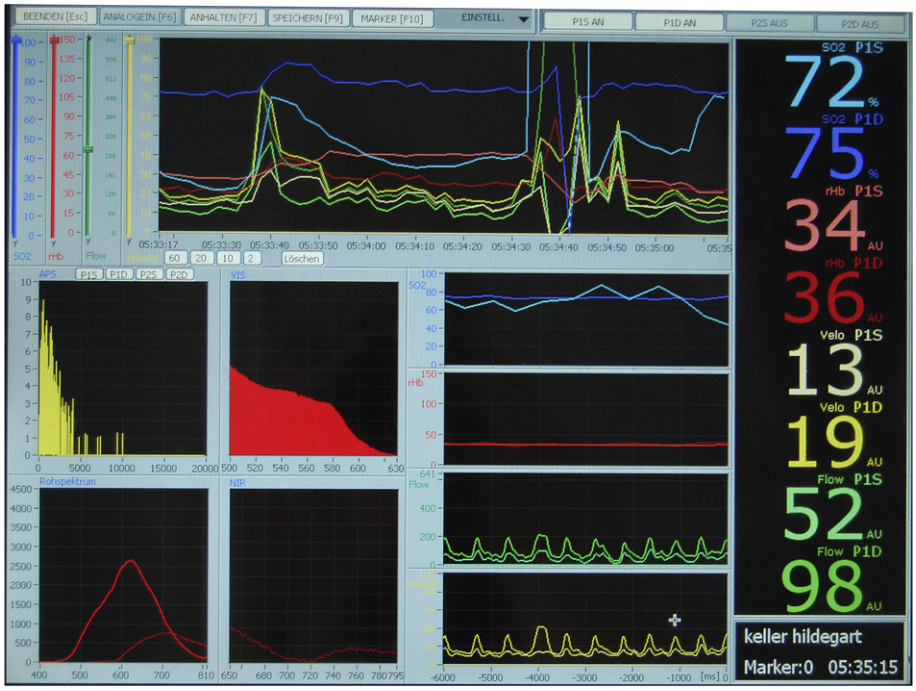

Fig. 3. O2C display shows real time measurement of perfusion and oxygenation parameters.