RABBIT MODEL FOR URETHRAL TISSUE ENGINEERING

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\textbf{A R T I C L E  I N F O}

Published: 1\textsuperscript{st} December, 2014
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\textbf{K E Y  W O R D S}

Urethral tissue engineering, Rabbit model, Synthetic graft

\textbf{A B S T R A C T}

To investigate the feasibility of using rabbit urethral model for replacement with synthetic graft. A segment of distal urethra of the rabbit was resected under general anesthesia. The resulting defect was bridged by a synthetic graft. After graft placement, the sutured ends were reinforced with Tissue glue. 21 adult white male New Zealand rabbits were operated over 7 months. Anesthesia, surgical techniques and graft handling were optimized to improve the overall outcome of the experiment. Of the operated rabbits, 17 are alive with good wound healing, the period of survival ranging from 7 months to 1 month. Rabbit urethra appears to be an appropriate model for tissue engineering experiments. The preoperative and postoperative care, intraoperative monitoring techniques will be discussed. The technical points including urethral dissection, optimizing graft suturing, graft length measurement and wound protection will be detailed.

\textbf{1.0 Introduction}

Tissue engineering is a rapidly progressing discipline in pediatric urology and many tissue engineered grafts have been used for urethral reconstruction (1). The creation of a suitable animal model for urethral replacement is essential for progress in this area (2). While urethral replacement grafts in rabbits have been used in established centers of regenerative medicine, local experience in this field is limited.

The rabbit is the largest animal in the small animal category and in comparison to rats and mice is also less aggressive and easily available (3). We describe our experience in the use of replacement grafts for rabbit urethra.

\textbf{2.0 Materials and Methods}

A segment of the distal urethra was resected in the adult male New Zealand rabbit under general anesthesia. At the beginning of the operation, a catheter was inserted through the urethra into the bladder and a 1.5 to 2 cm urethral segment, located 1.5cm proximal to the external meatus was removed to create the urethral defect. (Fig.1)

The replacement graft was placed in the defect and anastomosed to the native urethra at both ends using 6-0 Maxon. (Fig.2). After verifying a water tight anastamsosis, fibrin based tissue glue was applied to the suture sites. The skin was approximated.

\textbf{3.0 Discussion and Conclusion}

The preoperative and postoperative care, intraoperative anesthesia, monitoring techniques adopted, and the technical points in surgical repair including urethral dissection, optimizing graft suturing, graft length and wound protection are detailed as follows.
1. Intraoperative temperature, respiration and pulse monitoring are essential along with fluid replacement and use of warming devices.

2. Drug therapy includes preoperative & postoperative antibiotics and analgesics.

3. 6-0 Maxon is the preferred suture material for anastomosis with the use of 8 Fr catheters as a stent during anastomosis.

4. Postoperative stenting is not required as it is difficult to retain. (2)

5. The rabbit urethra is very thin and the plane of dissection done just superficial to the corpus cavernosum on each side, protects the urethra from damage.

6. The graft shrinkage occurs to approximately 25-30% of its original length when exposed to atmosphere and the length of the graft chosen should take this into account.

7. The amount of tissue glue applied should be just adequate to cover the anastomotic site; excessive tissue glue produces tension on skin suture and also may predispose to graft obstruction as noted in one of our cases. (2)

Acknowledgement

The research grant is provided under the University Malaya Research Grant.

References

