

基础研究

PLGA纳米可降解尿道支架的制备及力学性能

王晓庆|王春喜|侯宇川|陈岐辉|张海峰|姜凤鸣

(吉林大学第一医院泌尿外科,吉林 长春 130021)

摘要:

目的: 探讨电纺丝法制备聚乳酸-羟基乙酸共聚物(PLGA)(摩尔比80:20)可降解尿道支架的可行性, 并评价支架管的力学性能。方法: PLGA(80:20)用三氯甲烷溶解并配成3%、4%、5%和6%的溶液, 采用电纺丝技术制备纳米尿道支架, 采用扫描电镜观察各种浓度PLGA制备的纳米尿道支架的微观结构, 比较各种浓度PLGA支架的纤维直径、孔径、孔隙率及力学性能的差异。结果: 浓度为3%、4%和5%的PLGA尿道支架制备成功, 浓度为6%的PLGA因浓度过高制管失败。支架呈白色,长度4 cm,内径约 3.0 mm, 外径约4.0 mm。电镜扫描见3种浓度的PLGA支架纤维平均直径随浓度的增高而增粗, 组间比较差异有统计学意义(P<0.05)。3种浓度PLGA支架的平均孔径分别为(7±4)、(13±7)和(32±13)μm, 各组间比较差异有统计学意义(P<0.05)。3%PLGA支架的孔隙率接近79%, 4%PLGA支架的孔隙率约为85%, 而5%PLGA支架的孔隙率约为90%, 各组间比较差异有统计学意义(P<0.05)。3种浓度PLGA支架的平均断裂强度分别为(2.37±0.15)、(1.97±0.07)和(1.85±0.11)MPa, 3%PLGA支架的断裂强度显著高于浓度4%及5%PLGA支架(P<0.05), 而4%与5% 2种浓度PLGA支架的平均断裂强度比较差异无统计学意义(P>0.05)。 结论: 5%PLGA 尿道支架在孔径、孔隙率等方面可较好满足尿道组织工程支架对空间结构的要求, 虽力学性能较3%PLGA支架略差, 但可完全满足支架对力学性能的要求。

关键词: 电纺丝;聚乳酸-羟基乙酸共聚物;尿道支架;纳米结构

Preparation and mechanical properties of co-polymer poly(lactic-co-glycolic acid) |degradable tubular urethral scaffold

WANG Xiao-qing,WANG Chun-xi,HOU Yu-chuan,CHEN Qi-hui,ZHANG Hai-feng,JIANG Feng-ming

(Department of Urinary Surgery,First Hospital|Jilin University,Changchun 130021,China)

Abstract:

Abstract:Objective To discuss the feasibility of the fabrication of co-polymer poly (lactic-co-glycolic acid) (PLGA) 80 : 20 tubular urethral scaffold by electrospinning and evaluate its mechanical properties. Methods PLGA(80 : 20) was dissolved in chloroform to form solutions with concentrations varying from 3% to 6%.The electrospinning technique was used to fabricate the tubular urethral scaffolds.The morphology was investigated by scanning electron microscope. Fiber diameters,aperture,porosity and mechanical properties were compared between various concentrations of PLGA. Results PLGA urethral stents with concentrations of 3%,4% and 5% were successfully fabricated,and the concentration of 6% failed for high concentration. The scaffold was 4 cm long and with an inner diameter of 3.0 mm and an outside diameter of 4.0 mm. The fiber diameter was thicken with the increasing of the concentrations,the difference was significant between various groups(P<0.05). The average pore sizes of three concentrations of PLGA were (7±4),(13±7) and (32±13) μm,respectively,there were significant differences between various groups(P<0.05). The porosity of 3% PLGA was close to 79%,and 5% PLGA was up to 90%,there was significant difference between two groups (P<0.05). The mean stress at break of the three concentrations of PLGA was (2.37±0.15),(1.97±0.0) and (1.85±0.11)Mpa,respectively,the mean stress at break of 3% PLGA was significantly higher than those of the concentrations of 4% and 5%(P<0.05),while no difference was observed between 4% PLGA and 5% PLGA (P> 0.05). Conclusion The properties of 5% PLGA (80 : 20) urethral scaffold which fabricated by electrospinning technique can fully satisfied the demand for structure and mechanical properties of a degradable urethral scaffold.

Keywords: electrospinning;co-polymer poly (lactic-co-glycolic acid);urethral stent;nanostructure

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通讯作者: 姜凤鸣

作者简介: 王晓庆（1981-）|男|吉林省长岭县人|在读医学博士|主要从事泌尿系统组织工程材料方面的研究。

作者Email:（Tel: 0431-88782321, E-mail: jfm63@163.com）

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