30 A new heterotopic vascularized model of total urinary bladder transplantation in the rat

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Introduction & Objectives: Rapid development of composite tissue allotransplantation together with a new immunosuppressive protocols can bring the breakthrough in urinary bladder transplantation. There is still a long way to use urinary bladder grafting in clinical application, that is why extensive basic research are still required to overmaster numerous technical and immunological problems. An orthotopic model of urinary bladder transplantation is characterized by high threshold mortality. Deficiency of a good animal model, small diameters of urinary bladder artery and vein stumps cause that the orthotropic urinary bladder transplantation is a very technically demanding procedure with a high risk of anastomotic and thrombotic complications. To overcome this problem we developed a new method of whole urinary bladder transplantation in a rat model. This is the first step for successful allogenic urinary bladder transplantation, especially for those patients in whom standard urinary diversion with gastrointestinal tissue is not feasible.

Materials & Methods: In the first step an anatomic study of the origin of urinary bladder vascular pedicle was performed. For this purpose the right (1st group, n=10) or left (2nd group, n=10) urinary bladder vessels were ligated and cut. Heterotopic urinary bladder isotransplatation into the right groin vessels was performed in ten animals (3rd group, n=10). The control group (4th group, n=10) was not involved in any surgical protocols. Macroscopic urinary bladder examination, microangiography and histological analysis to evaluate urinary bladder wall structure were performed. India ink injection to assess an urinary bladder viability was used. Follow-up of isografts was one month.

Results: Macroscopic analysis performed two weeks after the right urinary bladder vessels dissection revealed the complete viable urinary bladder wall. In the group with left urinary bladder vessels dissection after 2 weeks, the partial 2/3 bladder atrophy supplied by adequate, ligated left vascular pedicle was observed. This confirmed repeatable anatomic circumstances in all operated animals and disclosed that left bladder vessels, sufficiently supply the whole bladder wall instead of right vascular pedicle covering only 30% of total bladder blood supply. This result was utilized by the left vascular pedicle bladder supply transplantation model. The isograft survival rate was 8 in one month after the procedure. We lost two urinary bladder due to anastomosis failure. Rest of isografts survived one month without any complications. We observed no deterioration or loss of transitional epithelium or smooth muscle layer. The infiltration of inflammatory cells was absent in all transplanted urinary bladders.

Conclusions: This novel, promising model of urinary bladder transplantation constitute a powerful alternative for the previously published orthopic model.