27 Construction of an artificial urinary conduit – preclinical study in a porcine model

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Introduction & Objectives: The use of ileal segment is a standard method for urinary diversion after radical cystectomy. The main disadvantage of this method is a necessity of carrying out the additionally surgical procedure and different properties of intestinal and urinary bladder tissues that lead to numerous metabolic complications. To overcome these side effects, tissue engineering methods can be utilized as an alternative treatment procedure for urinary diversion. The aim of this study was to assess the tissue-engineered conduit for urinary diversion in a porcine model.

Materials & Methods: Tissue engineered tubular scaffolds were used for construction of the artificial urinary conduits. Conduits were sterilized and implanted as an incontinent urostomy using right ureter. A 10 male pigs were operated and divided into two equal groups: in 1st Group (Control) ureterocutaneostomy were created, in 2nd Group the ureter was connected with scaffold conduit directly with the skin (the artificial conduit model). Computed tomography was used to confirm the patency of created diversions. Morphological and histological analysis was used for evaluation of diversion construction efficiency. The observation time was six months.

Results: All animals survived the experimental procedures and 6-month follow-up. The patency of ureterocutaneostomy (1st Group) was between 3 to 12 weeks compared to 18 - 22 weeks for artificial conduit (2nd Group). In the case of 2nd Group the prolapse of tissue-engineered conduit was observed between 3 and 4 weeks after surgical procedure. The remnants of the implant created a retroperitoneal post-inflammation tunnel which constitutes urostomy. Computed tomography and histological evaluation showed that the prolapse of a tissue engineered scaffold was related to the disruption of the scaffold integration process with adjacent tissues as a result of developing biomaterial infection.

Conclusions: The simultaneous urinary diversion using tissue-engineered scaffold connected directly with skin is not appropriate method for clinical application, despite appearance of post inflammation tunnel. Our results showed that there is emerging need for searching a new method solving the urinary diversion after cystectomy.

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