Journal of Pediatric Urology (2005) 1, 95—99

Journal of Pediatric Urology

Subspecialty training and surgical outcomes in children with failed bladder exstrophy closure

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Received 8 December 2004; accepted 10 January 2005

KEYWORDS
Bladder exstrophy;
Postoperative complications;
Referral and consultation

Abstract *Objectives:* Failure of initial and subsequent bladder closures has significant implications for patients with bladder exstrophy. We evaluated the association between outcomes of repeat bladder closure among patients who failed initial closure, and the credentials and training of the operating surgeons.
Materials and methods: From a bladder exstrophy database, we identified patients with a failed initial exstrophy repair. Records were evaluated with respect to success of the bladder closure (dehiscence or prolapse), number of closures required, surgeon credentials (fellowship-trained pediatric urologists (FPU) or other surgeons (OS)), post-closure bladder capacity, subsequent continence procedures, and continence outcomes.
Results: Of 101 patients whose initial bladder closure failed, 94 patients underwent repeat bladder closure, of which 65 (69%) were successful. Of repeat closures performed by FPUs, 84% (54/64) were successful, while only 37% (10/28) of repeat closures performed by OSs were successful ($P<0.0001$). Of the 65 patients whose repeat bladder closure was successful, 38 (58%) achieved bladder capacity adequate for bladder neck reconstruction (BNR), versus only 10/29 (34%) patients whose repeat closure failed ($P=0.032$). Overall, after repeat closure, 26% were completely dry after BNR, 41% were partially dry after BNR, and 33% required further reconstruction for continence.
Conclusions: Among bladder exstrophy patients who fail their initial closure, repeat closure is more successful when the surgeon is a fellowship-trained pediatric

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doi:10.1016/j.jpurol.2005.01.002

urologist, and failure of repeat closure bodes ill for long-term continence. Exstrophy outcomes may be better at centers of excellence with significant experience in the management of this rare, complex condition.

Introduction

Regardless of surgical approach, successful initial closure of the bladder is critical to the development of adequate bladder capacity and ultimate continence in patients with bladder exstrophy [1]. Failure of initial closure, and the need for subsequent re-closure, severely impacts the patient's potential for eventual continence [2]. Considering the rarity of this anomaly, and the surgical nuances involved in exstrophy reconstruction, interest has developed in the regionalization of exstrophy care as a way of improving surgical outcomes. Regionalization is based on the assumption that outcomes are better among surgeons and centers with greater experience in management of a particular condition. To determine whether surgical and subspecialty training is associated with improved outcomes in complex exstrophy cases, we reviewed the records of patients seen at our institution who had failed initial bladder repair, and compared the training level of the operating surgeon with outcomes of repeat bladder closure.

Materials and methods

With the approval of the Institutional Review Board, we reviewed a bladder exstrophy database comprising patients seen at the institution from 1975 to the present, and identified 101 patients with classic bladder exstrophy whose initial bladder closure procedure failed. Of these, 94 underwent a second closure. Failure of exstrophy closure was defined as bladder dehiscence or significant bladder prolapse. Clinical history was assessed with regard to number of bladder closures, latest bladder capacity, continence, and overall outcomes. Continence was defined as dry intervals of 3 h or more. Patients with dry intervals lasting less than 3 h were considered partially continent. Patients with successful bladder exstrophy re-closure underwent delayed bladder neck repair when adequate bladder capacity was achieved. Based on reviews of our experience with outcomes after bladder neck reconstruction (BNR), in recent years we have used a threshold of 85 cc as the minimum capacity for proceeding with surgery, both after successful primary closures as well as after successful re-closure [3]. Surgeon credentials were divided into two primary groups: fellowship-trained pediatric urologist (FPU) and all other surgeons (OS). The 'other surgeons' group was further divided into pediatric urologists without fellowship training (NFPU), general urologists (GU), pediatric general surgeons (PS), and training unknown.

Results

We identified 101 patients whose initial bladder closure failed. Of these initial closures, six (6%) were performed at our institution, while the remaining 95 (94%) were performed at other institutions. FPUs performed half of these cases ($n=51$), followed by GUs ($n=18$), NFPUs ($n=17$), PSs ($n=6$), and unknown ($n=9$).

Of these 101 patients, 94 patients had undergone a second bladder closure at the time of study, and of these 65 (69%) were considered to be successful. Success rates varied significantly depending on the training of the surgeon: 84% (54/64) of the repeat closures performed by FPUs were successful, while only 37% (10/28) of the repeat closures performed by other categories of surgeons were successful ($P<0.0001$). Two patients were operated on by surgeons with unknown credentials.

Among cases performed by non-FPU surgeons, success rates were consistently lower (Fig. 1). The largest group were operated on by general urologists, with 4/13 (31%) successful, followed by pediatric urologists without fellowship training, of which 4/12 (33%) were successful. Three repeat bladder closures were performed by pediatric general surgeons, with two successful outcomes (67%).

In the repair of bladder exstrophy, achievement of adequate bladder capacity is crucial before BNR can proceed. However, we found that patients who fail bladder closure more than once are less likely to achieve adequate bladder capacity (Table 1). Of the 65 patients whose second bladder closure was successful, 38 (58%) achieved bladder capacity adequate for BNR (mean volume 93 cc). In contrast, of the 29 patients whose second closure failed (and thus required three or more repairs), only 10 (34%) achieved adequate bladder capacity