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RESEARCH OF HISTOLOGIC OUTCOMES OF RABBIT AUGMENTATION CYSTOPLASTY

Hypothesis / aims of study
To explore the safety and effectiveness of the 3-D printing poly-lactactic acid patch in rabbit augmentation cystoplasty through observing the degradation and biocompatibility of the patch as well as the ingradation and regeneration of the tissue.

Study design, materials and methods
A total of 12 female New Zealand rabbits were devided into 4 groups (A, B, C, D) randomly based on the patch used (A, C with patch one and B, D with patch two) and the number of days sacrificed postoperatively (A, B, 30 days postoperatively; C, D, 90 days postoperatively). Urinary tract from pelvis to bladder were anatomized to justify the degree of adhension and upper urinary tract dilation and the formation of bladder stone. Regenerated bladder strips and the original normal bladder strips from the same bladder were obtained and then underwent histologic and immunocytochemical analyses to find out the degradation of the patch and the degree of inflammation as well as the regeneration of the the bladder mucosa, the muscle layer and the vessels.

Results
The degree of adhension in group C and D were greater than that in group A and B. The total incidence of lithiasis was 50%, and encustration (Figure1 (a)(d)) was 58.3%. Dilation of upper urinary tract were not seen in all of the rabbits. After 30 days of the operations, the sites of the patch were covered by regenerated mucosa (Figure1 (a)(b)). The number of epithelium layer in group A was much lower than that in normal bladder (0.3±0.5 vs 4.0±1.3), while in group B, the two resembled each other (1.8±1.3 vs 2.8±0.4). The inflammatory responses of the regenerated tissue in both group A and B were obvious and some of the mucosas were contracted radically. The new tiny vessels were observed and the regenerated smooth muscle cells were not well organized. After 90 days of the operations, the regenerated mucosas were smooth (Figure1 (c)(d)). The number of epithelium layer in group A and group B were similar to that in corresponding normal bladder (4.0 ± 0.8 vs 3.0 ± 0.8, 4.0 ± 0.6 vs 3.8±0.8). The inflammatory responses were much alleviated. The new vessels grew thicker and the smooth muscle cells were well organized and oriented, resembling those in the normal bladder. The regenerations of epithelium, the muscle layers and the vessels of patch one group were similar to those of patch two.

Interpretation of results
There were no dilations of the upper urinary tract or severe complication such as bladder ruptures seen in the study. The epithelium regeneration of patch one group is lower than that of patch two ($P<0.05$) after 30 days of the operations while 90 days later, patch one and two group resembled each other. The inflammatory responses were alleviated as time went by and the biocompatibility was satisfied. The regeneration of the epithelium, the smooth muscle cells and the vessels were getting normal, reaching a satisfactory histologic outcome.

Concluding message
The 3-D printing poly-lactactic acid patch was successfully applied in the augmentation cystoplaty in rabbits histogically. It can be used in rabbit augmentation cystoplaty while further researches need to been done to find out the functional outcomes.

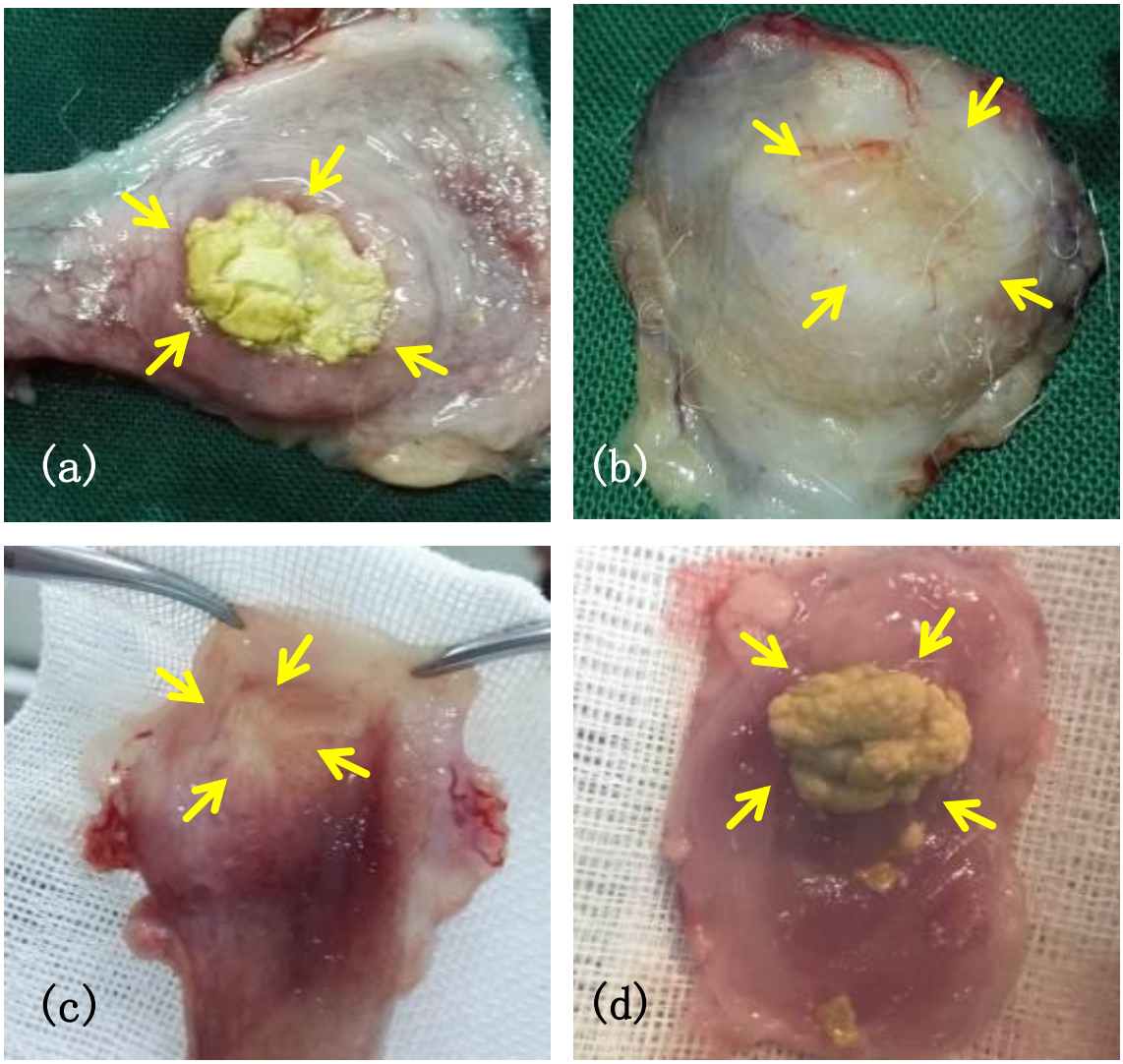

Figure 1 Inner layer and encustration of regenerative bladder

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