Outcomes of Deflux® treatment for vesicoureteral reflux following pediatric transplant: a systematic review

Karla Rebullar¹, Fardod O’Kelly¹, Martin A. Koyle¹, Andrew J. Kirsch², Armando Lorenzo¹, Rusul Al-Kutbi¹, Fadi Zu’bi¹

¹Division of Urology, The Hospital for Sick Children, Toronto, ON
²Department of Pediatric Urology, Children’s Healthcare of Atlanta, Atlanta ON

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Introduction

• Post-transplant vesicoureteral reflux (VUR) in pediatric population as high as 58%\(^1\)
  • May be associated with urinary tract infection (UTI), chronic renal insufficiency, and allograft loss

• Correction of transplant VUR beneficial to patient and may prolong graft survival

Deflux®

• October 2001: US FDA approved Dextranomer/Hyaluronic acid (Deflux®) for endoscopic therapy

• Has since been used widely for VUR management
Methods

• Pubmed/Medline and Embase databases were searched from the FDA approval date of Deflux® in 2001- April 2019

• Inclusion criteria
  • Full-text English articles
  • Patients less than 18 years old at the time of transplant
  • Diagnosis of VUR post-transplantation
  • Underwent Deflux® treatment
PUBMED  
n=48

EMBASE  
n=78

Total References  
n=126

Duplicates  
n=24

n=102

Title and abstract review

n=14

References reviewed, none fit criteria

Full text review

Studies included in systematic review  
n=6
Results

- 6 eligible studies, total of 67 pediatric patients with post-transplant VUR treated with Deflux®

- Average success rate is **36.8%**

- **7/67 (10.4%)** developed ureteral obstruction (two studies)
  - Endoscopic ureteric stenting was the initial management, but was only successful in 1/7 patient (14%)
  - Open ureteral reimplantation was performed in 4/7 cases (57%), while 2/7 were managed expectantly (29%, unknown outcomes)

- **20/67 (29.8%)** patients had persistent VUR with UTI
  - 7 (35%) were managed with instituting prophylactic antibiotics, and 13 (65%) with open reimplant

- Success rates were low for reimplant after failed Deflux (40 to 50%) in comparison to redo reimplantation in transplant ureters without prior injection (70 to 80%)²,³

Conclusions

• Low success rates following injection techniques for symptomatic VUR after pediatric renal transplant

• Not an insignificant risk of obstruction

• Lower rates of success if reimplant is required after failed Deflux®

• Multi-institutional prospective study with a larger population size (study power) may further elucidate these results
<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Age (years)</th>
<th>Cause of end-stage renal disease (ESRD)</th>
<th>UNC Technique</th>
<th>Amount Injected (mL)</th>
<th>Deflux® Technique</th>
<th>Success Rate</th>
<th>Complication Rate (% Obstruction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Williams 2008</td>
<td>8</td>
<td>11.6 (7-19)</td>
<td>NR</td>
<td>NR</td>
<td>1-1.5</td>
<td>NR</td>
<td>43.5</td>
<td>0</td>
</tr>
<tr>
<td>Vemulakonda 2010</td>
<td>11</td>
<td>8 (3-16)</td>
<td>Upper tract 6/11 Lower tract 3/11 Both 1/11 Unknown 1/11</td>
<td>Lich-Gregoir</td>
<td>0.5-1.5</td>
<td>NR</td>
<td>54.5</td>
<td>0</td>
</tr>
<tr>
<td>Castagnetti 2014</td>
<td>11</td>
<td>8.3 (1.8-17.9)</td>
<td>Upper tract pathology 6/11 Lower tract pathology: Prune belly syndrome 3/11 Posterior urethral valves 2/11</td>
<td>Extravesical reimplantation</td>
<td>0.6-2</td>
<td>transplant ureteral orifice location required a dye test with i.v. injection of a vital dye in seven cases, but the orifice could be visualized and accessed using a standard pediatric cystoscope in all Injection sites were selected according to the anatomy of each case</td>
<td>63.6</td>
<td>0</td>
</tr>
<tr>
<td>Cambareri 2017*</td>
<td>17</td>
<td>6-11</td>
<td>Denys-Drash syndrome 1/4, Bilateral multicystic dysplastic kidneys and solitary multicystic dysplastic kidney 2/4 unknown upper tract pathology 1/4</td>
<td>NR</td>
<td>1.6-3</td>
<td>NR</td>
<td>NR</td>
<td>23.5</td>
</tr>
<tr>
<td>Sheth 2018</td>
<td>11</td>
<td>9.2</td>
<td>Renal inflammatory process, Congenital nephrotic syndrome, Thrombotic cortical necrosis, Cystic disease, Renal dysplasia, Reflux nephropathy, Lower urinary tract, obstruction</td>
<td>Lich-Gregoir, non-refluxing</td>
<td>NR</td>
<td>NR</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wu 2018</td>
<td>9</td>
<td>6.3 (1.5-16.3)</td>
<td>Glomerulonephritis, nephronophthisis, nephrotic syndrome, bilateral Wilms tumor, unknown (each n = 1), bilateral renal dysplasia, bilateral VUR (each n = 2)</td>
<td>Lich-Gregoir/Polita no Leadbetter</td>
<td>1-6</td>
<td>Injection at both the back wall of the ureter and circumferentially around the ureterovesical anastomosis, using the “Double HIT” technique</td>
<td>22.2</td>
<td>33.3</td>
</tr>
</tbody>
</table>

* Only looked at complications. NR = not reported